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Three Chapters on Corporate Financial Decisions

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A thesis submitted to the University of Glasgow for the degree of

Doctor of Philosophy in Finance

Year of Submission: 2025

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

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Yifan Li

December 2024

To the Memory of My Grandma,

Maolan Yin

Abstract

Corporate decision-making is shaped by the interplay of internal managerial dynamics and external forces, such as globalization and climate risks. This study examines three critical dimensions of this complex environment, integrating behavioral and neoclassical perspectives to provide a comprehensive understanding of corporate policies.

First, it explores how CEOs influence corporate cash management, focusing on the transferability of cash management styles during CEO transitions. Using a dynamic partial adjustment model, the findings reveal that high-cash-style CEOs tend to increase excess cash levels in new firms, while low-cash-style CEOs adapt to existing policies. These insights highlight the conditional persistence of managerial traits and their impact on firm outcomes.

Second, the study investigates the role of global connectedness in cross-border mergers and acquisitions (M&A). By leveraging the DHL Global Connectedness Index, it demonstrates that trade breadth and information flows drive international deal activity. However, the findings also caution against potential downsides, as highly connected environments may encourage lower-quality acquisitions.

Finally, it assesses the effects of climate risks, specifically extreme heat exposure, on M&A dynamics. Firms with higher heat exposure face reduced acquisition likelihood, diminished bargaining power, and long-term underperformance, underscoring the importance of integrating climate risks into corporate finance frameworks.

This research contributes to the understanding of managerial influence, globalization, and climate finance, offering practical insights for corporate leaders, investors, and policymakers navigating today's interconnected and climate-conscious world.

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1. Introduction

Corporate finance decision-making encompasses a set of investment decisions (e.g., capital budgeting and acquisitions), financing decisions (e.g., capital structure and funding sources) and other financial policies related decisions. The decision processes operate at the intersection of internal and external factors, creating a complex environment in which firms should navigate challenges and opportunities.

Internally, the factors include ownership structure and concentration, board composition and monitoring intensity, executive incentives, organizational culture and internal capital markets, firm life-cycle (size, age, growth opportunities), and financial constraints, among others. These internal dynamics are critical, as they often translate into corporate decisions regarding investment, risk management, mergers and acquisitions (M&A), and cash policies. Among these factors, top managers' management styles play a pivotal role in shaping firm strategies and policies through their individual preferences, experiences, and leadership styles and have been raising growing interests in academia. Studies by Bertrand and Schoar (2003) highlight the persistence of managerial traits across firms, demonstrating how CEOs' distinct styles influence firm performance. Similarly, research has shown that early-life experiences, professional exposures, and risk appetites shape the way CEOs and managers approach strategic decisions (Malmendier, Tate, and Yan 2011; Dittmar and Duchin 2015). Such influences are particularly evident in areas like cash management and acquisition strategies, where CEOs' decisions reflect their management philosophy and objectives.

Externally, conditions in capital and credit markets (interest rates, risk premium, lending standards), product-market competition and demand, regulation and tax policy, labor market tightness, technological change and digital connectivity, supply-chain and

geopolitical disruptions, and environmental and climate risks all shape corporate policy choices. This thesis specifically pays attention to the impact of globalization and climate physical risks. The selection of globalization as one of our research interests have several following reasons. First, globalization has expanded firms' access to markets, resources, and technologies, but it has also increased exposure to external shocks, such as financial crises, trade disputes, and regulatory uncertainty. Second, according to DHL Global Connectedness Index report¹, the trend of globalization is steadily growing despite of the recent appearance of pandemic and geopolitical conflicts (e.g., Russia- Ukraine conflicts, Israel-Pakistan conflicts and China- US trade war), in contrast to the intuition of the appearance of regionalization or deglobalization. Likewise, the resilience of cross-border mergers and acquisitions, despite disruptions from events like the COVID-19 pandemic and geopolitical tensions, underscores the critical role of globalization in shaping corporate strategies. Studies such as Rossi and Volpin (2004) and Erel, Liao, and Weisbach (2012) emphasize the importance of governance quality, cultural alignment, and macroeconomic stability in facilitating cross-border deals, highlighting the interconnected nature of global finance. At the same time, firms face growing pressures from environmental risks, particularly those arising from climate change. Physical climate risks, such as extreme heat and severe weather events, increasingly influence corporate decisions, from capital allocation to risk management (Colacito, Hoffmann, and Phan 2019; Hsiang et al. 2017). The intensifying effects of these risks necessitate a reevaluation of traditional corporate finance frameworks to incorporate environmental considerations and long-term sustainability goals.

This thesis builds on both behavioral and neoclassical perspectives in corporate finance to address three critical dimensions of decision-making within this complex

¹ See <https://www.dhl.com/global-en/delivered/global-trade/global-connectedness-index.html>

landscape. The first empirical chapter focuses on the influence of CEOs' managerial styles on corporate cash policies, particularly during CEO transitions across firms. This area of research extends the behavioral finance literature by exploring how individual managerial traits shape firm-level outcomes and how these traits are selectively transferred in new organizational contexts. The second empirical chapter examines the role of global connectedness in cross-border M&A activity, providing insights into how trade, information, and governance asymmetries influence the volume and quality of international transactions. By leveraging the DHL Global Connectedness Index, this study situates cross-border M&A within the broader framework of globalization, offering a novel perspective on the mechanisms driving international economic integration. The third empirical chapter addresses the financial impact of climate risks, focusing on how heat exposure affects corporate acquisition decisions, market efficiency, and post-merger performance. By integrating insights from climate finance, this study contributes to the understanding of how firms adapt to environmental challenges in their strategic decisions. Collectively, these empirical chapters offer a comprehensive framework for analyzing the interplay between internal leadership, global integration, and environmental risks in shaping corporate policies.

The role of top executives in shaping corporate policies has long been a central focus in the field of corporate finance. CEOs, as the primary decision-makers, exert substantial influence on a firm's strategic and operational choices, with their individual management styles often leaving lasting imprints on firm outcomes. Research by Bertrand and Schoar (2003) first documented that managerial styles are persistent across firms and significantly affect corporate policies such as investment, financing, and cash management. Subsequent studies have corroborated these findings, showing that CEO characteristics—including traits, preferences, and early-life experiences—shape their decisions, thereby influencing firm performance (Malmendier and Nagel 2011; Bernile, Bhagwat, and Rau 2017).

Despite this extensive body of work, the question of whether and how mobile CEOs transfer their management styles across firms remains an open and underexplored area.

This chapter focuses on a specific aspect of CEO influence: the transferability of cash management styles. Cash management, particularly the handling of excess cash reserves, is a critical area where managerial discretion plays a dominant role. Excess cash—defined as cash held beyond the firm’s operational and investment needs—is subject to competing managerial motivations. On one hand, conservative managers may accumulate cash reserves as a buffer against uncertainty, adhering to a “play it safe” strategy. On the other hand, some managers may deplete excess cash to pursue personal or opportunistic interests, potentially misaligning with shareholder value (Dittmar and Mahrt-Smith 2007). Understanding whether incoming CEOs bring their cash management tendencies into new firms—and under what conditions these tendencies manifest—is essential for decoding the broader dynamics of managerial influence and its limitations.

Building on the foundation of Bertrand and Schoar (2003), this study examines whether incoming CEOs selectively transfer their cash management styles to successor firms during horizontal job transitions. Using data from the ExecuComp database spanning 1992 to 2021, this chapter identifies cases of CEO mobility and constructs a proxy for cash management style, the average excess cash (XCash) of the CEO’s prior firm. This proxy captures the proportion of cash reserves most subject to managerial discretion, providing a window into the CEO’s cash management tendencies.

Unlike prior studies that primarily focus on cash levels post-succession, this research adopts a dynamic approach, analyzing changes in excess cash levels before and after the CEO’s arrival. By doing so, it isolates the influence of the CEO’s style from preexisting firm policies. The findings reveal that CEOs with a higher cash management style

consistently increase excess cash levels in the successor firm, while those with a lower cash management style show no significant changes. This selective transfer underscores a conditional persistence of managerial traits, suggesting that high-cash-style CEOs prioritize building cash reserves even in new environments, whereas low-cash-style CEOs tend to adapt to the existing policies of the successor firm.

To further understand the dynamics of cash management style transfer, the study constructs a dynamic partial adjustment model to analyze the speed of adjustment (SOA) toward target cash levels. The results indicate that CEOs actively adjust cash levels toward their perceived optimal level, with SOA estimates ranging from 0.47 to 0.78. These values, translated into half-life measures, reveal that CEOs typically take between 0.47 and 1.14 years to close half the gap between current and target excess cash levels. Importantly, the adjustment is more pronounced when the actual cash level is below the target, suggesting that CEOs are more active in addressing cash deficiencies than surpluses. This finding aligns with the notion that excess cash is at the discretion of CEOs, reflecting their strategic priorities and risk preferences.

The study employs rigorous empirical methods to ensure the validity of its findings. A combination of propensity score matching (PSM) and difference-in-differences (DiD) methodologies addresses endogeneity concerns, accounting for unobservable heterogeneity at the firm level and selection biases in CEO transitions. Parallel trend tests and placebo analyses further corroborate the causal relationship between CEO mobility and cash management changes. For instance, a counterfactual test using fictitious succession dates confirms that the observed changes are attributable to the incoming CEO's influence rather than pre-existing firm trends.

Robustness checks provide additional support for the study's conclusions. Alternative measures of excess cash, such as deviations from industry group means DeAngelo, DeAngelo, and Stulz (2010), yield consistent results. Furthermore, the study addresses potential biases from staggered DiD designs by adopting the heterogeneous DiD methodology proposed by De Chaisemartin and D'Haultfoeuille (2020). These methodological refinements ensure that the findings are not artifacts of model specification or data limitations.

The contributions of this chapter are multifaceted and can be categorized into three key areas. First, it significantly enhances the understanding of managerial influence by demonstrating that the transfer of CEO styles is not uniform but conditional, thereby challenging the prevailing assumption of consistent style persistence across firms. Specifically, the findings reveal that only CEOs characterized by high-cash styles actively impose their preferences on successor firms, while others do not exhibit the same degree of influence. This nuanced perspective contributes to a more sophisticated understanding of the adaptability and context-dependence of managerial traits. By doing so, the study broadens the conceptualization of how managerial characteristics interact with organizational contexts, offering a fresh lens through which to examine leadership dynamics and firm behavior.

Second, the chapter makes a substantial contribution to the literature on cash management by elucidating the dynamic nature of excess cash adjustment. It sheds light on the factors that drive the observed heterogeneity in how firms manage and adjust their cash reserves. This focus on variability rather than uniformity underscores the complexity of financial decision-making processes and highlights the role of both external pressures and internal managerial preferences in shaping corporate cash strategies. The study provides empirical evidence that deepens our understanding of the interplay between

managerial discretion, firm-level characteristics, and broader market conditions in influencing cash management practices.

Finally, the study offers actionable insights with practical implications for corporate boards, investors, and other stakeholders. The findings emphasize the importance of understanding the selective transfer of CEO styles, which has direct implications for succession planning and corporate governance. Boards of directors can leverage these insights to align managerial tendencies with firm objectives, ensuring that leadership transitions are strategically managed to support long-term organizational goals. Similarly, investors can benefit from recognizing the variability in CEO influence, allowing them to make more informed decisions regarding firm valuation and risk assessment in the context of leadership changes.

In summary, the first chapter makes a robust contribution to the academic discourse on managerial influence, cash management, and corporate governance by integrating theoretical advancements with practical relevance. It underscores the importance of considering conditionality and heterogeneity in managerial and financial behaviors, offering a comprehensive framework for analyzing the intricate dynamics at the intersection of leadership and organizational outcomes.

In conclusion, the first chapter sheds light on the interplay between managerial discretion and corporate cash policies in the context of CEO mobility. By demonstrating that cash management styles are selectively and conservatively transferred, it enriches the broader discourse on managerial influence in corporate finance. These findings not only bridge gaps in existing research but also provide actionable guidance for stakeholders seeking to navigate the complexities of leadership transitions.

Globalization has significantly transformed the corporate landscape, creating unprecedented opportunities for international expansion through mechanisms such as cross-border mergers and acquisitions (M&A). Despite recent geopolitical upheavals—including the COVID-19 pandemic, the Russia-Ukraine war, and the Israeli–Palestinian conflict—globalization remains resilient. The 2024 DHL Global Connectedness Report underscores this trend, revealing no signs of reversal in global integration. Cross-border M&A activities reflect this momentum, constituting over 30% of total M&A deals, with 9,100 transactions reported in 2022. These deals are vital for firms seeking market expansion, diversification, and competitive advantage. While existing research has examined the influence of cultural, legal, and economic factors on cross-border M&A, limited attention has been paid to the overarching role of a country’s global connectedness. This chapter addresses this gap by investigating how a country’s level of global connectedness influences its cross-border acquisition activities.

This study seeks to broaden the understanding of globalization’s impact on cross-border M&A by leveraging the DHL Global Connectedness Index (GCI), a comprehensive measure of a country’s integration into global networks. The GCI encompasses four key pillars—trade, information, people, and capital—evaluated across two dimensions: depth, which measures the intensity of international flows relative to domestic activity, and breadth, which assesses the geographic dispersion of these flows. By examining both aggregate and pillar-level effects, the chapter identifies specific aspects of global connectedness that drive cross-border acquisitions.

The analysis employs a dataset spanning 48 countries from 2002 to 2021, combining M&A transaction data from the Securities Data Company (SDC) Platinum database with GCI scores. The empirical strategy incorporates country-year-level and country-pair-level analyses to assess the impact of global connectedness on cross-border M&A activity. The

country-year-level analysis evaluates the aggregate number of inbound and outbound deals, while the country-pair-level analysis employs a gravity model to examine bilateral M&A flows. This dual approach provides a nuanced understanding of how global connectedness shapes international deal-making patterns.

The findings reveal that global connectedness, as measured by the GCI, is positively associated with the volume of cross-border M&A deals. This relationship holds even after controlling for macroeconomic factors such as GDP, trade-to-GDP ratios, and financial market size. At the pillar level, trade and information flows emerge as the most significant drivers of cross-border M&A activity. Trade connectedness, particularly its breadth dimension, underscores the importance of geographically dispersed trade networks in facilitating cross-border acquisitions. Information connectedness, encompassing internet and telecommunications infrastructure, highlights the role of reducing information asymmetry between countries in promoting international transactions. Interestingly, the analysis finds no significant relationship between people flows, such as tourism, and M&A activity, aligning with prior studies that downplay the direct economic impact of international travel. Capital connectedness also exhibits a positive relationship with cross-border M&A, reinforcing the critical role of financial integration in facilitating international deal-making.

The country-pair-level analysis confirms these findings, demonstrating that higher bilateral connectedness between two countries correlates with increased cross-border deal activity. To address potential endogeneity concerns, the study employs an instrumental variable (IV) approach, drawing on the “common friends” methodology proposed by Jochmans and Verardi (2019). This approach leverages the average connectedness of each country with third-party countries to isolate exogenous variation in bilateral connectedness. The IV estimation results affirm the robustness of the positive relationship between GCI

and cross-border M&A, alleviating concerns about omitted variable bias and reverse causality.

Robustness checks reinforce the study's validity. Excluding U.S.-centric deals, which constitute 20% of the sample, ensures results are not skewed by the dominance of U.S. financial markets. Alternative econometric methods, such as Poisson Pseudo Maximum Likelihood (PPML), address potential biases from log-linearized models. Controlling for economic outlook changes, the study finds no significant relationship between global connectedness (GCI) and domestic acquisitions, confirming that the effects are specific to cross-border deals. The study also examines cross-border deal quality, highlighting potential drawbacks of increased global connectedness. Consistent with empire-building theory (Jensen 1986), higher bilateral connectedness correlates with lower-quality acquisitions, marked by reduced combined cumulative abnormal returns (CAR) and higher premiums. Targets gain through higher CARs and premiums, while acquirers face lower CARs, indicating value transfer rather than synergy creation. However, no evidence suggests that global connectedness affects long-term post-merger performance, implying efficient market pricing of these transactions.

The implications of these findings are far-reaching. By highlighting the critical role of trade and information globalization in driving cross-border M&A, the study contributes to the broader literature on globalization and corporate strategy. It underscores the importance of breadth in international flows, emphasizing the benefits of expanding geographic networks for fostering economic integration. At the same time, the evidence of empire-building behavior cautions against the uncritical pursuit of international acquisitions, particularly in highly connected environments.

This chapter provides meaningful contributions to two critical areas of finance research, addressing both theoretical and practical dimensions.

First, it deepens the understanding of how globalization influences corporate decision-making by bridging the gap between micro-level corporate strategies and macro-level indicators of global connectedness. By analyzing the interplay between firm-specific actions and broader globalization trends, the chapter sheds light on the mechanisms through which global integration impacts strategic decisions. This contribution highlights the importance of aligning corporate policies with the evolving contours of globalization, offering a more holistic perspective on how firms can leverage global opportunities while mitigating associated risks.

Second, it enhances the literature on cross-border mergers and acquisitions (M&A) determinants by introducing and incorporating under explored dimensions of globalization. Specifically, the study emphasizes the role of information flows, trade breadth, and other novel aspects of global connectedness that have received limited attention in prior research. These dimensions provide a richer and more nuanced understanding of the factors driving cross-border M&A activity, moving beyond traditional economic and financial variables to account for the increasingly multifaceted nature of globalization. This approach not only fills a critical gap in the literature but also sets the stage for future research to explore the intricate linkages between globalization and corporate expansion strategies.

Additionally, these findings carry significant implications for policymakers and corporate leaders navigating the complexities of global markets in an era of sustained globalization. Policymakers can draw on the insights provided to design frameworks that facilitate seamless cross-border investments while safeguarding domestic economic interests. Similarly, corporate leaders can utilize these findings to refine their international

strategies, ensuring alignment with global trends and optimizing the benefits of interconnected markets.

In sum, this chapter contributes a robust theoretical and practical framework for understanding the dynamic relationship between globalization and corporate finance, enriching both academic discourse and decision-making processes in an increasingly interconnected world.

In summary, this chapter demonstrates that global connectedness plays a pivotal role in shaping cross-border M&A activity, influencing both the volume and quality of deals. By integrating insights from macroeconomic globalization trends with firm-level corporate strategies, it offers a comprehensive perspective on the dynamics of international acquisitions. These findings contribute to a deeper understanding of the mechanisms through which globalization drives economic integration and corporate value creation, while also highlighting potential pitfalls associated with empire-building tendencies in highly connected environments.

The escalating consequences of climate change have positioned environmental risks at the forefront of corporate decision-making. Among these risks, extreme heat exposure—a pervasive and intensifying form of physical climate risk—has profound implications for firms and investors alike. According to the 2023 Task Force on Climate-related Financial Disclosures report, global economic losses due to natural disasters reached \$284 billion in 2022, underscoring the urgency of addressing climate-related vulnerabilities. While a burgeoning body of literature has explored the economic consequences of climate risks, the specific impact of heat exposure on corporate investment decisions, particularly in the context of mergers and acquisitions (M&A), remains insufficiently understood. This chapter seeks to bridge this gap by examining how

firm-level heat exposure influences acquisition likelihood, bargaining power, and post-merger performance.

The integration of climate risk into corporate strategy is becoming increasingly essential as firms and investors grapple with the financial and operational repercussions of environmental changes. Extreme heat, a frequent manifestation of climate change, poses unique challenges by exacerbating operational costs, reducing productivity, and amplifying uncertainty. For acquiring firms, these risks may alter the perceived value of potential targets and influence post-merger outcomes. By investigating the relationship between heat exposure and M&A decisions, this study contributes to the broader discourse on climate risks in corporate finance and provides actionable insights for stakeholders navigating a warming world.

The third chapter addresses three interconnected research questions: how firm specific heat exposure influences the likelihood of being acquired, what impact heat exposure has on target firms' bargaining power as reflected in takeover premiums, and how heat exposure affects post-merger outcomes, including short- and long-term market performance and operational adjustments. By answering these questions, the chapter contributes to three streams of literature. First, it enhances the understanding of physical climate risks in corporate finance by focusing on heat exposure, a relatively underexplored dimension of climate risk. Second, it extends the literature on the determinants of M&A activities by introducing heat exposure as a novel factor influencing acquisition dynamics. Third, it contributes to debates on the efficiency of climate risk pricing in financial markets, providing evidence of how investors respond to heat risks in both the short and long term.

The empirical analysis draws on a comprehensive dataset of over 8,000 U.S. publicly traded firms merged with domestic M&A transaction information from January 1, 2000, to December 31, 2023. The study leverages firm-level location data and temperature records from the ERA5 global temperature reanalysis dataset to construct precise measures of heat exposure. This granular approach enables an accurate assessment of the percentage of “hot days” firms experience annually, defined using two complementary thresholds: an absolute threshold, where days with maximum temperatures exceeding 30°C are counted as “hot days,” and a relative threshold, which identifies days exceeding both 30°C and the 90th percentile of historical daily maximum temperatures for a given location. The use of dual thresholds addresses concerns about heterogeneity in firms’ geographic and operational contexts, ensuring robustness in heat risk measurement.

The third chapter employs a series of econometric models to explore the effects of heat exposure on M&A dynamics. To estimate the likelihood of being acquired, probit and linear probability models are used, with firm-level controls and industry- and year-fixed effects incorporated to account for macroeconomic cycles and sectoral patterns. The relationship between heat exposure and takeover premiums is analyzed using regression models that control for deal-specific factors and firm characteristics. For post-merger performance, short-term effects are assessed through five-day cumulative abnormal returns (CAR), while long-term impacts are examined via two-year buy-and-hold abnormal returns (BHAR). Operational impacts are evaluated through changes in industry-adjusted selling, general, and administrative expenses (SGA) and return on assets (ROA). To mitigate endogeneity concerns, the analysis incorporates lagged heat exposure measures for one, two, and three years and controls for potential correlations with cold days. The robustness of findings is further validated through permutation tests, alternative temperature thresholds, and exclusions of systematic shocks such as the financial crisis and the COVID-19 pandemic.

The third chapter finds that firms with higher heat exposure are less likely to be acquired, with a one-standard-deviation increase in hot days associated with an 11.16% decline in acquisition likelihood. This suggests that heat risks diminish firms' attractiveness to potential acquirers, likely due to anticipated operational challenges and valuation uncertainties. Firms with elevated heat exposure also exhibit reduced bargaining power during M&A negotiations, as reflected in lower takeover premiums. The analysis further reveals inefficiencies in market responses to heat risks; short-term market reactions, as measured by cumulative abnormal returns, are insignificant, indicating that investors do not fully account for heat risks during acquisition announcements. However, long-term performance, as measured by buy-and-hold abnormal returns, is negatively affected, consistent with the notion that capital markets under-react to climate risks initially but adjust over time. Post-merger operational impacts are limited, with only slight increases in SGA expenses observed, while return on assets remains unaffected, suggesting that acquiring firms anticipate and manage these risks effectively.

The robustness of these findings is confirmed through multiple approaches. Permutation tests, where heat exposure is randomly reassigned within different levels, consistently replicate the results, indicating that the findings are not artifacts of chance. By excluding years associated with systematic shocks such as the financial crisis and the COVID-19 pandemic, the analysis ensures that the results are not driven by external economic disruptions. Alternative definitions of heat exposure, including absolute and percentile-based thresholds, further validate the conclusions, demonstrating consistency across varying methodologies.

The implications of these findings are far-reaching, extending beyond the confines of academic research to influence corporate strategy, investment decision-making, and climate policy development.

For firms, the results emphasize the critical importance of proactively managing heat risks to enhance their attractiveness to potential acquirers. Addressing these risks not only mitigates adverse impacts on valuation but also signals resilience and forward-thinking leadership to stakeholders. Firms that effectively integrate climate adaptation measures into their operations are better positioned to sustain competitive advantage and secure favorable outcomes in the M&A market. This strategic focus on climate resilience underscores the growing necessity of embedding environmental considerations into long-term corporate planning.

For investors, the study reveals inefficiencies in market responses to heat-related risks, underscoring the urgent need for more sophisticated climate risk assessments and their systematic integration into investment strategies. The findings highlight the limitations of existing tools in capturing the nuances of physical climate risks and their financial implications, calling for the development of innovative frameworks to improve risk-adjusted decision-making. By recognizing the materiality of heat exposure in corporate valuation and performance, investors can better align their portfolios with both risk mitigation objectives and sustainable investment principles.

For policymakers, the insights offered by this chapter provide a foundation for designing targeted incentives that encourage firms to adopt climate adaptation measures. Such incentives could include tax benefits, subsidies, or regulatory frameworks that promote investments in climate-resilient infrastructure and operations. By supporting corporate efforts to adapt to rising temperatures, policymakers can enhance economic resilience, protect jobs, and ensure stable growth in the face of escalating climate challenges. These measures also serve as a signal to markets, reinforcing the importance of climate considerations in shaping the economic landscape of the future.

By investigating the intersection of heat exposure, corporate acquisitions, and post-merger performance, this chapter makes a novel contribution to the understanding of how physical climate risks intersect with corporate finance. It underscores the importance of incorporating these risks into M&A strategies and highlights the broader economic and financial implications of a warming planet. Furthermore, the findings engage with ongoing debates about the efficiency of climate risk pricing, shedding light on gaps in current methodologies and offering a call to action for both scholars and practitioners.

In addition to advancing academic discourse, these findings have significant practical implications. They equip firms with actionable insights to better manage climate risks, guide investors toward more resilient and informed strategies, and inform policymakers in crafting effective interventions. By integrating these perspectives, this chapter provides a comprehensive framework for understanding and addressing the complex challenges posed by climate change in the realm of corporate finance. It not only enriches the literature on climate risk and M&A activity but also sets a robust agenda for future research and practical applications in navigating the economic realities of a warming world.

The remainder of this thesis is organized as follows: The first empirical chapter investigates how CEOs transfer their management style between firms. The second empirical chapter explores the role of global connectedness in the cross-border acquisition market. The third empirical chapter examines how climate physical risks affect the target firms' attractiveness in the acquisition market. The last chapter provides the concluding remarks, main conclusions of the three chapters, contributions on corporate financial decision making and suggestions on future studies.

**The first empirical chapter: Prepare for landing?
Transfer of CEO cash management style**

2.1 Introduction

Do incoming CEOs' management style affect firm's cash policies? CEOs' management style matters in various perspectives in corporate policies and affects firms' performance (e.g., Bertrand and Schoar (2003); Malmendier, Tate, and Yan (2011); Bernile, Bhagwat, and Rau (2017)). Previous studies have examined the impact of CEO management style transformation between firms. For instance, Bertrand and Schoar (2003) first document that managers possess management styles in various firm policies, and management styles are persistent across firms. Besides, Graham, Harvey, and Puri (2013) also show that compensation fixed effects are significantly correlated with management styles by exploring manager mobility sample. A recent work by Rau, Wu, and Jeong (2023) uses exogenous CEO turnover events to prove the causal effects of Superfund polluted CEOs and firms' outcomes. However, do mobile CEOs always transfer their management styles across different firms? While previous research has explored the CEO management style transfer issue, the specific question of whether and how mobile CEOs selectively transfer their management style remains less understood. This study aims to explore if mobile CEOs selectively transfer their cash management style towards a specific direction.

To explore the selective issue of CEO cash management style transfer, we collect CEO-firm match data from 1992 Q1 to 2021 Q4 from the ExecuComp database to identify CEO horizontal job change. To proxy the CEO cash management style, we calculated the average excess cash (XCash) of the first firm while the CEO held the position following Bertrand and Schoar (2003). The excess cash captures cash reserves held after considering operation and investment, and this proportion of cash is at most manager's discretion (Dittmar and Mahrt-Smith 2007). A stylized CEO may build excess cash reserve to "play it safe" or may waste the excess cash to meet their own interest.

We begin by testing whether CEO transfer their cash management style from a general perspective. We investigate the changes on average XCash of the second firm around the succession using cross-sectional analysis. Instead of focusing on the postsuccession cash level like Bertrand and Schoar (2003), we specifically look into the changes of cash level before and after the succession to identify the effect of transfer. This allows us to account for cases where the mobile CEO is hired by a second firm that has a similar cash level to the first firm. Similar to previous studies, we find that CEOs previous management style can positively explain the cash level changes for the second firm. Furthermore, by employing panel data, we find the consistent result that higher cash management style of the successor significantly leads to a higher change in excess cash.

We then look into whether those CEOs selectively transfer their cash management style in the horizontal job changes, depending on their prior cash management style. Since most mobile CEOs change jobs only once, the second firm they join is often the last place where they hold a management role in their careers. From the perspective of “playing it safe”, CEOs with higher cash management style will increase the excess cash of the second firm to get the “safe zone”, while CEOs with lower cash management style will be satisfied with the current higher cash level and do not actively decrease the cash level of the second firm. By dividing the sample into two groups by high and low cash style, we found that there is no significant change in excess cash level around succession for the lower cash style successor, while the higher cash style successor improves the cash level of the second firm. It implies that mobile CEOs tend to exhibit a relatively conservative cash style.

To offer further insight into the cash management style transfer, we construct a dynamic partial adjustment model to look into the speed of adjustment (SOA). Exploring the SOA can show us how actively the mobile CEO adjust the cash level. To start with,

from a dynamic perspective, the findings above implies that CEOs should actively adjust the excess cash level towards their perceived excess cash level. Consistency with previous study (Dittmar and Mahrt-Smith 2007) , we find evidence that CEOs actively adjust cash level to our constructed target level with estimated SOAs lie between 0.47 to 0.78. To deliver economics intuition, the estimated SOAs are translated to half-life, which shows the time needed to adjust one-half the distance toward the target ratio responding to one-unit shock to the residual. The half-life estimated ranges from 0.47 years to 1.14 years. Compared to the half-life estimated for the total cash ratio by Dittmar and Duchin (2010), our results suggest that CEOs more actively adjust the estimated excess proportion of cash, which is in line with the argument that the excess cash is at most CEOs' discretion.

We find further evidence of the heterogenous cash style transfer by exploring the differences in adjustment activeness. Specifically, CEOs more actively adjust the cash level after succession when the actual cash level is below their perceived cash level, compared to the period when the actual cash level is higher than the perceived cash level. The SOA when cash deficiency to the perceived cash level is higher than the cash surplus period by around 0.303. Translated to the half-life, the cash deficiency period has a half-life of around 0.47 years compared to a half-life of 1.14 for the cash surplus period.

To alleviate endogeneity concerns, we first adopt a propensity score matching and difference in difference (PSM-DiD) methods to rule out endogenous issues caused by unobservable heterogeneity at the firm level (Girma, Greenaway, and Kneller 2004) and to avoid the potential selection bias of the succeeded CEOs. Following that, parallel trend test and dynamic event study figures are provided. Considering a firm pursuing a specific cash policy may reversely select a successor with a matched management style and these firms may adopt such policy before the succession, we adopt a placebo test by manually setting the counterfactual succession time at three years before the actual succession year

and re-estimate the DiD model. We find that the changes in cash policy is due to CEOs' management transfer rather than firms' actions before the succession.

For robustness, we perform several additional tests. To start with, since it might be hard to explain the changes in excess cash, which is calculated by residual term, and suggesting that the error term can be explained by other variables that may challenge the optimal cash function, we use an alternative measurement of XCash by using the actual cash minus the group mean of cash of the comparable firms, following H. DeAngelo, L. DeAngelo, and Stulz (2010). Further, due to the potential bias from the traditional staggered DiD methods, we repeat our DiD tests by using heterogenous DiD method suggested by De Chaisemartin and D'Haultfœuille (2020). All results above are persistence with our main and heterogenous results.

This study contributes to the ongoing literature by showing that successor CEOs selectively and conservatively transfer their cash management style toward an upward direction. Specifically, we find that only CEOs with a relatively higher cash management style actively transfer their preferences to the second firm, leading to more proactive cash policy adjustments. In contrast, CEOs with a lower cash management style tend to adopt the existing cash policies of the second firm, rather than imposing their own style. Our findings reveal that the persistence of management style is conditional, particularly in the horizontal change for CEOs. This insight challenges the previous studies of uniform style transfer across firms.

The rest of the paper is organized as follows. Section 2.2 presents the literature review and the hypotheses development. Section 2.3 discusses the estimation strategy of the baseline analysis, data collection, and the construction of the sample. Section 2.4 presents the empirical results and Section 2.5 concludes this study.

2.2 Literature review

This section provides comprehensive literature review on CEO management style, CEO turnover and mobility, cash holdings and dynamic financial policy.

2.2.1 Management style

Bertrand and Schoar (2003) first document that managers possess management style in various firm policies and managers actively transfer the management style across firm in the succession settings. Following their study, a large number of studies focus on the determinants of CEOs' management style and the relevant effect. In this section, we document a comprehensive literature review on the relation between CEOs' experience and traits and the management style.

2.2.1.1 CEO experience and management style

There are plenty of studies that focus on how CEO early-life experience or traits affect their decision-making (e.g., Malmendier and Nagel (2011), Bernile, Bhagwat, and Rau (2017), and Yonker (2017)). For example, Malmendier, Tate, and Yan (2011) found that overconfident CEOs use less external finance and issue less equity, leading to higher leverage compared to others. They also documented that CEOs who grew up in the Great Depression period are reluctant to borrow debt, while CEOs with military experience prefer aggressive policies. Similarly, Bernile, Bhagwat, and Rau (2017) suggested an inverse-U shaped relation between CEOs' early life experience of disaster and the risk of their financial policies. In their studies, they exclude professional experience in which the

manager was a CEO to mitigate the concern that the CEO is selected based on her experience in managing troubled firms. Feng and Johansson (2018) focus on the impact of the Great Chinese Famine, as one exogenous event, on board chairs' behavior. They documented that firms managed by board chairs who experienced famine during their younger years exhibit more conservative financial, investment and cash-holding decisions and are less likely to engage in unethical behaviour. Meanwhile, they find a linear causal relation between the severity of the famine that the chairs have experienced and managerial decisions. Regarding performance, the firm managed by board chairs who experienced the famine performs significantly better than peer firms during economic downturns and the power of board chairs also drives the effect. Taken together, these studies demonstrate that formative shocks in early life can have a persistent imprint on CEOs' financial decision-making, including policies directly related to liquidity and cash use.

Beside the early-life experience, previous studies also suggest how macroeconomic environment related experiences shape the CEO's management style. Malmendier and Nagel (2011) document the impact of macroeconomic experience affect risk-taking behavior using the survey data from 1960 to 2007. They suggest that individuals who have experienced high stock market returns report higher tolerance of financial risk, are more likely to participate in the stock market and allocate a higher proportion of their liquid assets to stock. On the contrary, investors with low bond return experience are less likely to hold bonds. They also examined the recency law in their study. Specifically, individuals put more weight on recent returns than on more distant realization, but experience many years ago still has some impact on current risk taking. Schoar and Zuo (2017) discussed how the macroeconomic environment shapes CEOs' career and management style. They find that managers who start their career life in the recession period become CEOs more quickly in smaller firms. And they are more conservative when making decisions, such as

keeping low investment, R&D, leverage and working capital and cutting more costs. These results again highlight that managers' personal experiences shape their tolerance for financial risk, which may translate into systematic differences in how they manage firm cash and liquidity buffers.

Regarding professional-related experience, Dittmar and Duchin (2015) find that CEOs with financial distressed experience tend to avoid risk in their policies. In contrast to the studies discussed above, the results indicate that ongoing professional experiences - their timing, frequency, and saliency - are key determinants of managers' style. McDonald, Westphal, and Graebner (2008) suggest that outside directors with a specific kind of acquisition experience will bring their expertise into the focal firm (measured by the improvement of stock return. Matemilola et al. (2018) find that top managers' total years of working are positively related to the firms' capital structure. But the application of their paper might be limited as they use Malaysia data. The gap between their study and previous literature is that the significant event they focus on does not happen in a manager's early life. Thus, unlike the life-long impact of early-life experience, the impact of such experience is decreasing over time (recency law). Malmendier and Tate (2009) explore the impact of award on the CEO's management style. Specifically, they suggest that firm performance declines following CEO awards. One reason is winning CEOs extract higher compensation, largely in the form of stock and options. Besides, award winners also indulge in tasks that provide private benefits but little firm value (writing books, sitting on outside boards, playing golf), and they increasingly engage in earnings management. Unlike early-life experiences, these effects often decay over time, but they still suggest that managers' accumulated professional exposure affects the way they approach core financial policies, including cash management.

There are also a large number of studies on CEO-specific professional experience in their corporate decision and performance. For example, Hu and Liu (2015) explored the impact of diversified career experience on CEOs' behavior. They find that CEO with more diverse career experience tends to maintain a low investment-cash sensitivity and actively seek outside financing like bank loans and trade credit. Besides, they also find that diversified professional experience provides CEOs with more social connections, which decrease financial constraints and help the firm to get external debt fund.

Another important factor that will affect a CEO's behavior is the incentives the payments. For example, Hall and Liebman (1998) and Jensen and Murphy (1990) and explored the impact of the sensitivity of CEO compensation to the stock price (Delta). This compensation design aligns with the benefit of managers and shareholders. Moreover, Coles, Daniel, and Naveen (2006) first provide evidence that CEO compensation sensitivity to the volatility of the firm's stock (Vega), is positively related to the riskiness of both investment policies (more R&D investment, less PPE investment, more concentrative investment) and financial policies (higher leverage). Cai and Vihh (2007) find that CEOs provided with a higher market value of option holdings have greater acquisitiveness, while CEOs with a higher illiquidity discount are more likely to get their firms acquired.

2.2.1.2 CEO traits and management style

For CEO traits, Zhao, Niu, and Chen (2022) find that CEOs with a high-level risk preference are willing to accept a higher value of goodwill. This positive correlation is more significant in non-state-owned or lower ownership concentration companies, and firms within a suitable debt capacity. Graham, Harvey, and Puri (2013) find more straightforward evidence on traits by arguing that US CEOs possess different underlying

attitudes from non-US CEOs. Besides, they also argue that CEOs are significantly more optimistic and risk-tolerant than the lay population and traits like this affect corporate financial policies and their compensation. Cao and Mauer (2010) find the empirical evidence that CEO turnover is highly related to the firm's debt policy changes (from zero debt to leveraged or from leveraged to zero debt). Similar to our findings on excess cash holdings, they also find that the direction of change of debt policy is consistent with the debt of the CEO's former company. It implies how individual style—whether in debt or cash holdings—can persist across different corporate contexts. Besides, they suggest that firms which never change their debt policy are less likely to substitute the CEOs. In addition, Adams, Keloharju, and Knupfer (2018) find that traits used to rank CEOs in labour markets like cognitive and non-cognitive ability and physical characteristics like height are necessary for them to get the top position but do not have an impact on their management style. Gay et al. (2019) investigate how CEOs' openness to experience affects the decision-making process by collecting social media post data. They suggest that CEOs with higher openness are more likely to initiate a mergers and acquisition activity and more likely to make diversifying M&A rather than non-diversifying M&A. Overall, these studies show that CEOs' traits and behavior can be distorted by exogenous events, life experiences and the change in social status and other events.

2.2.1.3 CEO management style consistence

A further literature stream stresses the consistency of managerial style across domains. Davidson, Dey, and A. Smith (2015) document that CEOs and CFOs with criminal records are more likely to conduct fraud. Meanwhile, they find that unfrugal CEOs provide a laxer governance environment, which leads to a higher probability of perpetrating fraud by other insiders or unintended reporting errors. Similarly, Cain and McKeon (2016) suggest that CEOs with higher personal risk-taking adopt riskier policies

such as higher leverage and greater acquisitiveness, which cannot be explained by the compensation components. May (1995) suggests that CEOs are more likely to diversify when making acquisition decisions if they have more personal wealth vested in the firm. Moreover, they also find that CEOs with specialists in the existing business line of the firm are more likely to buy similar firms. However, they show that CEOs who have specialists and have worked in the firm for a longer time tend to reduce the risk by making diversifying acquisitions. Besides, Cronqvist, Makhija, and Yonker (2012) find that firms' leverage is highly related to the CEOs' personal leverage in their most recent house purchases. The result is still robust when analyzing the turnover events. One contribution of their papers is that one can use a top manager's personal behavior to predict the firm's financial policy. This result underscores that personal financial behavior and corporate financial policy are consistently aligned, and that such alignment persists across firms.

2.2.2 CEO succession

Previous studies use CEO turnover and mobility cases to disentangle the effect of a CEO and the effect of a firm. Bertrand and Schoar (2003), Fee, Hadlock, and Pierce (2013), and Dittmar and Duchin (2015) explore their research in a turnover framework to isolate the effect of CEO experience. In this section, we provide literature review on CEO succession.

2.2.2.1 Selection of successor and post-turnover performance

In a mobility case, one should notice that the CEO is regarded as an outside successor to the new firm. Previous studies have thoroughly discussed the reasons and outcomes of a

CEO turnover event and find that firms that would like to change the current situation are more likely to hire a new CEO from outside of the firm. For example, Helmich and W. B. Brown (1972) suggest that outside appointments are often followed by a greater rate of departures and personnel changing. Besides, although firms usually grow rapidly after the turnover (both for inside and outside succession), firms with outside successors expand larger than those with inside successors. Cannella and Lubatkin (1993) find that there is a negative relationship between the likelihood of outside succession and the accounting performance of a firm, suggesting that poor performed firms are more likely to look for outside successors. Alexandridis, Doukas, and Mavis (2019) find that acquisition performance following the succession is significantly higher than the performance prior to the succession. And such performance is related to CEO's experience measured by the years that CEO has worked as a CEO in the former firm. It shows that the outside successors do enhance the performance of the firm as expected. While a large number of studies show evidence that the relatively underperformed CEOs are more likely to be forced out, Eisfeldt and Kuhnen (2013) suggest that overall industry performance also plays an important role in using a competitive assignment framework. They argue that the industry-level shock will impact the desired managerial skills and thus affect outside options for both firms and CEOs.

Ryan and L. Wang (2011) provide a more general view of outside successors from the firm-CEO matching perspective. They argue that mobile CEO are more likely to be hired by a firm with bad performance, facing shocks in revenue and providing compensation related to the risk of the firm. Besides, they find that mobile CEO perform well in the new firm by improving both stock and operating performance, increasing the firm's idiosyncratic risk and adjusting the structure of the firm's assets. Similarly, Huson, Malatesta, and Parrino (2004) find that the operating return of assets (OROA) and the operating return on sales (OROS) significantly improve after the CEO turnover. Besides

the operating performance, they also find an abnormal return around the CEO turnover announcement, suggesting that the investors regard the turnover as a piece of positive information and have a positive view of the firm's future performance. However, most studies also address that their framework cannot necessarily to draw a causal conclusion. Most previous studies on CEO turnover or mobility suggested that the selection of a new outside CEO is ex-ante and the new CEO is very unlikely to be randomly assigned to a new firm.

Parrino (1997) explored the factors that lead to different types of turnover from the reasons and sources of a successor's perspectives. He suggested that the likelihood of a turnover is driven by the cost of turnover and the following performance. To have a better understanding of the cost of turnover, we start with a brief discussion of the potential candidates' abilities in the CEO labor market and the firms' current situation. When a firm is under good condition and considering the new CEO candidate, it is important for the new CEO to possess the abilities to suit the firm's ongoing strategies to ensure the continuation. The cost is significant if it takes much time for the successor to get used to the new environment. Regarding the firms in bad condition, it is more important for them to hire CEO with the ability that can change the firm's direction. Inside successors with much time spent in the current firm, therefore, are more beneficial when the firm wants to continue the current policy, while the outside successor with professional experience in other firms, or even industry, is expected to provide an alternative way to run a firm. Based on the above discussion, Parrino (1997) find empirical evidence that firms under bad condition are more likely to hire a new CEO from outside. Furthermore, there are also studies exploring the turnover issue from the human capital perspective. Parrino (1997) argues that the inside successors often have more specific skills due to the firm-related experience, while the outside successors have less such human capital. However, the value of such specific abilities varies across different industries, as outside successors from the

same industry consist of similar firms and also possess more transferable skills. Accordingly, he finds that there is a positive relation between industry homogeneity and the likelihood of outside succession.

Bailey and Helfat (2003) find evidence that successors with more transferable skills decrease the variance of the firms' performance, although there is not a significant difference in the mean of performance. While the inside successor is familiar with the management team and the board members, it is important for the outside CEOs to manage their relationship with the management team and the board well. Thus, another human capital of the outside successors discussed by Zhu and Shen (2016) is the ability to deal with the relationship with the board members. They suggested that outside successors with prior experience working with a more diversified board have a better ability to deal with the relationship with the board compared to outside CEOs who worked with a less diversified board. Firms tend to invest more in internal development programs to train inside managers and staff due to the high cost of outside succession (Parrino 1997). As a result, the investment in such internal development programs reduces the likelihood of outside succession.

Besides, there are also studies on other external factors. For example, Martijn Cremers and Grinstein (2014) argue that CEOs who work in the firm near other similar companies in the same industry have more outside options. H. Gao, Luo, and Tang (2015) find that CEOs have a lower probability of job-hopping compared to other top managers as it is difficult for them to find a CEO job at an equivalent or better firm. Moreover, they also suggest that stock ownership also has a negative impact on a CEO's mobility. Similar to the effect of stock ownership, they also argue that CEOs with higher compensation have lower mobility. Besides, previous studies also find that CEOs have greater mobility in the industry with larger number of firms, with more outside recruitment and with greater

homogeneity (Deng and H. Gao 2013; Martijn Cremers and Grinstein 2014; H. Gao, Luo, and Tang 2015) . Furthermore, studies on the CEO's age and tenure show that CEO who are reaching the retirement age or have been working in a firm for longer years has lower mobility (Balsam and Miharjo 2007; Gibbons and Murphy 1992; H. Gao, Luo, and Tang 2015). Parrino (1997) suggest that CEO's mobility is dependent on the supply and demand forces of the labor market. However, Çolak and Korkeamaki (2021) argue that the mechanism of the impact of supply and demand in the labor market on CEO mobility is complex because not only the CEO's behavior but also the firm's behavior can be affected by the forces. Parrino (1997) finds that the more potential successors there are, the more likely that CEO turnover happens, as a large number of candidates can reduce the cost of the replacement. Similarly, Liu (2014) also suggests that both the supply of potential successors and the outside opportunity of the incumbent CEO can significantly affect the likelihood of CEO turnover.

Georgakakis and Ruigrok (2017) suggest that the benefit of outside succession depends on the new CEOs' characteristics, including whether the successor fits the other executives from the social demographic perspective, whether they have a diversified experience and whether they are chosen by a well-performing company. Besides, leadership related human capital of the outside CEOs also plays an important role for the post-turnover performance. Desai, Lockett, and Paton (2016) find that outside successors with prior leadership experience at the old firm outperform than the CEOs with a lower prior position regarding the organizational performance. These top managers are selected to lead the firm; therefore, firms have the motivation to select new managers with such ability (experience) to ensure a well post-succession performance. Such candidates are more likely from the outside firm as the inside successor normally worked at a lower level. However, Hamori and Koyuncu (2015) draw a different conclusion from the job-specific skills' transferability perspective. They argue that the new firms possess a different

context and situation from the old firms. And even if CEOs have good prior records, they may find it hard to improve the performance by simply replicating what they have done before. In addition, Morrison and Brantner (1992) also suggest that CEOs' prior experience of working as a CEO in the last firm slow down their learning progress in the new firm, as it is better for the individual to learn some skills in the new context from the "unlearned" status. To support this argument, they find evidence that if a CEO once had a non-CEO position experience between two CEO job experiences, this negative impact will be less significant. Fee, Hadlock, and Pierce (2013) explored what happens to CEOs after the turnover. They suggest that there is a significant discount on the value of CEOs after turnover as they normally find a worse job compared to the prior position. Moreover, they argue that CEOs with more firm-specific abilities suffer from turnover the most. A potential explanation for it is that the outside option and bargaining power of the specialist CEOs decreases over time. As a result, the turnover process is generally efficient to keep the more capable CEO in the firm.

2.2.2.2 Outside job opportunity and CEO behavior

Moreover, previous studies also discussed the mechanism of how the career concern and outside opportunity distort CEOs' management style. To start with, studies on the CEOs' career concerns argue that fired CEOs suffer a devaluation in the labor market when seeking a new job (Agrawal and Walkling 1994; Eckbo, Thorburn, and W. Wang 2016). For example, Eckbo, Thorburn, and W. Wang (2016) find that only one-third of the incumbent CEOs still hold the executive position, although they do not suffer a compensation loss on average. However, they also show evidence that those who leave the executive market suffer a loss and the probability of leaving leads the CEOs to decrease their stock ownership. As a result, CEOs with limited outside job opportunities have the motivation to reduce the firms' risk to secure their position, causing an agency problem

Jensen and Meckling (1976), Fama (1980), and Gervais, Heaton, and Odean (2011). Previous studies explored how the outside options for CEOs affect their managerial decision. For example, Graham, Harvey, and Puri (2015) find that the external labor market has the explanatory power of managers' behavior by using survey data. Custodio, Ferreira, and Matos (2019) suggest that firms' innovation is positively related to CEOs outside options. Besides, they also argue that managers who are unlikely to move to another firm tend to adopt more aggressive policies. For acquisition policies, previous studies show that the adoption of anti-takeover laws leads to excessively conservative acquisition decisions (Low 2009; Gormley and Matsa 2016).

2.2.3 CEO life cycle and CEO appointment

Guenzel and Malmendier (2020) thoroughly discussed the stages of a CEO's career. They divide a CEO life cycle into three stages and discussed the behavior issues in each stage. The stages include the appointment stage, the working stage, and the dismissal stage. Regarding the appointment stage, Goel and Thakor (2008) develop a model showing that overconfident candidates are more likely to be selected as a CEO when the biases of the potential candidates are unobservable. The mechanism is as follows. The board members need to select the most capable candidate to maximize the value of the company, while the abilities and biases of candidates are unobservable. Thus, the optimal option is to appoint the CEO with the highest payoff because the abilities in the selection process have to be inferred from the observable payoffs, while the biases are not correlated with the payoffs. As a result, overconfident candidates, who prefer to select projects with higher risks and accordingly obtain excessive returns, tend to be appointed. Moreover, Guenzel and Malmendier (2020) extend the application of this, suggesting that any biases leading to riskier projects can lead to similar results. Surprisingly, overconfident CEOs are still more likely to be appointed even if the biases are observable before the appointment. Gervais,

Heaton, and Odean (2011) argue that a moderate level of overconfidence for a CEO is optimal to maximize the firm's value, as overconfidence can counter the negative effect of risk aversion. Thus, firms may actively seek overconfident CEOs and provide incentive contracts to account for the level of overconfidence. Similarly, Hirshleifer, Low, and Teoh (2012) find that overconfident CEOs provide more value for firms in innovative industries, as such firms naturally have to embrace risky projects. Guenzel and Malmendier (2020) also document that the distorted selection process and biased board members may also lead to the selection of biased managers.

Biased CEOs also significantly affect the firm's policy compared to the rational ones in the second stage of the life cycle. Although one may argue that the learning process of an individual can finally lead biased CEOs to become rational when making decisions, Guenzel and Malmendier (2020) indicate four reasons to refute this point. First, some measurable policies only happen at a low frequency during a single CEO's tenure. For example, the acquisitiveness of a CEO is hard to be captured as acquisition activity is not common given a fixed tenure. Another reason is hard to defend a causal relation between biased CEO and performance outcome.

Regarding the dismissal stage, Guenzel and Malmendier (2020) discussed this stage from the corporate governance and CEO turnover perspective. To start with, Graham, S. Li, and Qiu (2012) suggest that executive compensation is specially designed for a CEO by having a large component of CEO-specific components to align the interests of managers and shareholders. Previous studies do not reach an agreement on the relationship between overconfidence and compensation. Humphery-Jenner finds that there is a large proportion of overconfident CEOs' compensation is contingent pay, while Otto (2014) suggests that overconfident CEO (measured by Longholder) has a lower option and total compensation compared to others. Regarding the CEO turnover perspective, the authors

first suggest that biased CEOs do not necessarily have a greater probability of being dismissed. The dismissal rate of a biased CEO mainly depends on three factors. First, it depends on whether the biased CEO outperforms or underperforms compared to a rational one. Second, it depends on whether the board select the biased CEO on purpose or not. Third, it also depends on whether the firm has a good corporate governance or not. Previous studies with the rational board member assumption suggest an inverse-U shape relation between overconfidence and forced turnover (Campbell et al. 2011; Goel and Thakor 2008; Gervais, Heaton, and Odean 2011). However, there is very little research exploring the CEO turnover issue under the biased board member assumption. Previous studies discuss other board factors that affect CEO turnover. For example, Adams and Ferreira (2009) show that the probability of CEO dismissal increases if the board has more female members. Besides, Eisfeldt and Kuhnen (2013) and Jenter and Lewellen (2015) find that industry-level shock also has explanation power for CEO turnover.

2.2.3 Dynamic Corporate Financial Policy

2.2.3.1 The measurement of the changing speed

The changing speed of dynamic financial policies has been typically measured using the speed of adjustment (SOA) in prior studies. Perfect continuous readjustment is represented as an SOA of 1, while an SOA of 0 implies that the firm does not response to the estimated target cash level. Iliev and Welch (2010) discuss the fact that previous studies disagree on the SOA of leverage. The SOA of leverage estimated in previous studies varies from 0 (Welch 2004) to 34 percents (Flannery and Rangan 2006). Although Iliev and Welch (2010) use the same sample and definitions of the variables, they still find the different estimated SOA. They argue that one reason causing the biased SOA is 0 ratio of leverage (lagged or current), which is an unlike situation for cash holdings because few

firms report a zero excess cash ratio in our sample. As the accuracy of calculating SOA is beyond the topic of this paper, we still follow the previous studies (e.g., Lemmon, Roberts, and Zender (2008); Dittmar and Duchin (2010)) to use the traditional way to calculate the SOA of excess of cash. An intuitionistic way of understanding the economic meaning of SOA is the half-life way. Half-life is the time that a firm use to adjust the financial ratio to the target level to response the one-unit shock to the error term. Here are some examples of previous studies interpretation on the half-life method to provide us a guideline of explaining our results. Dittmar and Duchin (2010) call a half-life of 1.4 to 3.1 years (an SOA of 0.2 to 0.4) “the imperfect adjustment towards the target”. More specifically, 34 percents SOA with a 1.7 half-life estimated by Flannery and Rangan (2006) is called “reasonable active managerial intervention”. Besides, Huang and Ritter (2009) call a 23 percents SOA with a 2.7 half-life “active but not quick managerial intervention”. A 10 percents SOA implying a 6.6 years half-life by Fama and French (2002) is called “glacial readjustment”, while an SOA of 5 percents with a 14 years half-life is called “practically no-readjustment”.

2.2.3.2 Dynamic cash policy

When examining the dynamic management of cash holdings, Dittmar and Duchin (2010) identify the relative position of current cash holdings in relation to the target level as a significant determinant of the speed of adjustment (SOA). Specifically, they observe that firms with cash holdings below the target level exhibit lower SOAs, largely due to the higher cost of retaining cash compared to deploying it for purposes such as investments. Additionally, their findings indicate that firms with a greater disparity between current and target cash levels adjust their holdings more rapidly, reflecting the lower marginal cost of adjustment in such cases. Furthermore, they demonstrate that access to bank lines of credit positively influences the SOA for cash holdings.

Building on this research, Lozano and Duran (2017) analyze the SOA of cash holdings from the perspective of family-owned firms. They conclude that family firms are more proactive in adjusting their cash levels compared to non-family firms. Moreover, their study highlights that factors such as firm age, financial constraints, and the strength of investor protection in the firm's home country significantly impact the SOA of cash holdings.

2.2.4 Cash policy

This section explores the previous studies on cash holdings from the theoretical and empirical perspectives.

2.2.4.1 Theories of cash holdings

Starting to Modigliani and Miller (1958), the cash holdings level is not relevant to the firm's performance in a perfect market assumption. In an imperfect market, firms have different motivations to hold cash. Transaction motivation by Keynes (1936) and Frazer (1964) suggest that the firm's size is a key factor in cash holdings. Similarly, Miller and Orr (1966) pointed out there are economies of scale for cash holdings. Besides, previous studies also suggest that firms hold more cash as a precaution for investment opportunities in the future, especially when outside funding is expensive or unavailable (Myers and Majluf 1984; Keynes 1936). For example, Foley et al. (2007) argue that multinational companies would hold more cash for tax reasons compared to other companies.

According to Opler et al. (1999) and Kim, Mauer, and Sherman (1998), there is an optimal level for firms' cash holdings. The trade-off theory suggests that the optimal level of cash holdings is the level where the marginal profit of holding cash is equal to the

marginal cost of maintaining cash, to maximize the shareholders' benefits. The benefits of holding cash include two parts. First, as Keynes (1936) suggests, liquid assets can help the firm to reduce the transaction costs of raising money from outside and the costs of being unable to complete payments. Second, firms have the precautionary motivation to hold cash to prepare for the uncertainty in future cash flow or the situation that outside funding is not accessible or exceedingly expensive. For the cost of cash holdings, Miller and Orr (1966) propose an optimal model by considering the brokerage cost in their settings, which is the transfer cost between the cash asset and the liquid assets. Besides, Myers (1977) and Myers and Majluf (1984) argue that maintaining liquidity assets has opportunity costs when there are valuable investment opportunities, which leads to insufficient investment. Fazzari, Hubbard, and Petersen (1988) analyse the US firms' data from 1970-1984 showing that liquidity assets help firms with financial constraints smooth investment, also implying the opportunity cost of investment.

However, pecking order theory (financing hierarchy theory) implies that there is not an optimal level of cash ratio. In the pecking order theory, leverage is defined as the net debt, which is the total liability minus cash holdings. Thus, cash is regarded as a negative debt and there is no difference between using internal resource to accumulate liquid assets or paying back the debt (Opler et al. 1999). In other words, cash is irrelevant under this view. As a result, a firm can still maintain the capital structure by increasing the cash holdings and having more debt or using cash to repay the debt.

Overall, the empirical evidence from previous studies discussed above cannot draw the conclusion that the cash level is perfectly irrelevant.

2.2.4.2 Empirical models on cash holdings

Opler et al. (1999) examined the determinants of a firm's cash holding. Specifically, they explored the determinants of a firm's cash level from three aspects: (1) Transaction costs, (2) Information asymmetries and (3) Agency cost of debt. Regarding transaction agency costs, they suggested that the cash reservation depends on the risk of cash flow, length of the cash conversion cycle, interest rate structure, cost of debt, liquidity of their assets, cost of hedging risk and dividend payout. Regarding information asymmetries, outside investors have incentives to ask for a discount based on the potential scale of information asymmetries, as they do not want to buy an overpriced security. Besides, they found that firms tend to reserve more cash than the predicted level. One firm-level reason is that the firm wants to moderate its dependence on the financial markets to avoid scrutiny. Similarly, recent studies by Barry et al. (2022) and Graham (2022) argue that firms' decision-making is conservative because it may give firms more options and flexibility to face uncertainties in the future.

2.2.4.3 Excess cash and agency issues

Previous studies identify excess cash as one of the financial policies most influenced by CEOs (Bertrand and Schoar 2003; Çolak and Korkeamaki 2021; Dittmar and Mahrt-Smith 2007). While the optimal cash-holding model provides a foundational understanding of cash management, differences in how managers and shareholders perceive the benefits and costs of cash holdings can lead to deviations from the optimal level (Opler et al. 1999). Agency theory offers a comprehensive explanation for these deviations. For example, managers may be incentivized to retain higher cash reserves to reduce firm-level risks, thereby protecting their positions and increasing their decisionmaking flexibility. As a result, Opler et al. (1999) argue that firms with higher agency costs tend to hold excess cash beyond the optimal level. Excess cash is often viewed as an indicator of agency problems. Dittmar and MahrtSmith (2007) assert that

excess cash can lead to suboptimal outcomes, as firms with abundant cash reserves are more likely to spend it inefficiently. They find that excess cash can erode a firm's value, particularly in the context of weak governance. Moreover, managers may allocate free cash to poor investment opportunities, such as pursuing excessive acquisitions, further exacerbating inefficiencies (Harford 1999). This study contributes to the excess cash literature by showing that mobile CEOs transfer their conservative style through maintaining relatively high excess cash levels in new firms.

2.3 Hypothesis

2.3.1 CEO Management Style

CEO management style is a critical driver of firm policies, with numerous studies indicating that both personal and professional experiences shape how CEOs lead their companies (Bertrand and Schoar 2003). Management style can transfer across firms in CEO succession settings, and various factors can influence a CEO's behaviour.

CEO professional experiences (e.g., Dittmar and Duchin (2015) and Hu and Liu (2015)) and traits (e.g., Graham, Harvey, and Puri (2013) and Zhao, Niu, and Chen (2022)) can contribute to a CEO's management style. For example, Dittmar and Duchin (2015) show that CEOs with past exposure to financial distress tend to adopt risk-averse policies, indicating that ongoing professional experiences can significantly shape managerial styles, whereas Zhao, Niu, and Chen (2022) find that CEOs with high-risk preferences are more likely to accept higher goodwill values, particularly in firms with suitable debt capacities.

Additionally, early-life experiences can have a profound effect on CEOs' decisionmaking processes and underscore the enduring influence of early-life events on management styles (see, Malmendier and Nagel (2011); Bernile, Bhagwat, and Rau (2017); Feng and Johansson (2018)). For example, Malmendier, Tate, and Yan (2011) demonstrates that overconfident CEOs, shaped by their formative experiences, tend to use less external finance and rely more on internal resources, resulting in higher leverage. In addition, macroeconomic environments during CEOs' formative years also leave lasting impressions. For instance, Malmendier and Nagel (2011) find that individuals who witnessed high stock market returns exhibit greater risk tolerance and invest more heavily in stocks. Schoar and Zuo (2017) further document that managers who begin their careers in recession periods adopt conservative policies, such as lower investments, reduced R&D spending, and cost-cutting.

2.3.2 Theories of Cash Holdings and Empirical Evidence

In contrast to the Modigliani and Miller (1958) study which highlighted the irrelevancy of cash holdings to firm performance, other studies have suggested the importance of holding cash in imperfect markets. Opler et al. (1999) examine the determinants of cash holdings, and find that firms often hold more cash than theoretically predicted, partly to reduce reliance on external financial markets and avoid market scrutiny. Similarly, Barry et al. (2022) and Graham (2022) suggest that conservative cash management provides firms with more flexibility in dealing with future uncertainties.

Excess cash holdings are often closely linked to CEO behavior and agency problems (Bertrand and Schoar 2003; Dittmar and Mahrt-Smith 2007; Çolak and Korkeamäki 2021). While the optimal cash model offers a basic framework, differences in how managers and shareholders view the costs and benefits can lead to deviations from this

optimal level (Opler et al. 1999). Managers may prefer to hold excess cash to mitigate risks, secure their positions, and retain decision-making flexibility. Thus, firms with higher agency costs tend to maintain excess cash reserves. Dittmar and Mahrt-Smith (2007) argue that excess cash can result in suboptimal outcomes, as cash-rich firms may dissipate their reserves quickly, particularly under poor governance. They find that excess cash can decrease firm value and is often used for poor investments, such as unnecessary acquisitions (Harford 1999), underscoring the potential pitfalls of holding too much cash.

Following previous research on the transfer of management style (e.g., Bertrand and Schoar (2003)), a CEO's cash management approach tends to be fixed and can be transferred to a new firm. The changes in the firm's cash policy after a new CEO's arrival are expected to align with the new CEO's established management style. In addition to Bertrand and Schoar (2003), we develop the management style transfer theory by showing that the relative cash level of mobile CEOs matters in the post-succession changes in the cash policy. The relative cash level is defined as the difference between incoming CEO's pre-succession policy in the first firm and the pre-succession policy in the second firm before the incoming CEO arrive. A higher (less) relative cash level stands for the incoming CEO transfer from a cash-rich firm to a relative cash-less firm. Thus, instead of directly measuring whether the incoming CEO's post-succession policy in the second firm are related to the the incoming CEO's cash policy at the first firm , we put more attention on the changes made before and after in the second firm policy and examine whether the changes are related to the relative cash level of the CEOs. Besides, it is necessary to test whether the CEOs transfer their relative management style before looking into the further heterogenous questions, leading to our first hypothesis:

Hypothesis 1: Changes in a firm's cash policy around CEO succession are positively related to the incoming CEO's cash management style, all else being equal.

2.3.3 Dynamic Corporate Financial Policy

Dittmar and Duchin (2010) find that firms with cash below their target adjust more slowly due to the higher costs associated with holding cash versus spending it. Firms farther from their target cash level adjust more quickly, as the marginal cost of adjustment is lower. The speed at which firms adjust their financial policies is commonly measured using the Speed of Adjustment (SOA). Due to the adjustment costs associated with altering cash holdings (e.g., Dittmar and Duchin (2010); H. Gao, Harford, and Li (2013)), it is unlikely that a CEO will fully adjust the firm's cash policy to match their preferred style within a single fiscal year. These adjustment costs may arise for CEOs who prefer to raise cash through external financing, as well as for those who favor a lower cash reserve by repurchasing stock or distributing dividends. Consequently, we posit our second hypothesis: Additionally, academic literature suggests a link between excess cash and agency issues (e.g., Harford (1999); Bertrand and Mullainathan (2003); Dittmar, Mahrt-Smith, and Servaes (2003); Harford, Mansi, and Maxwell (2008)). Although there are mixed findings regarding the relationship between cash reserves and the severity of agency problems, most studies agree that managers often do not optimally set cash reserves, instead prioritizing their private benefits.

Furthermore, Cannella and Lubatkin (1993) suggest that external CEOs are often hired to manage high unsystematic risks in a firm. In such situations, these CEOs, and by extension the firm, are more likely to maintain higher cash reserves due to precautionary motives. Conversely, given that the second firm might be the final career destination for many CEOs, they may be driven by a desire to secure their job or simply pursue a "quiet life" (Bertrand and Mullainathan 2003). Therefore, changes in cash policy can result from a combination of building cash reserves and transferring management style. Specifically, for CEOs with a lower cash management style compared to the hiring firm, the reduction

in excess cash is unlikely to be as pronounced as the increase for CEOs with a higher cash management style. This leads to our next hypothesis:

Hypothesis 2: Increases in cash policy implemented by CEOs with a relatively higher cash management style are more significant than decreases made by CEOs with a relatively lower cash management style.

The cash policy of the new firm is more sensitive/pronounced when the incoming CEO has a higher cash management style (or when the CEO comes from a firm with higher XCash).

Precautionary motives and risk management create an asymmetry: building buffers can be executed with relatively low organizational resistance by retaining earnings, moderating investment, or drawing on credit facilities, while depleting buffers often requires payouts, higher leverage, or discretionary spending that faces closer monitoring and governance constraints (Opler et al., 1999; Bates, Kahle, and Stulz, 2009; Harford, Mansi, and Maxwell, 2008). Post-succession dynamics also work in favor of upward moves. Outside successors are typically mandated to stabilize and reshape policies early in tenure, especially in higher-risk settings, and act more decisively when their preferred style calls for stronger liquidity (Cannella and Lubatkin, 1993; Huson, Malatesta, and Parrino, 2004). In contrast, when a CEO's preferred style is to run lean on cash, downside adjustments are dampened by precautionary motives and by "quiet-life" tendencies that reduce willingness to take actions that raise risk exposure or invite board scrutiny (Bertrand and Mullainathan, 2003). Taken together, these mechanisms imply that, conditional on the same distance between the firm's pre-succession policy and the CEO's preferred policy, upward re-targeting is implemented more actively than downward re-targeting.

Given these supplementary (or counteractive) motivations for CEOs with higher (or lower) cash management styles, we expect to observe similar patterns in the intensity of their adjustment processes.

Hypothesis 3: CEOs with a relatively higher cash management style are more proactive in adjusting the firm’s cash policy compared to those with a relatively lower cash management style.

2.4 Sample, Data and Calculation of Excess Cash Holdings

2.4.1 Data

The US CEO-level data is collected from the Compustat Execucomp database between 1992 and 2021, as the CEO data is available from 1992. A CEO is recognized by the CEO Annual Flag. The CEO movement case is defined when a CEO’s (indicated by EXECID) firm unique identifier (GVKEY) changes in two consecutive observations (sorted by years). Note that, the CEO horizontal mobility case requires that the executive has the CEO title in both firms (the first firm and the second firm). Table 1 provides the details of the CEO movement sample.

Table 1.1: Number of cases and observations

| | Number of Cases | Total Observations |
|----------------------------------|-----------------|--------------------|
| Panel A. Initial Movement Sample | | |
| CEOs moved once | 382 | 3192 |
| CEOs moved twice | 23 | 234 |
| CEOs with overlap years | 74 | 896 |
| Total | 479 | 4322 |
| Panel B. Final Movement Sample | | |

| | | |
|--------------------------|-----|------|
| Cross-sectional analysis | 113 | 113 |
| Panel analysis | 124 | 1034 |

This table presents the number of mobility cases and the number of total observations for initial movement sample, cross-sectional sample, and panel sample, which are shown in Panel A and B.

The initial sample contains 479 CEO movement cases with 4322 firm-year observations. Specifically, there are 382 CEOs that move once from one firm to another, 23 CEOs that move twice, and 74 CEOs that join a second firm without instantly leaving the CEO position at their former firms. The sample excludes cases involving financial or utility firms (SIC: 4900-4999; 6000-6999), regardless of whether they occur in the initial or subsequent firm. This exclusion is due to these firms holding cash for regulatory purposes and carrying significant debt levels for operational needs.

2.4.2 Calculation of Excess Cash Holdings

This section discusses the calculation of excess cash holdings (XCash). Following previous studies (Opler et al. 1999; Dittmar and Mahrt-Smith 2007; Smith, Gleason, and Kannan 2021), Xcash is defined as the difference between actual and predicted cash holdings. The calculation includes two steps. The first step is to estimate the optimal level of cash holding levels of a firm. The second step is to take the difference between the actual and the estimated optimal level of cash holdings of a firm as the Xcash. Specifically, we use the following equation to estimate the optimal level of cash according to the previous studies (Dittmar and Mahrt-Smith 2007; Opler et al. 1999).

$$\ln\left(\frac{Cash_{i,t}}{NA_{i,t}}\right) = \beta_0 + \beta_1 \ln(NA_{i,t}) + \beta_2 \frac{FCF_{i,t}}{NA_{i,t}} + \beta_3 \frac{NWC_{i,t}}{NA_{i,t}} + \beta_4 IndustrySigma_{i,t} + \beta_5 \frac{MV_{i,t}}{NA_{i,t}} + \beta_6 \frac{RD_{i,t}}{NA_{i,t}} + \sum_j \gamma_j Firm_j + \sum_n \theta_n Year_n + \epsilon_{i,t}$$

(1.1)

Where $Cash_{i,t}$ is cash and short-term investment; $NA_{i,t}$ is total assets less cash and short-term investment; $FCF_{i,t}$ is free cash flow; $NWC_{i,t}$ is net working capital; $IndustrySigma_{i,t}$ is the risk of an industry's free cash flow, measured by the average of the prior 10-year standard deviation of $\frac{FCF_{i,t}}{NA_{i,t}}$. $\overline{MV}_{i,t}$ is the market value at time t ; $\overline{RD}_{i,t}$ is R&D over year t , set to 0 if missing; $\sum_j \gamma_j Firm_j$ represents the firm-level fixed effect; and $\sum_n \theta_n Year_n$ represents the time fixed effect.

All variables for this estimation are winsorized at the one per cent level. The population used for the estimation includes all public firms from 1992-2021. We also tried other populations (market data from 1979-2021; Succession Sample firm data from 1992-2021) to calculate $XCash$, and the estimated values from different populations are highly correlated. The findings are not affected by using different populations.

2.5 Empirical Analysis

2.5.1 Cross-sectional analysis

To providing a straight view of the cash management style transfer, we start with a simple cross-sectional analysis by providing how the changes in cash policy around the succession can be explained by CEOs' cash management style. To do this, we compare the average $XCash$ of the firm before and after the CEO moved in.

Following Bertrand and Schoar (2003) we require CEOs to have at least three years in the second firm to allow sufficient time to change the firms' policy. In addition, we also

require firms to have at least three years of observation before the CEOs move in to allow meaningful comparisons around mobility. Then, there are 113 cases left (excluding the cases with missing values), as shown in Panel B of Table 1.1.

To measure a CEO's cash management style, we use the average *XCash* of the first firm, when the CEO held the position, minus the average *XCash* of the second firm from three years before the succession. Figure 1 illustrates the design of the cross-sectional regression.

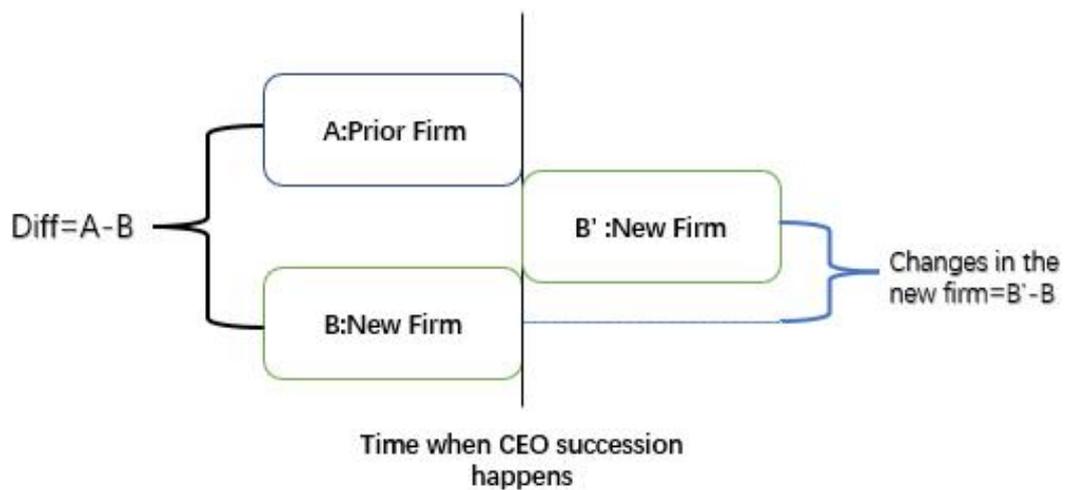


Figure 1.1 Measurement of comparative CEO's cash management style

In Figure 1, rectangular A presents the CEO's cash management style, while square B and rectangular B' present the average *XCash* of the firm before and after the succession, respectively. $A - B$ presents the comparative level of CEO cash management style, and $B' - B$ presents the changes in *XCash*. Following the hypothesis, this study expects a positive

relationship between $A - B$ and $B' - B$. Specifically, the following regression model is estimated:

$$\Delta X\text{Cash} = \beta_0 + \beta_1 \Delta \text{Diff} + \beta_{i,c} \Delta \text{Firmlevelcontrols} + \epsilon_i \quad (1.2)$$

Where $\Delta X\text{Cash}$ is the difference between the average $X\text{Cash}$ of the second firm after and before the CEO's succession happens, for each case c . Diff is the difference between the average $X\text{Cash}$ of the first firm and the average $X\text{Cash}$ of the second firm three years before the CEO moves into it. All control variables in the cross-sectional regression model are calculated as the difference between the values before and after the CEO's mobility for each case.

Firm-level control variables are included in the baseline regression. Following Coles, Daniel and Naveen (2006) and Çolak and Korkeamaki (2021), this study controlled the firm-level variables that represent the determinants of the policy measure. Besides, another set of variables is those used for calculating the $X\text{Cash}$ in the regression models, as these factors can also affect the $X\text{Cash}$ ratio. The definitions of the additional control variables are as follows. Market to book ratio (MTB) is calculated as the market value of the firm divided by the book value. Sales is calculated as the log form as the proxy of the size. Sales growth is the logarithm of the ratio of sales in the current year divided by the sales in the last year. Leverage is the total debt divided by the total assets. ROA is calculated as the earnings before interest, taxes, depreciation, and amortization (EBITDA) divided by the total assets. NetPPE is calculated as the investment in plant, property and equipment scaled by the total assets. Stock return is the return of stock over the fiscal year. Adjusted ZScore is the (Altman, 1968) Z-Score multiplied by 0.001 for the scale reason. Table 1.2 provides the summary statistics of the cross-sectional changes in variables.

Table 1.2: Summary Statistics

| | N | Mean | SD | Min | Max |
|-------------------------------|-----|---------|---------|-----------|-------|
| Δ XCash | 113 | 0.201 | 0.779 | -1.844 | 3.061 |
| Δ Diff | 113 | 0.043 | 0.922 | -4.804 | 3.503 |
| Δ Market-to-book ratio | 113 | -0.084 | 1.046 | -6.299 | 1.998 |
| Δ Sales | 113 | 0.182 | 0.781 | -1.176 | 6.067 |
| Δ Sales growth | 113 | -11.148 | 115.977 | -1232.855 | 2.754 |
| Δ Leverage | 113 | 0.008 | 0.146 | -0.369 | 0.437 |
| Δ ROA | 113 | 0.020 | 0.134 | -0.400 | 0.565 |
| Δ Net PPE | 113 | -0.010 | 0.073 | -0.414 | 0.198 |
| Δ ZScore | 113 | -0.001 | 0.016 | -0.146 | 0.061 |
| Δ Stock return | 113 | -14.802 | 110.558 | -1149.041 | 1.519 |
| Δ R&D | 113 | -0.002 | 0.045 | -0.340 | 0.153 |
| Δ Net assets | 113 | 0.133 | 0.570 | -1.077 | 3.720 |
| Δ Free cash flow | 113 | 0.004 | 0.068 | -0.229 | 0.261 |
| Δ Market value | 113 | -0.013 | 1.085 | -6.539 | 2.133 |
| Δ Sigma | 113 | -0.001 | 0.010 | -0.058 | 0.028 |
| Δ Net working capital | 113 | -0.005 | 0.090 | -0.430 | 0.320 |

Note: Δ represents changes over time for each variable.

Table 1.3 provides the cross-sectional results estimated from *Equation 1.2*. The first column shows the results without control variables. The second column presents the results by controlling for the firm-level control variables that are used to calculate the XCash, while the third column presents the results using the firm-level control variables suggested by Coles et al. (2006) and Çolak and Korkeamaki (2021). Considering a relatively small sample size for the cross-section sample, we do not put all control variables in a single model to avoid overfitting issues. We include firm level control variables in Table 1.3.

Table 1.3: Cross-sectional Regression Results

| | (1) | (2) | (3) |
|---------------|----------|----------|----------|
| Δ Diff | 0.397*** | 0.354*** | 0.335*** |

| | | | |
|------------------------|----------|----------|----------|
| | (0.071) | (0.074) | (0.072) |
| Δ Market-to-book ratio | 0.177* | | |
| | (0.072) | | |
| Δ Sales | 0.245* | | |
| | (0.142) | | |
| Δ Sales growth | 0.001 | | |
| | (0.001) | | |
| Δ Leverage | 0.068 | | |
| | (0.523) | | |
| Δ ROA | -0.111 | | |
| | (0.546) | | |
| Δ Net PPE | 1.870* | | |
| | (1.118) | | |
| Δ ZScore | -0.810 | | |
| | (4.245) | | |
| Δ Stock return | -0.000 | | |
| | (0.001) | | |
| Δ R&D | | 1.016 | |
| | | (1.726) | |
| Δ Net assets | | 0.023 | |
| | | (0.129) | |
| Δ Free cash flow | | 1.517 | |
| | | (1.103) | |
| Δ Market value | | 0.125 | |
| | | (0.081) | |
| Δ Sigma | | 4.729 | |
| | | (6.235) | |
| Δ Net working capital | | 0.213 | |
| | | (0.764) | |
| Constant | 0.184*** | 0.188*** | 0.186*** |
| | (0.065) | (0.068) | (0.067) |
| Observations | 113 | 113 | 113 |
| R-squared | 0.214 | 0.228 | 0.242 |

This table presents the results of the effect of CEO's cash management style on the changes of cash policy using the cross-sectional sample, in which firms are those that experienced an outside CEO succession in our main sample. The dependent variable is Δ XCash, which is the difference between the average of XCash before and after the succession for the focal firm. Control variables include firm-level control variables for risk, firm-level control variables for the calculation of XCash, and CEO-level control variables. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The results in Table 1.3 show that second firm CEOs with higher XCash style significantly increase the XCash of the firm after the succession. It indicates that the comparative level of CEO cash experience matters. For example, the coefficient of 0.354 for *Diff* in the first column suggests that if the CEO's XCash experience increases by one unit, the log of XCash ratio of the second firm will increase by around 35.4%. Our results hold when we control for factors that affect excess cash holdings. The results from cross-sectional analysis are in line with previous findings that CEO management style in the first firm matters (e.g., Bertrand and Schoar, 2003).

2.5.2 Panel data analysis: around-succession

This research further explores the impact of the CEO's cash management style on the cash policy of the firm using panel data. Panel data allow us to include more observations and provide a dynamic view of such relationships in the later analysis. This section estimates within the firms experienced a CEO succession. We construct a control group and estimate a DiD estimator in the robustness test section.

$$\begin{aligned}
 XCash_{i,t} &= \alpha + \beta_1(Post \times Experience) + \beta_2 Experience + \beta_3 Post \\
 &+ \beta_x X_{i,t} + \gamma_i + \delta_t + \epsilon_{i,t}
 \end{aligned}
 \tag{1.3}$$

Where *Post* is a dummy variable equal to 1 if the observation is in the post-succession period, and 0 otherwise. *Experience* is calculated in two ways: First, *Experience* is calculated as the difference (*Diff*) between the average cash level (*XCash*) of the old firm and the three-year prior succession period of the second firm. Second, *Experience dum* is a dummy variable equal to 1 if *Diff* is larger than 0, and 0 otherwise.

The term $Post \times Experience$ (or $Post \times Experience\ dum$) is the interaction term between $Post$ and $Experience$ (or $Experience\ dum$). Control variables include firm-level and CEO-level factors at time t for firm i . γ_i and δ_t represent firm-level fixed effects and year fixed effects, respectively. The regression results from *Equation 1.3* are provided in Table 1.4.

Table 1.4: Panel Regression Model

| | (1) | (2) | (3) | (4) |
|------------------------------|----------|----------|-----------|-----------|
| Experience \times Post | 0.584*** | 0.382*** | | |
| | (0.140) | (0.118) | | |
| Experience_dum \times Post | | | 0.991*** | 0.783*** |
| | | | (0.143) | (0.127) |
| Constant | -0.055 | -0.062 | -6.444*** | -6.983*** |
| | (0.060) | (0.075) | (1.696) | (1.623) |
| Observations | 1034 | 1034 | 841 | 841 |
| Control | No | No | Yes | Yes |
| FirmFE | Yes | Yes | Yes | Yes |
| YearFE | Yes | Yes | Yes | Yes |
| Adj R-squared | 0.236 | 0.205 | 0.353 | 0.342 |

This table presents the results of the panel regression analysis by using the main sample, in which the firms are those that experienced an outside CEO succession. The dependent variable is XCash, which is the difference between the actual cash holdings and the predicted cash holdings at the fiscal year t , following Dittmar and Mahrt-Smith (2007). We include all control variables including firm-level control variables for risk, firm-level control variables for the calculation of XCash, and CEO-level control variables. Experience is the difference between the average XCash of the first firm and the average XCash of the second firm before the CEO moves into it. Experience_dum equals 1 if Experience is larger than 0, and 0 otherwise. Post equals 1 if the observation is in post-succession period, and 0 otherwise. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Column (1) presents result by using Experience as the proxy of CEO cash management style, while Column (2) reports result using *Experience dum* as the proxy of CEO cash management style. Both columns control for all firm and CEO level variables. All coefficients of the interaction terms are significantly positive at 1% level, suggesting that in the post succession period (Post equal to 1), higher CEO's cash management style significantly leads to a higher XCash of the firm. Regarding economic magnitude, one unit

increase in mobile CEO's prior cash management style leading to the increasing in XCash for 0.382 in the post-succession period, as presented in column 3. Adjusted R-squared statistics range from 0.205 to 0.353, showing that the models above provide a strong explanation of the post-succession XCash of the firm.

To test Hypothesis 2A, we divide our sample into two categories based on the Experience dum and repeat the analysis process in Section 5.1. A higher cash management style is identified when Experience dum is equal to 1, while a lower cash management style is identified when Experience dum is equal to 0. We estimate the effect of succession in each subsample to understand how exactly CEOs from different groups behave in terms of post-succession cash policy. Specifically, the model for estimation is as follows:

$$XCash_{i,t} = \alpha + \beta_1 Post + \beta_x X_{i,t} + \gamma_i + \delta_t + \epsilon_{i,t} \quad (1.4)$$

Where Post is a dummy variable equal to 1 if the observation is in the post-succession period, and 0 otherwise. $\overline{X}_{i,t}$ is a set of control variables, including include firm-level and CEO-level factors at time t for firm i . γ_i and δ_t represent firm and time level fixed effects, respectively. The heteroskedastic robust standard errors are clustered at both firm and year levels. The estimation results of *Equation 1.4* are reported in Table 1.5.

Table 1.5: The Heterogeneity Analysis

| | (1) XCash High | (2) XCash High | (3) XCash Low | (4) XCash Low |
|----------|--------------------|---------------------|------------------|------------------|
| Post | 0.451** (0.191) | 0.533*** (0.155) | 0.110 (0.172) | 0.113 (0.112) |
| Constant | -0.28** | -8.756*** | 0.430 | -2.367 |

| | | | | |
|---------------|---------|---------|---------|---------|
| | (0.124) | (2.287) | (0.635) | (1.456) |
| Observations | 586 | 467 | 453 | 378 |
| Control | No | Yes | No | Yes |
| FirmFE | Yes | Yes | Yes | Yes |
| YearFE | Yes | Yes | Yes | Yes |
| Adj R-squared | 0.232 | 0.361 | 0.265 | 0.554 |

This table presents the results of the heterogeneity analysis by using the main sample, in which the firms are those that experienced an outside CEO succession. The first column presents the results of higher cash management style group. The dependent variable is XCash, which is the difference between the actual cash holdings and the predicted cash holdings at the fiscal year t , following Dittmar and Mahrt-Smith (2007). We include all control variables including firm-level control variables for risk, firm-level control variables for the calculation of XCash, and CEO-level control variables. All variables' definitions are provided in the Appendix. Firm fixed effect and time fixed effect are controlled in all models. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Table 1.5, column (1) and column (2) show the results using the higher cash management style group. Columns (3) and (4) use the lower cash management style sample. Columns (1) and (3) report the results without control variables. The coefficient of Post in column (1) and column (2) are significantly positive, indicating that CEOs with a higher cash management style improve the cash level after the succession. Meanwhile, the coefficient of 0.533 for Post in column (2) also suggests a significant economic scale of the management style transfer. The coefficient of Post for the lower cash management style is positive (rather than negative) and not significant, with a P-value of 0.321 in column (4), indicating that CEOs with a lower cash management style do not significantly transfer their cash management style into the firm. This asymmetry suggests that the transfer of managerial style is conservative in nature. Incoming CEOs are more willing to transmit a preference for higher cash holdings, which aligns with precautionary motives and is less likely to be opposed by boards or investors. By contrast, CEOs with a lower cash management style do not significantly reduce firms' cash buffers, likely because cutting liquidity exposes the firm to financing risks and may face resistance from key stakeholders. In other words, style transfer occurs primarily in the upward (more

conservative) direction, reinforcing the notion that cash policy adjustments are asymmetric and cautious. Together, these findings provide evidence for Hypothesis 2A.

2.5.3 Panel data analysis: post-succession

This section explores the firm adjustment process of XCash after succession. As the difference of XCash around the succession is a result of such adjustment, the transfer of management style implies that the post-succession cash policy related to CEOs' previous management style. Besides, in addition to previous analysis, this section also aims to test the effect of the absolute level of CEO experience, rather than the comparative level of experience (Diff).

We follow Lemmon, Roberts, and Zender (2008) to examine whether a CEO's previous XCash level plays a role in the target cash level of the second firm. The basic idea is that the XCash of the second firm after the succession is related to the CEO's prior XCash experience. Here, the average XCash of the first firm is used as the CEO's XCash experience and is named *Referencepoint*. We estimate the following regression:

$$XCash_{i,t} = \alpha + \beta X_{i,t} + \gamma Referencepoint + \sum_n \theta_n Year_n + \epsilon_{i,t} \quad (1.5)$$

Where $XCash_{i,t}$ is the excess cash of firm i at time t ; $X_{i,t}$ is a set of control variables, following Coles, Daniel, and Naveen (2006) and Çolak and Korkeamaki (2021). *Referencepoint* is the average cash level of the previous firms. $\theta_n Year_n$ represents the time fixed effect, and $\epsilon_{i,t}$ is the error term. The *Referencepoint*, which is the average cash level of the old firm for each CEO, is highly correlated with the firm-level fixed effect as

most firms have only one outside succeeded CEO. As a result, the following analysis reports the results of only controlling for the time-level fixed effect, following Lemmon, Roberts, and Zender (2008).

Table 1.6: Panel Regression Model

| | (1) | (2) | (3) | (4) |
|----------------|---------|---------|---------|---------|
| Referencepoint | 0.125* | 0.142* | 0.148* | 0.168* |
| | (0.066) | (0.070) | (0.085) | (0.088) |
| Constant | 0.084 | 0.082** | -0.544 | -0.567 |
| | (0.053) | (0.031) | (0.400) | (0.392) |
| Observations | 839 | 838 | 767 | 766 |
| Control | No | No | Yes | Yes |
| FirmFE | No | No | No | No |
| YearFE | No | Yes | No | Yes |
| Adj R-squared | 0.010 | 0.040 | 0.039 | 0.067 |

This table presents the results of the panel regression by using the post-succession sample, in which the observations are firms that experienced an outside CEO succession in our main sample in the post-succession period. The dependent variable is XCash, which is the difference between the actual cash holdings and the predicted cash holdings at the fiscal year t , following Dittmar and Mahrt-Smith (2007). All variables' definitions are provided in the Appendix. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The regression results from *Equation 1.5* are presented in Table 1.6. Column (1) presents the results without any control variables and fixed effects. Column (2) only controls for year-level fixed effects, while columns (3) and (4) show results with control variables. Column (4) reports results with control variables and year-fixed effects. The coefficient of *Referencepoint* is significant at the 10% level across all specifications. The positive results indicate that the cash experience of a CEO has a positive effect on the future cash level of the second firm. For example, the coefficient of 0.168 (in the last column) implies that a 1 percent increase in the CEO's cash management style will lead to

an increase in the XCash of the second firm by 16.8%, which is also economically significant. Overall, the results suggest that the CEO's cash management style plays an important role in determining the XCash of the second firm.

2.5.4 Dynamic regression analysis

This study also explored the impact of a CEO's cash management style from a dynamic perspective. The aim of this is to further provide a dynamic view of whether mobile CEOs actively adjust the second firms' cash holdings towards their perceived cash level. Following the reference point analysis above, this research expects that the prior XCash experience impacts the CEO's perceived cash level and further affects the target level of XCash of the second firm. Thus, dynamic models are constructed to capture the adjustment process.

We follow Lemmon, Roberts and Zender (2008), Dittmar and Duchin (2010) and Lozano and Duran (2017) and use the system Generalized Method of Moments (GMM)' to exploit differences and levels simultaneously. System GMM allows us to include time-invariant regressors such as the CEO's cash management style according to Roodman (2009). To test if CEOs' cash management style will affect their cash adjustment behavior, this study extends the classic target adjustment of previous studies as follow (e.g., Lintner, 1956; Shyam-Sunder and Myers, 1999; Lemmon, Roberts and Zender, 2008) to explore the hypothesis.

To start with, we assume the target excess cash level for firm i at time t is $XCash^*_{i,t}$. Following the idea that mobile CEOs adjust the cash level of the second firm towards the target cash level, we propose a static target excess cash equation as a function of the reference point as follows:

$$XCash_{i,t}^* = \beta_0 + \beta_k ReferencePoint_k + \epsilon_{i,t} \quad (1.6)$$

where $ReferencePoint_k$ represents the average XCash level of the first firm k , and $\epsilon_{i,t}$ is the error term. Considering that a CEO adjusts the firm's excess cash level towards the target level in a dynamic way, we use a partial adjustment model:

$$XCash_{i,t} - XCash_{i,t-1} = \gamma + \delta(XCash_{i,t}^* - XCash_{i,t-1}) + v_{i,t} \quad (1.7)$$

where $XCash_{i,t}$ is the excess cash of the second firm at time t , and $XCash_{i,t}^* - XCash_{i,t-1}$ represents the remaining proportion to reach the target cash level. As we are also interested in the speed of adjustment (SOA), the equation is reorganized as follows:

$$XCash_{i,t} - XCash_{i,t-1} = \gamma + \delta(\beta_0 + \beta_k ReferencePoint_k + \epsilon_{i,t} - XCash_{i,t-1}) + v_{i,t} \quad (1.8)$$

Rearranging by moving $XCash_{i,t-1}$ from the left-hand side to the right, we get:

$$XCash_{i,t} = (\gamma + \delta\beta_0) + \delta\beta_k ReferencePoint_k + (1 - \delta)XCash_{i,t-1} + (\delta\epsilon_{i,t} + v_{i,t}) \quad (1.9)$$

If $\alpha_0 = \gamma + \delta\beta_0$, $\alpha_k = \delta\beta_k$, $\alpha_1 = 1 - \delta$, and $\omega_{i,t} = \delta\epsilon_{i,t} + v_{i,t}$, we have the basic model as:

$$XCash_{i,t} = \alpha_0 + \alpha_k ReferencePoint_k + \alpha_1 XCash_{i,t-1} + \omega_{i,t}$$

(1.10)

The speed of adjustment in equation (10) is measured as $1 - \alpha_1$, since $\delta = 1 - \alpha_1$. We expect $0 < \alpha_1 < 1$, which implies that the optimal level of excess cash exists, and CEOs adjust the cash level steadily towards the optimal level.

For the selection of instrumental variables for the GMM model, we use all time-varying variables lagged from $t - 1$ to $t - 6$ ($t - 2$ to $t - 7$ for the lag of cash holdings) as instruments, and we use time-invariant variables as strictly exogenous instrument variables that are only estimated in levels. Table 1.7 presents the results of the GMM analysis, estimated according to *Equation 1.10*.

Table 1.7: SOA Basic

| | (1) | (2) | (3) |
|--------------------|----------|-----------|----------|
| SOA | 0.521 | 0.772 | 0.455 |
| L.XCash | 0.479*** | 0.228*** | 0.545*** |
| | (0.084) | (0.048) | (0.097) |
| Reference Point | 0.040 | 0.233** | 0.085 |
| | (0.055) | (0.103) | (0.066) |
| Constant | 0.021 | -0.228*** | 0.067 |
| | (0.056) | (0.064) | (0.235) |
| Observations | 684 | 338 | 346 |
| Prob > F | 0.000 | 0.000 | 0.019 |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| AR1 (p-value) | 0.014 | 0.000 | 0.012 |
| AR2 (p-value) | 0.505 | 0.469 | 0.478 |
| Hansen-J (p-value) | 0.997 | 0.852 | 0.945 |

This table presents the results of the speed of adjustment analysis by using the post-succession sample, in which the observations are firms that experienced an outside CEO succession in our main sample in the post-succession period. The dependent variable is XCash, which is the difference between the actual

cash holdings and the predicted cash holdings at the fiscal year t , following Dittmar and Mahrt-Smith (2007). We include control variables including firm-level control variables for risk and CEO-level control variables. All variables' definitions are provided in the Appendix. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Column (1) shows the results for the full sample, while columns (2) and (3) show the results for the higher and lower cash style groups to demonstrate the heterogeneity of SOA. The coefficients of the lagged excess cash in the first column estimations are positive at the 1% significance level, while the coefficient of the reference point is not significant. This suggests that a CEO actively adjusts their firm's excess cash but not towards the reference point in the entire sample under the dynamic setting. The insignificant coefficient of the reference point can be driven by CEOs with a lower cash management style, as we expect that they do not react to a higher given cash level.

In line with this argument, we show that the coefficients of the reference point and lagged XCash are both significant at the 5% level for the higher cash style group, while the coefficients are both insignificant for the lower cash style group. The results imply that CEOs with a higher cash style actively adjust the cash level towards their perceived cash level, while other CEOs do not. Specifically, the coefficient of 0.233 in column (2) indicates that a one-unit increase in the CEO's cash style will lead to the XCash of the second firm increasing by 23.3%.

The speed of adjustment estimated by GMM is 0.772 ($1 - 0.228$) for the higher cash group, which implies that the CEOs do not fully adjust to the optimal level at once. Instead, CEOs in the sample partially make such adjustments. The SOA suggests that mobile CEOs actively adjust XCash towards the target level, which is influenced by the perceived XCash level. The "half-life" explanation provides an intuitive way to understand this. It implies that a firm would use $\log(0.5)/\log(1 - \text{SOA})$ years to adjust to the target level after

a one-unit shock to $\omega_{i,t}$. In our case, the “half-life” time is around 0.469 years by GMM. Compared to Dittmar’s finding of 1.6 years by the GMM estimator, the “half-life” time for the XCash of higher cash style CEOs is much shorter. This implies that these CEOs more actively adjust excess cash holdings. Moreover, the coefficient of the reference point is significantly positive, indicating that the CEO’s cash management style plays a crucial role in the target cash level.

As shown in Table 1.7, the selection of the time span meets the overidentification and exogenous IV criteria.

2.5.5 PSM-DiD estimation

2.5.5.1 PSM-DiD for the whole sample

The sample used in the baseline regression models only includes firms engaged in the CEO movement cases. To further address the casual relation between the CEO’s past experience and the changes of the XCash policy of the second firm, this section adopts matching and difference in difference methods. This technique effectively controls for unobservable heterogeneity at the firm level (Girma et al., 2004). In our cases, the use of PSM allows us to select control groups with similar firm characteristics to avoid the potential selection bias of the succeeded CEOs.

The purpose of matching is to select a valid control group with similar characteristics to the treated group. Since there are a number of characteristics (e.g., Stock Return, ZScore, industry, year effect) that can be used for matching, this study adopts propensity score matching (PSM) (Rosenbaum and Rubin, 1983) to low the dimension by using the probability of getting the treatment, depended on the pre-succession characteristics. In this

section, we adopt 1 to 3 nearest neighbor PSM. And firms in treated group are exactly matched with firms in the same industry and matched based on the covariants in the fiscal year. The PSM method selects three years average of variables including MTB, Sales, ROA, Stock Return and ZScore, prior to the succession year (t-3, t-2, t-1) as the set of covariant. We select the set of covariant as they have significant impact on the probability of being treated and also have significant effect on XCash as shown in the main regressions above.

Then, the DiD approach is adopted for further analysis. Using DiD can rule out the potential time trend effects that are the same for both the treatment group and control group to isolate the effect of treatment from other unobserved factors. Specifically, this section estimates the following model:

$$\begin{aligned}
 \text{XCash}_{i,t} = & \alpha + \beta_1 \text{Post} + \beta_2 \text{Experience} + \beta_3 \text{Treat} + \beta_4 \text{Post} * \text{Experience} \\
 & + \beta_5 \text{Post} * \text{Treat} + \beta_6 \text{Treat} * \text{Experience} + \beta_7 \text{Post} * \text{Experience} * \text{Treat} \\
 & + \beta_x X_{i,t} + \epsilon_{i,t}
 \end{aligned}
 \tag{1.11}$$

Where *Treat* is a treatment identifier, which is equal to 1 if the firm experienced a CEO turnover in our sample, and 0 otherwise. The coefficient of the triple interaction captures the effect of CEO cash policy transfer. Table 1.8 provides the results of the DiD approach, estimated from *Equation 1.11*.

Table 1.8: PSM-DiD

| | (1) | (2) | (3) | (4) |
|-----------------------|----------|-----|---------|-----|
| Post × Expdum × Treat | 0.743*** | | 0.651** | |
| | (0.247) | | (0.249) | |

| | | | | |
|--------------------|---------------------|---------------------|-------------------|---------------------|
| Post × Expdum | -0.068 (0.126) | | -0.087 (0.133) | |
| Post | 0.113 (0.094) | 0.085 (0.068) | 0.107 (0.102) | 0.070 (0.075) |
| Post × Treat | -0.391** (0.155) | -0.027 (0.112) | -0.236 (0.174) | 0.081* (0.110) |
| Expdum | -0.588* (0.335) | | -0.110 (0.177) | |
| Post × Exp × Treat | | 0.532*** (0.158) | | 0.491*** (0.145) |
| Post × Exp | | -0.083 (0.076) | | -0.093* (0.086) |
| Exp | | -0.198* (0.151) | | -0.036* (0.097) |
| Constant | 0.310* (0.177) | 0.012 (0.030) | 0.243 (0.531) | 0.159* (0.511) |
| Observations | 5521 | 5521 | 5025 | 5025 |
| Control | No | Yes | Yes | Yes |
| FirmFE | Yes | Yes | Yes | Yes |
| YearFE | Yes | Yes | Yes | Yes |
| R-squared | 0.027 | 0.029 | 0.108 | 0.111 |

This table presents the results of the staggered PSM-DiD estimator using the after matched sample, in which the treatment firms are those experienced an outside CEO succession in our main sample and the control firms are matched by using 1 to 3 nearest-neighbor matching. The dependent variable is XCash, which is the difference between the actual cash holdings and the predicted cash holdings at the fiscal year t , following Dittmar and Mahrt-Smith (2007). We include all control variables including firm-level control variables for risk, firm-level control variables for the calculation of XCash, and CEO-level control variables. Firm fixed effect and time fixed effect are controlled in all models. Standard errors are clustered by both firm and year. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Column (1) and column (3) present the result estimated by using dummy as the proxy of CEO cash management style, while column (2) and column (4) use the continuous measurements. Column (1) and column (2) report results without control variables. The coefficients of the triple interaction terms in all columns are significantly positive, suggesting that CEOs' cash management style is positively related to the excess cash level

of the firm. The PSM-DiD design further strengthens the causal interpretation by accounting for selection into treatment, showing that the transfer of cash style is not explained by firm-level heterogeneity but by CEO managerial imprinting.

2.5.5.3 Parallel Trend Test

We then use the dynamic event study methods to test the parallel trend assumption for the DiD estimator and to investigate the dynamics effect of the cash management style transfer following Autor (2003), Green, Heywood, and Navarro (2014), and Braghieri, Levy, and Makarin (2022). Specifically, we estimate the following model:

$$XCash_{i,t} = \alpha_0 + \beta_k \sum_{k=-5}^3 D_{k(i,t)} + \beta_x X_{i,t} + \gamma_i + \delta_t + \epsilon_{i,t} \quad (1.12)$$

Where $XCash_{i,t}$ is the excess cash of the firm i at time t . $D_{k(i,t)}$ is a set of dummy variables equal to one for the treated firms in time t , and 0 otherwise. $X_{i,t}$ is a set of control variables. γ_i and δ_t are firm-level fixed effects and time fixed effects, respectively. We run the model above separately for two subsamples where CEOs have a higher cash management style and a lower cash management style. The following figures show the results.

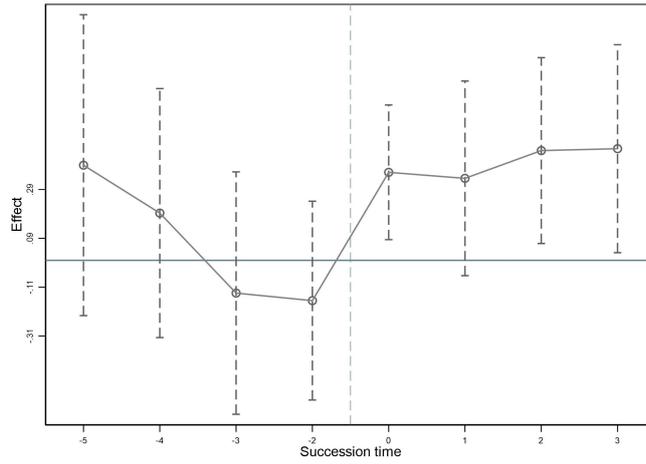


Figure 1.2: Event study for higher cash management style transfer

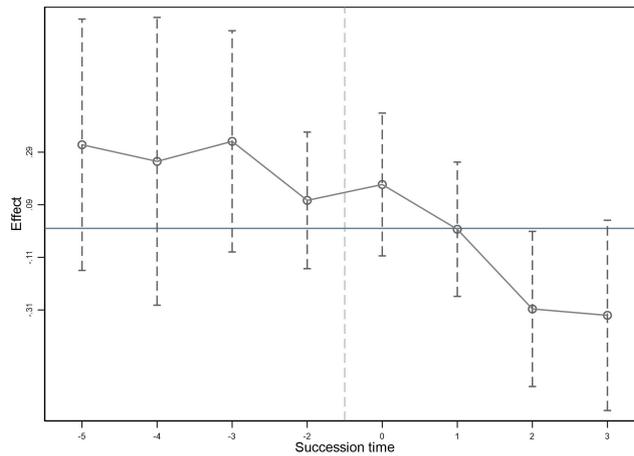


Figure 1.3: Event study for lower cash management style transfer

In Figure 1.2 and Figure 1.3, the Y-axis represents the effect of the treatment in different time periods ($\text{TimeDummy} \times \text{Treat}$) and the X-axis represents the timeline,

where the successions happen at time 0. The reference period selected is one year before the succession ($\beta_{-1} = 0$), to capture the cumulative effect of the policy.

In Figure 1.2, the cumulative effects for the higher cash management style group become significant at the succession year and remain so up to three years after. The positive and persistent cumulative effect indicates that CEOs with stronger cash management preferences successfully transmit their conservative style into firm policy, leading to a sustained increase in liquidity buffers over time. This result is consistent with our baseline DiD estimates and demonstrates not only statistical but also economic significance: the effect accumulates, implying that cash style transfer is not a short-lived adjustment but an enduring shift in firm financial policy.

By contrast, as shown in Figure 1.3, the cumulative effects for the lower cash management style group are mostly insignificant. Although the direction of the effect is negative, the lack of significance suggests that CEOs with lower cash preferences fail to transfer their management style. These findings reinforce our interpretation that style transfer is asymmetric and conservative in nature.

2.5.5.4 Placebo tests

CEO mobility may not be randomly selected (see for instance, Bertrand and Schoar, 2003; Ryan and Wang, 2011). For example, one may argue that firms aiming to build more cash reserves will look for CEOs with higher cash management style and these firms may adjust cash level before the succession. In this case, the coefficient we estimated in DiD setting captures the trend of the changes rather than the effect of CEO succession. To test the robustness of our results, we manually set the counterfactual

succession time at three years before the actual succession year and re-estimate the DiD model. Table 1.9 shows the result of the placebo test.

Table 1.9: Placebo Test

| | (1) | (2) | (3) |
|-------------------------------------|-------------------|-------------------|------------------|
| Post \times Expdum \times Treat | 0.086 (0.334) | | |
| Post \times Expdum | 0.053 (0.144) | | |
| Post \times Treat | 0.071 (0.231) | 0.193 (0.227) | 0.053 (0.227) |
| Post | -0.053 (0.123) | -0.089 (0.095) | 0.004 (0.126) |
| Experience_dum | -0.035 (0.202) | | |
| Constant | 0.231 (0.543) | -0.248 (0.701) | 0.896 (0.771) |
| Observations | 5025 | 2604 | 2419 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| R-squared | 0.103 | 0.137 | 0.078 |

This table presents the results of placebo test. The staggered PSM-DiD estimator uses the after matched sample, in which the treatment firms are those that experienced an outside CEO succession in our main sample and the control firms are matched by using 1 to 3 nearest-neighbor matching. The succession period is manually brought forward to three years before the actual succession. The dependent variable is XCash, which is the difference between the actual cash holdings and the predicted cash holdings at the fiscal year t , following Dittmar and Mahrt-Smith (2007). We include all control variables including firm-level control variables for risk, firm-level control variables for the calculation of XCash, and CEO-level control variables. All variables' definitions are provided in the Appendix. Firm fixed effect and time fixed effect are controlled in all models. Standard errors are clustered by both firm and year. P-value are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Table 1.9, Column (1) presents the results of using the whole sample. The coefficient of triple interaction term is insignificant, showing that the changes in cash

policy is due to CEOs' management transfer rather than firms' actions before the succession. Column (2) and Column (3) show the results by using subsample. The coefficients of Post*Treat are again not significant for both Columns. Thus, the placebo tests support our main results that the changes in XCash are led by CEOs rather than firms.

2.5.6 Robustness Test

2.5.6.1 Alternative measurement of XCash

One may argue that using residual terms to calculate excess cash may raise some concerns. We use an alternative measurement of XCash to replicate the main regression model, following (DeAngelo, DeAngelo and Stulz, 2010). After that, we repeat our analysis in section 5. The following table presents the result.

Table 1.10: DDS XCash Test

| | (1) | (2) | (3) |
|----------------------------|-------------------|---------------------|-------------------|
| Post × Exp_dds_dum × Treat | 0.058* (0.030) | | |
| Post | 0.004 (0.031) | 0.084** (0.036) | -0.006 (0.029) |
| Constant | -0.911 (0.610) | -1.493** (0.623) | 0.071 (0.478) |
| Observations | 847 | 453 | 393 |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Adj R-squared | 0.613 | 0.504 | 0.778 |

This table presents the results of using DDS XCash. The dependent variable is DDS XCash, which is the difference between the actual cash holdings and the median ratio of cash holdings to total assets of firms in the same industry, tercile of total book assets, and tercile of market-to-book value of assets for the year. All

variables' definitions are provided in the Appendix. Firm fixed effect and time fixed effect are controlled in all models. Two-way robust clustered standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Column (1) shows the results of the total sample. Column (2) presents the results for the subsample with the *DDSExperienceDummy* equal to one, while Column (3) presents the results subsample with the *DDSExperienceDummy* equal to zero. As expected, the coefficient triple interaction term are positive and significant, showing that the CEOs with higher cash management style increase more cash level of the firm after succession. Moreover, the results in the last two columns show that there is no evidence that CEOs with lower cash management style (in column (2)), unlike other CEOs (in column (3)), transfer their management style. Overall, the results are in line with our baseline results.

2.6 Conclusion

This study investigates the selective transfer of CEO cash management styles in horizontal job changes, addressing a critical gap in the literature regarding the nuanced dynamics of managerial influence on corporate cash policies. By leveraging a comprehensive CEO-firm match dataset spanning nearly three decades and employing rigorous empirical methods, we provide robust evidence that CEOs with a higher cash management style actively impose their preferences on the second firm, leading to an upward adjustment in excess cash reserves. In contrast, CEOs with a lower cash management style exhibit minimal influence, adhering instead to the pre-existing cash policies of their new firms.

Our findings highlight that the transfer of CEO management style is not uniform but conditional, depending on the CEO's propensity for cash management in their prior roles. This conditional persistence challenges the assumption of consistent management style

transfer and underscores the selective nature of managerial influence. The results indicate that higher cash style CEOs prioritize achieving a “safe zone” by increasing cash reserves, reflecting a conservative and proactive approach. Conversely, lower cash style CEOs display a passive stance, signaling satisfaction with the existing cash policy of their new organizations.

Further, the dynamic partial adjustment model reveals that CEOs actively adjust cash levels toward a perceived target, with the speed of adjustment (SOA) providing insights into the intensity of managerial influence. Notably, the adjustment is more rapid when addressing cash deficiencies compared to cash surpluses, suggesting that CEOs prioritize mitigating shortfalls over reducing excess reserves. This finding reinforces the argument that excess cash, being at the CEO’s discretion, serves as a critical lever for managerial decision-making.

The robustness test enhances the reliability of these conclusions. By employing propensity score matching, difference in differences (DiD) analysis, placebo tests, and robustness checks, we address potential endogeneity concerns and ensure that observed effects are attributable to CEO management style transfer rather than firm-level factors or pre-succession policies. Alternative measurements of excess cash and heterogeneous DiD approaches further corroborate the findings.

This research contributes to the literature on managerial styles and corporate policies by offering novel insights into the conditional nature of management style transfer in horizontal CEO transitions. It advances the understanding of how individual managerial characteristics interact with organizational contexts to shape firm outcomes. For practitioners, the results emphasize the strategic importance of aligning CEO characteristics with organizational priorities during succession planning. Future studies

may explore how external factors, such as industry conditions or board dynamics, mediate the selective transfer of management styles.

In conclusion, this study illuminates the complex interplay between CEO mobility and corporate cash management, demonstrating that successor CEOs selectively and conservatively influence their new firms' policies based on their inherent management styles. These findings pave the way for further exploration of conditional managerial impacts in other facets of corporate decision-making.

The second empirical chapter: Global connectedness and cross-border M&A

3.1 Introduction

Although the shock by COVID-19 and recent geopolitical risks such as the Russia-Ukraine war and Israeli–Palestinian conflict, the trend of globalization has no sign of stopping and into the reverse according to the recent DHL Global Connectedness Report 2024 ². Besides, cross-border M&A deals constitute more than 30% of M&A deals, with the number reaching 9,100 in 2022. Although previous studies have explored how international activities affect cross-border deals, a more generalized view of the effects of a country’s global connectedness is still unknown. Motivated by this, we contribute to this ongoing literature by providing a wider view that countries’ global connectedness can affect their cross-border acquisition activities.

To assess the relationship between a country’s and cross-border acquisition activity, we construct a sample of 48 countries from 2002-2021 on both the country-year level and country-pair-year level. We obtain the cross-border M&A deals information from the Securities Data Company (SDC) Platinum database. To measure global connectedness, we obtain the DHL Global Connectedness Index 2022 by Altman and Bastian (2023). The index is the weighted average of four pillars trade, information, people and capital from two dimensions depth and breadth. Besides, we also use pillar level and dimension level data to explore which perspective of a country’s globalization drives cross-border acquisition activities.

We begin our empirical analysis on country-year level data and assess the impact of a country’s global connectedness on the total number of cross-border deals. Particularly, we estimate the sum of outbound deals number and inbound deals number announced in year $t+1$ as a function of GCI as well as firm– and macroeconomic–level controls in year t .

² see., <https://www.dhl.com/global-en/delivered/global-trade/global-connectedness-report.html>

Furthermore, we also examine the effects of each pillar and dimensions to explore which specific components drives the international acquisition activities. The results suggest that the aggregate index is positively related to the number of crossborder deals, no matter whether the *capital* pillar is included. Regarding the specific pillars, trade has a positive effect on the number of deals even if the trade-to-GDP is controlled. This result suggests that the breadth level of international flows also plays an important role in cross-border acquisition marketing, contributing to the previous literature that mostly focuses on depth. We find that information connectedness has significantly positive effects on the number of deals. This result implies that the telephone and internet connectedness to the world provides the information transition channel and help to reduce the information asymmetry between countries. We find no evidence that international people flows can explain the cross-border acquisition activities. The results are in line with Aleksanyan et al. (2021) and Nitsch (2007) that the tourist flow cannot directly affect the cross-border deals number. For completeness, we also examine the effect of capital and find that capital has a positive effect on the deals number.

We then extend our analysis on the country-pair level by estimating a gravity model. The results indicates that the connectedness between two countries are positively related to the number of deals between two countries, in line with the results on country-year level. However, the results might be driven by other omitted confounding factors. To address concerns regarding endogeneity, we employ an instrumental variable (IV) two-stage approach. Specifically, we use the average popularity of the two countries, measured by their average connectedness with other countries, drawing on the methodology of "common friends" proposed by Jochmans and Verardi (2019). The basic idea of the "common friends" is that if two countries has more common friends, they are more likely friends with each other, indicating that the instrument is likely to meet the relevance criterion for instrumental variables. Moreover, the acquisition decisions are unlikely to be

directly related to the connections with other countries. The IV estimation results suggests that our findings are robust after alleviating concerns of endogeneity bias.

We further address the potential issues of omitting variables on country-year level. Although we controlled for macroeconomic level factors and country and year level fixed effects, the impact of connectedness can be alternatively explained by omitted factors of economic outlook enhancements. The increase of a country's economic outlook, for example, due to an open economic policy, could both increase a country's global connectedness as well as the number of cross-border acquisitions. If the the omitted factors of economics outlook plays a role in our analysis, we can expect the number of domestics acquisition deals also increase lead by the increasing in GCI. However, we did not find evidence that GCI are related to domestic deals, suggesting that the alternative channel can be ruled out.

Although the IV approach addresses endogeneity concerns, we conduct two additional tests to further alleviate these concerns as supplements. First, we treat the ChinaUS trade war as an exogenous shock and tests whether the cross-border deals between China and the United State are affected due to the trade war by using the difference-indifference (DiD) methods. The results show that the cross-border deals between China and USA significantly declines during the trade war compared to control groups. Secondwe conduct a granger test to show that there are no reverse causality issue in our estimations. The results support our predictions.

The pillars of the GCI were impacted differently during the COVID-19 pandemic. We further examine the role of these pillars during the period of restricted international flows to determine whether they play different roles under such conditions. Specifically,

trade and people flow, which require physical contact, were the most affected, while information and capital flows continued to grow during the COVID-19 pandemic.

Next, we investigate the quality of the cross-border acquisitions. According to empire building theory (e.g., Duchin and Schmidt (2013) and Jensen (1986)), managers have incentive to expand their firms beyond the optimal size. A higher GCI between countries, which reflects lower information asymmetry, facilitates managers in completing international deals. Consequently, we hypothesize that a higher GCI is associated with lower-quality deals. Our findings support this hypothesis, showing that higher GCI between countries is linked to lower combined cumulative abnormal returns (CAR), lower acquirer CAR, higher target CAR, and higher premiums paid. These results suggest that CEOs are more inclined to complete international deals with familiar countries, by offering higher premiums. Overall, the evidence aligns with the predictions of empire-building theory. We did not observe the GCI has long-term effects on post-merger performance, suggesting that the market is efficient on the factors.

A set of robustness tests are conducted. First, we exclude the USA related cross-border deals since they consist of around 20% total deals in the sample. Secondly, we apply the Poisson Pseudo Maximum Likelihood (PPML) methods and re-estimate the baseline regression to address the concerns of the log of 1 plus issue Cohn, Liu, and Wardlaw (2022).

Our study offers novel contributions to two key streams of literature. First, this study contributes the research in globalization and openness in economic growth from a micro-perspective (e.g., Fischer (2003), Norback and Persson (2008), and Grossman and Helpman (2015)). We extensively examine four perspectives of globalization and two dimensions and provide views of how pillars of globalization affect decision making of

cross-border activities. The results address that not only trade but also information globalization play critical roles in international activities. Besides, we also contribute to previous studies by addressing the importance of breadth dimension (especially for the trade) in cross-border acquisitions. These findings provide valuable insights into the mechanisms through which globalization shapes corporate strategies.

Second, this study also contributes to the determinants of cross-border M&A. Previous studies suggest that financial market size (Di Giovanni 2005), tax rates (Froot and Stein 1991), culture values (Ahern, Daminelli, and Fracassi 2015), laws and regulation (Rossi and Volpin 2004; Bris and Cabolis 2008), geography (Erel, Liao, and Weisbach 2012), bilateral trade (Erel, Liao, and Weisbach 2012), political uncertainty (Cao, Li, and Liu 2019; Gavriilidis et al. 2019; Aleksanyan et al. 2021) plays important roles in cross-border deals in addition to the other common used variables in gravity model. Examining the relationship between globalization and mergers and acquisitions (M&As) is crucial, as acquisition activity plays a key role in promoting economic growth and increasing firm value.

3.2 Literature review

Cross-border mergers and acquisitions (CBM&As) are essential to global economic integration, allowing firms to expand their geographic scope, access new markets, and leverage synergies across borders. The rich literature on CBM&As investigates the factors influencing these transactions, including governance quality, institutional frameworks, macroeconomic and financial stability, cultural and geographic proximity, valuation dynamics, political uncertainty, and networking opportunities. Together, these studies offer valuable insights into the drivers of cross-border M&A activity, outcomes, and

resilience to external shocks, forming the foundation for understanding global connectedness.

3.2.1 Governance, institutions and ownership

Governance and institutional quality are critical determinants of cross-border M&A activity, shaping both the volume and outcomes of these transactions. Bris and Cabolis (2008) highlight that CBM&As act as governance shifts, as target firms adopt the acquirer's governance systems post-acquisition. Their findings reveal that acquirers from countries with stronger shareholder protections and accounting standards achieve higher merger premiums, suggesting governance asymmetries as key value drivers. Rossi and Volpin (2004) address that acquirers often target firms in weaker governance environments, motivated by the opportunity to enhance governance quality and streamline operations. Further, Starks and Wei (2013) explore the relationship between governance quality and transaction structure. They find that acquirers from weaker governance regimes must compensate target shareholders with higher premiums, particularly in stock-based transactions, to mitigate concerns about reduced protections post-merger. Ferreira, Massa, and Matos (2010) emphasize the role of foreign institutional investors in bridging governance gaps, particularly in countries with weaker institutional frameworks. These investors reduce transaction costs, enhance deal success rates, and increase the probability of full ownership, positioning them as critical facilitators of cross-border M&A activity. These findings resonate with our study's focus on governance quality as a pillar of global connectedness, illustrating how governance asymmetries influence cross-border deal-making. Ferreira, Massa, and Matos (2010) highlight the role of foreign institutional investors in bridging governance and informational gaps, particularly in weaker institutional environments. These findings underscore the importance of relational

networks in fostering international transactions and align with our exploration of global connectivity as a facilitator of cross-border deal-making activity.

3.2.2 Cultural differences

Cultural differences significantly influence cross-border M&A success. Ahern et al. (2015) argue that cultural distance, particularly in trust and individualism, reduces synergy gains and raises integration costs, creating substantial barriers to successful cross-border integration. Cultural proxies such as language and religion influence institutional frameworks and creditor rights enforcement. They show that these cultural differences indirectly shape cross-border M&A activity by affecting the institutional landscape in which transactions occur. However, contrasting perspectives view cultural differences as opportunities rather than obstacles. Chakrabarti, Gupta-Mukherjee, and Jayaraman (2009) and Morosini, Shane, and Singh (1998) posit that cultural diversity can foster complementary routines, perspectives, and capabilities, enhancing cross-border M&A performance. This positive impact is particularly evident when acquirers hail from stronger economies, enabling them to capitalize on the diversity introduced by cultural differences. These findings underscore the dual role of cultural distance as both a challenge and an enabler of value creation in cross-border M&As.

3.2.3 Political, regulatory, and policy uncertainty

Political and regulatory uncertainty is a key deterrent to cross-border M&A activity. Aleksanyan et al. (2021) highlights how state visits can promote cross-border acquisitions by fostering business networks and reducing cultural and informational barriers, suggesting that diplomatic engagement mitigates the adverse effects of political uncertainty. Similarly, Cao, Li, and Liu (2019) show that political instability in host

countries deters inbound acquisitions, as foreign investors face heightened risks of expropriation, regulatory changes, and unpredictability. Conversely, firms in politically uncertain home countries often pursue outbound deals in stable or cooperative markets, emphasizing the importance of geopolitical stability in shaping cross-border strategies. Aleksanyan et al. (2021) demonstrates that state visits foster cross-border deal activity by facilitating business relationships and addressing cultural and informational barriers. Similarly, Li, Xia, and Lin (2017) argue that legitimacy concerns among host-country stakeholders, mediated by theorization from regulatory agencies, affect acquisition success. State-owned foreign firms face lower completion rates and longer deal durations due to higher legitimacy thresholds. Firm-specific factors, such as target public status, R&D alliances, and acquirer experience, can moderate these effects, highlighting legitimacy's critical role in cross-border acquisitions.

Nationalist economic policies add another layer of the explanatory factors. Serdar Dinc and Erel (2013) document how nationalist governments deter foreign acquisitions to maintain domestic ownership, suppressing immediate cross-border deal activity and discouraging future foreign bids. Bonaime, Gulen, and Ion (2018) Bonaime, Gulen, and Ion (2018) focus on policy uncertainty, finding that it discourages irreversible deals, increases negotiating power for targets, and results in higher premiums and termination fees. These findings align with our study's analysis of external shocks, such as geopolitical tensions and the COVID-19 pandemic, illustrating how political uncertainty affects cross-border M&A activity. Lee examines the impact of political uncertainty on bargaining outcomes, using national elections as a measure. The study finds that political uncertainty shifts bargaining power toward foreign acquirers, who secure more favorable outcomes by demanding compensation for risk, leaving target firms with a smaller share of acquisition gains.

3.2.4 Macroeconomic conditions

Macroeconomic conditions and financial market dynamics play a critical role in shaping cross-border M&A activity. Harford (2005) identifies liquidity as a key driver of merger waves, finding that sufficient capital availability amplifies the effects of economic, regulatory, and technological shocks, clustering merger activity over time. His findings emphasize the importance of macro-level liquidity conditions in driving industry-level cross-border M&A activity. Di Giovanni (2005) and Uddin and Boateng (2011) highlight the role of GDP, exchange rates, and stock market performance in facilitating cross-border deals. Their findings reveal that macroeconomic stability and financial development are crucial enablers of international transactions, particularly in well-developed markets.

Valuation dynamics provide another lens for understanding cross-border M&A activity. Shleifer and Vishny (2003) and Rhodes–Kropf, Robinson, and Viswanathan (2005) argue that valuation mispricing, particularly firm-specific deviations from industry norms, drives mergers. Their findings highlight how short-term valuation discrepancies influence the timing and structure of transactions, with overvalued firms more likely to engage in acquisitions using stock as payment. Markides and Ittner (1994) explores these insights to international acquisitions, showing that the value creation potential of cross-border deals depends on macroeconomic conditions, industry competitiveness, and the acquirer’s prior international experience. These findings complement Rhodes–Kropf, Robinson, and Viswanathan (2005), who decompose valuation effects into firm-specific, sector-wide, and long-run components, emphasizing the role of short-term mis-valuations in driving M&A behavior. These findings connect to our study’s focus on how information flows within global connectedness reduce valuation uncertainties, potentially improving the efficiency and success rates of cross-border transactions.

3.2.5 Gravity model factors

Gravity models provide a robust framework for analyzing cross-border M&A flows. Frankel and Romer (1999) demonstrate how geographic characteristics influence trade, offering instrumental variables for identifying causal relationships. Erel, Liao, and Weisbach (2012) extend the gravity model to M&As, finding that geographic proximity, bilateral trade, and accounting quality are critical determinants of cross-border deal activity. These models align with our study's approach of examining trade and information flows as determinants of cross-border M&A activity within the global connectedness framework. Geographic proximity complements cultural alignment in shaping cross-border acquisitions. Uysal, Kedia, and Panchapagesan (2008) find that local acquisitions generate significantly higher acquirer returns, driven by the informational advantages and reduced costs associated with physical proximity. Erel, Liao, and Weisbach (2012) extend these findings by demonstrating the importance of geographic proximity and bilateral trade in facilitating cross-border M&A activity. These insights align with our exploration of trade and information flows as dimensions of global connectedness, emphasizing proximity's role in enabling international transactions.

3.2.6 Information transaction on cross-border M&A

Portes and Rey (2005) exams bilateral cross-border equity flows, emphasize the role of information and transaction efficiency in shaping international financial transactions. Using a gravity model, they demonstrate that gross equity transaction flows are driven by the market size of both source and destination countries, trading costs, and informational frictions. Geographic distance acts as a proxy for information costs, while explicit measures of information transmission and asymmetry reveal the critical role of the "geography of information" in determining transaction patterns. Their findings show

limited support for the diversification motive in equity transactions, suggesting that informational frictions and transaction technology are far more influential. These results provide a compelling parallel to cross-border M&As, where information asymmetries similarly shape transaction volumes and outcomes. Both studies highlight the importance of economic links and information flows in shaping transaction patterns, offering valuable lessons for understanding the determinants of cross-border M&A activity. The findings on informational frictions emphasize the role of transparency and efficiency in facilitating international transactions.

3.2.7 Long-term performance and value creation

The long-term performance of cross-border acquisitions remains a contested area. Chakrabarti, Gupta-Mukherjee, and Jayaraman (2009) and Morosini, Shane, and Singh (1998) argue that culturally diverse mergers can achieve superior long-term performance when synergies emerge from complementary routines and perspectives. Conversely, Denis, Denis, and Yost (2002) caution that global diversification often reduces excess value, as the costs of managing international operations outweigh the benefits. Markides and Ittner (1994) find that international acquisitions generally enhance shareholder value, but the extent of value creation depends on deal characteristics, acquirer experience, and macroeconomic conditions. These findings resonate with our study's focus on balancing cross-border deal volume and quality, emphasizing the importance of strategic alignment in achieving long-term success.

3.2.8 Trade and cross-border M&A

Harford, Schonlau, and Stanfield (2019) highlights the importance of economic links created through supplier-customer relationships in determining firm behavior and market

dynamics. The research shows that significant trade relationships and indirect economic connections influence which firms are more likely to be involved in acquisitions and which pairs are more likely to merge. Firms with major trade relationships exhibit a lower propensity to acquire or be acquired by firms outside those relationships. This finding underscores the role of pre-existing economic ties in shaping acquisition activity and suggests that trade relationships provide a structural framework for evaluating merger potential and impact. These insights are particularly relevant when comparing domestic firm-level trade dynamics to the broader scope of cross-border M&As, as they illustrate the importance of relationship-specific synergies in merger decisions.

This extensive body of literature highlights the multifaceted factors driving cross-border M&A activity, including governance, cultural alignment, macroeconomic stability, valuation dynamics, political uncertainty, and networking opportunities. Our study integrates these insights by framing global connectedness as a comprehensive framework encompassing trade, information, capital, and people flows. By analyzing these dimensions, we extend existing research to provide a deeper understanding of how globalization affects cross-border M&A volume and quality. This integrative approach bridges gaps in the literature, emphasizing the interconnected nature of globalization dimensions in shaping cross-border M&A activity and economic integration.

3.2.9 Empire building theory

Empire building theory explains acquisitions as outcomes of managerial agency problems in which executives derive private benefits from operating larger, more complex firms, even when expansion does not maximize shareholder value (Jensen, 1986; Morck, Shleifer, and Vishny, 1990). In mergers and acquisitions this perspective predicts value-diluting bids, higher offer premiums, and weaker bidder or combined announcement

returns, especially when constraints on doing deals are light and managerial discretion is high (Harford, 1999; Masulis, Wang, and Xie, 2007; Duchin and Schmidt, 2013). We bring this logic to the cross-border setting by using country-pair connectedness as a friction channel. A higher Global Connectedness Index lowers information asymmetry and execution costs across borders, enlarges the feasible set of targets, and makes it easier for managers to justify and close deals with familiar countries. The mechanism emphasizes deal incidence and terms rather than post-merger operating efficiency, so it allows muted long-run performance effects even when announcement-window outcomes show value transfer to targets.

We rely on empire building rather than competing explanations because it maps directly to our source of variation and to our outcome mix. Hubris and overconfidence theories focus on belief errors tied to manager traits and do not imply systematic covariation with country-pair connectedness; they more often predict persistent underperformance after mergers, which we do not observe (Roll, 1986; Malmendier and Tate, 2008). Synergy and resource-based views would forecast higher deal quality when connectedness is high, since information transfer and integration should improve. Market-timing stories center on misvaluation and payment method, with no clear directional link to connectedness. Empire building uniquely predicts that easing cross-border frictions relaxes constraints on value-reducing expansion and yields higher premiums with weaker bidder and combined CARs, which is the pattern our evidence supports.

3.3 Sample, data, and measure of global connectedness

To investigate cross-border acquisition activity, we start with all completed cross-border M&A with deal values no less than \$1 million from 2002 to 2021 where more than 50% of the target firm is acquired from the Securities Data Company (SDC) Platinum

database. Following Ahern, Daminelli, and Fracassi (2015), we exclude government entities but place no restrictions on public status to include a more completed sample. We also collect the percentage of cash payments, industry classification, acquisition techniques, and other deal-level data from SDC. We also do not put restrictions on countries due to some countries will be excluded due to missing other country-level data.

We then collect macroeconomic level data including GDP, trade-to-GDP, and GDP growth from World Development Index (WDI), corporate tax rate from OECD, and other gravity variables from the CEPII database including the common language, same religion, shared border, distance, bilateral investment treaty, and others. We also calculated culture distance using the Euclidian formula based on Hofstede's four culture dimensions (individualism, uncertainty avoidance, power distance, and future orientation). All definitions of variables are provided in the Appendix. After merging the initial sample with controls, our final sample includes 70,028 cross-border M&A deals by 48 countries, with an average value of \$23.75 billion per country each year. Since the GCI measures a countries connectedness to the rest of worlds, we construct our country-year level sample by calculating total outbound and inbound deals of the 48 countries to all other countries in the world. While the country-pair level GCI measures the connectedness between two countries, the country-pair year level sample includes deals within 48 countries with a total number deal at 31,218. Panel A of Table 2.1 presents the total number of deals of the 48 countries to all other countries in the world, while Panel B of Table 2.1 shows the number of outbound deals between countries³.

³ In panel B, the outbound deals are made from the countries in the first columns to the countries in the first row.

Table 2.1 Trade relations between countries

| Panel A. Total number of deals between the country to the rest of world | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----|------|-----|-----|------|------|-----|------|-----|-----|------|-----|------|-----|------|------|-----|------|-----|-----|-----|------|------|-----|------|------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|-------|
| ISO | ARG | AUS | AUT | BRA | CAN | CHE | CHL | CHN | COL | CZE | DEU | DNK | ESP | FIN | FRA | GBR | GRC | HKG | HRV | HUN | IDN | IND | IRL | ISR | ITA | JPN | KOR | LTU | LVA | MAR | MEX | MYS | NLD | NOR | NZL | PAK | PER | PHL | POL | PRT | RUS | SGP | SVK | SWE | THA | TUR | URY | USA |
| Number | 292 | 3402 | 439 | 734 | 5690 | 1165 | 329 | 3239 | 299 | 258 | 3244 | 813 | 1844 | 750 | 2700 | 8717 | 214 | 2902 | 29 | 122 | 386 | 1127 | 1086 | 669 | 1398 | 1451 | 846 | 74 | 46 | 36 | 550 | 691 | 2023 | 991 | 603 | 30 | 226 | 144 | 572 | 319 | 500 | 2038 | 58 | 1989 | 269 | 324 | 57 | 14343 |
| Panel B. Outbound number of deals within 48 countries | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARG | 0 | 0 | 0 | 9 | 0 | 0 | 3 | 2 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| AUS | 6 | 0 | 2 | 20 | 119 | 9 | 28 | 31 | 9 | 4 | 41 | 13 | 19 | 7 | 18 | 222 | 1 | 39 | 0 | 1 | 27 | 15 | 10 | 8 | 9 | 12 | 11 | 0 | 0 | 0 | 7 | 21 | 16 | 11 | 250 | 0 | 9 | 14 | 8 | 2 | 3 | 48 | 2 | 12 | 5 | 3 | 0 | 462 |
| AUT | 3 | 5 | 0 | 2 | 4 | 3 | 0 | 2 | 0 | 7 | 47 | 1 | 5 | 2 | 4 | 7 | 0 | 0 | 0 | 7 | 0 | 1 | 3 | 1 | 11 | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 5 | 1 | 1 | 0 | 0 | 0 | 18 | 1 | 5 | 2 | 4 | 6 | 1 | 6 | 0 | 19 |
| BRA | 26 | 4 | 1 | 0 | 6 | 3 | 7 | 1 | 9 | 0 | 1 | 1 | 2 | 0 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 5 | 0 | 4 | 3 | 0 | 0 | 6 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 30 |
| CAN | 41 | 147 | 4 | 61 | 0 | 21 | 38 | 41 | 49 | 4 | 73 | 10 | 27 | 16 | 43 | 235 | 2 | 29 | 0 | 1 | 4 | 11 | 22 | 23 | 8 | 4 | 6 | 3 | 0 | 1 | 116 | 4 | 42 | 15 | 20 | 0 | 61 | 5 | 7 | 5 | 6 | 13 | 1 | 25 | 0 | 6 | 2 | 2195 |
| CHE | 4 | 19 | 11 | 16 | 25 | 0 | 2 | 7 | 7 | 4 | 71 | 7 | 22 | 8 | 42 | 59 | 2 | 5 | 0 | 1 | 2 | 5 | 8 | 5 | 20 | 5 | 6 | 0 | 0 | 0 | 1 | 3 | 19 | 5 | 2 | 2 | 2 | 1 | 5 | 3 | 8 | 3 | 2 | 18 | 0 | 4 | 1 | 179 |
| CHL | 11 | 1 | 0 | 22 | 2 | 0 | 0 | 0 | 23 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9 | |
| CHN | 6 | 74 | 5 | 10 | 52 | 14 | 5 | 0 | 2 | 3 | 43 | 6 | 14 | 6 | 34 | 49 | 1 | 320 | 0 | 2 | 5 | 2 | 3 | 12 | 35 | 32 | 19 | 0 | 1 | 0 | 4 | 12 | 24 | 7 | 8 | 2 | 4 | 0 | 3 | 1 | 3 | 55 | 1 | 7 | 7 | 4 | 2 | 165 |
| COL | 4 | 0 | 0 | 5 | 3 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | |
| CZE | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 2 | 0 | 9 | 0 | 0 | 2 | 0 | 2 |
| DEU | 1 | 41 | 42 | 9 | 11 | 46 | 3 | 19 | 3 | 14 | 0 | 22 | 52 | 15 | 92 | 149 | 4 | 4 | 0 | 8 | 2 | 19 | 18 | 8 | 38 | 9 | 8 | 2 | 1 | 1 | 6 | 3 | 63 | 17 | 2 | 0 | 0 | 1 | 42 | 8 | 4 | 10 | 3 | 46 | 1 | 13 | 1 | 229 |
| DNK | 0 | 3 | 1 | 1 | 8 | 8 | 0 | 6 | 0 | 2 | 28 | 0 | 6 | 13 | 12 | 28 | 1 | 4 | 0 | 0 | 0 | 4 | 4 | 2 | 9 | 2 | 2 | 1 | 3 | 0 | 1 | 0 | 12 | 23 | 1 | 0 | 1 | 0 | 13 | 1 | 1 | 4 | 0 | 52 | 0 | 1 | 0 | 53 |
| ESP | 11 | 5 | 2 | 34 | 8 | 5 | 19 | 3 | 12 | 4 | 24 | 1 | 0 | 3 | 51 | 47 | 1 | 3 | 0 | 1 | 0 | 7 | 2 | 1 | 50 | 4 | 3 | 0 | 0 | 3 | 24 | 0 | 14 | 3 | 0 | 0 | 8 | 0 | 12 | 64 | 0 | 2 | 0 | 10 | 0 | 2 | 9 | 87 |
| FIN | 0 | 7 | 2 | 4 | 4 | 3 | 0 | 6 | 0 | 2 | 27 | 17 | 1 | 0 | 10 | 22 | 0 | 2 | 0 | 0 | 0 | 7 | 1 | 0 | 8 | 0 | 1 | 5 | 2 | 0 | 1 | 2 | 14 | 35 | 1 | 0 | 0 | 4 | 0 | 10 | 2 | 3 | 75 | 1 | 3 | 2 | 35 | |
| FRA | 2 | 24 | 6 | 36 | 32 | 26 | 5 | 26 | 5 | 5 | 102 | 10 | 103 | 10 | 0 | 134 | 6 | 7 | 1 | 5 | 2 | 27 | 14 | 10 | 87 | 10 | 14 | 1 | 0 | 4 | 7 | 1 | 56 | 10 | 3 | 0 | 1 | 0 | 16 | 20 | 5 | 11 | 1 | 22 | 0 | 9 | 0 | 248 |
| GBR | 17 | 242 | 18 | 45 | 150 | 52 | 16 | 56 | 10 | 30 | 342 | 63 | 183 | 43 | 271 | 0 | 12 | 36 | 1 | 13 | 12 | 46 | 175 | 28 | 162 | 16 | 22 | 3 | 1 | 5 | 18 | 12 | 229 | 83 | 26 | 2 | 5 | 3 | 68 | 34 | 31 | 29 | 4 | 133 | 8 | 26 | 1 | 1353 |
| GRC | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 6 | 0 | 13 |
| HKG | 3 | 86 | 2 | 16 | 37 | 14 | 0 | 1095 | 1 | 0 | 18 | 2 | 5 | 4 | 9 | 78 | 0 | 0 | 0 | 0 | 0 | 29 | 5 | 0 | 3 | 10 | 39 | 40 | 0 | 0 | 4 | 40 | 8 | 3 | 15 | 2 | 5 | 9 | 3 | 3 | 4 | 95 | 0 | 6 | 15 | 0 | 1 | 106 |
| HRV | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| HUN | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 2 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | |
| IDN | 0 | 11 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 2 | 0 | 0 | 1 | | |
| IND | 1 | 19 | 1 | 11 | 14 | 13 | 3 | 6 | 1 | 8 | 26 | 3 | 5 | 6 | 21 | 71 | 0 | 0 | 0 | 0 | 14 | 0 | 4 | 4 | 12 | 5 | 4 | 0 | 0 | 0 | 4 | 7 | 11 | 3 | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 26 | 0 | 3 | 4 | 2 | 0 | 193 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|-----|----|-----|------|-----|----|-----|----|----|-----|-----|-----|-----|-----|------|----|-----|---|----|----|-----|-----|-----|-----|----|----|---|---|---|-----|-----|-----|-----|----|---|----|----|----|----|----|----|---|-----|----|----|-----|-----|---|---|
| IRL | 0 | 12 | 1 | 3 | 19 | 1 | 0 | 10 | 2 | 3 | 27 | 5 | 10 | 3 | 16 | 204 | 2 | 2 | 0 | 0 | 0 | 4 | 0 | 5 | 9 | 6 | 1 | 0 | 0 | 1 | 5 | 3 | 23 | 2 | 0 | 0 | 1 | 0 | 4 | 2 | 1 | 3 | 0 | 9 | 0 | 2 | 0 | 167 | | |
| ISR | 1 | 1 | 1 | 3 | 8 | 7 | 0 | 2 | 0 | 0 | 24 | 3 | 13 | 3 | 13 | 30 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 9 | 4 | 2 | 0 | 1 | 0 | 3 | 0 | 6 | 2 | 2 | 0 | 1 | 0 | 6 | 0 | 2 | 2 | 0 | 1 | 2 | 1 | 0 | 162 | | |
| ITA | 6 | 11 | 5 | 17 | 9 | 21 | 5 | 10 | 1 | 6 | 41 | 6 | 39 | 0 | 61 | 65 | 12 | 0 | 1 | 1 | 0 | 6 | 5 | 0 | 0 | 2 | 1 | 0 | 0 | 6 | 0 | 18 | 3 | 1 | 0 | 0 | 0 | 13 | 6 | 9 | 5 | 1 | 5 | 1 | 9 | 0 | 68 | | | |
| JPN | 2 | 63 | 3 | 16 | 21 | 14 | 4 | 36 | 0 | 4 | 34 | 7 | 9 | 7 | 20 | 86 | 1 | 20 | 0 | 0 | 30 | 36 | 4 | 2 | 20 | 0 | 42 | 0 | 0 | 0 | 3 | 32 | 19 | 2 | 5 | 0 | 0 | 8 | 1 | 2 | 5 | 59 | 0 | 8 | 21 | 16 | 1 | 311 | | |
| KOR | 1 | 8 | 2 | 5 | 16 | 2 | 0 | 61 | 0 | 4 | 10 | 1 | 4 | 1 | 13 | 23 | 0 | 17 | 0 | 0 | 16 | 11 | 3 | 1 | 6 | 24 | 0 | 0 | 0 | 0 | 5 | 6 | 2 | 1 | 2 | 1 | 1 | 3 | 3 | 5 | 10 | 1 | 0 | 6 | 5 | 0 | 131 | | | |
| LTU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | | |
| LVA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | |
| MAR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| MEX | 9 | 0 | 0 | 18 | 6 | 0 | 3 | 0 | 12 | 0 | 1 | 0 | 15 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 4 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 49 | | | |
| MYS | 0 | 29 | 0 | 2 | 3 | 3 | 1 | 22 | 0 | 0 | 6 | 0 | 3 | 0 | 0 | 19 | 0 | 23 | 0 | 0 | 53 | 9 | 1 | 0 | 2 | 4 | 2 | 0 | 1 | 1 | 0 | 0 | 6 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 78 | 0 | 0 | 17 | 2 | 0 | 9 | | |
| NLD | 1 | 14 | 7 | 13 | 24 | 10 | 1 | 14 | 2 | 12 | 80 | 16 | 29 | 16 | 68 | 114 | 5 | 7 | 1 | 6 | 7 | 10 | 9 | 5 | 27 | 6 | 12 | 1 | 1 | 0 | 11 | 10 | 0 | 14 | 3 | 4 | 1 | 1 | 31 | 6 | 25 | 11 | 4 | 37 | 0 | 26 | 0 | 134 | | |
| NOR | 0 | 8 | 2 | 10 | 10 | 7 | 3 | 1 | 0 | 2 | 24 | 49 | 20 | 23 | 16 | 53 | 2 | 1 | 0 | 1 | 0 | 3 | 3 | 0 | 8 | 2 | 3 | 4 | 0 | 1 | 0 | 0 | 10 | 0 | 2 | 0 | 1 | 0 | 8 | 1 | 2 | 5 | 0 | 112 | 0 | 3 | 0 | 49 | | |
| NZL | 0 | 91 | 0 | 0 | 4 | 2 | 1 | 3 | 0 | 0 | 2 | 2 | 1 | 0 | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 35 | | |
| PAK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | |
| PER | 3 | 0 | 0 | 0 | 5 | 0 | 13 | 0 | 10 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | |
| PHL | 0 | 5 | 0 | 0 | 3 | 0 | 1 | 4 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 4 | 0 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 1 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 6 | 0 | 1 | 1 | 0 | 0 | 9 | | | |
| POL | 0 | 0 | 3 | 0 | 2 | 2 | 0 | 1 | 0 | 14 | 18 | 2 | 5 | 0 | 4 | 5 | 0 | 0 | 0 | 8 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 2 | 5 | 0 | 7 | 0 | 4 | | |
| PRT | 1 | 1 | 0 | 9 | 1 | 0 | 1 | 0 | 0 | 1 | 3 | 0 | 31 | 0 | 3 | 6 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 4 |
| RUS | 1 | 0 | 2 | 0 | 6 | 1 | 0 | 1 | 0 | 2 | 5 | 1 | 1 | 2 | 2 | 14 | 4 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 8 | 0 | 19 | | |
| SGP | 0 | 146 | 1 | 5 | 8 | 7 | 1 | 195 | 1 | 1 | 19 | 5 | 8 | 3 | 10 | 101 | 0 | 102 | 0 | 0 | 99 | 84 | 4 | 1 | 7 | 55 | 35 | 0 | 0 | 0 | 2 | 113 | 21 | 6 | 16 | 1 | 2 | 15 | 5 | 2 | 2 | 0 | 0 | 4 | 35 | 4 | 0 | 104 | | |
| SVK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SWE | 6 | 17 | 9 | 5 | 23 | 18 | 3 | 8 | 0 | 10 | 83 | 115 | 32 | 138 | 51 | 118 | 9 | 1 | 0 | 4 | 1 | 5 | 10 | 2 | 18 | 0 | 8 | 6 | 6 | 0 | 5 | 5 | 53 | 141 | 3 | 0 | 0 | 0 | 13 | 2 | 14 | 6 | 1 | 0 | 1 | 3 | 2 | 168 | | |
| THA | 0 | 6 | 0 | 1 | 2 | 1 | 0 | 6 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 9 | 0 | 5 | 0 | 0 | 8 | 5 | 0 | 1 | 3 | 3 | 0 | 0 | 0 | 0 | 6 | 1 | 1 | 4 | 0 | 0 | 6 | 1 | 1 | 0 | 15 | 0 | 0 | 0 | 1 | 0 | 9 | | | |
| TUR | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 7 | 0 | 0 | 1 | 0 | 0 | 0 | 12 | | | |
| URY | 2 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| USA | 41 | 373 | 28 | 130 | 1178 | 120 | 41 | 218 | 19 | 30 | 456 | 70 | 230 | 49 | 343 | 1350 | 19 | 93 | 0 | 18 | 8 | 142 | 134 | 187 | 176 | 97 | 85 | 3 | 3 | 3 | 130 | 21 | 211 | 69 | 51 | 1 | 18 | 15 | 37 | 19 | 25 | 72 | 1 | 123 | 10 | 26 | 4 | 0 | | |

This table presents the cross-border acquisition deals distribution. Panel A presents the total number of deals (sum of outbound and inbound deals) to the rest of the world from 2002 to 2021. Panel B presents the number of outbound deals from the countries in the first column to the countries listed in the first row.

3.3.1 Measurement of GCI

To measure a country's connectedness with other countries, we use the DHL Global Connectedness Index 2022 by Altman and Bastian (2023). They define Global Connectedness as “*the depth and breadth of a country's integration with the rest of the world, as manifested by its participation in international flows of products and services, capital, information, and people*”. The original index is on the country-year aggregate level as well as including data on four pillars and the two dimensions. The aggregate index is constructed by calculating four pillars (Trade, Information, People, and Capital) from two dimensions depth and breadth⁴. The pillars are differently weighted with 35% Trade, 35% Capital, 25% Information, and 25% People. Each pillar is equally calculated by the depth and breadth of the pillar of the country.

$$GCI = 35\% Trade + 35\% Capital + 25\% Information + 25\% People \quad (2.1)$$

Where, trade pillars are calculated based on a country's merchandise trade (75%), and services trade (25%). Information is calculated based on international internet bandwidth (33%), telephone call minutes (33%), scientific research collaboration (17%), and trade in printed publication (17%). People are calculated based on tourists (33%), university students (33%), and migrants (33%), while capital is calculated based on FDI Stocks (25%), FDI Flows (25%), and Portfolio Equity Stocks (50%).

The depth is defined as the relative scale of a country's international financial flows compared to a relevant benchmark of its domestic economic activity, while the breadth

⁴ The specific methodology of how pillars and two dimensions are calculated.

measures the extent to which a country’s international flows are globally diversified versus concentrated within a narrower set of partners. Considering part of capital pillars is foreign direct investment (FDI), which can reflect the cross-border M&A activities itself, we also calculate a re-weighted GCI by excluding capital pillars as *GCI (exc.capital)* to avoid the concerns of endogeneity. Besides, we also obtain the country-pair level connectedness. The country-pair level connectedness of two countries is calculated based on their four pillars connections, as a proportion of all country pair connectedness at that year ⁵.

3.3.2 Descriptive statistics

Table 2.2 presents the results of summary statistics of measurements of GCI, number of deals, and other control variables.

Table 2.2 Descriptive Statistics

| Panel A: Country-year level descriptive statistics | | | | | | |
|--|-----|--------|--------|--------|--------|--------|
| | N | Mean | SD | p25 | p50 | p75 |
| GCI | 960 | 60.374 | 12.184 | 50.436 | 61.707 | 68.717 |
| GCI (exc. capital) | 960 | 62.075 | 11.431 | 53.63 | 62.826 | 70.945 |
| People | 960 | 58.397 | 16.104 | 44.261 | 61.175 | 72.683 |
| Information | 960 | 65.968 | 14.622 | 55.34 | 67.368 | 78.098 |

⁵ The sum of all country pair connectedness of each year is equal to one.

| | | | | | | |
|-------------------------|-----|--------|--------|--------|--------|--------|
| Trade | 960 | 61.983 | 12.327 | 52.72 | 61.206 | 69.264 |
| Capital | 960 | 57.406 | 15.827 | 45.208 | 56.577 | 70.105 |
| Number of deals | 960 | 3.355 | 1.45 | 2.485 | 3.401 | 4.363 |
| Tax rate | 959 | 0.267 | 0.067 | 0.211 | 0.275 | 0.313 |
| Pre-election | 960 | 0.159 | 0.366 | 0 | 0 | 0 |
| GDP growth rate | 960 | 2.684 | 3.735 | 1.14 | 2.756 | 4.816 |
| GDP | 960 | 26.746 | 1.421 | 25.879 | 26.565 | 27.788 |
| Depth (exc.capital) | 842 | 26.453 | 9.779 | 19.21 | 27.014 | 33.777 |
| Breadth (exc. capital) | 842 | 36.28 | 6.734 | 31.662 | 37.139 | 41.706 |
| Trade-to-GDP | 960 | 4.287 | 0.598 | 3.919 | 4.213 | 4.628 |
| Quality of institutions | 960 | 10.926 | 2.982 | 8.5 | 10.5 | 13.521 |
| Business environment | 960 | 9.905 | 1.774 | 8.5 | 10 | 11.5 |

Panel B: Country-pair year level descriptive statistics

| | N | Mean | SD | p25 | p50 | p75 |
|--------------------------------|-------|--------|--------|--------|--------|--------|
| Number of deals (country pair) | 28362 | 0.337 | 0.652 | 0 | 0 | 0.693 |
| Country Pair Connectedness | 28362 | 0.456 | 1.39 | 0.029 | 0.095 | 0.32 |
| Imports from acquirer country | 28362 | -3.966 | 1.476 | -5.023 | -3.975 | -2.899 |
| Private merger | 28362 | 0.091 | 0.266 | 0 | 0 | 0 |
| Public merger | 28362 | 0.034 | 0.164 | 0 | 0 | 0 |
| Exchange rate vol | 28362 | 8.396 | 69.894 | 0.003 | 0.036 | 0.296 |
| Exchange growth | 28362 | 0.003 | 0.133 | -0.052 | 0 | 0.048 |
| GDP (Acq) | 28362 | 27.216 | 1.318 | 26.265 | 27.017 | 28.136 |

| | | | | | | |
|--|-------|--------|--------|--------|--------|--------|
| GDP (Tar) | 28362 | 27.011 | 1.393 | 26.089 | 26.809 | 28.017 |
| Differences in tax rate | 28362 | 0.067 | 0.049 | 0.03 | 0.057 | 0.095 |
| Differences in quality of institutions | 28362 | 0.478 | 4.27 | -2.5 | 0.5 | 3.75 |
| Differences in investment profile | 28362 | 0.203 | 2.391 | -1.333 | 0 | 1.875 |
| Common friends | 28362 | 0.747 | 0.657 | 0.32 | 0.551 | 0.944 |
| Differences in tax rate | 28362 | 0.067 | 0.049 | 0.03 | 0.057 | 0.095 |
| Same religion | 28362 | 0.252 | 0.434 | 0 | 0 | 1 |
| Same legal | 28362 | 0.288 | 0.453 | 0 | 0 | 1 |
| Bilateral investment treaty | 28362 | 0.525 | 0.499 | 0 | 1 | 1 |
| Share border | 28362 | 0.067 | 0.25 | 0 | 0 | 0 |
| Share language | 28362 | 0.117 | 0.321 | 0 | 0 | 0 |
| Culture dist | 28362 | 60.415 | 22.889 | 43.359 | 62.073 | 78.479 |
| Geographic distance | 28362 | 8.379 | 1.071 | 7.528 | 8.794 | 9.197 |

Note: This table presents the descriptive statistics for all variables used in the analysis. The definitions of all variables are provided in Appendix.

Panel A reports descriptive statistics of variables at the country-year level. The GCI has a mean of 60.374 with a standard deviation of 12.184, while GCI excluding capital exhibits a slightly higher mean of 62.075. Variables related to trade, people, and information have a mean of 61.983, 58.397, and 65.968, respectively, indicating moderate variability (standard deviations between 12.327 and 16.104). The tax rate averages 0.267, while the pre-election indicator shows a mean of 0.159.

Panel B covers 28,362 observations at the country-pair-year level. The number of cross-border deals averages 0.337 per pair, with substantial variation (standard deviation of 0.652). Country pair connectedness, which measures the strength of ties between two countries, averages 0.456. Imports from the acquirer country have a negative mean of -3.966 (in logarithmic term). The control variable used in gravity models reveals the differences between countries. For example, only 11.7% of country pairs in the sample share the same primary language. More than half of country-pairs have bilateral investment treaty agreements. The culture distance has a mean of 60.415 with a standard deviation of 22.889.

3.4 Empirical Analysis

3.4.1 GCI and number of cross-border M&A deals

3.4.4.1 Country level evidence

To answer the question of how GCI impacts cross-border M&A deals, we start with OLS regressions at the country-year level by controlling the TWFE (two-way fixed effect) at country and year levels as well as country-level control variables which has been proven can affect the number of deals. The included controls are country-level, time-varying fundamentals (e.g., GDP level and growth, trade-to-GDP, the corporate tax rate, institutional quality, and the business environment). We lag these covariates by one year to reduce simultaneity. Their role is twofold: they proxy for standard macro determinants of cross-border activity that evolve within countries over time, and they partial out the component of GCI that comoves with those fundamentals, allowing the coefficients to reflect incremental predictive content beyond widely used macro predictors. Because GCI

is empirically correlated with economic size and openness, conditioning on these fundamentals is essential to avoid attributing their effects to connectedness. Country fixed effects absorb all time-invariant determinants of M&A intensity (e.g., geography, legal origins, persistent cultural ties), while year fixed effects remove global shocks and common trends that could jointly move connectedness and deal volumes. The baseline model that we used is as follows:

$$\text{Number of deals}_{i,t} = \alpha + \beta_1 \text{GCI}_{i,t-1} + \sum \beta_k C_{i,t-1} + \alpha_t + \alpha_{\text{Country}} + \epsilon_{i,t} \quad (2.2)$$

Where Number of deals_{*i,t*} is the natural logarithm of the sum of the number of outbound and inbound cross-border deals for each country in time *t*+1. GCI is the Global Connected Index, where we separately use the aggregate index, re-weighted aggregate index, and pillar-level variables as described in the section above. *C* is a vector of a set of country-level control variables, which includes GDP, GDP growth, trade-to-GDP, GDP growth rate, corporate tax rate, quality of institution, and business environment. We control for the GDP-related factors not only because these factors can directly affect cross-border activity but also because the GCI index is correlated to them, according to the DHL Global Connectedness Report 2023. Our results are robust because we use no time-lagged and two-year-lagged independent variables.

Table 2.3 reports the baseline results on the relationship between global connectedness and the number of outbound cross-border M&A deals, estimated by *Equation 2.2*. Columns (1) and (2) show that the aggregate GCI—both the original and re-weighted version—has a significantly positive effect at the 1% level. Economically, a one-unit increase in the GCI index leads to approximately a 2.8% rise in outbound deals (column 1), while the re-weighted GCI in column (2) implies a 3.4% increase. At the pillar

level, the results in columns (3)–(6) show that trade, information, and capital connectivity are all positively and significantly associated with outbound M&A activity. Specifically, a one-unit improvement in trade increases outbound deals by about 2.1%, information by 1.3%, and capital by 0.8%. These effects are consistent with the notion that stronger trade ties, information flows, and capital market linkages reduce transaction costs, improve information availability, and facilitate access to financing, thereby encouraging cross-border expansion through M&A. By contrast, the “people” pillar is insignificant, which is consistent with expectations. The measure of people mobility mainly reflects tourism flows, international students, and migrant stock—factors that, while socially and culturally relevant, do not directly reduce informational or financial frictions in M&A markets. This interpretation aligns with Aleksanyan et al. (2021), who document the weak link between people mobility and corporate deal activity. In column (5), when the three pillars are included together to address potential correlation among dimensions, the coefficients for trade and information remain positive and significant at the 10% level. This robustness indicates that trade and information linkages exert independent effects on cross-border deal activity, beyond their shared contribution to the aggregate index. Finally, columns (6) and (7) suggest that both depth (the intensity of connectedness relative to domestic activity) and breadth (the global distribution of connectedness) matter for outbound M&A, although the effect is somewhat stronger on the breadth dimension.

Overall, these findings provide strong evidence that global connectedness fosters cross-border deal-making. Economically, the results imply that even modest improvements in trade integration, information flows, and capital openness can significantly expand a country’s outbound M&A activity in the following year.

3.4.4.2 Country-pair level evidence

We further explore the effects of connectedness on the country-pair level. To test our hypothesis, we apply a “gravity” model, which is a common approach widely adopted in international trade studies. Specifically, we estimate the following regression model:

$$\begin{aligned} \text{Number of Outbound Deals}_{p,t} &= \alpha + \beta_1 \text{Pair Connectedness}_{i,t-1} \\ &+ \sum \beta_k \text{Pair Controls}_{i,t-1} + \alpha_t + \alpha_{pair} + \epsilon_{i,t} \end{aligned} \tag{2.3}$$

Table 2.3 Baseline regression

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|------------------------|---------------------|----------------------|---------------------|-----------------------|-----------------------|---------------------|-------------------|-------------------|
| GCI | 0.022** (0.009) | | | | | | | |
| GCI (exc. capital) | | 0.029** (0.011) | | | | | | |
| Trade | | | 0.017** (0.008) | | | | | |
| Information | | | | 0.015** (0.007) | | | | |
| People | | | | | -0.004 (0.007) | | | |
| Capital | | | | | | 0.006* (0.003) | | |
| Depth (exc. capital) | | | | | | | 0.018 (0.014) | |
| Breadth (exc. capital) | | | | | | | | 0.032* (0.018) |
| Constant | -8.256** (3.556) | -9.251*** (3.220) | -9.523** (3.410) | -10.070*** (3.288) | -10.721*** (3.712) | -9.369** (3.789) | -5.380 (3.557) | -5.944 (3.814) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 959 | 959 | 959 | 959 | 959 | 959 | 841 | 841 |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: heteroskedasticity-robust standard errors in parentheses. The dependent variable is Number of Outbound Deals, which is the natural logarithm number of outbound deals for country pair p and time $t+1$. *, **, *** indicate significance at the 10%, 5%, and 1% levels respectively.

Where Number of Outbound Deals is the natural logarithm number of outbound deals for country pair p and time $t+1$. $Value$ is the connectedness between country pair p at time t . $Pair\ Controls$ is a vector of a set of country-pair level control variables for a gravity model following (Ahern, Daminelli, and Fracassi 2015), which include imports between two countries, percentage of private mergers between two countries, percentage of public mergers between two countries, exchange rate volatility, exchange rate growth rate, common language, shared border, geographical distance, bilateral investment treaty, same legal system, same religion, culture distance, two countries' GDP, the difference in the tax rate, the difference in the quality of institutions, the difference in the business environment. We include year-level fixed effects to control worldwide macro-level shocks on the economy, such as the financial crisis and COVID-19. For the country level, we first control two fixed effects on the acquirer country level and target country level to capture a country's takeover regulation, which has little variation across time (Ahern, Daminelli, and Fracassi 2015; Adler and Alegi 1999). Moreover, we also further control country-pair level fixed effects to control for the other potentially omitted differences between the two countries. Our results are conceptually unchanged by using different fixed effects controls.

Table 2.4 Country-pair level analysis

| | OLS | | 2SLS | | Two stage PPML | |
|-------------------------------|----------|----------|-------------|--------------|----------------|--------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | OLS | OLS | First stage | Second stage | First stage | second stage |
| Country Pair Connectedness | 0.161*** | 0.056*** | | 0.125** | | 0.804*** |
| | -0.017 | -0.02 | | -0.055 | | -0.229 |
| Common friends | | | 0.747*** | | 0.747*** | |
| | | | -0.118 | | -0.118 | |
| Imports from acquirer country | 0.032** | 0.013* | 0.034*** | 0.008 | 0.034*** | 0.044 |
| | -0.012 | -0.007 | -0.011 | -0.008 | -0.011 | -0.103 |

| | | | | | | |
|--|----------|----------|-----------|----------|-----------|---------|
| Private merger | 0.098*** | 0.012 | -0.005 | 0.012 | -0.005 | -0.009 |
| | -0.017 | -0.011 | -0.007 | -0.011 | -0.007 | -0.032 |
| Public merger | 0.294*** | 0.064*** | 0.018 | 0.062*** | 0.018 | 0.073** |
| | -0.057 | -0.019 | -0.016 | -0.019 | -0.016 | -0.031 |
| Exchange rate vol | -0.000* | 0 | 0 | 0 | 0 | -0.001 |
| | 0 | 0 | 0 | 0 | 0 | -0.001 |
| Exchange growth | 0.019 | 0.021 | 0.009 | 0.019 | 0.009 | 0.013 |
| | -0.027 | -0.014 | -0.012 | -0.014 | -0.012 | -0.086 |
| GDP (Acq) | 0.049 | 0.089*** | 0.057 | 0.075*** | 0.057 | 0.186* |
| | -0.048 | -0.019 | -0.038 | -0.021 | -0.038 | -0.111 |
| GDP (Tar) | -0.052 | -0.025 | 0.155*** | -0.046** | 0.155*** | -0.139 |
| | -0.044 | -0.017 | -0.039 | -0.022 | -0.039 | -0.123 |
| Differences in tax rate | -0.284 | 0.119 | -0.482*** | 0.168* | -0.482*** | -0.041 |
| | -0.201 | -0.092 | -0.139 | -0.099 | -0.139 | -0.508 |
| Differences in quality of institutions | -0.001 | -0.001 | -0.004 | -0.001 | -0.004 | 0.024 |
| | -0.008 | -0.004 | -0.005 | -0.003 | -0.005 | -0.023 |
| Differences in investment profile | 0 | 0 | 0.003 | 0 | 0.003 | 0.022 |
| | -0.004 | -0.002 | -0.004 | -0.002 | -0.004 | -0.015 |
| Constant | 1.325 | -1.398** | -5.676*** | | -5.676*** | -0.568 |
| | -1.469 | -0.609 | -1.197 | | -1.197 | -5.036 |
| Observations | 28362 | 28362 | 28362 | 28362 | 28362 | 24179 |
| Acquirer country FE | Yes | No | No | No | No | No |
| Target country FE | Yes | No | No | No | No | No |
| Country pair controls | Yes | No | No | No | No | No |
| Country pair FE | No | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Kleibergen-Paap Wald rk | | | 40.099 | | 40.099 | |
| Stock-Yogo weak ID test 10% | | | 16.38 | | 16.38 | |

Notes: Heteroskedasticity-robust standard errors in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels respectively.

The first two columns Table 2.4 presents the result. Column (1) shows the results with three-way fixed effects at the acquirer country level, target country level, and year

level. Column (2) controls for the country-pair level fixed effect and year fixed effect. The control variables for the gravity model are added in the last two columns. Time-invariant variables for country pair, such as common language, and geographic distance, are absorbed by the country-pair fixed effect in the second column. As shown in the table, the coefficients for OLS estimations for country pair connectedness are significantly positive at 1% level. The effect is also economically significant. For example, the coefficient for Value in column (4) shows that one unit increase in connectedness between two countries will lead to the number of M&A deals increasing by around 55.8% in the next year.

3.4.2 Endogeneity

3.4.2.1 Instrumental variable

Country-pair level connectedness is an endogeneity factor. For example, strong bilateral relationships may lead to strong country-pair connections. To ease the concern and potential consequences led by the omitted variable we employ an instrumental variable (IV) two-stage approach to estimate the effects of country-pair connectedness on the number of cross-border M&A. We first borrow the idea from Jochmans and Verardi (2019) to construct an instrumental variable by measuring the average connectedness of the two countries with other countries. For example, instead of directly measure the connectedness between the US and the UK, we average connected between the US with the rest of countries (excluding the UK) as well as the rest connectedness for the UK. Then, we take the average of rest connectedness of the two countries as the instrumental variable. In line with the idea of “common friends” by Jochmans and Verardi (2019), the instrumental variable is highly likely to be correlated to the original country-pair connectedness. Meanwhile, the cross-border M&A activity are less likely to be affected by the connectedness with other countries, satisfying the exclusion condition of instruments.

The results of the two-stage least squares (2SLS) shows that our results are robust after excluding the concerns of the endogeneity concerns. The estimation results of the instrumental variables are reported in Table 2.4. Moreover, Cohn, Liu, and Wardlaw (2022) suggests the issue that using log of count number plus the outcome can produce estimates with meaningless interpretation and Poisson model. Thus, we also adopt the IV two-stage PPML methods, which use the country pair connectedness regress on the proposed instrument variable, and then estimate a PPML regression of number of deals on the country pair connectedness as the second stage.

Column (3) and (5) report the first stage of the IV regression. The result implies that the proposed *Commonfriends* is indeed positively related to the connectedness at pair level. Additionally, the Kleibergen–Paap rk Wald F statistic for the weak identification test exceeds the critical value set by Stock and Yogo (2002), meeting the relevance requirement and allowing us to reject the null hypothesis of weak identification.

The second stage result in column (4) and (6) presents that the coefficient of estimated country-pair connectedness is significantly positive at 5% level (1% level for PPML results) with economic magnitude that is more than double (column (5)) relative to the OLS results in Panel A.

3.4.2.2 Economic conditions in the focal country

There are previous studies arguing that a country's underlying economic condition could drive cross-border M&A deals (e.g., Dunning (1998), Erel, Liao, and Weisbach (2012), and Uddin and Boateng (2011)). Although we controlled for macroeconomic level factors as well as country- and year-level fixed effects, we further examine whether the impact of connectedness can be alternatively explained by the effects of economic outlook

enhancement. The starting point is that the improvement in a country's economic outlook, for example, due to an open economic policy, could simultaneously increase a country's global connectedness and the number of cross-border acquisitions. Since the number of domestic deals might also be expected to increase following an economic outlook enhancement, we directly test whether GCI can explain the volume of domestic deals to rule out this alternative explanation. The results of the impact of GCI on domestic deals are reported in Table 2.5.

Table 2.5 Domestic deals

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| GCI | 0.019 | | | | | | | |
| | (0.016) | | | | | | | |
| GCI (exc. capital) | | 0.027 | | | | | | |
| | | (0.017) | | | | | | |
| Trade | | | 0.009 | | | | | |
| | | | (0.013) | | | | | |
| Information | | | | 0.016 | | | | |
| | | | | (0.010) | | | | |
| People | | | | | 0.019** | | | |
| | | | | | (0.010) | | | |
| Capital | | | | | | 0.003 | | |
| | | | | | | (0.005) | | |
| Depth (exc. capital) | | | | | | | 0.059* | |
| | | | | | | | (0.029) | |
| Breadth (exc. capital) | | | | | | | | 0.012 |
| | | | | | | | | (0.021) |
| GDP | 0.856*** | 0.876*** | 0.933*** | 0.886*** | 0.904*** | 0.926*** | 0.683*** | 0.700*** |
| | (0.269) | (0.252) | (0.263) | (0.219) | (0.245) | (0.260) | (0.171) | (0.187) |
| Constant | - | - | - | - | - | - | - | - |
| | 24.012*** | 24.766*** | 25.526*** | 25.458*** | 25.728*** | 25.426*** | 18.110*** | 20.184*** |
| | (7.271) | (6.906) | (7.271) | (6.396) | (6.905) | (7.147) | (5.138) | (5.359) |
| Observations | 959 | 959 | 959 | 959 | 959 | 959 | 841 | 841 |
| Controls | Yes |
| Country FE | Yes |
| Year FE | Yes |

Notes: This table presents the results of the effects of GCI on the total number of domestic acquisition deals of a country. The dependent variable is the natural logarithm of the total number of domestic acquisition deals plus one for each country in time t+1. GCI is the Global Connected Index, where we separately use the aggregate index, re-weighted aggregate index, pillar-level measurements, and depth and breadth dimensions from column (1) to column (8). In all models, we control for country level and year level fixed effects.

Heteroscedasticity-robust standard errors clustered by country are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

The coefficients for GCI, its sub-pillars, and dimensionalities are generally insignificant, with the exception of the “People” dimension, which exhibits a positive and statistically significant relationship with the number of domestic deals in some specifications (e.g., Column (7)). However, the overall results are inconsistent with the findings from our baseline specifications on cross-border M&A deals, where GCI and its sub-components demonstrated significant explanatory power. Notably, variables such as “Breadth” and ”Depth,” which play a significant role in cross-border acquisitions, do not exhibit similar explanatory power for domestic deals. Furthermore, traditional macroeconomic control variables, such as tax rates, GDP growth rates, and trade-to-GDP ratios, are either insignificant or have coefficients inconsistent with the economic outlook explanation.

Taken together, these findings provide further evidence to rule out the alternative explanation that the observed effects of GCI on cross-border deals are merely a reflection of economic outlook enhancement. The lack of consistent, significant coefficients across the GCI dimensions for domestic deals reinforces the conclusion that global connectedness is a distinct driver of cross-border M&A activity, separate from broader economic improvements.

3.4.3 Covid period

The DHL Global Connectedness Report 2022 highlights how the COVID-19 pandemic disrupted global connectedness, particularly affecting its core pillars in distinct ways. As illustrated in Figure 2.1, the trade and people pillars experienced notable declines during the

pandemic, driven largely by physical restrictions and lockdown measures that curtailed international movement and trade logistics. In contrast, the upward trends in the capital and information pillars remained resilient, as these forms of connectedness rely on remote and digital platforms, which were less impacted by physical restrictions. This divergence underscores the pandemic’s unique influence on the composition of global connectedness, necessitating a reassessment of the relative contributions of these pillars.

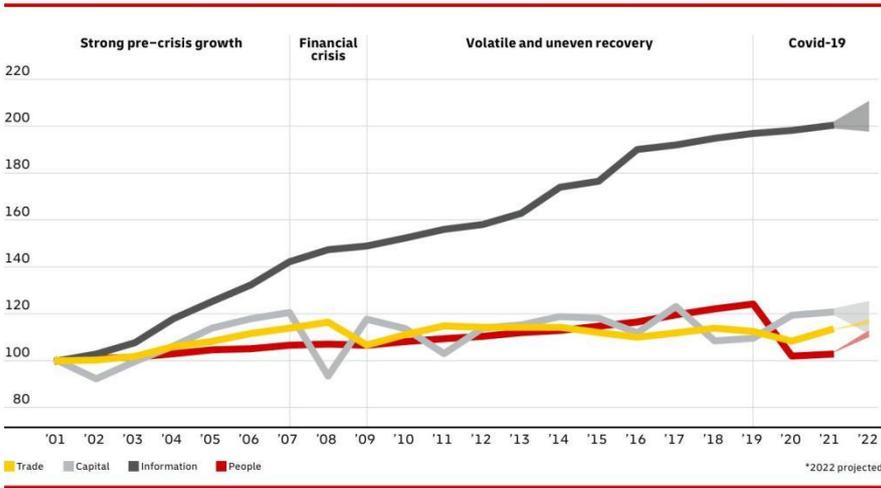


Figure 2.1: The impact of COVID on global connectedness index (Source: 2022 DHL Global Connectedness Report)

To explore the re-weighting of these effects during the pandemic, we define a dummy variable *Covid*, which equals one for the years 2020 and 2021, and zero otherwise. This variable captures the period most affected by COVID-19 disruptions. The results of our

analysis are presented in Table 2.6, where we examine the interaction between the pandemic period and each pillar of global connectedness.

Table 2.6: Mechanism of COVID

| | (1) Trade | (2) Information | (3) People | (4) Capital |
|---------------------|---------------------|--------------------|---------------------|-------------------|
| Trade × Covid | 0.005* (0.003) | | | |
| Information × Covid | | 0.007* (0.004) | | |
| People × Covid | | | 0.009*** (0.002) | |
| Capital × Covid | | | | 0.007* (0.003) |
| Trade | 0.021*** (0.006) | | | |
| Information | | 0.014** (0.006) | | |
| People | | | -0.001 (0.009) | |
| Capital | | | | 0.008* (0.004) |
| Constant | -6.916** (2.967) | -3.364 (2.513) | -4.415 (2.818) | -3.073 (2.992) |
| Observations | 959 | 959 | 959 | 959 |
| Controls | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

This table presents the results of the mechanism of COVID-19. The dependent variable is the natural logarithm of the sum of the number of outbound and inbound cross-border deals plus one for each country in time $t+1$. Covid is a dummy variable equal to one if year is equal to 2020 or 2021, and 0 otherwise. In all models, we control for country level and year level fixed effects. Heteroscedasticity–robust standard errors clustered by country are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

As presented in Table 2.6, the coefficients of the interaction terms between the COVID-19 dummy variable and the global connectedness pillars are all significantly

positive, indicating that the Global Connectedness Index (GCI) assumed a more critical role during the pandemic. However, the underlying reasons for these heightened effects vary across the different pillars, reflecting the distinct ways in which global connectedness adapted to the constraints imposed by the pandemic.

Despite the implementation of stringent restriction policies worldwide, both international trade (in column (1)) and people flow (in column (3)) persisted, albeit at reduced levels. This continuity suggests that trade and people movements during the pandemic were driven by compelling and high-priority motivations. Similarly, people flow, though limited, were sustained for indispensable purposes, such as the movement of healthcare workers, diplomats, and other essential personnel. These high-priority activities meant that the remaining trade and people flows during the pandemic were concentrated in areas of utmost necessity, thereby amplifying their relative importance and influence during this period.

Moreover, the restricted mobility caused by lockdowns, travel bans, and quarantine requirements forced a fundamental shift in how international communication and collaboration occurred. In particular, many activities that were traditionally conducted in person transitioned to virtual platforms, such as video conferencing, online meetings, and remote working arrangements. This transformation was especially prevalent in cross-border activities, where physical contact became increasingly costly and, in many cases, impractical. As a result, the information pillar (in column (2)) took on a heightened role in mitigating the challenges of information asymmetry, serving as a crucial channel for maintaining the flow of knowledge, coordination, and decision-making across borders. This shift underscores how technology enabled continuity in global connectedness by allowing businesses, governments, and individuals to overcome the physical limitations imposed by the pandemic.

The enhanced reliance on the information pillar during COVID-19 also highlights its adaptability and scalability in times of crisis. Unlike trade and people flows, which depend on physical infrastructure and mobility, information flows are inherently digital and can often be scaled up rapidly. The widespread adoption of virtual solutions allowed for efficient communication and collaboration, even in the face of unprecedented disruptions. Consequently, the information pillar played a pivotal role in sustaining global connectedness during the pandemic and offsetting some of the declines observed in the trade and people pillars.

This re-weighting of the effects across pillars demonstrates the resilience and flexibility of global connectedness in adapting to external shocks. While trade (shown in column (1)) and people (shown in column (3)) flow were constrained by physical barriers, their essential nature during the pandemic ensured that they maintained significant influence. At the same time, the information pillar (in column (2)) compensated for the reduction in physical flows by enabling alternative forms of interaction and collaboration. Together, these dynamics illustrate how global systems can reorganize and prioritize different dimensions of connectedness in response to changing circumstances.

In summary, the results in Table 2.6 provide valuable insights into how the COVID19 pandemic reshaped the dynamics of global connectedness. The persistence of trade and people flow, driven by critical needs, highlights the enduring importance of these pillars in ensuring economic and social stability during crises. Meanwhile, the elevated role of the information pillar underscores the transformative potential of digital solutions in maintaining international collaboration and reducing information asymmetry. These findings not only enhance our understanding of global connectedness during the pandemic but also offer important lessons for building resilience in an increasingly interconnected world. By recognizing the strengths and limitations of each pillar, policymakers and

businesses can better prepare for future disruptions, ensuring that global connectedness remains a robust driver of economic and social progress.

3.4.4 China-US trade war

Starting from January 2018, the US government starts to set a series of tariffs and other trade barriers to import from China. To respond to these trade barriers policy, the Ministry of Commerce of China also starts a set of policies imposing tariffs on goods from the USA. The trade war between the USA and China obviously affects the connectedness between the two countries, especially regarding the trade perspective. We use the Difference-in-Difference method (DiD) and take the China-USA as the treatment group and explore how the affected connectedness can further impact the acquisition activities between the two countries.

Table 2.7 US-China Trade War

| | (1) | (2) |
|-------------------------------|---------------------------------|---------------------------------|
| | Number of outbound deals (pair) | Number of outbound deals (pair) |
| Treat × Post | -0.620*** (0.083) | -0.658*** (0.038) |
| Imports from acquirer country | | 0.017** (0.007) |
| Private merger | | 0.012 (0.011) |
| Public merger | | 0.066*** (0.019) |
| Exchange rate | | -0.000 (0.000) |
| Exchange growth | | 0.021 (0.014) |

| | | |
|--|----------|-----------|
| GDP (Acq) | | 0.102*** |
| | | (0.020) |
| GDP (Tar) | | -0.007 |
| | | (0.017) |
| Differences in tax rate | | 0.066 |
| | | (0.091) |
| Differences in quality of institutions | | -0.002 |
| | | (0.004) |
| Differences in investment profile | | 0.000 |
| | | (0.002) |
| Constant | 0.337*** | -2.200*** |
| | (0.000) | (0.641) |
| Observations | 28362 | 28362 |
| Country pair FE | Yes | Yes |
| Year FE | Yes | Yes |

This table presents the results of the impact of country pair connectedness on trade war. The dependent variable is the natural logarithm of the sum of the number of outbound cross-border deals between each country pairs in time $t+1$. Post is a dummy variable equal to one from 2018 to 2021, and 0 otherwise. In all models, we control for country pair level and year-level fixed effects. Heteroscedasticity-robust standard errors clustered by country pair are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

The results presented in Table 2.7 underscore the significant adverse impact of the US-China trade war on cross-border merger and acquisition (M&A) activities between the two countries. The variable Post captures the post-2018 period, while Treat indicates whether the country pair involves the US and China. The interaction term (Treat \times Post) serves as the key variable of interest, reflecting the effect of the trade war on deal activity.

The results reveal that the interaction term is statistically significant at the 1% level, with a coefficient of -0.658 (for column (2)). This indicates a substantial decline in the number of outbound cross-border deals involving US-China country pairs during the trade war period. The magnitude of the negative coefficient suggests that the decreased connectedness between the two countries due the regulations can significantly lead to the

following cross-border acquisition activity for the two countries. These findings are in line with our predictions.

3.4.5 Granger test

Although the use of an instrumental variable (IV) approach mitigates concerns about reverse causality, we further strengthen the validity of our findings by conducting a Granger causality test (Granger 1969). This additional step ensures that it is global connectedness influencing cross-border M&A activity, rather than cross-border deals driving global connectedness. Our methodology follows the approach outlined by Ahmad, De Bodt, and Harford (2021), which is well-suited for panel data analysis and addresses concerns about the direction of causality.

The Granger causality test is based on a panel vector auto-regression (VAR) model that simultaneously examines the dynamics of global connectedness and cross-border acquisition activity at the country-pair level. The VAR model includes two equations: one modeling the evolution of global connectedness over time and the other modeling the dynamics of cross-border deal activity. By incorporating lags of both dependent variables in the system, the Granger causality test evaluates whether past values of global connectedness significantly improve the prediction of cross-border M&A activity, and vice versa. This approach builds on the econometric principles discussed in Greene (2012).

Table 2.8 Granger Test

| Responses of | Number of outbound deals (pair) | Country pair connectedness |
|------------------------------------|---------------------------------|----------------------------|
| Number of outbound deals(pair) t-1 | 0.179*** (0.000) | 0.000 (0.201) |
| Number of outbound deals(pair) t-2 | 0.119*** (0.000) | 0.000 (0.304) |
| Number of outbound deals(pair) t-3 | 0.073*** | 0.000 |

| | | |
|---|------------|-----------|
| | (0.000) | (0.384) |
| Country pair connectedness t-1 | 679.021*** | 0.947*** |
| | (0.001) | (0.000) |
| Country pair connectedness t-2 | -127.762* | 0.043 |
| | (0.083) | (0.468) |
| Country pair connectedness t-3 | -202.223** | -0.078 |
| | (0.037) | (0.291) |
| Wald Test (Prob > Chi2) | | |
| Responses of Country pair connectedness to Number of deals | 13.130*** | 13.130*** |
| Responses of Number of outbound deals(pair) to Country pair connectedness | 2.009 | 2.009 |
| Observations | 21580 | 21580 |

This table presents the results of Granger causality test.

The results of the Granger causality test are presented in Table 2.8. The table highlights several important patterns. First, the auto-regressive coefficients for the number of cross-border deals are significant across all specifications, confirming that cross-border M&A activity exhibits strong auto-correlation. This finding aligns with the well documented phenomenon of M&A waves, where deal activity tends to cluster over time due to cyclical economic and market conditions. Similarly, global connectedness at the country-pair level follows an AR (1) process, indicating that its values are strongly influenced by their lagged values.

The Granger causality Wald tests provide further clarity. The results demonstrate that the lagged values of global connectedness significantly predict the number of cross-border deals, as indicated by the strong statistical significance of the relevant coefficients. In contrast, the lagged number of deals does not significantly predict global connectedness. These findings provide robust evidence that global connectedness Granger causes cross-border acquisition activity, rather than the reverse.

The implications of these findings are twofold. First, they confirm that global connectedness is a driver of cross-border M&A activity, rather than merely a byproduct of

it. This directional relationship strengthens the theoretical foundation of our study by establishing a clear causal pathway from connectedness to deal-making. Second, the results underscore the importance of considering temporal dynamics when analyzing the relationship between global factors and firm-level behavior. By leveraging the Granger causality framework, we provide additional confidence that our findings are not confounded by feedback effects or reverse causality.

Overall, the Granger causality test complements our IV analysis by providing further evidence that the observed relationship between global connectedness and cross-border acquisitions reflects a causal influence of connectedness on M&A activity.

3.4.6 Combined CAR

In this section, we employ a gravity model framework to analyze the performance of cross-border acquisitions, focusing on the impact of country-pair connectedness on market reactions to acquisition announcements. Specifically, we investigate the effects of connectedness on the combined cumulative abnormal returns (CARs) for acquirer and target firms. Combined CARs provide a comprehensive measure of market sentiment toward the overall value created by the transaction, reflecting both acquirer and target performance. The results of this analysis are presented in Table 2.9.

Columns (1), (2), and (3) in Table 2.9 report the effects of country-pair connectedness on the 3-day, 5-day, and 7-day combined CARs around the announcement date, respectively. The combined CAR is calculated as the weighted average of the individual CARs of the acquiring and target firms, with weights determined by the firms' market values four weeks prior to the announcement date. This approach ensures that the relative size of each firm is appropriately accounted for in assessing the transaction's overall

impact. Detailed definitions of all variables used in this analysis are provided in the Appendix to ensure transparency and reproducibility.

Table 2.9 CAR Regressions

| | (1) Combined CAR [-1,1] | (2) Combined CAR [-2,2] | (3) Combined CAR [-3,3] |
|----------------------------|-------------------------------|-------------------------------|-------------------------------|
| Country Pair Connectedness | -0.010*** (0.004) | -0.012*** (0.004) | -0.006 (0.005) |
| Transaction value | -0.000 (0.000) | -0.000 (0.000) | -0.001 (0.000) |
| Private merger | -0.013 (0.030) | -0.025 (0.033) | -0.035 (0.038) |
| Public merger | -0.023 (0.015) | -0.028* (0.016) | -0.026 (0.021) |
| Relative size | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) |
| Market value (Acq) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) |
| Major cash | 0.013 (0.014) | 0.013 (0.016) | 0.014 (0.019) |
| Tender offer | 0.009 (0.011) | 0.006 (0.012) | 0.009 (0.012) |
| Friendly offer | 0.013 (0.013) | 0.004 (0.014) | -0.003 (0.017) |
| Same industry | 0.015 (0.009) | 0.019* (0.011) | 0.017 (0.012) |
| Target defense | 0.011 (0.022) | 0.013 (0.022) | 0.002 (0.021) |
| Observations | 399 | 399 | 399 |
| Country pair FE | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes |
| Country-level controls | Yes | Yes | Yes |

This table presents the results of the impact of country pair connectedness on combined CAR. The dependent variable is the weighted average of cumulative abnormal return of acquirer firms and target firms, where weights are based on firm's market value 4 weeks before the announcement date. Columns (1), (2) and (3) reports the impact on 3-day, 5-day, and 7-day combined CAR around the announcement date, separately. In all models, we control for country pair level and year-level fixed effects. Heteroscedasticity-robust standard errors clustered by country pair are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. 10% levels, respectively.

As shown in Table 2.9, the coefficients for country-pair connectedness are negative across all specifications, and they are statistically significant at the 1% level in the 3day and 5-day event windows (Columns (1) and (2)). These findings suggest that higher country-pair connectedness is associated with lower combined CARs, indicating that the market perceives such deals less favorably. The negative market reaction implies that transactions between more connected country pairs may be viewed as value-diminishing from a shareholder perspective.

This pattern aligns with the empire-building theory, which posits that managerial decision-making in cross-border acquisitions can be influenced by personal motivations or non-value-maximizing considerations. Managers may prioritize transactions in highly connected country pairs due to reduced information barriers and the familiarity afforded by strong economic, cultural, or institutional ties between the countries. However, these factors do not necessarily translate into enhanced value creation, as evidenced by the diminished combined CARs. The findings suggest that ease of execution and reduced perceived risks may encourage managers to pursue deals that are less economically advantageous, ultimately leading to weaker market responses.

In addition to the primary variable of interest, control variables included in the analysis yield results consistent with prior research. For instance, the acquiring country's GDP (denoted as GDP (Acq)) has a positive and significant effect on combined CARs, indicating that acquisitions originating from economically stronger countries tend to be associated with more favorable market reactions. This could reflect the higher resource availability and stronger institutional frameworks in such countries, which enhance the perceived likelihood of successful deal execution. Similarly, the market value of the acquiring firm (denoted as Market value (Acq)) is positively related to CARs, suggesting that larger acquirers are better positioned to extract value from cross-border transactions, possibly due to their greater experience, access to resources, and bargaining power in negotiations.

Overall, these results underscore the nuanced relationship between global connectedness and cross-border acquisition performance. While connectedness reduces information asymmetries and facilitates deal-making, it may also lead to managerial overconfidence and a preference for transactions that prioritize ease of completion over strategic value. The negative market response to highly connected deals highlights the

importance of aligning acquisition strategies with shareholder value objectives rather than managerial preferences.

In subsequent sections, we further explore the implications of these findings, including potential mechanisms through which connectedness influences deal outcomes and the role of corporate governance in mitigating the risks associated with overpayment in highly connected cross-border deals. These insights contribute to a deeper understanding of the trade-offs inherent in global connectedness and its impact on the efficiency of international M&A markets.

3.4.7 Acquirer and target CAR

We further explore the impact of country-pair connectedness on CARs for both acquiring and target firms. This analysis incorporates controls for macroeconomic differences between the two countries involved in the transaction, including factors such as GDP, GDP growth, and the business environment, following the methodology outlined by Cao, Li, and Liu (2019). By accounting for these macroeconomic variations, we ensure that the observed effects of connectedness are not confounded by differences in economic conditions. Additionally, we include country-pair fixed effects to control for time-invariant factors specific to each country pair, consistent with the approach used in earlier sections of the study.

The results are presented in Table 2.10, with the first three columns focusing on acquirer CARs over 3-day, 5-day, and 7-day event windows and the subsequent three columns reporting the corresponding results for target CARs. This structure allows us to capture both short-term and slightly extended market reactions to acquisition

announcements, providing a comprehensive view of the effects of country-pair connectedness.

Table 2.10 Acquirer/Target CAR

| | Acquirer CAR | | | Target CAR | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Acq CAR [-1, 1] | Acq CAR [-2, 2] | Acq CAR [-3, 3] | Tar CAR [-1, 1] | Tar CAR [-2, 2] | Tar CAR [-3, 3] |
| Country Pair Connectedness | -0.002 (0.001) | -0.004* (0.002) | -0.004* (0.002) | 0.013** (0.006) | 0.013** (0.006) | 0.022*** (0.006) |
| Diff in GDP growth | 0.001 (0.001) | 0.002 (0.002) | 0.002 (0.002) | -0.005* (0.003) | -0.005* (0.003) | -0.003 (0.003) |
| Diff in GDP | 0.009 (0.017) | 0.004 (0.022) | -0.001 (0.028) | 0.124* (0.064) | 0.124* (0.064) | 0.096 (0.074) |
| Diff in trade-to- GDP | -0.003 (0.028) | -0.012 (0.034) | -0.007 (0.038) | 0.035 (0.092) | 0.035 (0.092) | -0.066 (0.110) |
| Diff in investment profile | 0.007*** (0.002) | 0.006** (0.003) | 0.006** (0.003) | 0.011 (0.008) | 0.011 (0.008) | 0.008 (0.008) |
| Diff in business environment | -0.005 (0.003) | -0.002 (0.004) | -0.004 (0.004) | -0.012 (0.016) | -0.012 (0.016) | -0.018 (0.015) |
| Same industry | 0.001 (0.004) | -0.000 (0.006) | 0.000 (0.006) | 0.011 (0.016) | 0.011 (0.016) | 0.023 (0.018) |
| Transaction value | -0.001*** (0.000) | -0.001*** (0.000) | -0.001*** (0.000) | -0.005*** (0.001) | -0.005*** (0.001) | -0.005*** (0.001) |
| Constant | 0.011 (0.010) | 0.026* (0.014) | 0.029 (0.019) | 0.182*** (0.034) | 0.182*** (0.034) | 0.162*** (0.035) |
| Observations | 925 | 925 | 925 | 697 | 697 | 697 |
| Country pair FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

This table presents the results of the impact of country pair connectedness on acquirer- and target-CAR. The dependent variables are the cumulative abnormal return of acquirer firms in the first three columns and are cumulative abnormal return of target firms in the last three columns. Columns (1), (2) and (3) reports the impact on 3-day, 5-day, and 7-day acquirer CAR around the announcement date, separately. The last three columns report the impact on target CAR, accordingly. In all models, we control for country pair level and year-level fixed effects. Heteroscedasticity-robust standard errors clustered by country pair are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

As shown in Table 2.10, the coefficients for acquirer CARs are negatively significant for the 5-day and 7-day event windows, indicating that higher levels of country-pair connectedness are associated with reduced market gains for acquiring firms over these periods. This suggests that market participants may interpret acquisitions involving highly connected country pairs as potentially overvalued, with concerns stemming from overpayment for the target or limited anticipated synergies. These negative reactions are particularly pronounced over longer event windows, highlighting the market's apprehension regarding the strategic value of these deals for the acquirers.

In contrast, the results for target CARs reveal a starkly different pattern. Across all event windows, target CARs exhibit strong and positively significant coefficients in relation to country-pair connectedness. This finding suggests that target firms benefit considerably in deals involving highly connected country pairs, receiving higher premiums from acquirers eager to finalize the transaction. The positive market response for target firms underscores the perception that these deals deliver immediate and substantial value to target shareholders, likely driven by the substantial premiums offered in highly connected cross-border transactions.

These findings align with the hypothesis that acquirers operating in highly connected country pairs may prioritize deal completion over value creation, leading to overpayment and diminished long-term returns for acquirers. This dynamic is consistent with the empire-building hypothesis, where managerial incentives drive decision-making that prioritizes the strategic or symbolic importance of the transaction rather than its financial prudence. In contrast, target firms capitalize on this behavior by securing higher premiums, which directly translate into immediate market gains for their shareholders.

The implications of these findings are explored further in subsequent sections, where we examine the broader consequences of connectedness-driven premiums and their alignment—or lack thereof—with long-term value creation for acquiring firms. Additionally, we discuss the role of corporate governance mechanisms in mitigating the risks associated with overpayment in highly connected international markets. These insights contribute to a deeper understanding of how global connectedness influences the dynamics of value distribution in cross-border M&A activity.

3.4.8 Premium paid

We investigate the relationship between country-pair connectedness and the premiums paid to target firms in cross-border acquisitions, focusing on whether stronger connections between countries lead to higher valuation premiums. The results of this analysis are presented in Table 2.11, where the dependent variable is the premium paid by acquiring firms relative to the target firm’s market value at two critical reference points: one day before the announcement date (Column (1)) and one week before the announcement date (Column (2)). This approach captures both immediate and slightly longer-term pre-announcement valuations, providing a robust measure of the premiums paid. The analysis incorporates a comprehensive set of control variables and fixed effects consistent with those used in the combined cumulative abnormal returns (CAR) analysis to ensure comparability and control for potential confounding factors.

Table 2.11 Premium

| | Acquirer CAR | | | Target CAR | | |
|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Acq CAR [-1, 1] | Acq CAR [-2, 2] | Acq CAR [-3, 3] | Tar CAR [-1, 1] | Tar CAR [-2, 2] | Tar CAR [-3, 3] |
| Country Pair Connectedness | -0.002 (0.001) | -0.004* (0.002) | -0.004* (0.002) | 0.013** (0.006) | 0.013** (0.006) | 0.022*** (0.006) |

| | | | | | | |
|------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Diff in GDP growth | 0.001 (0.001) | 0.002 (0.002) | 0.002 (0.002) | -0.005* (0.003) | -0.005* (0.003) | -0.003 (0.003) |
| Diff in GDP | 0.009 (0.017) | 0.004 (0.022) | -0.001 (0.028) | 0.124* (0.064) | 0.124* (0.064) | 0.096 (0.074) |
| Diff in trade-to-GDP | -0.003 (0.028) | -0.012 (0.034) | -0.007 (0.038) | 0.035 (0.092) | 0.035 (0.092) | -0.066 (0.110) |
| Diff in investment profile | 0.007*** (0.002) | 0.006** (0.003) | 0.006** (0.003) | 0.011 (0.008) | 0.011 (0.008) | 0.008 (0.008) |
| Diff in business environment | -0.005 (0.003) | -0.002 (0.004) | -0.004 (0.004) | -0.012 (0.016) | -0.012 (0.016) | -0.018 (0.015) |
| Same industry | 0.001 (0.004) | -0.000 (0.006) | 0.000 (0.006) | 0.011 (0.016) | 0.011 (0.016) | 0.023 (0.018) |
| Transaction value | -0.001*** (0.000) | -0.001*** (0.000) | -0.001*** (0.000) | -0.005*** (0.001) | -0.005*** (0.001) | -0.005*** (0.001) |
| Constant | 0.011 (0.010) | 0.026* (0.014) | 0.029 (0.019) | 0.182*** (0.034) | 0.182*** (0.034) | 0.162*** (0.035) |
| Observations | 925 | 925 | 925 | 697 | 697 | 697 |
| Country pair FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

This table presents the results of the impact of country pair connectedness on takeover premium. The dependent variable in column (1) is the premium paid relative to the target market value one day before the announcement date. The dependent variable in column (2) is the premium paid relative to the target market value 4 weeks before the announcement date. In all models, we control for country pair level and year-level fixed effects. Heteroscedasticity-robust standard errors clustered by country pair are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

As displayed in Table 2.11, the coefficients for country-pair connectedness are both positive and statistically significant, with values ranging from 2.56 to 2.77 across the specifications. These results indicate a clear trend: cross-border deals involving country pairs with higher levels of connectedness are associated with significantly larger premiums paid to target firms. This finding aligns with the hypothesis that acquiring firms operating in highly connected international contexts are willing to pay a substantial premium to secure deals. The robustness of this result across different reference points for target valuation underscores its reliability.

The observed behavior is consistent with the empire-building hypothesis, which suggests that managerial incentives can drive decision-making in ways that prioritize deal completion and personal or organizational prestige over value creation. In this context, managers may perceive deals in highly connected country pairs as strategic or prestigious,

justifying higher premiums to finalize such transactions even when these premiums may not enhance long-term shareholder value. Additionally, the familiarity and ease of operating within more connected markets could reduce perceived risks for acquiring firms, further incentivizing higher offer prices.

3.4.9 The impact of GCI on Buy-and-hold abnormal return (BHAR)

One potential critique of our findings on acquisition performance is that they might reflect differences in investor reactions across countries rather than the higher costs incurred due to decisions made by the managers of acquiring firms. While this is a plausible alternative explanation, we first address this argument by emphasizing that only a portion of our results could be attributed to such investor-driven differences. Specifically, our findings related to the number of cross-border deals are not contingent on market reactions, as they do not rely on investor sentiment or market response metrics.

Moreover, even if investor reactions vary across countries, such differences would likely influence longer-term performance as well. To explore this possibility, we extend our analysis by examining the effect of global connectedness on long-term post-acquisition returns. For this purpose, we calculate buy-and-hold abnormal returns (BHAR) as a measure of long-term performance and assess whether cross-country connectedness impacts the sustained performance of acquiring firms. The results of this additional analysis are presented in Table A.2.2.

Our findings indicate no significant evidence that the level of connectedness between countries influences long-term returns. This result is consistent with market efficiency theory, which posits that the value effects of corporate actions, such as acquisitions, are incorporated into prices at the time of their announcement. Under this framework, market

efficiency implies that no systematic momentum or reversals in performance should occur post-announcement, as the market has already priced in the expected outcomes.

Consequently, the absence of long-term effects from connectedness supports the conclusion that our performance findings are not simply driven by differences in investor reactions across countries. Instead, they are more plausibly linked to managerial decision-making and the strategic dynamics of cross-border acquisitions, such as the premiums paid or the potential empire-building behavior identified in our study. This additional robustness test reinforces the validity of our conclusions by demonstrating that the observed performance patterns align with theoretical expectations of efficient markets and are not artifacts of country-specific investor behavior.

3.5 Robustness test

3.5.1 Excluding USA

Given that cross-border deals involving the United States account for approximately 20% of the total transactions in our sample (14,343 out of 70,028 deals), one might contend that the observed results are disproportionately influenced by the United States' high level of global connectedness. To address this concern and ensure the robustness of our findings, we conducted a separate analysis by excluding all U.S.-related deals from the sample. Specifically, we re-estimated our models at both the country level and the country-pair level, focusing exclusively on cross-border acquisitions that do not involve the United States as either the acquirer or the target nation.

The results of this supplementary analysis are presented in Table A.2.3. As detailed in the table, our primary conclusions remain unchanged after excluding U.S.-related deals. The positive relationship between the Global Connectedness Index (GCI) and the volume of cross-border acquisitions persists, confirming that our findings are not driven by the United States' prominent role in the global M&A landscape. Importantly, this consistency demonstrates the generalizability of our results across different contexts and highlights the broader relevance of global connectedness in explaining cross-border acquisition activity.

By removing the influence of the United States—a dominant player in international M&A markets—we further validate that the relationship between global connectedness and cross-border acquisitions is not an artifact of a single country's economic and global integration characteristics. This additional analysis strengthens the credibility of our findings and underscores their applicability to a wide range of countries, irrespective of their individual connectedness or share in global M&A activity. The robustness of our results to this exclusion reinforces the argument that the observed effects are systematic and not merely a reflection of the United States' unique position in global trade and investment networks.

3.5.2 PPML Robustness to Zero Counts in Country–Pair Deals

In our analysis of country-pair-level outbound deals, we address potential issues arising from the use of log-transformed count variables, particularly when a significant proportion of the dependent variable—Number of outbound deals—is zero for certain country pairs in some years. This issue is particularly relevant for count data because taking the logarithm of zero is undefined, which often leads researchers to use a transformation such as $\ln(1+\text{count})$. While this transformation is a common approach to

handling zeros in the data, it introduces a small positive bias, especially when the number of zeros is not negligible.

Count outcomes like deal counts are highly right-skewed and pile up at zero, so simple linear regressions on levels are inefficient and the common $\log(1+y)$ workaround can distort inference. In log-linear models, consistent estimation hinges on homoskedastic errors in the underlying constant-elasticity formulation; when errors are heteroskedastic—a realistic feature of count data—the slope estimates become systematically biased and can even flip sign, with fixed effects amplifying this problem (see Santos Silva and Tenreyro, 2006). Because many observations are zero, the $\log(1+y)$ transformation also changes the estimand in a way that lacks a clear economic interpretation and can induce nontrivial small-sample biases; in practice, the choice between $\log(1+y)$ and Poisson-type estimators often moves coefficients more than omitting a major control would. Together, these features mean that standard log-linear regressions on transformed counts can yield misleading magnitudes, significance, and even directions, posing a real risk to the reliability of results unless models designed for counts—such as PPML that accommodates zeros and is robust to general forms of heteroskedasticity—are used as a primary specification or as a stringent robustness check (Cohn, Liu and Wardlaw, 2022).

Although only a small fraction of our dataset (approximately 20 observations at the country-year level) has zero values for the dependent variable, it is important to ensure that our results are not sensitive to the choice of transformation. To address this, we complement our baseline analysis by re-estimating the model using the Poisson Pseudo Maximum Likelihood (PPML) estimator, which allows for the inclusion of zero values in count data without requiring a log transformation. Specifically, we use $\ln(\text{Number of deals})$ as the dependent variable without adding 1 to the count, thereby addressing concerns about potential biases introduced by the $\ln(1 + \text{count number})$ transformation.

The results of the PPML estimation are presented in Table A.4. As shown, the findings remain consistent with our main baseline results, suggesting that the core relationships identified in our study are robust to alternative specifications for handling zero-valued observations. The coefficients retain their expected signs and statistical significance, confirming that the conclusions drawn from our analysis are not driven by the specific treatment of zeros in the dependent variable.

In conclusion, the robustness checks presented in Table A.2.4 demonstrate that our findings are not sensitive to the choice of how zeros in the dependent variable are handled. Whether using the $\ln(1 + \text{count number})$ transformation or directly modeling the count variable through PPML, the results consistently support the validity of our main conclusions. This robustness further strengthens the reliability of our analysis and underscores the broader implications of the relationships we identify in the data.

3.6 Conclusion

This study provides comprehensive insights into the relationship between global connectedness and cross-border acquisitions, offering a significant contribution to the literature on globalization and the determinants of mergers and acquisitions (M&A) activity. By examining this relationship at the country-year level, our findings establish a robust positive association between a higher Global Connectedness Index (GCI) and the total number of cross-border deals. Among the various components of global connectedness, trade and information flows stand out as the principal drivers of this effect. Notably, the impact of trade extends beyond its depth to underscore the critical importance of breadth in global flows, highlighting how diverse international trade relationships promote cross-border M&A activity. Similarly, information flows facilitate cross-border deal-making by mitigating information asymmetry, enabling firms to make more informed

investment decisions. By contrast, people flow exhibits no significant impact on cross-border acquisitions, a finding consistent with prior research and suggestive of their limited role in influencing international M&A patterns.

To ensure the robustness of these results, we undertake a gravity model analysis at the country-pair level, addressing potential endogeneity concerns through an instrumental variable (IV) approach grounded in the “common friends” methodology. This innovative approach accounts for the possibility of reverse causality between connectedness and deal activity, strengthening the causal interpretation of our findings. Furthermore, we perform a series of robustness checks, including an analysis of the China–U.S. trade war as an exogenous shock to global trade flows and the application of Granger causality tests. These additional tests confirm the stability of our results and mitigate concerns regarding alternative explanations. Importantly, our analysis reveals that the positive relationship between GCI and cross-border acquisitions does not extend to domestic M&A activity, ruling out general improvements in economic conditions as the sole driver of our findings.

Beyond deal volume, we also explore the quality of cross-border acquisitions and uncover intriguing dynamics. Despite the reduction of information asymmetry associated with higher global connectedness, our results indicate that increased GCI correlates with lower-quality acquisitions. This outcome appears to be driven by CEO behaviors that prioritize familiar markets, often resulting in higher premiums paid for acquisitions, a phenomenon consistent with empire-building theory. While these premiums may generate short-term market gains for target firms, they fail to translate into sustained long-term performance benefits for acquiring firms. This pattern suggests that market participants efficiently price the potential drawbacks of such acquisitions, tempering long-term value creation.

This study makes several noteworthy contributions. First, it advances the understanding of globalization's impact on economic activity by providing a granular, microlevel perspective on how global connectedness influences cross-border M&A decisions. Our emphasis on the breadth of globalization, particularly the role of trade and information flows, enriches the literature by highlighting the significance of diverse and expansive international linkages. This perspective complements existing work on globalization depth, offering a more nuanced understanding of how global networks shape economic behavior. Second, we contribute to the literature on the determinants of M&A activity by positioning global connectedness as a crucial factor alongside established variables such as financial market conditions, tax policies, cultural influences, and institutional quality. By bridging the fields of international economics and corporate finance, our findings provide a holistic framework for analyzing cross-border M&A activity.

The implications of this research are far-reaching, with relevance for policymakers, corporate managers, and other stakeholders. For policymakers, the findings underscore the critical role of global connectedness in driving cross-border M&A activity, which in turn facilitates economic growth, promotes international capital flows, and deepens global economic integration. To capitalize on these benefits, policymakers should focus on enhancing openness in trade and information exchange while addressing barriers that hinder global connectivity. Such efforts can foster a more conducive environment for cross-border investment, accelerating economic development.

For corporate decision-makers, the study highlights the dual-edged nature of global connectedness. While greater connectedness facilitates deal-making and reduces information asymmetry, it also increases the risk of overpayment and empire-building tendencies. Companies must carefully balance the pursuit of deal volume with rigorous

assessments of deal quality to avoid adverse long-term outcomes. Enhanced due diligence processes, coupled with a strategic focus on aligning acquisitions with long-term corporate objectives, are essential. This is particularly important when engaging with highly connected yet familiar markets, where over-optimism and familiarity bias may lead to suboptimal decision-making. By integrating these insights into their acquisition strategies, firms can better navigate the complexities of global M&A activity and achieve more sustainable value creation.

The third empirical chapter: Losing attractiveness? Extreme weather and M&A

4.1 Introduction

According to the Task Force on Climate-related Financial Disclosures 2023 status report, rising global temperatures contribute to significant losses through extreme weather events. "In 2022, natural disasters resulted in global economic losses of \$284 billion." Although there are plenty of studies focusing on the economic consequence of climate-related risk, we still know little about the impact of heat exposure, one critical climate physical risk, on corporate investment decisions. Our paper aims to contribute to the literature by answering the question that how heat exposure affects firms' acquisition decision-making and post-merger performance.

In this study, we attempt to answer the questions by constructing a sample including more than 8,000 US publicly traded firms, merged with US domestic M&A transaction information from 1st January 2000 to 31st December 2023. Furthermore, we causally estimate the impact of extremely high temperatures using the variation of firm-level specific exposure to days of extremely hot weather. According to Pankratz, Bauer, and Derwall (2023), such variation is exogenous and randomly distributed conditional on fixed effects. As a result, examining the effects of physical heat risk is subject to fewer endogeneity concerns. We find that firms with higher heat exposure risk is less attractive to be acquired. We then conduct series analyses on the impact of heat exposure on post-merger performance and robustness test.

To assess firm-level heat exposure, we follow Pankratz, Bauer, and Derwall (2023) and utilize spatially and temporally granular data on daily maximum temperatures, obtained from ERA5, a global temperature reanalysis dataset. We then acquire firm specific location, translate it to coordinates and merge the coordinates with the nearest ERA5 nodes. Firm-level heat risk is identified as the percentage of hot days of a year. To

classify whether a day is hot, we adopt two measurements. First, we take 30°C as the absolute threshold. If the daily maximum temperature of the firm is above 30°C, we count the day as a hot day. Second, to ease the concern that workers living in a hot place may adapt to the hot weather and maintain their working efficiency, we also take the relative threshold into account. Specifically, we calculate the 90th percentile historical daily maximum temperature distribution as relative threshold. If the daily maximum temperature of the firm is above 30°C as well as the 90th percentile threshold, we count the day as a hot day as our second measurement.⁶

To examine the effect of firm specific heat exposure on the likelihood of being acquired, we estimate the likelihood of being acquired in year $t + 1$ as a function of percentage of hot days as well as firm-level controls in year t . Following Harford (2005), Martynova and Renneboog (2009), Mavis et al. (2020), and Wu and Chung (2019), we control for the industry- and year- level fixed effects to account for inter-industry M&A patterns and macroeconomic cycle. In addition, we are mindful that the percentage of hot days might be negatively correlated with the percentage of cold days for a specific location. Thus, we also control for the percentage of cold days in additional specifications. Besides, to test whether the effect is persistent, we present the results of using one, two and three year lagged heat exposure. Controlling for all above factors, our results prove the prediction that firms with higher heat exposure risk is less likely to be acquired, suggesting that they are less attractive for investors. The economic magnitude of the impact is significant: one standard deviation increase in percentage of hot days is associated with a 11.16% decline in acquisition likelihood next year, relative to the mean of acquisition probability in our sample.

⁶ We use a various set of alternative thresholds in our robustness test to show that our results are consistent to the selection of thresholds.

Less attractive firms are generally expected to have weaker bargaining power in M&A transactions. To examine the impact of high temperatures on firms' bargaining power, we analyze the effect of heat exposure on the takeover premium. After controlling for a set of acquirer and target firms characteristics, as well as deal-specific factors, we find evidence that firms exposed to higher temperatures exhibit reduced bargaining power, resulting in lower takeover premiums.

To further test whether the market efficiently responds to the heat physical risk, we explore the impact of heat exposure on short-term and long-term abnormal return. According to Pankratz, Bauer, and Derwall (2023), financial assessments for climate change mitigation are often complicated by policy and uncertainty, but extreme high temperatures provide a straightforward context to test investor expectations. Although the reanalysis data on temperature could be delayed, local temperature data is publicly and timely available for investors, and extreme temperatures are unaffected by external factors, enabling an objective analysis of market anticipation regarding performance impacts. We measure the short-term market reaction using 5-day acquirer cumulative abnormal returns (CAR) and measure long-term market performance as 2-year acquirer buy-and-hold abnormal returns (BHAR). We find that investors response to the heat risk factor in an inefficient way. Specifically, the impact of heat exposure on CAR is insignificant, while the effect on two-year BHAR is significantly negative. Overall, our results are in line with Pankratz, Bauer, and Derwall (2023) finding that the capital market participants do not fully anticipate the economic consequence of extreme hot weather in a timely way.

To test whether the heat risk have cumulative effects in a long run, we examine the impact on operating expenses and performance. Since the acquirer firms realize the heat risk of the target firm ex-ante, we expect the impact on the operation of the firm could be limited. We specifically consider the post-merger changes in industry-adjusted selling,

general and administrative (SGA) and industry-adjusted return on assets (ROA). We find evidence that the target firms' heat exposure increase the acquirer's post-merger SGA expense. However, the impact is limited since not all specifications find the significant results. Regarding ROA, we do not find evidence that the heat exposure risk can affect abnormal ROA. Overall, we conclude that the acquirer firm responses to potential negative impact of the heat risk of the target firms and keep the impact on the operation of the firm to a limited level.

We also conduct a series robustness tests. First, to make sure that our results are not outcomes of chances, we randomly reassign the heat exposure within different levels and re-estimate our baseline results. Our results are still holds across all permutation tests. Second, to mitigate concerns that the findings may be influenced by the financial crisis and the COVID-19 pandemic, as these systematic shocks in the capital markets that could overlap with heat shocks, we re-estimate our results after excluding the years associated with the financial crisis and the pandemic. Thirdly, we use a set of alternative thresholds including 25C, 25C and 90th percentile, 25C and 95th percentile and 30 ° C and 95th percentile. Our results remain consistent across all robustness tests.

First, our study contributes to the literature that on corporate finance and climate risk hazard. In this regard, our work complements recent studies on the natural disaster and corporate sales (Barrot and Sauvagnat 2016), managers' overreaction to nearby hurricane strikes (Dessaint and Matray 2017), corporate cash holdings and extreme cold weather (Brown, Gustafson, and Ivanov 2021) and climate risk and firm performance (Ozkan, Temiz, and Yildiz 2023; Pankratz, Bauer, and Derwall 2023). This study provides direct evidence that heat exposure, which is one of the most frequent and common climate risks, can affect corporate investment decision and further impact their post-merger performance.

Second, this study adds to the determinants of M&A activities. Prior literature shows that acquirer and target firms' valuation, CEO traits and early-life experience, innovation, industry shocks, risk management and corporate liquidity plays a significant role in driving M&A activity. We extend the literature by uncovering an incremental factor, climate physical risk, negatively drives a firm's likelihood to be acquired and leads to long-term persistence economic consequences.

Third, we also contribute to the debates of climate risk pricing efficiency. Murfin and Spiegel (2019) find that there is limited pricing effects of sea level rising risk, while Baldauf, Garlappi, and Yannelis (2019) argue that beliefs play an important role in how and if the climate risk is priced. Moreover, growing studies find the evidence that the market may underestimate the economic consequence of the climate risk (see, Alok, Kumar, and Wermers (2020), Hong, W. Li, and Xu (2019), Krueger, Sautner, and Starks (2020), Stroebel and Wurgler (2021), and Pankratz, Bauer, and Derwall (2023)). Our results that the capital market does not response to the consequence of acquiring firms with higher physical heat exposure risk in short-term but adjust in the long run supports the argument that investors under-react to the climate factors.

4.2 Literature review

Rising concerns on the climate risk has led to a growing body of research on how climate risks affect firm performance, investor behavior, and financial markets. As extreme weather events become more frequent and intense due to global warming⁷, the climate physical risks to firms and the financial sector are becoming increasingly important. One key area of focus is how extreme temperatures impact firm investment

⁷ *Extreme weather and climate change. NASA. Retrieved September 14, 2024, from <https://science.nasa.gov/climate-change/extreme-weather/>*

decision and properly pricing the climate risk. Although there are growing recent studies on the economics consequence of climate-related risk, we still know little about the impact of heat exposure, one critical climate physical risk, on corporate investment decision. To this regard, this study explores how heat exposure risks influence firms' acquisition decision, market pricing and post-merger performance to provide a further understanding of the financial impacts of climate change.

4.2.1 The economic consequence of temperature exposure

One of the strands of climate finance literature focused on the impact of temperature on the productivity, particularly in developing countries. For example, Li, Cong, and Yin (2021) find that high temperatures have persistent adverse effects on firm-level exports by negatively influencing investment, capital, and production output. Moreover, Somanathan et al. (2021) demonstrates that higher temperatures are linked to declines in worker productivity and increased absenteeism, based on micro-level data from India. Zhang et al. (2018) suggests an inverted U-shaped relationship between temperature and total factor productivity, indicating that this relationship is a key driver of the temperature-output effect. Besides, they find labor-intensive and capital-intensive firms in China demonstrate vulnerability to high temperatures. Similarly, Xie (2017) shows that high temperatures increase the probability of firm exits in Indonesia. These studies provide valuable insights into how firms in emerging markets are vulnerable to extreme temperature.

Regarding developed market, recent studies find the similar patterns of the negative effects of climate risk. For example, Colacito, Hoffmann, and Phan (2019) suggests that seasonal temperature increasing have significant and systematic effects on the both the overall economy and a broad range of economic sectors for the United States, measured by Gross Domestic Product (GDP) and Gross State Product (GSP). Hsiang et al. (2017) finds

the similar results by analysing multiple economic sectors that 1°C increasing lead to roughly 1.2% of gross domestic product on average. On the micro-level, Addoum et al. (2020) find no evidence that temperature exposure affects establishment level sales and productivity, even in heat-sensitive industries. At the firm level, aggregated temperature exposure across multiple establishments shows no consistent relationship with sales, productivity, or profitability. Similarly, we find positive but limited effects of target firm's heat on post-merger operating cost and no significant effects on ROA, in line with Addoum et al. (2020) results. Moscona and Sastry (2023) argues that innovation has shifted toward crops increasingly exposed to extreme temperatures and U.S. counties benefiting from this induced innovation experience significantly reduced local economic damage from extreme temperatures.

Deryugina and Hsiang (2017) explores the US economics data and argue a persistence negative marginal effect of temperature between 1970 and 2010, despite considering population adaptation. They also suggest that Envelope Theorem implies that the marginal effect of long-term climate can be precisely determined using only variations in idiosyncratic weather. In contrast, Natoli (2022) construct country level heat and cold exposure and find that heat cannot affect output, while cold shocks lead to reduced output. The reason they argue is that the economic is less prepared to the cold waves during the global warming era. As a results, we also consider for the effect of cold shocks as control in our study. Ginglinger and Moreau (2023) utilizes forward-looking climate physical risk data and finds that increased climate risk is associated with lower leverage following the Paris Agreement. Specifically, firms facing high climate risk tend to experience higher loan spreads, particularly for bank loans, indicating that the reduction in debt is partly driven by lenders' growing awareness of physical climate risks. Kumar, Xin, and Zhang (2019) find that US firms with higher temperature sensitivity experience lower future profitability and adopt riskier corporate policies. These firms are also subject to

overpricing, as they generate lower average future returns. The mispricing appears to be driven by market participants, including nonlocal institutional investors who overweight these firms in their portfolios, and sell-side analysts who issue less accurate forecasts. Donadelli et al. (2017) suggest that a temperature shock has a substantial, negative, and statistically significant impact on total factor productivity (TFP), output, and labor productivity. These findings are explained within a production economy model that accounts for long-run temperature risk.

Regarding climate risk on firm sales, Starr-McCluer (2000) explore the impact monthly weather fluctuations on sales. He finds that unusual weather has mild but significant effects on the sales. However, the effect can be quickly offset by the following monthly effect. Roth Tran (2023) finds that even after accounting for shifts in sales between outdoor and indoor stores, the firm's website, or over time, weather still has a significant and lasting impact on sales. Surprisingly, while sales sensitivity to precipitation, snow, and cold weather decreases with historical experience, this reduction does not occur for extreme heat events.

Studies on the more widely global setting rather than focusing on one country also find the consistent results. Noy (2009) argues that developing countries and smaller economies experience significantly larger output declines following disasters of similar relative magnitude compared to developed countries or larger economies. Dell, Jones, and Olken (2012) demonstrates a negative effect of high temperature on economics growth but only in poor countries. Furthermore, the high temperature affects the growth of economy, not only affecting the level of output, which leads to a greater and persistence economic consequences. Besides, rising temperatures have far-reaching effects on not only agricultural output but also industry output and political stability. By exploring 93 outside US countries, Pankratz, Bauer, and Derwall (2023) suggests increased exposure to

extremely high temperatures leads to a reduction in firms' revenues and operating income. Furthermore, it finds evidence that capital market participants do not fully anticipate the economic consequences of heat as a primary physical climate risk. Pankratz and Schiller (2024) explore the impact of heat exposure on the global supply chain. Specifically, they find that heat in supplier location leads to the reduced operating performance. Customers are more likely to end the supplier relationship when the supplier experiences heat exposure that exceeds ex-ante expectations. Burke, Hsiang, and Miguel (2015) find that overall economic productivity exhibits a non-linear relationship with temperature across all countries, peaking at an annual average temperature of 13°C and decreasing significantly at higher temperatures. Regarding comments, they suggest that adaptations, such as groundbreaking innovation or defensive investments, could mitigate these effects. However, social conflict or disrupted trade—whether due to political restrictions or simultaneous global losses—might amplify them. Xiang et al. (2014) find that manual workers exposed to extreme heat or working in hot environments, particularly in low- and middle-income countries in tropical regions, are at heightened risk of heat stress. By exploring 48 countries' data, Faccia, Parker, and Stracca (2021) show that hot summers lead to short-term increases in food price inflation, particularly in emerging market economies. However, over the medium term, the impact on various price indices tends to be either insignificant or negative. This effect is more pronounced in impacts occurring in response to larger temperature shocks and at higher absolute temperatures.

Ferriani, Gazzani, and Natoli (2023) suggest that international investors tend to pull back net flows from equity mutual funds exposed to countries hit by disasters, but this behavior is primarily seen when the affected nations are emerging economies with higher vulnerability to climate risk. Besides, they also argue that natural disasters cause investors to reduce their portfolio flows not only to affected countries but also to nearby high-climate-risk countries within the same region. Additionally, disasters in high-climate-risk

emerging economies tend to redirect investment flows toward advanced countries that are perceived to be relatively safer from climate risks.

4.2.2 Investor behavior and weather

In addition to the literature on firm performance, a rich body of research has explored how weather and climate conditions affect investor behavior. This behavioral finance literature suggests that weather can influence the mood, risk tolerance, and decision making of market participants, leading to observable effects in financial markets. Saunders (1993) was among the first to document this phenomenon, demonstrating that cloud cover in New York City is correlated with daily stock market returns. He suggested that poor weather may negatively influence investors' mood, resulting in lower stock returns. By exploring more than 28 countries from 1982 to 1997, Hirshleifer and Shumway (2003) demonstrates that sunshine weather is positively correlated to the stock returns, while rain and snow do not have significant effect. Similarly, Kamstra, Kramer, and Levi (2003) investigate the impact of seasonal changes on investor risk aversion, discovering that during winter months, characterized by fewer daylight hours, investors tend to exhibit more risk-averse behavior. This seasonal effect is supported by Bassi, Colacito, and Fulghieri (2013), who conduct experiments and find that favorable weather conditions promote greater risk-taking. Goetzmann et al. (2015) extend this line of research by utilizing survey data and disaggregated trade data and demonstrating that cloudier days are associated with increased perceptions of overpricing in individual stocks and the Dow Jones Industrial Index. Further, Dehaan, Madsen, and Piotroski (2017) provide evidence that analysts are slower to respond to earnings announcements on days with poor weather, highlighting how weather-induced mood shifts can impair both the speed and quality of financial decision-making. These findings suggest that weather conditions not only influence firm performance but also have a significant psychological impact on investors,

shaping their sentiment and behavior, which in turn affects stock prices, trading volumes, and market liquidity.

By using international data, Choi, Gao, and Jiang (2020) finds that individuals adjust their beliefs about climate change upward when experiencing unusually warm temperatures in their area. During abnormally warm weather, stocks of carbon-intensive firms tend to under-perform compared to low-emission firms. Retail investors, rather than institutional investors, are more likely to sell shares of carbon-intensive companies in response to these temperature anomalies. Similarly, Ferriani, Gazzani, and Natoli (2023) natural disasters lead investors to reassess global climate risks, prompting them to shift investments to safer regions.

Our research connects to this literature by showing that investors fail to efficiently react to the climate physical risks. While we find that extreme hot weather does not have an immediate and statistically significant effect on short-term CARs around M&A announcements, the long-run BHAR analysis over a two-year horizon reveals a pronounced negative impact. This discrepancy suggests that markets underreact to climate-related physical shocks in the short run, possibly because such risks are not yet fully priced into investor expectations or are perceived as transitory noise. However, as time unfolds, the adverse consequences of extreme heat gradually materialize in firm performance and valuation, and investors who initially ignored these signals face cumulative losses. In other words, our findings highlight a systematic inefficiency: investor sentiment and trading behavior appear insensitive to acute temperature shocks in the short run but eventually adjust in a delayed manner. This pattern complements the behavioral finance evidence that weather influences mood, risk tolerance, and information processing, and extends it by demonstrating that climate-induced physical stress can impair market efficiency in pricing long-term risks.

4.2.3 Climate risk and mispricing

The growing body of literature examining the intersection of climate risks and financial markets reveals important insights into how climate-related factors influence asset pricing, investment decisions, and market dynamics. Bernstein, Gustafson, and Lewis (2019) and Baldauf, Garlappi, and Yannelis (2020) focus on the financial implications of exposure to rising sea levels, analyzing their effects on property values, municipal bond yields, and underwriting fees. Their findings suggest that climate-related risks are increasingly being integrated into financial market valuations, reflecting an emerging awareness of these risks among investors and market participants. However, despite this progress, there is compelling evidence that financial markets may still systematically undervalue climate risks, pointing to inefficiencies in how such risks are priced and managed.

The impact of climate-related information on firm-level outcomes is further underscored by Anttila-Hughes (2016), who demonstrates that major announcements from NASA—such as record-high global temperatures and the collapse of significant ice shelves—directly influence the stock market performance of energy companies. These findings highlight the extent to which climate-related news can shape investor perceptions and, consequently, firm valuations. Nevertheless, a recurring challenge identified in the literature is the tendency of investors to underreact to or misprice climate risks. Alok, Kumar, and Wermers (2020), for instance, document a behavioral bias among U.S. mutual fund managers in areas affected by natural disasters, who subsequently underweight stocks tied to regions prone to similar hazards. Similarly, Hong, Li, and Xu (2019) provide evidence of investor underreaction to drought-induced profitability declines in the food sector, resulting in lower-than-expected abnormal stock returns. Extending these insights, Kumar, Xin, and Zhang (2019) identify patterns of overpricing among U.S. firms facing

significant climate risks, which leads to systematically lower average future returns. This overpricing appears to stem from actions taken by key market participants. Nonlocal institutional investors, for example, are shown to disproportionately overweight these firms in their portfolios, while sell-side analysts provide less accurate earnings forecasts for these firms, contributing to mispricing and inefficiencies in market responses.

Research into the broader societal and individual-level responses to climate risks also provides valuable context. For example, Deryugina (2013) analyze survey data to examine how temperature fluctuations influence public beliefs about global warming. Their findings suggest that long-term temperature changes exert a meaningful influence on individuals' beliefs in global warming, while short-term variations do not. Interestingly, these effects are mediated by political ideology, with conservatives more likely to adjust their beliefs in response to temperature abnormalities. This behavioral heterogeneity underscores the complex interplay between information processing, ideological filters, and climate perceptions. Complementing these findings, Kelly, Kolstad, and G. T. Mitchell (2005) provide a firm-level perspective, arguing that companies engage in a process of learning and adaptation in response to shifts in the distribution of environmental shocks. This adjustment process often incurs significant costs, highlighting the economic implications of evolving climate risks. Further theoretical contributions by Moore (2017) explore experience-based learning models, which describe how individuals and firms update their understanding of climate risks over time based on personal or observed experiences with adverse climatic events. These models offer a framework for interpreting how climate-related knowledge evolves in response to both immediate and long-term exposures.

Building on this extensive literature, our study makes a novel contribution by exploring the role of heat exposure in shaping corporate acquisition strategies and market

reactions. Specifically, we find that firms' target selection processes are significantly influenced by climate physical risks, particularly those related to heat exposure. Moreover, our analysis reveals that market participants often respond inefficiently to the climate risks associated with target firms, resulting in observable market mispricing. This inefficiency underscores the broader theme of how financial markets struggle to fully integrate climate risks into pricing and decision-making frameworks. By linking the physical risks of climate change to both corporate strategy and market inefficiencies, our study deepens the understanding of the multifaceted ways in which climate risks permeate financial markets and corporate behavior. This contribution not only extends the empirical literature but also highlights critical implications for policymakers, investors, and firms aiming to navigate the challenges posed by a changing climate.

4.2.4 Determinants of M&A activity

Our study also makes a significant contribution to the literature on the determinants of mergers and acquisitions (M&A) activities, expanding on a rich tradition of theoretical and empirical research. Rhodes-Kropf and Viswanathan (2004) highlight the role of deviations in market values from fundamental values in explaining patterns in stockbased mergers. Their findings suggest that such deviations can rationally account for the correlation between merger activity and market valuations, particularly during periods of over- and under-reaction in the stock market. These insights align with the foundational work of Shleifer and Vishny (2003), who similarly propose that misvaluations can drive M&A waves, a hypothesis later substantiated by the empirical findings of Rhodes-Kropf, Robinson, and Viswanathan (2005). This body of work underscores the importance of valuation anomalies in explaining both the timing and nature of merger waves.

Building on these valuation perspectives, Jovanovic and Rousseau (2002) extend the Q -theory framework to M&A settings, demonstrating that firms with high Q values—indicating a higher market valuation relative to replacement cost—tend to acquire firms with lower Q values. This dynamic emphasizes the role of market valuation disparities as a driver of acquisition activity. Dong et al. (2006) further integrate the misvaluation and Q theories, revealing that the interplay between bidder and target valuations influences critical transaction characteristics, including the method of payment (cash versus stock), acquisition modes (hostile versus friendly), premiums offered, offer success rates, and announcement-period stock returns for both bidders and targets. Their analysis deepens our understanding of how valuation differences shape the outcomes and strategic decisions surrounding M&A.

Macroeconomic and industry-level factors also play a pivotal role in driving M&A activities. Maksimovic and Phillips (2001) argue that the procyclicality of economic activity can significantly influence the volume and timing of acquisitions, as firms capitalize on favorable market conditions during economic expansions. Similarly, Harford (2005) find that industry merger waves are driven by a combination of economic, regulatory, and technological shocks, with these forces creating environments conducive to heightened M&A activity. In their analysis of 52 industries, Mitchell and Mulherin (1996) identify inter-industry variations in takeover and restructuring rates as being closely tied to the economic shocks that affect those industries, further emphasizing the role of external shocks in shaping M&A trends. Using a novel text-based approach, Hoberg and Phillips (2010) examine the language used in product-market disclosures and find that firms with similar language are more likely to engage in mergers. They argue that risk management considerations play a crucial role in merger decisions, particularly during periods of heightened merger activity.

Liquidity considerations add another layer to the determinants of M&A activity. Almeida, Campello, and Hackbarth (2011) introduce the concept of “liquidity mergers,” where financially healthy and liquid firms acquire distressed firms, often in the absence of operational synergies. These mergers are driven by the need to reallocate liquidity and prevent inefficient firm closures, particularly in industries where assets are highly specific yet transferable across firms. This liquidity perspective provides a distinct lens through which to view the motivations behind certain types of M&A transactions.

In addition to firm-level and market-level determinants, research has also explored how CEO traits and behavioral factors influence M&A activity. Goel and Thakor (2010) examine the role of CEO envy in driving merger waves, showing that even idiosyncratic shocks can trigger waves due to the competitive behavior of envious CEOs. Interestingly, early acquisitions in a wave tend to yield higher returns for bidders, involve smaller target firms, and result in greater compensation gains for acquiring CEOs compared to later acquisitions, highlighting the dynamic interplay between timing, target size, and executive incentives. Yim (2013) further investigate the relationship between CEO characteristics and M&A decisions, finding that a CEO’s age is inversely related to a firm’s acquisition propensity. This effect is particularly strong in firms where CEOs expect significant post-acquisition compensation or have the ability to influence such outcomes, suggesting that personal incentives heavily shape acquisition behavior.

Age-related dynamics are also explored by Jenter and Lewellen (2015), who find that the likelihood of a firm becoming a takeover target increases when the CEO nears retirement age, particularly around the age of 65, due to the lower costs of CEO turnover. Meanwhile, cultural and innovation-related factors also affect cross-border and domestic M&A trends. Ahern, Daminelli, and Fracassi (2015) argue that cultural differences between countries serve as a barrier to cross-border deals, reducing the number of such

transactions despite potential economic benefits. In contrast, Wu and Chung (2019) find that firms with higher innovation output and greater R&D investments are more likely to become acquisition targets, reflecting the strategic importance of acquiring innovative capabilities in competitive markets.

Through this comprehensive exploration of M&A determinants, the literature reveals a complex interplay of market forces, firm-specific traits, CEO characteristics, and external shocks, all of which collectively shape acquisition activities. Our study builds on this foundation by examining the role of climate-related physical risks in influencing firms' M&A strategies, thereby providing a new dimension to this rich and multifaceted field of inquiry.

4.3 Hypothesis

Firms that are exposed to higher levels of heat risk may encounter significant challenges that can negatively impact their overall performance. This heightened exposure can lead to reduced work productivity, as employees may be less efficient in extreme temperatures, and operational processes could be disrupted. In addition, bidders may believe that such firms may also experience lower future profitability due to increased energy costs, higher maintenance expenses, and potential downtime caused by heat-related issues. Evidence summarized in Section 4.2 shows that heat depresses labor productivity and raises absenteeism, while extreme temperatures reduce output and revenues and destabilize supply chains (Somanathan et al., 2021; Li, Cong, and Yin, 2021; Zhang et al., 2018; Burke, Hsiang, and Miguel, 2015; Pankratz, Bauer, and Derwall, 2023; Pankratz and Schiller, 2024). Lenders also price physical climate risk, tightening financing conditions for exposed firms (Ginglinger and Moreau, 2023). Consequently, acquiring a firm with substantial heat exposure risk might not yield the anticipated synergies typically expected

from mergers and acquisitions. These considerations suggest that firms with higher climate physical risk are less attractive and less likely to be acquired. Thus, we have the first hypothesis as:

Hypothesis 1A. A firm's likelihood of being acquired is negatively related to the firm's heat exposure.

Moreover, the above considerations imply that the acquirer may be willing to pay a lower premium for heat-exposed firms. Besides, the reduced attractiveness of heat-exposed firms may translate into weaker bargaining power in M&A deals. Markets and intermediaries capitalize physical risk into prices and funding costs—properties in flood- and sea-level-risk areas trade at discounts and face higher municipal financing costs, and firms with greater physical exposure face higher loan spreads (Bernstein, Gustafson, and Lewis, 2019; Baldauf, Garlappi, and Yannelis, 2020; Ginglinger and Moreau, 2023). Extreme heat is also associated with lower revenues and operating income outside the U.S., reinforcing lower private valuations for exposed targets (Pankratz, Bauer, and Derwall, 2023). Mapping these valuation and financing channels into takeover negotiations yields a straightforward pricing prediction.

Hypothesis 1B. The takeover premium paid is negatively related to the target firm's heat exposure.

The market inefficiency on climate risk factors (DeHaan, Madsen, and Piotroski, 2017; Pankratz, Bauer, and Derwall, 2023) may also be observed in acquisition deals. Since investors may be insensitive to exposure factors, we expect the market reaction around acquisition announcements does not fully respond to such risks, while the market will adjust in the long term. Prior work shows slow diffusion and underreaction to climate

physical risk in prices and forecasts, as well as behavioral frictions linked to weather that can mute short-window responses (Hong, Li, and Xu, 2019; Kumar, Xin, and Zhang, 2019; Saunders, 1993; Hirshleifer and Shumway, 2003; Kamstra, Kramer, and Levi, 2003; Goetzmann et al., 2015). Applied to M&A, this implies limited sensitivity of announcement-window CARs to target heat exposure but weaker post-merger performance as higher operating costs and risk premia materialize over time, leading to the following hypothesis:

Hypothesis 2A. The long-term post-merger buy-and-hold abnormal return is negatively related to the target firm's heat exposure.

The firms in the developed country have ability to respond the to climate risk, such as controlling rising expense by heat, avoid the reduced sales and productivity. Furthermore, if the hypothesis 1 holds, it implies that bidders recognize the target's physical climate risk at the deal stage and have incentives to plan adaptations during integration. Section 4.2 notes heterogeneous real effects and meaningful adaptation margins: establishment-level evidence often shows limited links between temperature exposure and sales or productivity once firms adjust, and innovation can shift toward heat-tolerant processes and inputs (Addoum et al., 2020; Moscona and Sastry, 2023). Short-to-medium-term macro price and output effects also tend to attenuate as adjustment occurs (Faccia, Parker, and Stracca, 2021; Colacito, Hoffmann, and Phan, 2019). These mechanisms make it plausible that accounting outcomes after the merger show little systematic relation to target heat exposure even when equity returns drift downward as risks are realized. Thus, we have Hypothesis 2B as:

Hypothesis 2B. The long-term post-merger operating expenses and performance is not related (or is limited affected by) to the target firm's heat exposure.

4.4 Temperature and M&A data

4.4.1 Financial data

Our initial sample comprises all firms listed in the Compustat North American Database between January 1, 1999, and December 31, 2023. This comprehensive dataset provides the foundational universe of firms for our analysis, ensuring broad coverage of U.S. public companies during the specified period. To incorporate information on mergers and acquisitions (M&A), we merge this dataset with detailed transaction data from the SDC Platinum Database, focusing on U.S. domestic M&A transactions that occurred between January 1, 2000, and December 31, 2023. We restrict our analysis to transactions with a reported value exceeding \$1 million to ensure that the sample reflects significant deals with meaningful economic and strategic implications.

Both the acquiring and target firms in our final dataset are required to be U.S.-based and publicly traded, as this criterion facilitates the availability of detailed financial and market data needed for our analysis. Additionally, we impose a set of ownership constraints to ensure that the selected transactions meet conventional definitions of acquisition. Specifically, we require that the acquiring firm holds less than 50% of the target firm's shares prior to the transaction and attains ownership of more than 50% after the deal is completed. This condition ensures that the sample is composed exclusively of transactions that result in a transfer of corporate control, a key aspect of M&A activity.

We also implement a series of exclusions to refine the sample and eliminate deals that do not fit the traditional acquisition framework. Transactions categorized as divestitures, exchange offers, recapitalizations, repurchases, spinoffs, and mandatory offerings are excluded from the dataset. These types of transactions typically involve different strategic

objectives, ownership structures, or regulatory frameworks and could introduce noise into our analysis.

4.4.2 Firm's location

To identify firms' geographic locations, we first extract text-based location data for company headquarters from the Compustat North American Database. This step provides the foundational location information for all firms in our sample, ensuring consistency and reliability in mapping firms to their physical environments. Since these locations are stored as text, further processing is necessary to integrate this data with geospatial and climatic datasets.

To link the firm location data with temperature exposure information, we geocode the text-based location entries using the Bing Maps API, which translates textual addresses into precise geographic coordinates (latitude and longitude). This geocoding step allows us to spatially locate each firm's headquarters with a high degree of accuracy. Once the coordinates are established, we match each firm to the nearest climate data node from the ERA5 reanalysis dataset, which provides high-resolution global climate information, including temperature readings. By associating firms with the closest ERA5 node, we ensure that the climate data corresponds as closely as possible to the actual environmental conditions experienced at each firm's location.

Despite these efforts, it is important to acknowledge potential sources of error in matching firms' locations to climate data, particularly in cases where geocoding may produce inaccuracies. Thus, We hand-delete those observations with matched node apparently not in the US. While we employ stringent quality control measures to minimize these errors, some degree of mismatch in the exposure to heat data may persist. However,

it is reasonable to assume that any remaining errors are randomly distributed across firms. Such randomness would mean that these errors are unlikely to systematically bias our results, as they do not correlate with firm-specific characteristics or outcomes (Pankratz, Bauer, and Derwall 2023). Instead, the random nature of these errors would likely result in a small degree of noise, reducing statistical precision but not compromising the validity of our findings.

4.4.3 Temperature data and temperature variable construction

To measure firms' exposure to heat, we collect the daily maximum temperature data from the ERA5 dataset, developed by the European Centre for Medium-Range Weather Forecasts (ECMWF). The ERA5 dataset provides high-resolution, continuous daily atmospheric data calculated from its original hourly records. It features a spatial resolution of $0.25^{\circ}\text{C} \times 0.25^{\circ}\text{C}$ grid, which ensures precise temperature measurements that can be accurately matched to firm headquarters' geocoded locations. By leveraging this dataset, we calculate firms' heat exposure based on the number of hot days experienced at each location during the calendar year.

Firms' heat exposure is quantified using two distinct measurements, both adopted from Pankratz, Bauer, and Derwall (2023), to capture varying definitions of hot weather and its potential effects. The first measure uses a fixed temperature threshold informed by prior research. Studies such as Seppanen, Fisk, and Faulkner (2003) and Tanabe et al. (2013) have shown that individual productivity begins to decline when temperatures exceed 25°C , with more pronounced productivity drops observed above 30°C . Based on this, we classify a day as "hot" if its daily maximum temperature exceeds 30°C . We then calculate the percentage of hot days in a year by dividing the number of hot days by the total number of days in the year (365 for non-leap years and 366 for leap years). This

measure reflects the impact of consistently high temperatures, which may reduce productivity and, by extension, firm attractiveness to potential acquirers or investors.

However, recognizing that individuals and organizations may adapt to specific local climates, we develop a second, location-adjusted measure of hot days. This measure accounts for historical temperature variability at each firm's location, offering a more relative perspective on heat exposure. Specifically, we use historical daily maximum temperature distributions for each location, calculated by aggregating temperature data from 1980 to 1999 for each calendar day, including the five days before and after. For each day of the year, we compute the 90th percentile of this distribution, which represents the historical threshold for exceptionally hot days. A day is classified as "hot" under this second measure if its daily maximum temperature exceeds both the 90th percentile threshold for that location and 30°C. As with the first measure, we compute the percentage of hot days using this second definition, dividing the number of days meeting these criteria by the total number of days in the year.

The second measure provides additional insights into whether acquirers and investors respond to historically adjusted relative temperatures rather than absolute thresholds. Furthermore, it reduces inter-year correlations compared to the first measure. The first measure's correlations across years arise from the fixed-effect nature of the location, as consistently hot regions tend to experience high temperatures each year. In contrast, the second measure accounts for yearly variations in weather, as a historically "hot" year for a location does not necessarily lead to another following year with the same conditions. This distinction allows us to disentangle the effects of absolute and relative temperature anomalies on firm outcomes, thereby offering a more comprehensive understanding of heat exposure's role in firm attractiveness and market responses.

4.4.4 Sample descriptive statistics

Panel A and Panel B in Table 3.1 shows the descriptive statistics of US sample firms from 2000 to 2023 regarding firm performance, control variables and heat exposure. Definition of all variables included is provided in Appendix. All continuous variables except hot exposure measurement are winsorized at 1% and 99 %. As shown in the Panel B, the average percentage of hot days above 30°C (one to three years lagged) are ranging from 0.145 to 0.148, equal to around 53 to 54 hot days of a year. It shows that firms has around 2/3 summer time exposed to hot on average. When considering the historical temperature distribution, the average percentage of hot days ranges from 0.047 to 0.049, equal to around 17 to 18 hot days of a year.

We provide the distribution of the hot days across and within firms in Figure 2 to show that there are both cross-sectional and within-firms variations. The expansion of the bars in (a) and (b) shows the variation varies strongly across firms. (a) and (b) show that there are small frictions of firms are classified as "never treated" groups since the means of percentage hot days are 0. The maximum average percentage of hot days with 30°C threshold of a firm is around 65.95%, suggesting that the firm has around 240 days are above 30°C in a year. For the second measurement, the maximum of average percentage hot days is 32.88%, equal to 120 days with daily maximum temperature above 30°C and 90th historical threshold. Compared to only using absolute threshold, using both absolute threshold and relative threshold leads to a greater variation within firms. The standard deviation of the number of days exposed to temperatures above 30°C deviating from the location-specific average is 12 days per year (0.033×365), which is similar under the combined 30°C and 90th percentile threshold (0.034×365).

Table 3.1 Descriptive Statistics

| Variable | N | Mean | SD | p25 | p50 | p75 |
|----------------------------|-------|----------|-----------|--------|---------|----------|
| Panel A: Firm performance | | | | | | |
| Tangible assets | 70603 | 0.154 | 0.121 | 0.056 | 0.131 | 0.223 |
| Book-to-market ratio | 70603 | 0.532 | 0.712 | 0.213 | 0.424 | 0.746 |
| Cash ratio | 70603 | 0.223 | 0.241 | 0.040 | 0.128 | 0.330 |
| Firm size | 70603 | 4072.271 | 12809.369 | 93.442 | 469.917 | 2059.949 |
| Leverage | 70603 | 0.523 | 0.297 | 0.307 | 0.500 | 0.680 |
| ROA | 70603 | -0.022 | 0.278 | -0.038 | 0.053 | 0.106 |
| Sales growth rate | 70603 | 0.181 | 0.686 | -0.042 | 0.069 | 0.216 |
| Stock return | 70603 | 0.112 | 0.630 | -0.263 | 0.032 | 0.340 |
| Panel B: Heat exposure | | | | | | |
| Heat Exp (t-1) >30°C | 70603 | 0.148 | 0.132 | 0.047 | 0.101 | 0.219 |
| Heat Exp (t-2) >30°C | 70411 | 0.145 | 0.131 | 0.044 | 0.099 | 0.219 |
| Heat Exp (t-3) >30°C | 67078 | 0.146 | 0.132 | 0.044 | 0.099 | 0.219 |
| Heat Exp(t-1) >30°C & 90th | 70603 | 0.049 | 0.044 | 0.019 | 0.038 | 0.066 |
| Heat Exp(t-2) >30°C & 90th | 70411 | 0.047 | 0.043 | 0.019 | 0.036 | 0.066 |
| Heat Exp(t-3) >30°C & 90th | 67078 | 0.047 | 0.044 | 0.016 | 0.036 | 0.066 |
| Heat Exp>30°C (FE) | 70603 | 0.000 | 0.033 | -0.019 | -0.000 | 0.019 |
| Heat Exp>30°C & 90th (FE) | 70603 | 0.000 | 0.034 | -0.018 | -0.003 | 0.013 |
| Panel C: Deal variables | | | | | | |
| BHAR 2yrs | 2279 | 0.036 | 0.713 | -0.326 | -0.056 | 0.242 |
| CAR[-2;2] | 2193 | -0.014 | 0.082 | -0.046 | -0.008 | 0.023 |
| Relative size | 2073 | 0.601 | 0.083 | 0.552 | 0.590 | 0.638 |
| Stock runup | 2075 | 0.093 | 0.399 | -0.127 | 0.029 | 0.225 |
| Diversify deals | 2279 | 0.208 | 0.406 | 0.000 | 0.000 | 0.000 |
| Merger of equals | 2279 | 0.018 | 0.135 | 0.000 | 0.000 | 0.000 |
| Hostile offer | 2279 | 0.003 | 0.055 | 0.000 | 0.000 | 0.000 |
| Friendly offer | 2279 | 0.989 | 0.106 | 1.000 | 1.000 | 1.000 |
| Majority cash | 2279 | 0.488 | 0.500 | 0.000 | 0.000 | 1.000 |
| Tender Offer | 2279 | 0.156 | 0.363 | 0.000 | 0.000 | 0.000 |
| Premium Paid | 1993 | 142.203 | 4701.114 | 14.940 | 28.700 | 48.000 |
| Premium Paid | 1985 | 145.085 | 4710.567 | 16.450 | 30.840 | 50.480 |

Definition of all variables are provided in Appendix.

4.5 Empirical analysis

4.5.1 Heat exposure and the likelihood of being acquired

In order to examine the effect of firm-level heat exposure on the likelihood of being acquired and to ease the interpretation, we adopt the linear probability models (LPM) by including a number of determinants that previous literature has shown to affect acquisition probability. LPM coefficients read directly as percentage-point effects, which makes interpretation transparent in this climate-exposure M&A setting. Compared to probit and logit model. The LPM also accommodates our industry and year fixed effects and lets us include continuous heat exposure and interaction terms without translating latent-index estimates into marginal effects. Specifically, we estimate the following model:

$$\begin{aligned}
 \text{Acquisition likelihood}_{i,t} &= \alpha + \beta_1 \text{Heat exposure}_{i,t-1} \\
 &+ \sum \beta_k \text{Firm Characteristic}_{i,k,t-1} \\
 &+ \alpha_t + \alpha_{IND} + \epsilon_{i,t}
 \end{aligned}
 \tag{3.1}$$

where *Acquisition likelihood*_{*i,t*} is equal to one if the firm_{*i*} is acquired in year *t* and zero otherwise. Heat exposure is the percentage of hot days of a year, where hot days is identified if the daily maximum temperature is above 30°C. Another measurement of hot days is if the daily maximum temperature is above 30°C and 90th historical daily maximum temperature as described in the section above. Firm Characteristic_{*i,k,t-1*} is a set of control variables *k*, including book-to-market ratio, cash ratio, firm size, leverage, sales growth, ROA, tangible assets ratio and stock return of the firm *i*.

Table 3.2 presents the results for the analysis estimated by *Equation 3.1*. To reduce the endogeneity concerns, all independent variables are lagged by one year. Since there are patterns in the level of acquisition across the industry and time, we follow the studies with the similar settings (e.g., Harford (2005), Martynova and Renneboog (2009), Mavis et al. (2020), and Wu and Chung (2019)) by controlling the industry and year level fixed effects. Besides, we report heteroskedasticity-robust standard errors clustered at firm level

due to the presence of repeated firm level observations. We also follow Mavis et al. (2020) and include an one year lagged dependent variable since it is auto-correlated and to reduce the concern raised due to the unobserved firm level time invariant factors.

Table 3.2 presents the results using the 30°C as the threshold of hot days and the results using both the absolute and relative threshold. Specifications uses the one, two and three years lagged hot days, respectively, considering that the acquisition decisions could last more than one year before the announcement date. Beside the firm level controls, we also include the number of cold days controls in specifications (2)(4)(6)(8)(10)(12). Since the hot days only capture the one tail of the extreme weather, which is also negatively related to the number of the cold days, an alternative explanation is that the acquirer prefers the target firm exposed to extreme cold days. Although such explanation is not likely to be truth, we still follow Pankratz, Bauer, and Derwall (2023) and include the number of days with daily maximum temperature between 0°C to -5°C, -5°C to -10°C and below -10 °C to rule out other explanations on the temperature side. As shown in the first six columns, most of coefficients of heat exposure are significantly negative and the all coefficients in specifications after controlling cold days are significant at 5% level. Besides, our results are also economically significant. Taking the example of column (2), one unit increase in the percentage of hot days is associated with a significant 1.91% decrease in the likelihood of being acquired, which translates to a 92.27% ($0.0191/0.0207$) decrease relative to the mean of acquisition probability in our sample. Results of using both absolute and relative threshold measurements are provided in specifications (7) to (12). Again, specifications show the results by using the one, two and three years lagged hot days measured by above 30°C and 90th historical distribution, while specifications (8)(10)(12) include the cold controls. Although we did not find significant results across all specifications, the patterns are still similar. First, all coefficients of the heat exposure are negative. Besides, after controlling the effect of cold days, the coefficients of the two

and three year lagged heat exposure are negatively significant at 5% level and 1% with larger magnitudes of effects (compared to the effect in Panel A). Not all results are significant using the second measurement is not surprising. First, unlike the first measurement, our second measurements are not that self-correlated across years since a historically hot years is not necessarily related to a following historically hot years. Secondly, the insignificant result for one year lagged measurement implies that the decision of the acquisition may take longer than one year and the heat exposure might have a longer effect on the likelihood of being acquired.

Table 3.2 Baseline Regression

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|----------------|-----------|------------|-----------|------------|-----------|------------|-----------|-----------|-----------|-----------|------------|------------|
| Heat exp.(t-1) | -0.0097* | -0.0191*** | | | | | -0.0051 | -0.0144 | | | | |
| | (0.053) | (0.001) | | | | | (0.718) | (0.323) | | | | |
| Heat exp.(t-2) | | | -0.0115** | -0.0211*** | | | | | -0.0249* | -0.0333** | | |
| | | | (0.022) | (0.000) | | | | | (0.078) | (0.022) | | |
| Heat exp.(t-3) | | | | | -0.0116** | -0.0210*** | | | | | -0.0451*** | -0.0551*** |
| | | | | | (0.021) | (0.000) | | | | | (0.001) | (0.000) |
| Constant | 0.0182*** | 0.0222*** | 0.0185*** | 0.0226*** | 0.0187*** | 0.0227*** | 0.0167*** | 0.0187*** | 0.0178*** | 0.0198*** | 0.0191*** | 0.0214*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| N | 61003 | 61003 | 60992 | 60992 | 60828 | 60828 | 61003 | 61003 | 60992 | 60992 | 60828 | 60828 |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cold Control | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Adj R-squared | 0.0077 | 0.0080 | 0.0077 | 0.0080 | 0.0077 | 0.0080 | 0.0076 | 0.0078 | 0.0077 | 0.0079 | 0.0078 | 0.0080 |

This table presents the results of the effects of heat exposure on the likelihood of being acquired for all publicly traded firms in Compustat/CRSP merged database from 2000 to 2023. The dependent variable is a dummy variable equal to one if the firm i is acquired in year t and zero otherwise. In columns (1) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30 °C. In column (7) to (12), heat exposure is the percentage of days in a year on which temperatures exceeded 30 °C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30 °C /90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Regarding the control variable, our results are mostly in line with previous studies. For example, we find similar results with Bena and Li (2014) and Wu and Chung (2019) that the likelihood of being acquired is positively related to ROA and firms' leverage, and is negatively related to the stock return and sales growth.

4.5.2 Heat exposure and takeover premium

We next investigate the impact of heat exposure on the takeover premium, building on the premise that firms exposed to higher levels of heat are less attractive to potential acquirers. Since the above sections indicate that the firms with higher heat exposure are less attractive for acquirer, the bargaining power of the firms can be expected to be lower. This reduced attractiveness is likely to weaken the bargaining power of target firms, leading to lower takeover premiums. Based on this reasoning, we hypothesize that target firms with higher heat exposure receive significantly lower premiums in acquisition deals.

To empirically test this hypothesis, we estimate OLS regressions using deal-level data, where the dependent variable is the premium of the offer price relative to the target firm's closing stock price one day before the deal announcement date. This measure of the premium reflects the immediate market valuation of the acquisition and serves as a robust indicator of the target firm's bargaining power in the transaction.

In our analysis, we include a comprehensive set of control variables to account for factors that may influence takeover premiums. These controls span both acquirer and target firm characteristics, such as size, profitability, leverage, and market-to-book ratio, as well as deal-specific attributes, including the method of payment (cash or stock), deal size, and industry match between the acquirer and the target. To address potential

confounding effects of climate conditions beyond heat exposure, we also control for the number of cold days in all regression specifications.

The regression results are presented in Table 3.3, with the first three columns showing estimates based on the 30°C heat exposure measure. Columns (4) through (6) extend the analysis by incorporating the second heat exposure measure, which combines the 30°C threshold with the 90th-percentile historical temperature threshold. Across all specifications, the coefficients associated with the heat exposure measures are predominantly negative and statistically significant, providing strong support for our hypothesis.

Table 3.3 Premium

| | (1) Premium | (2) Premium | (3) Premium | (4) Premium | (5) Premium | (6) Premium |
|-----------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Heat exp. (t-1) | -24.0073** (0.049) | | | -59.3707** (0.037) | | |
| Heat exp. (t-2) | | -24.4998* (0.060) | | | -84.8884*** (0.009) | |
| Heat exp. (t-3) | | | -18.9625 (0.123) | | | -13.9612 (0.694) |
| Constant | -126.1019*** (0.000) | -126.1234*** (0.000) | -126.9084*** (0.000) | -126.9032*** (0.000) | -126.9926*** (0.000) | -128.9586*** (0.000) |
| Observations | 818 | 818 | 818 | 818 | 818 | 818 |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes |

| Deal Controls | Yes | Yes | Yes | Yes | Yes | Yes |
|---------------|--------|--------|--------|--------|--------|--------|
| Adj R-squared | 0.3939 | 0.3938 | 0.3921 | 0.3931 | 0.3960 | 0.3896 |

This table presents the results of the effects of heat exposure on the takeover premium. The dependent variable is the premium of offer price to target closing stock price one day before the announcement date. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

The magnitude of these coefficients further highlights the economic relevance of heat exposure in determining takeover premiums. Specifically, the significant coefficients range from -84.89 to 24, indicating that a one-unit increase in the percentage of hot days is associated with a reduction in the premium by 2.17 to 0.62 percentage points relative to the sample mean. This effect is substantial in the context of acquisition deals, where premiums are a critical determinant of deal success and value creation for shareholders.

These findings suggest that heat exposure has a pronounced and negative impact on the bargaining power of target firms. Firms facing greater heat risks are perceived as less valuable by acquirers, resulting in lower premiums being offered. This underscores the broader implications of climate-related risks in financial markets, particularly in shaping the terms and outcomes of M&A transactions.

In summary, the results indicate that heat exposure significantly diminishes target firms' negotiating leverage, leading to lower acquisition premiums. This finding aligns with the broader narrative that climate risks are increasingly influencing firm valuations and market behavior. Table 3.3 provides detailed statistical evidence supporting these

conclusions, further emphasizing the critical role of climate considerations in shaping the dynamics of M&A activity.

4.5.3 Heat exposure and acquisition performance

Pankratz, Bauer, and Derwall (2023) highlight a critical inefficiency in capital markets, documenting that market participants often fail to fully anticipate the negative economic consequences of heat exposure. Extending this insight to the mergers and acquisitions (M&A) context, we predict that investors similarly under-react to the degree of heat exposure faced by target firms at the time of deal announcements. While heat risks may have a limited immediate effect on investor perceptions, as reflected in short-term metrics like cumulative abnormal return (CAR), these risks are likely to exert a significant negative impact on long-term outcomes, such as the acquirer’s post-merger buy-and-hold abnormal return (BHAR). In essence, we hypothesize that the heat exposure of a target firm will have a muted effect on short-term performance but will become evident over the long term through its detrimental impact on acquirer performance.

Table 3.4 CAR

| | 30°C | | | 30°C & 90 th | | |
|----------------|----------------------|----------------------|----------------------|-------------------------|----------------------|----------------------|
| | (1) CAR [-2,2] | (2) CAR [-2,2] | (3) CAR [-2,2] | (4) CAR [-2,2] | (5) CAR [-2,2] | (6) CAR [-2,2] |
| Heat exp.(t-1) | 0.0086 (0.766) | | | 0.0707 (0.255) | | |
| Heat exp.(t-2) | | 0.0055 (0.852) | | | -0.0645 (0.376) | |
| Heat exp.(t-3) | | | 0.0022 (0.934) | | | -0.0048 (0.949) |
| Observations | 930 | 930 | 926 | 930 | 930 | 926 |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |

| | | | | | | |
|----------------|--------|--------|--------|--------|--------|--------|
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Deal Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Cold Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R-squared | 0.1482 | 0.1481 | 0.1663 | 0.1491 | 0.1488 | 0.1663 |

This table presents the results of the effects of heat exposure on CAR[-2,2]. The dependent variable is acquirer' five days cumulative abnormal returns (CARs). We estimate the market model for each acquiring firm over 240 days to 41 days before the announcement date using the CRSP value-weighted market return. We then use the estimated parameters to calculate the CAR over the five-day event window around the announcement date. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

To test these predictions, we first examine the relationship between target firms' heat exposure and the acquirer's short-term performance around the announcement date, as measured by CAR. Table 3.4 presents the regression results, where the dependent variable is the acquirer's 5-day CAR centered on the announcement date. This metric captures the immediate market reaction to the deal. We control for cold days in all specifications to account for other climatic factors that might influence the analysis.

Table 3.4 BHAR

| | 30°C | | | 30°C & 90 th | | |
|----------------|---------------------|---------------------|---------------------|-------------------------|---------------------|---------------------|
| | (1) BHAR 2yrs | (2) BHAR 2yrs | (3) BHAR 2yrs | (4) BHAR 2yrs | (5) BHAR 2yrs | (6) BHAR 2yrs |
| Heat exp.(t-1) | -0.711* (0.064) | | | -0.346 (0.577) | | |
| Heat exp.(t-2) | | 0.806** (0.047) | | | -0.561 (0.398) | |
| Heat exp.(t-3) | | | 0.777* (0.077) | | | -1.429 (0.207) |
| Observations | 933 | 933 | 929 | 933 | 933 | 929 |

| | | | | | | |
|----------------|-------|-------|-------|-------|-------|-------|
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Deal Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Cold Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R-squared | 0.174 | 0.176 | 0.177 | 0.167 | 0.168 | 0.171 |

This table presents the results of the effects of heat exposure on the acquirer 2-year buy-and-hold abnormal returns (BHARs). The dependent variable is acquirer' 2-year BHAR. We estimate the market model for each acquiring firm over 240 days to 41 days before the announcement date using the CRSP value-weighted market return. We then use the estimated parameters to calculate the CAR over the five-day event window around the announcement date. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Additionally, we incorporate a comprehensive set of control variables informed by prior literature (Ambrose and Megginson 1992; Bena and Li 2014; Wang and Xie 2009; Wu and Chung 2019). These controls include firm-level characteristics of the acquiring firm, such as the book-to-market ratio, cash ratio, firm size, leverage, return on assets (ROA), sales growth rate, and the ratio of tangible assets. At the deal level, we control for factors such as deal type (e.g., diversifying deals, mergers of equals), deal nature (hostile or friendly), payment method (majority cash deals), and tender offers. This comprehensive set of controls ensures that the observed relationship between heat exposure and CAR is not confounded by other deal-specific or firm-specific factors.

As shown in Table 3.4, the coefficients of heat exposure across all six specifications are statistically insignificant, with p-values well above 0.5. This lack of significance suggests that investors do not immediately incorporate the heat exposure of the target firm into their valuation of the deal. These findings are consistent with our hypothesis that the

market does not fully recognize or price in the risks associated with heat exposure during the short-term announcement window.

In contrast, Table 3.5 presents the results of the impact of target firm heat exposure on the acquirer's long-term performance, as measured by the 2-year BHAR. This metric reflects the acquirer's ability to generate excess returns over an extended period following the merger, providing insights into the long-term economic consequences of heat risks. The same control variables from Table 3.4 are included to ensure consistency and robustness across the analyses.

Specifications (1), (2), and (3) in Table 3.5 use the absolute measurement of heat exposure, defined as the percentage of hot days above 30°C. Specifications (4), (5), and (6) incorporate both the absolute and relative measurements, with the relative measure accounting for the 90th-percentile historical threshold of temperature for the firm's location. The results indicate that the coefficients of the absolute heat exposure measurement in the first three specifications are consistently negative and significant at the 10% level, suggesting that higher heat exposure is associated with poorer long-term returns for the acquirer. While the coefficients for the relative measurement in specifications (4) through (6) are also negative, they are not statistically significant. This lack of significance may stem from the fact that pre-merger historical heat patterns do not always predict post-merger heat exposure, limiting the predictive power of the relative measurement.

These findings imply that acquiring firms with a higher percentage of hot days above 30°C leads to a notable decline in long-term performance. The market appears to overlook the implications of heat exposure at the time of deal announcements, only for these risks to manifest in the post-merger period. The mispricing observed in the short term is thus corrected over the long run, as the negative economic consequences of heat risks might

become evident in the acquirer's financial performance or come from the concerns of unrealized longer term climate risks.

Overall, the results from Tables 3.4 and 3.5 reinforce the notion that the market is inefficient in recognizing and pricing heat risks. While the short-term reaction to heat exposure is limited, likely due to investor underreaction, the long-term consequences are significant and adverse. This inefficiency underscores the importance of incorporating climate risk assessments into M&A decision-making processes to better understand and mitigate the potential long-term impacts on firm value and acquirer performance.

4.5.4 Heat exposure and operating expenses and performance

We further test whether the operating performance and expenses of the acquirer firm is associated with target firm. Pankratz, Bauer, and Derwall (2023) documents that although the heat exposure leads to an immediate increase in corporate expenses in SGA and cost of goods sold (COGS), the aggregate effect of previous four quarters exposure is very limited and insignificant. They argue that the firm experience a quarter increasing in the cost, and respond the increasing by cut the cost in latter period to avoid the cumulative effects. We mainly test the cumulative effect of heat exposure on (1) ROA to measure operating performance and (2) selling, general and administrative (SGA). To measure post-merge operating performance, we calculate the abnormal ROA by using the residual from the cross-sectional regression of the post-merger three-year average of industry-adjusted ROA on the pre-merger corresponding measure following Chen, Harford, and Li (2007) and Wu and Chung (2019). Regarding the SGA, we measure the changes in three-year post-merger industry-adjusted SGA as $(\text{Industry-adjusted SGA}_{i,t+3} - \text{Industry-adjusted SGA}_{i,t}) / \text{Industry-adjusted SGA}_{i,t}$. The control variables used are the same as those used in the above section.

Table 3.6 SGA

This table presents the results of the effects of heat exposure on the acquirer post-merger selling, general and administrative (SGA). The dependent variable is acquirer

| | 30°C | | | 30°C & 90 th | | | <i>(Industry_adjus Industry_adjus Industry_adjus</i> |
|----------------|--------------------|------------------|-------------------|-------------------------|-------------------|------------------|--|
| | (1) SGA | (2) SGA | (3) SGA | (4) SGA | (5) SGA | (6) SGA | |
| Heat exp.(t-1) | -1.087* (0.075) | | | 2.999* (0.082) | | | <i>Industry_adjus</i> |
| Heat exp.(t-2) | | 0.782 (0.194) | | | -0.226 (0.889) | | <i>Industry_adjus</i> |
| Heat exp.(t-3) | | | 1.082* (0.060) | | | 2.877 (0.104) | <i>Industry_adjus</i> |
| Observations | 857 | 857 | 854 | 857 | 857 | 854 | <i>Industry_adjus</i> |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes | <i>Industry_adjus</i> |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | <i>Industry_adjus</i> |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes | <i>Industry_adjus</i> |
| Deal Controls | Yes | Yes | Yes | Yes | Yes | Yes | <i>Industry_adjus</i> |
| Cold Controls | Yes | Yes | Yes | Yes | Yes | Yes | <i>Industry_adjus</i> |
| Adj. R-squared | 0.113 | 0.111 | 0.102 | 0.113 | 0.108 | 0.100 | <i>Industry_adjus</i> |

SGA. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 3.6 presents the results on SGA. The coefficients of heat exposure is significantly positive at 10% level for specifications (1) and (3) and is close to significant in specifications (4), while the others are positive but not significant. The results are in line with our prediction that the heat exposure has limited impact on the SGA, which includes cooling expenses. Regarding ROA, we find that the impact of the heat exposure is insignificant.

Table 3.7 ROA

| | 30°C | | | 30°C & 90th | | |
|----------------|------------------|-------------------|-------------------|-------------------|--------------------|--------------------|
| | (1) ROA | (2) ROA | (3) ROA | (4) ROA | (5) ROA | (6) ROA |
| Heat exp.(t-1) | 0.006 (0.814) | | | -0.004 (0.940) | | |
| Heat exp.(t-2) | | -0.003 (0.901) | | | -0.0082 (0.248) | |
| Heat exp.(t-3) | | | -0.012 (0.639) | | | -0.134* (0.066) |
| Observations | 933 | 933 | 929 | 933 | 933 | 929 |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Deal Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Cold Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj. R-squared | 0.722 | 0.722 | 0.722 | 0.722 | 0.723 | 0.723 |

This table presents the results of the effects of heat exposure on the acquirer post-merger operating performance. The dependent variable is post-merger operating performance, measured as the residual from a cross-sectional regression of the three-year post-merger industry-adjusted average return on assets (ROA) on its corresponding pre-merger value. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 3.7 shows the results on ROA. The coefficients of heat exposure for most specifications are insignificant, though the coefficient in the last column is negatively significant at 10% level. A potential explanation of the above results is that both the target firm and the acquirer firm realize the potential downside effect of the heat exposure and respond to it promptly to avoid the cumulative effect, which is in line with Pankratz, Bauer, and Derwall (2023) results.

4.5.5 Heat exposure and outdoor industry

We extend our analysis to explore whether firms in outdoor industries are disproportionately affected by physical heat risks. Prior research (e.g., Addoum, Ng, and Ortiz-Bobea 2023; Pankratz, Bauer, and Derwall 2023) suggests that the economic effects of heat exposure are at least partially supply-side related, as heat can directly disrupt labor productivity and operational efficiency in industries that require significant outdoor activity. Firms in outdoor industries, such as agriculture, mining, construction, and transportation, are particularly vulnerable due to their reliance on weather-sensitive operations. Consequently, we hypothesize that the impact of heat exposure is magnified for firms in these industries, making them more sensitive to extreme heat and more likely to exhibit adverse outcomes.

To classify outdoor-exposed industries, we follow the approach of Pankratz, Bauer, and Derwall (2023), defining firms in the agriculture, mining, construction, and transportation sectors as outdoor firms. This classification is consistent with prior studies that identify these sectors as particularly dependent on outdoor labor and therefore more susceptible to temperature fluctuations. While most previous studies on temperature sensitivity focus on short-term consequences (e.g., quarterly impacts or effects observed within a single year) (Addoum, Ng, and Ortiz-Bobea 2023; Pankratz, Bauer, and Derwall 2023), our analysis contributes to the literature by examining the longer-term persistence of heat exposure effects. Specifically, we report results based on one-year lagged heat exposure to capture the potential delayed responses of market participants and firms to extreme heat conditions.

Table 3.8 Outdoor industry mechanism

| 30°C | | 30°C & 90th | |
|----------|----------|-------------|----------|
| (1) | (2) | (3) | (4) |
| Acquired | Acquired | Acquired | Acquired |

| | | | | |
|----------------------------|------------------|-------|-------------------|-------------------|
| Outdoor × Heat exp.(t – 1) | 0.006 (0.814) | | | -0.004 (0.940) |
| Heat exp.(t-1) | | | -0.003 (0.901) | |
| Observations | 61003 | 61003 | 61003 | 61003 |
| Industry FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Firm Controls | Yes | Yes | Yes | Yes |
| Cold Controls | Yes | Yes | Yes | Yes |
| Adj. R-squared | 0.007 | 0.008 | 0.008 | 0.008 |

This table presents the results of the effects of heat exposure on the acquirer post-merger operating performance. The dependent variable is a dummy variable equal to one if the firm i is acquired in year t and zero otherwise. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

The results of this analysis are presented in Table 3.8. We define the variable $Outdoor_i$, which equals one if a firm operates in the agriculture, mining, construction, or transportation sectors, and zero otherwise. Columns (1) and (2) report results using the 30° threshold for heat exposure, while Columns (3) and (4) incorporate both the 30° threshold and the 90th percentile historical temperature threshold to account for relative heat exposure. In all models, we control for cold days to mitigate confounding effects from low-temperature conditions. Columns (2) and (4) explicitly include cold days controls to ensure robustness.

The interaction terms between $Outdoor_i$ and the heat exposure measures provide insights into how outdoor firms respond to physical heat risks. The coefficients for the interaction term between $Outdoor_i$ and the combined 30° and 90th percentile measure is significantly negative at the 5% level, indicating a strong and adverse relationship between

heat exposure and firm outcomes in outdoor industries. Conversely, the interaction term with the 30°-only threshold is negative but not statistically significant. These findings suggest that the historical relative temperature exposure plays a more prominent role in driving the sensitivity of outdoor firms to heat risks. The results underscore the importance of adapting to physical risks, as extreme heat conditions appear to heavily influence decision-making processes, such as those of potential bidders evaluating acquisition targets.

In line with our predictions, the data reveal that firms in outdoor industries are more vulnerable to extreme heat exposure and that their likelihood of being acquired is more sensitive to such conditions. The heightened sensitivity reflects the inherent operational challenges faced by firms in these industries under extreme weather conditions, likely exacerbating their perceived risks and reducing their attractiveness as acquisition targets.

Furthermore, we conducted unreported analyses to investigate the persistence of these effects over longer time horizons by examining two- and three-year lagged heat exposures. However, these additional analyses did not yield significant results, suggesting that the moderating effects of heat sensitivity in outdoor industries exhibit a relatively short-term rather than long-term persistent pattern. This finding aligns with the view that extreme heat events trigger immediate and localized disruptions, but their effects on firm attractiveness tend to dissipate over time as firms and markets adjust to changing conditions.

In summary, our findings highlight that outdoor firms are disproportionately affected by physical heat risks, with the adverse effects of extreme heat primarily manifesting in the short term. These results contribute to the growing literature on climate-related risks

by demonstrating how industry characteristics influence firm sensitivity to environmental factors, particularly in the context of M&A activities.

4.6 Robustness test

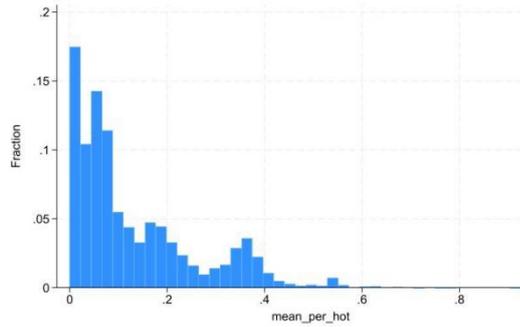
4.6.1 Placebo test

To address concerns about potential spurious correlations and provide robustness to our findings, we conduct a permutation analysis and present the results in Figure 2. This approach allows us to test whether the observed relationship between heat exposure and firm outcomes arises by chance or due to unaccounted-for patterns in the data. Specifically, we follow the methods outlined by Fishman, Carrillo, and Russ (2019), Hsiang and Jina (2014), and Pankratz, Bauer, and Derwall (2023), and perform three types of reshuffling of the heat exposure variable across the sample before re-estimating the baseline regressions. This ensures that we systematically test for spurious associations while preserving various structural aspects of the data. Specifically, we reshuffle the heat exposure within sample in three ways: (1) unconditionally reshuffle the heat exposure across the sample (2) reshuffle the heat exposure within industries (3) reshuffle the heat exposure between firms but maintaining the order of years. The second way of permutation test if the time-invariant cross-sectional industry level patterns generate spurious correlation. The third way maintain the time structure of the data and test if the time trend leads to spurious correlation.

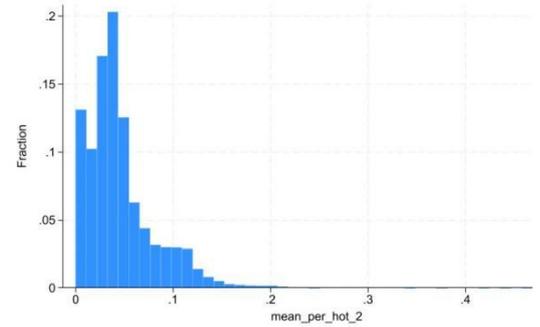
After each reassignment of the heat exposure variable, we re-estimate the baseline regression model described in Equation (1). This process is repeated 5,000 times, generating a distribution of re-estimated coefficients for each permutation scenario. The results are displayed in Figure 2, where the vertical line represents the actual coefficient

estimated in Column (1) of Table 3.2 (0.0191). The distribution of re-estimated coefficients for each permutation scenario is centered around zero, indicating no systematic relationship when heat exposure is reassigned. Moreover, all three distributions show coefficients larger than the actual estimated coefficient in absolute value.

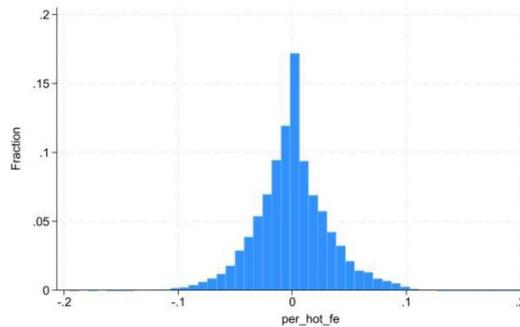
Figure 3.1 Identifying Variation



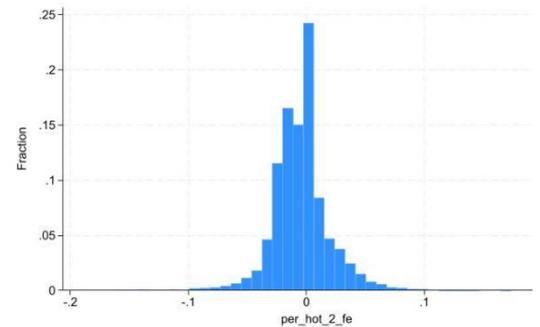
(a) Cross-Sectional Variation for Percent of hot days > 30°C



(b) Cross-Sectional Variation for Percent of hot days > 30°C & 90th



(c) Within Variation for Percent of hot days > 30°C (Firm FE)



(d) Within Variation for Percent of hot days > 30°C & 90th (Firm FE)

Note: (a) Cross-sectional variation in heat exposure for 30°C measurement. (b) Cross-sectional variation in heat exposure for 30°C measurement & 90th historical temperature measurement. (c) Within firm variation for 30°C measurement, calculated by abstracting mean percentage of hot days of the firm from the percentage of hot days of each year. (d) Within firm variation for 30°C & 90th historical temperature measurement, calculated by abstracting mean percentage of hot days of the firm from the percentage of hot days of each year.

To further assess the robustness of our results, we compute the p-values associated with each permutation scenario. Specifically, we perform a t-test to evaluate whether the magnitude of the coefficients from the permutation tests equals or exceeds the actual estimated coefficient (0.0191). The p-values for all three reshuffling approaches are less than 0.001, providing strong evidence that our observed results are unlikely to be due to random chance or artifacts of the study design.

These findings confirm the validity of our results, ruling out the possibility of spurious correlations driven by random noise, industry-level cross-sectional patterns, or time-related trends. The use of permutation analysis further strengthens the robustness of our conclusions, demonstrating that the negative relationship between heat exposure and firm outcomes is statistically significant and unlikely to be an artifact of the data structure. Figure 2 illustrates the distinct separation between the actual estimated coefficient and the distribution of coefficients derived from the randomized permutations, emphasizing the reliability of our findings.

4.6.2 Financial crisis and COVID-19

To ensure that our results are not driven by the systematic shocks associated with the global financial crisis or the COVID-19 pandemic, we conduct additional robustness checks by excluding the years during which these events exerted significant stress on capital markets. Systematic shocks like these could potentially coincide with heat exposure

shocks, creating confounding effects that might influence our analysis. To address this concern, we exclude data from the financial crisis period (2008–2010, with similar results observed when limiting exclusions to 2008–2009) and the year 2020, which was heavily impacted by the COVID-19 pandemic.

Table 3.9 Financial crisis and COVID-19

| | 30°C | | | 30°C & 90th | | |
|----------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Acquisition likelihood |
| Heat exp.(t-1) | -0.0261*** (0.000) | | | -0.0332** (0.048) | | |
| Heat exp.(t-2) | | -0.0256*** (0.000) | | | -0.0287* (0.090) | |
| Heat exp.(t-3) | | | -0.0265*** (0.000) | | | -0.0662*** (0.000) |
| Constant | 0.0239*** (0.000) | 0.0236*** (0.000) | 0.0241*** (0.000) | 0.0200*** (0.000) | 0.0195*** (0.000) | 0.0223*** (0.000) |
| Observations | 43734 | 43723 | 43559 | 43734 | 43723 | 43559 |
| Adj R-squared | 0.009 | 0.009 | 0.009 | 0.009 | 0.009 | 0.009 |
| Firm Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |

This table presents the results of the effects of heat exposure on the likelihood of being acquired for all publicly traded firms in Compustat/CRSP merged database after excluding financial crisis and Covid-19 years. The dependent variable is a dummy variable equal to one if the firm_{*i*} is acquired in year_{*t*} and zero otherwise. In columns (1) to (3), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (4) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are calculated. P-value statistics are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

The results of these robustness tests are presented in Table 3.9, where we re-estimate our baseline regressions after excluding these specific years. Across all six specifications,

the effect of heat exposure on firm outcomes remains significantly negative, consistent with our original findings. These results demonstrate that the observed relationship between heat exposure and firm outcomes is robust to the exclusion of periods marked by severe aggregate economic shocks.

By excluding the financial crisis years (2008–2010), we ensure that our findings are not biased by the unique market dynamics of that period, including widespread liquidity constraints, elevated volatility, and dramatic shifts in investor risk appetite. Similarly, the exclusion of 2020 eliminates the influence of the COVID-19 pandemic, a time characterized by unprecedented disruptions to global supply chains, extreme market uncertainty, and significant fiscal and monetary interventions. These events could have disproportionately impacted firm operations and valuations, especially for industries sensitive to either capital market fluctuations or physical heat risks.

The persistence of significantly negative coefficients in Table 3.9 provides strong evidence that the effects of heat exposure are not confounded by these large-scale economic disruptions. Furthermore, the stability of the results across all six specifications indicates that the negative relationship between heat exposure and firm outcomes is not an artifact of temporary or extraordinary market conditions but rather a consistent phenomenon that persists across varying economic environments.

4.6.3 Alternative measurement of heat exposure

Although the selection of the thresholds for defining hot days is grounded in prior research, as discussed in the previous section, concerns may arise that the observed effects of heat exposure could be influenced by the subjective choice of thresholds. Such concerns raise the possibility of cherry-picking thresholds to align with the hypothesized results. To

address this issue and provide additional robustness to our findings, we extend the analysis by incorporating three alternative threshold definitions: (1) 25°C, (2) 25°C combined with the 90th percentile of historical temperature distribution, (3) 25°C combined with the 95th percentile, and (4) 30°C combined with the 95th percentile.

The results of these alternative specifications are presented in Table 3.10, where we re-estimate the baseline regressions using each of these thresholds. Across the 12 combinations of heat exposure thresholds tested, the effects of heat exposure on the likelihood of being acquired and other firm outcomes remain consistently negative and significant in 10 out of the 12 specifications. This high level of consistency demonstrates that the observed effects are robust to variations in the threshold definition and are not driven by the arbitrary selection of a particular threshold.

Moreover, the significant effects observed across a broad range of thresholds further reinforce the persistence of heat exposure's impact on firms over the long term. Specifically, the results show that regardless of whether a lower fixed threshold (25°C) or a relative threshold (e.g., 90th percentile or 95th percentile) is applied, the adverse consequences of heat exposure remain evident. This robustness suggests that the relationship between heat exposure and firm outcomes is not contingent upon a narrowly defined temperature criterion but rather reflects a broader underlying phenomenon.

The findings presented in Table 3.10 provide strong evidence against the notion that the observed effects of heat exposure are artifacts of cherry-picking thresholds. Instead, they highlight the resilience of the results across a variety of plausible definitions of heat exposure. Additionally, these results reaffirm that the economic consequences of heat exposure are not only statistically significant but also robust to alternative methodological choices. By demonstrating that the effects persist across diverse thresholds, this analysis

further strengthens the validity of our conclusions and underscores the broader relevance of climate risks to corporate decision-making and market behavior.

Table 3.10 Alternative Threshold

| | 25°C | | 25°C & 90th | | | | 25°C & 95th | | | 30°C & 95th | | |
|----------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Heat exp.(t-1) | -0.0187*** (0.000) | | | -0.0212* (0.076) | | | -0.0145 (0.376) | | | -0.0058 (0.770) | | |
| Heat exp.(t-2) | | -0.0170*** (0.000) | | | -0.0285** (0.022) | | | -0.0353** (0.037) | | | -0.0349* (0.091) | |
| Heat exp.(t-3) | | | -0.0158*** (0.002) | | | -0.0406*** (0.002) | | | -0.0612*** (0.000) | | | -0.0675*** (0.001) |
| Constant | 0.0268*** (0.000) | 0.0281*** (0.000) | 0.0291*** (0.000) | 0.0201*** (0.000) | 0.0229*** (0.000) | 0.0258*** (0.000) | 0.0187*** (0.000) | 0.0221*** (0.000) | 0.0255*** (0.000) | 0.0180*** (0.000) | 0.0212*** (0.000) | 0.0242*** (0.000) |
| Observations | 61003 | 53051 | 46696 | 61003 | 53051 | 46696 | 61003 | 53051 | 46696 | 61003 | 53051 | 46696 |
| IndustryFE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| YearFE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| ColdControl | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm-level | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adj R-squared | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 | 0.008 |

This table presents the results of the effects of heat exposure on the likelihood of being acquired for all publicly traded firms in Compustat/CRSP merged database from 2000 to 2023. The dependent variable is a dummy variable equal to one if the $firm_i$ is acquired in $year_t$ and zero otherwise. In columns (1) to (6), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C. In column (7) to (12), heat exposure is the percentage of days in a year on which temperatures exceeded 30°C and the 90th percentile of the historic distribution of temperatures that occurred on the same day as well as the five preceding and subsequent days (30°C/90th percentage). In all models we control for year and Fama–French 48 industry fixed effects. Heteroscedasticity–robust standard errors clustered by firm are reported in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

4.7 Conclusion

This study explores the critical question of how climate physical risk influences corporate mergers and acquisitions (M&A) decisions, shedding new light on the intersection of environmental challenges and corporate strategy. By leveraging firm-level temperature data, we provide compelling evidence that firms exposed to higher temperatures are significantly less likely to be acquired. The economic impact of this relationship is substantial: our findings indicate that a one standard deviation increase (from the sample mean) in the percentage of hot days is associated with an 11.16% decline in the likelihood of being acquired. Importantly, this effect is not transient but persists for at least three years, suggesting that heat exposure does not merely delay acquisition events but actively deters them, leading to the termination of acquisition prospects.

The observed negative relationship between heat risk and acquisition likelihood implies that target firms with greater exposure to climate risks are perceived as less attractive in the M&A market. This conclusion is further substantiated by our findings on bargaining power and takeover premiums. Specifically, target firms with higher heat exposure demonstrate reduced negotiating leverage, resulting in significantly lower takeover premiums. This aligns with the broader narrative that climate risks diminish a firm's desirability as an acquisition target.

We also investigate how market participants react to the acquisition of firms with high heat exposure. Our results indicate a pronounced inefficiency in market behavior: investors show little reaction to climate risk factors in the short term, as evidenced by cumulative abnormal returns (CAR) around the announcement date. However, these risks manifest in the long run, with significant downward adjustments in the acquirers' buy-and-hold abnormal returns (BHAR) over two years. These findings highlight a critical market inefficiency, where climate physical risks are undervalued or ignored in short-term assessments but exert significant impacts over longer horizons.

In terms of operational performance, we examine the post-merger consequences for acquiring firms that target highly heat-exposed firms. The evidence suggests that acquiring such targets has a limited cumulative impact on industry-adjusted selling, general, and administrative expenses (SG&A), and no significant effect on industry-adjusted abnormal return on assets (ROA). This indicates that acquiring firms may possess the capability to anticipate and mitigate heat exposure risks of target firms, effectively neutralizing these risks in terms of operational performance. These findings further suggest that while heat risks are factored into acquisition decisions, they do not necessarily impair the operational integration of the target firm post-merger.

Additionally, we explore the heterogeneity in the impact of heat exposure across different industries. Our analysis reveals that the negative impact of heat risk on acquisition likelihood is magnified for firms operating in outdoor industries such as agriculture, mining, construction, and transportation. These sectors are inherently more vulnerable to temperature fluctuations, which likely amplifies the perceived risks for potential acquirers. This industry-specific sensitivity underscores the importance of considering sectoral differences in assessing the implications of climate risks.

Robustness checks confirm that our results are resilient to alternative specifications and thresholds, including tests that exclude periods of significant financial shock, such as the global financial crisis (2008–2010) and the COVID-19 pandemic (2020). Additionally, permutation tests demonstrate that our findings are unlikely to be driven by chance or design artifacts, further reinforcing the validity of our conclusions.

Our findings carry several important implications for both research and practice. First, the negative impact of heat exposure on acquisition likelihood highlights a form of "climate risk discrimination." While post-merger operating performance remains largely unaffected, the reluctance of acquirers to target firms with high heat exposure suggests that climate risks are a significant concern in acquisition decisions. This behavior

may reflect an increased focus on long-term sustainability risks rather than immediate operational challenges. Both bidder firms and market participants appear to consider the longer-term implications of climate risks, as evidenced by their influence on BHAR and acquisition outcomes. Second, the results underscore persistent inefficiencies in how markets incorporate climate risks into pricing and decision-making. Despite growing awareness of climate change, investors fail to react adequately to heat risks in the short term, only adjusting their valuations over extended periods. This delayed adjustment highlights the need for improved integration of environmental risks into financial analysis and decision-making frameworks. Third, the amplified impact of heat risks in outdoor industries suggests that climate risk assessments should account for sector-specific vulnerabilities. Policies and strategies aimed at mitigating climate risks should prioritize industries with higher exposure to physical climate risks, where the economic consequences are more pronounced.

In conclusion, this study contributes to the growing literature on climate risk and corporate strategy by demonstrating the significant and multifaceted impact of heat exposure on M&A decisions. It calls for greater awareness and proactive management of climate risks in financial markets, emphasizing the importance of aligning corporate and investment strategies with long-term sustainability goals.

5. Conclusion

This thesis provides a comprehensive exploration of the interplay between managerial discretion, global integration, and environmental risks in shaping corporate decision-making. Across its three chapters, it offers novel insights into how internal leadership traits and external forces influence firm strategies and financial outcomes.

The first essay shows that CEO cash-management style is selectively transferred to successor firms. Using matched CEO moves in ExecuComp (1992–2021) and a relative-style construct that compares the incoming CEO's prior cash policy with the hiring firm's pre-succession policy, this study documents systematic, directionally consistent shifts in post-succession cash levels. High-cash-style CEOs raise excess cash more than low-cash-style CEOs reduce it, an asymmetry consistent with precautionary motives and governance frictions around cutting buffers. A dynamic analysis indicates active but incomplete adjustment, with estimated speeds of adjustment between 0.47 and 0.78 and faster moves when the firm's cash is below the CEO's implicit target than when it is above. Propensity score matching, difference-in-differences tests, and placebos point to the CEO change—not pre-existing trends—as the driver. The essay reframes style transfer as conditional and asymmetric, governed by distance from the preferred policy and by the costs of moving upward versus downward.

The second essay examines how international linkages facilitate cross-border deals. Leveraging the DHL Global Connectedness Index for 48 countries (2002–2021), I find that greater connectedness—especially in trade and information flows—is associated with higher cross-border M&A activity through reduced informational frictions and lower execution costs. At the same time, cultural and institutional differences compress synergy gains and raise integration costs, which helps explain heterogeneity in deal quality. Identification strategies, including instrumental variables and difference-in-differences around shocks, support a causal interpretation. External disruptions such as geopolitical

tensions and the COVID-19 pandemic disproportionately weigh on trade and people flows, underscoring both the enabling and fragile nature of the channels that support international deal-making.

The third study adds physical climate risk to the corporate control margin. Using U.S. firm-level data over 23 years, the study shows that heat-exposed targets are less likely to be acquired and, when acquired, command lower premiums and exhibit weaker bargaining positions. Announcement-window reactions are muted, yet long-horizon buy-and-hold returns deteriorate after acquisitions of heat-exposed targets, consistent with the gradual realization of higher operating costs and risk premia. Results are robust to alternative heat thresholds and to controls for cold exposure. The evidence positions heat as a first-order determinant of who gets bought, at what price, and with what long-run outcomes, and it highlights a timing gap in how markets incorporate physical risk.

Building on these results, the overarching contribution is a clearer architecture for thinking about corporate decision making under constraint. The first essay shows that policy choices are not memoryless. They reflect persistent managerial preferences, and the degree to which those preferences show up in observed policies depends on distance from the status quo and on adjustment costs. The second essay shows that cross-border actions are not frictionless. Connectedness expands the feasible set of deals while institutional and cultural gaps compress expected surplus. The third essay shows that physical climate risk is not an abstract background condition. It enters screening, pricing, and realized performance in ways that markets only gradually absorb. Read together, the essays provide a general view in which firm choices are the product of internal preferences confronted by external frictions and interpreted by markets over different horizons.

The work also has implications for practice and policy that inform future research. Boards can view succession through the lens of relative style and adjustment capacity, not only absolute fit. Deal makers can separate feasibility channels from integration frictions

when screening cross-border targets and pricing synergies. Investors can incorporate physical risk diagnostics into valuation at the transaction stage rather than only at the portfolio stage. Regulators can encourage disclosure regimes that speed the incorporation of hard-to-price risks without constraining value-creating discretion. These applications point to open questions on optimal matching of CEOs to firms, equilibrium sorting across jurisdictions with different frictions, and governance designs that preserve flexible decision rights while disciplining costly deviations.

In sum, the thesis advances a general perspective on corporate decisions as dynamic choices made by identifiable agents facing evolving constraints and interpreted by markets with finite attention. That perspective can organize future inquiry on innovation strategy, capital structure, payout policy, and corporate control in economies that are more connected and more climate exposed, where both the space of options and the cost of mistakes are changing.

Collectively, this thesis bridges critical gaps in the literature on corporate finance by addressing how managerial discretion, globalization, and climate risks shape firm behavior and financial outcomes. The findings provide a nuanced understanding of the challenges firms face in an increasingly interconnected and environmentally volatile world, offering both academic contributions and practical guidance for navigating these complexities. This work underscores the importance of adaptive strategies that align managerial decision-making with global and environmental realities, ensuring resilience and long-term value creation.

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Appendix

Table A.1.1 Variable Definitions

| Variables | Definitions |
|-----------------|--|
| XCash | The difference between the Cash and the estimated optimal cash holdings. Data for calculation is from COMPUSTAT. |
| DDS Normal Cash | The median ratio of cash holdings to total assets of firms in the same industry (two digit SIC), tercile of total book assets, and tercile of market-to-book value of assets for a given year. Data for calculation is from COMPUSTAT. |
| Reference Point | The average XCash of the first firm over the time that the CEO holds the position. |
| Experience | The difference between the average XCash of the first firm and the average XCash of the second firm before the CEO move into it. Data for calculation is from COMPUSTAT. |
| Experience_dum | Equal to 1 if Experience is larger than 0, and 0 otherwise. |
| Post | Equal to 1 if the observation is in post-succession period, and 0 otherwise. |
| Treat | A treatment identifier, which is equal to 1 if the firm experienced a CEO turnover in our sample, and 0 otherwise. |
| Gap | The difference between Reference Point and the second firm's current XCash. |

| | |
|-------------|---|
| Cash | Cash and Short-term Investments. Data is from COMPUSTAT. |
| NA | Total Assets minus Cash. Data is from COMPUSTAT. |
| FCF | Operating Income minus Interest minus Taxes scaled by Net Assets. Data is from COMPUSTAT. |
| MV | Stock price times Shares plus Total Liabilities scaled by Net Assets. Data is from COMPUSTAT. |
| NWC | Current Assets minus Current Liabilities minus Cash scaled by Net Assets. Data is from COMPUSTAT. |
| R&D | R&D expenditures scaled by Net Asset, set to zero if missing. Data is from COMPUSTAT. |
| Sigma | Industry average of the prior 10-year standard deviation of FCF/NA. Data is from COMPUSTAT. |
| MTB | Market value of equity divided by the book value of equity. Data is from COMPUSTAT. |
| Sales | Logarithm of firm's Total Sales. Data is from COMPUSTAT. |
| SalesGrowth | Growth rate of Sales, calculated as $(\text{Sales}) / (\text{Lagged Sales}) - 1$. Data is from COMPUSTAT. |
| Leverage | Total Liabilities scaled by the Net Assets. Data is from COMPUSTAT. |
| ROA | Net Income divided by Net Assets. Data is from COMPUSTAT. |
| NetPPE | Net Property, Plant, and Equipment divided by Net Assets. Data is from COMPUSTAT. |
| StockReturn | Annual return over the fiscal year. Data is from CRSP. |
| ZScore | Altman ZScore, calculated as $3.3 * (\text{OIADP} / \text{AT}) + 1.2 * ((\text{ACT} - \text{LCT}) / \text{AT}) + (\text{SALES} / \text{AT}) + 0.6 * (\text{MVE}) / (\text{DLC} + \text{DLTT}) + 1.4 * (\text{RE} / \text{AT})$. OIADP is operating income after depreciation; ACT is |

total current assets; LCT is total current liabilities; and RE is retained earnings. Data is from COMPUSTAT.

| | |
|---------|--|
| Delta | The change in the value of CEO's total (stocks plus options) portfolio due to a 1% increase in the price of the firm's common stock shares. This study follows Coles et al. (2006)'s calculation of a CEO's Delta and uses ExecuComp, COMPUSTAT, and Compustat data files. |
| Vega | The change in the value of CEO's total option portfolio due to a 1% change in the annualized standard deviation of stock returns. This study follows Coles et al. (2006)'s calculation of a CEO's Vega and uses ExecuComp, COMPUSTAT, and Compustat data files. |
| CashPay | Logarithm of the cash pay (salary plus bonus) a CEO receives in a given year. Data is from ExecuComp. |

Table A.2.1 Variable Definitions

| Variables | Definitions |
|----------------------------|---|
| Number of deals | The natural log of the sum number of outbound and inbound deals plus one for country <i>i</i> . (SDC) |
| GCI | Global Connectedness Index, a weighted average index of four pillars including trade (35%), capital (35%), information (15%), and people (15%). (DHL Global Connectedness Report) |
| GCI | Reweighted Global Connectedness Index, which averages trade, information, and people with the same weight as <i>gci_world</i> . (DHL Global Connectedness Report) |
| trade | The average of the depth and breadth dimensions of merchandise and service trade. See details in DHL Global Connectedness Report 2023. (DHL Global Connectedness Report) |
| people | The average of the depth and breadth dimensions of tourists, international university students, and international migrant stock. See details in DHL Global Connectedness Report 2023. (DHL Global Connectedness Report) |
| Country Pair Connectedness | Country-pair level connectedness index. |
| Information | The average of the depth and breadth dimensions of international internet bandwidth and scientific research collaboration. See details in DHL Global Connectedness Report 2023. (DHL Global Connectedness Report) |
| Tax rate | Country corporate tax rate. (OECD) |
| Pre-election | Dummy variable equal to one if the year is a pre-election year, and zero otherwise. |

| | |
|-------------------------------|---|
| Trade-to-GDP | The natural logarithm of the sum of imports and exports divided by GDP. (WDI) |
| GDP growth rate | Annual growth rate of GDP. (WDI) |
| GDP | The natural logarithm of GDP. (WDI) |
| Quality of institutions | The sum of three ICRG Political Risk subcomponents: corruption, law and order, and bureaucratic quality. (ICRG) |
| Business environment | Investment profile index from ICRG. (ICRG) |
| Imports from acquirer country | The ratio of the dollar volume of all trade flows from the acquirer country to the target country to the total imports of the target country. |
| Private merger | Ratio of the dollar volume of all private-target mergers to the total volume of all mergers for each country-pair and year. |
| Public merger | Ratio of the dollar volume of all public-target mergers to the total volume of all mergers for each country-pair and year. |
| Exchange rate volatility | Exchange rate standard deviation from 36 months up to one month before the announcement, between the acquirer and target nation. |
| Exchange growth rate | Exchange rate growth one year prior to the announcement between the acquirer and target nation. |
| Share language | Dummy variable equal to one if two countries share the same primary spoken language, and zero otherwise. (CEPII) |
| Share border | Dummy variable equal to one if two countries share a border, and zero otherwise. |
| Geographic distance | The natural logarithm of geographic distance between capitals. (CEPII) |

| | |
|-----------------------------|---|
| Bilateral investment treaty | Dummy variable equal to one if the acquirer and target nation signed a bilateral investment treaty, and zero otherwise. (CEPII) |
| Same legal | Dummy variable equal to one if the acquirer and target nation share the same legal system, and zero otherwise. (CEPII) |
| Same religion | Dummy variable equal to one if the acquirer and target nation share the same primary religion, and zero otherwise. (CEPII) |
| Culture dist | Cultural differences between two countries based on four dimensions (individualism, uncertainty avoidance, power distance, and future orientation) using the Euclidean distance formula. (www.geerthofstede.nl) |
| Treat | Dummy variable equal to one if the country pair is USA-CHN or CHN-USA. |
| Post | Dummy variable equal to one for the years 2018–2021, and zero otherwise. |
| Transaction value | The dollar value of all consideration paid in a merger minus costs and fees. (SDC) |
| Relative size | The ratio of the transaction value to the target market value at the announcement date. (SDC) |
| Acquiror market value | Acquiror market value four weeks before the announcement date. (SDC) |
| Major cash | Dummy variable equal to one if the merger payment is made with at least 50% cash. (SDC) |
| Tender offer | Dummy variable equal to one if a merger is a tender offer, zero otherwise. (SDC) |
| Friendly offer | Dummy variable equal to one if a merger is a friendly offer, zero otherwise. (SDC) |
| Same industry | Dummy variable equal to one if the acquirer and target share the same three-digit SIC code. (SDC) |
| Target defense | Dummy variable equal to one if a target company uses anti-takeover defenses to attempt to |

| | |
|--------------------------------|---|
| | prevent the merger. (SDC) |
| Combined CAR | The weighted cumulative abnormal return surrounding the merger announcement of the acquirer and target firms. (SDC) |
| Acq CAR | Acquirer firm cumulative abnormal return surrounding the merger announcement. (SDC) |
| Tar CAR | Target firm cumulative abnormal return surrounding the merger announcement. (SDC) |
| Premium paid (1 day) | The premium paid relative to the target market value one day before the announcement date. (SDC) |
| BHAR | Acquirer firm cumulative abnormal return one or three years post-merger. (SDC) |
| Number of outbound deals(pair) | Number of outbound deals from the acquirer country to the target country. (SDC) |
| Number of domestic deals | The natural log of the number of domestic deals plus one for country i. (SDC) |

Table A.2.2 BHAR

| | (1) | (2) |
|-------------------------------|----------|-----------|
| | BHAR 1yr | BHAR 3yrs |
| Country Pair Connectedness | 0.040 | 0.072 |
| | 0.030 | 0.059 |
| Transaction value | 0.003 | 0.000 |
| | 0.004 | 0.005 |
| Private merger | 0.029 | 0.001 |
| | 0.097 | 0.146 |
| Public merger | 0.029 | 0.141 |
| | 0.068 | 0.109 |
| Relative size | -0.023 | -0.048 |
| | 0.024 | 0.031 |
| Market value (Acq) | 0.000 | -0.000 |
| | 0.000 | 0.000 |
| Major cash | 0.068 | 0.175* |
| | 0.050 | 0.099 |
| Tender offer | -0.011 | -0.090 |
| | 0.050 | 0.063 |
| Friendly offer | -0.036 | -0.323** |
| | 0.070 | 0.141 |
| Same industry | 0.008 | 0.024 |
| | 0.037 | 0.071 |
| Target defense | -0.015 | -0.302 |
| | 0.104 | 0.268 |
| GDP (Acq) | 0.038 | 0.099 |
| | 0.223 | 0.476 |
| GDP (Tar) | -0.576 | -1.190** |
| | 0.350 | 0.486 |
| GDP growth (Acq) | 0.007 | -0.005 |
| | 0.012 | 0.014 |
| GDP growth (Tar) | -0.018 | 0.033 |
| | 0.026 | 0.045 |
| Trade to GDP (Acq) | -0.018 | -0.413 |
| | 0.369 | 0.679 |
| Trade to GDP (Tar) | 0.657 | -0.202 |
| | 0.523 | 0.745 |
| Tax rate | 0.002 | 0.071 |
| | 0.038 | 0.077 |
| Exchange rate volatility | -0.004** | -0.005 |
| | 0.002 | 0.007 |
| Exchange growth | -0.739** | -1.082* |
| | 0.347 | 0.620 |
| Imports from acquirer country | 0.054 | 0.227 |
| | 0.135 | 0.272 |
| Constant | 13.247 | 34.595 |
| | 14.704 | 21.842 |
| N | 438 | 438 |
| Country pair FE | Yes | Yes |
| Year FE | Yes | Yes |

This table presents the results of the impact of country pair connectedness on buy-and-hold abnormal return. The dependent variable in column (1) is the BHAR for one year after the announcement date. The dependent variable in column (2) is the BHAR for two year after the announcement date. In all models, we control for country pair level and year-level fixed effects. Heteroscedasticity-robust standard errors clustered by country pair are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. 10% levels, respectively.

Table A.2.3 Exclude U.S.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | Number of deals |
| GCI | 0.022** | | | | | | | |
| | 0.009 | | | | | | | |
| GCI (exc. capital) | | 0.029** | | | | | | |
| | | 0.011 | | | | | | |
| Trade | | | 0.017** | | | | | |
| | | | 0.008 | | | | | |
| Information | | | | 0.015** | | | | |
| | | | | 0.006 | | | | |
| People | | | | | -0.004 | | | |
| | | | | | 0.008 | | | |
| Capital | | | | | | 0.006 | | |
| | | | | | | 0.004 | | |
| Depth (exc. capital) | | | | | | | 0.018 | |
| | | | | | | | 0.014 | |
| Breadth (exc. capital) | | | | | | | | 0.032* |
| | | | | | | | | 0.018 |
| Tax rate | -0.613 | -0.465 | -0.504 | -0.750 | -0.694 | -0.676 | -0.301 | -0.101 |
| | 0.746 | 0.753 | 0.767 | 0.746 | 0.807 | 0.755 | 0.778 | 0.826 |
| Pre-election | 0.061** | 0.056** | 0.056** | 0.056** | 0.058** | 0.061** | 0.062** | 0.061** |
| | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.026 | 0.026 |
| GDP growth rate | 0.023*** | 0.024*** | 0.023*** | 0.024*** | 0.022*** | 0.023*** | 0.025*** | 0.023*** |
| | 0.005 | 0.005 | 0.006 | 0.005 | 0.006 | 0.006 | 0.007 | 0.007 |
| Trade-to-GDP | 0.344* | 0.255 | 0.231 | 0.546*** | 0.530*** | 0.481*** | 0.290 | 0.561*** |
| | 0.176 | 0.189 | 0.196 | 0.149 | 0.170 | 0.166 | 0.244 | 0.164 |
| GDP | 0.273** | 0.304** | 0.347*** | 0.322** | 0.399*** | 0.334** | 0.200 | 0.151 |
| | 0.133 | 0.124 | 0.128 | 0.122 | 0.131 | 0.132 | 0.132 | 0.142 |
| Quality of institutions | 0.097*** | 0.104*** | 0.106*** | 0.098*** | 0.095*** | 0.092*** | 0.100*** | 0.101*** |
| | 0.031 | 0.031 | 0.033 | 0.031 | 0.034 | 0.032 | 0.037 | 0.035 |
| Business environment | 0.035 | 0.035 | 0.033 | 0.035 | 0.033 | 0.035 | 0.063** | 0.055** |
| | 0.025 | 0.025 | 0.025 | 0.025 | 0.026 | 0.026 | 0.027 | 0.024 |
| Constant | -8.127** | -9.158*** | -9.470*** | -9.912*** | -10.667*** | -9.278** | -5.492 | -6.033 |
| | 3.600 | 3.318 | 3.489 | 3.288 | 3.630 | 3.682 | 3.691 | 3.845 |
| Observations | 939 | 939 | 939 | 939 | 939 | 939 | 829 | 829 |
| Country FE | Yes |
| Year FE | Yes |

This table presents the results of the effects of GCI on the total number of cross-border acquisition deals of a country excluding USA. The dependent variable is the natural logarithm of the sum of the number of outbound and inbound cross-border deals plus one for each country in time $t+1$. GCI is the Global Connected Index, where we separately use the aggregate index, re-weighted aggregate index, pillar-level measurements, and depth and breadth dimensions from column (1) to column (8). In all models we control for country level and year level fixed effects. Heteroscedasticity-robust standard errors clustered by country are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table A.2.4 PPML

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Ln(Number of deals) |
| GCI | 0.009*** 0.003 | | | | | | | |
| GCI (exc. capital) | | 0.010** 0.004 | | | | | | |
| Trade | | | 0.006** 0.003 | | | | | |
| Information | | | | 0.005* 0.003 | | | | |
| People | | | | | -0.003 0.004 | | | |
| Capital | | | | | | 0.003** 0.001 | | |
| Depth | | | | | | | 0.017*** 0.006 | |
| Breadth | | | | | | | | 0.003 0.004 |
| Tax rate | -0.346 0.281 | -0.275 0.291 | -0.296 0.288 | -0.361 0.279 | -0.392 0.312 | -0.390 0.282 | -0.358 0.280 | -0.353 0.283 |
| Pre-election | 0.017** 0.008 | 0.015* 0.008 | 0.015* 0.009 | 0.015* 0.008 | 0.015* 0.008 | 0.017** 0.008 | 0.017* 0.009 | 0.016* 0.008 |
| GDP growth rate | 0.010*** 0.003 | 0.011*** 0.003 | 0.010*** 0.003 | 0.010*** 0.003 | 0.010*** 0.003 | 0.010*** 0.003 | 0.010*** 0.003 | 0.010*** 0.003 |
| Trade-to-GDP | 0.134** 0.066 | 0.112 0.068 | 0.099 0.073 | 0.201*** 0.059 | 0.195*** 0.065 | 0.180*** 0.064 | 0.065 0.067 | 0.195*** 0.063 |
| GDP | 0.131*** 0.044 | 0.147*** 0.043 | 0.163*** 0.044 | 0.146*** 0.046 | 0.175*** 0.049 | 0.148*** 0.047 | 0.163*** 0.041 | 0.156*** 0.051 |
| quality of institutions | 0.033*** 0.011 | 0.035*** 0.012 | 0.035*** 0.012 | 0.033*** 0.011 | 0.031*** 0.011 | 0.031*** 0.011 | 0.032*** 0.011 | 0.031*** 0.011 |
| investment profile | 0.007 0.008 | 0.008 0.008 | 0.008 0.008 | 0.007 0.008 | 0.007 0.008 | 0.007 0.008 | 0.010 0.008 | 0.007 0.008 |
| Constant | -3.826*** 1.399 | -4.261*** 1.349 | -4.378*** 1.390 | -4.234*** 1.454 | -4.483*** 1.545 | -4.026*** 1.488 | -4.300*** 1.275 | -4.269*** 1.571 |
| Observations | 941 | 941 | 941 | 941 | 941 | 941 | 941 | 941 |
| Country FE | Yes |
| Year FE | Yes |

This table presents the poisson pseudo-maximum likelihood (PPML) results of the effects of GCI on the total number of cross-border acquisition deals of a country. The dependent variable is the natural logarithm of the sum of the number of outbound and inbound cross-border deals for each country in time $t+1$. GCI is the Global Connected Index, where we separately use the aggregate index, re-weighted aggregate index, pillar-level measurements, and depth and breadth dimensions from column (1) to column (8). In all models we control for country level and year level fixed effects. Heteroscedasticity-robust standard errors clustered by country are reported. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table A.3.1 Variable Definitions

| Variables | Definitions |
|--|--|
| Panel A: Climate physical exposure risk variables | |
| Heat exposure >30°C | Percentage of hot days of the year. Calculated as number of hot days divided by the total number of days of the year. Hot days is identified if the daily maximum temperature at the firm location is above 30°C. Firm location is identified by matching the specific coordinates with the ERA5 grid by the nearest principle. (ERA5) |
| Heat exposure >30°C & 90th | Percentage of hot days of the year. Calculated as number of hot days divided by the total number of days of the year. Hot days is identified if the daily maximum temperature at the firm location is above 30°C and 90th hottest daily maximum temperature distribution. (ERA5) |
| Cold exposure between -5°C to 0°C | Percentage of cold days of the year. Calculated as number of cold days divided by the total number of days of the year. Cold days is identified if the daily maximum temperature at the firm location is between -5°C to 0°C. (ERA5) |
| Cold exposure between -10°C to -5°C | Percentage of cold days of the year. Calculated as number of cold days divided by the total number of days of the year. Cold days is identified if the daily maximum temperature at the firm location is between -10°C to -5°C. (ERA5) |
| Cold exposure below -10°C | Percentage of cold days of the year. Calculated as number of cold days divided by the total number of days of the year. Cold days is identified if the daily maximum temperature at the firm location is below -15°C. (ERA5) |

Panel B: Firm-level main control variables

| | |
|-----------------------|---|
| Book-to-market ratio | Book value of common equity divided by market value of common equity. Market value of common equity is calculated as number of common shares outstanding multiplied by the close price at the end of fiscal year. (Compustat) |
| Cash ratio | Cash and short-term investment divided by total assets. (Compustat) |
| Firm Size | The natural logarithm of the market value of common equity. (Compustat) |
| Leverage ratio | Total debt divided by total assets. Total debt is calculated as long-term debt plus debt in current liabilities. (Compustat) |
| Return on assets | Earning before interest and taxes divided by total assets. (Compustat) |
| Sales growth | The company year-on-year difference sales divided by sales at year-end. (Compustat) |
| Stock return | The cumulative monthly return of the year. (CRSP) |
| Tangible assets ratio | Following Berger et al. (1996) and Wu, tangible assets ratio is calculated by $(0.715 * \text{Receivables} + 0.547 * \text{Inventories} + 0.535 * \text{Fixed capital})$ divided by total assets. (Compustat) |

Panel C: M&A variables

| | |
|------------------|--|
| Takeover premium | Premium of offer price to target closing stock price one day before the announcement date. (SDC Platinum) |
| CAR[-2,2] | Acquirer's five days cumulative abnormal returns (CARs). Estimated using the market model for each acquiring firm over 240 days to 41 days before the announcement date with CRSP value-weighted market return. (CRSP) |
| 2-year BHAR | Acquirer 2-year buy-and-hold abnormal returns (BHARs). Estimated using the market model for each acquiring firm over 240 days to 41 days before the announcement date |

| | |
|-------------------|--|
| Relative size | with CRSP value-weighted market return. (SDC Platinum) Transaction value divided by the target market value 4 weeks prior to the announcement date plus transaction value. (SDC Platinum) |
| Stock runup | Acquirer's buy-and-hold-abnormal return over the period (-210, -11) prior to the announcement date using the CRSP value-weighted index as the market return. (CRSP) |
| Diversifying deal | Dummy variable equal to one if the acquirer two-industry recorded in SDC is different with target macro-industry, and zero otherwise. (SDC Platinum) |
| Merger of equals | Dummy variable equal to one if the merger is recorded by SDC as a merger of equals, and zero otherwise. (SDC Platinum) |
| Hostile | Dummy variable equal to one if the merger is recorded by SDC as a hostile takeover. (SDC Platinum) |
| Tender offer | Dummy variable equal to one if the merger is recorded by SDC as a tender offer. (SDC Platinum) |
