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The Impact of the United States Re-Joining the Paris Agreement on Acquisition Premia Paid in Domestic Mergers and Acquisitions

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PREFACE AND ACKNOWLEDGEMENTS

This thesis marks the culmination of my MSc. Financial Economics at the Erasmus School of Economics, thereby reflecting a milestone in my educational- and personal development. Despite certain challenges, I have genuinely enjoyed writing my thesis. Throughout the process of conducting this research, I have found myself highly engaged, allowing my curiosity in the topic of the economic implications of environmental regulation, in particular the Paris Agreement, to be strengthened.

First and foremost, I would like to express my sincere gratitude to my supervisor, Dr. Jan Lemmen, for his invaluable support and guidance throughout the duration of my thesis. His extensive expertise provided me with the relevant insights that allowed me to challenge myself to continuously improve this research. Furthermore, I would like to thank both Dr. Jan Lemmen and my co-reader for the time dedicated to the evaluation of my thesis.

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ABSTRACT

This empirical study researches the impact of the United States (U.S.) re-joining the Paris Agreement (PA) on acquisition premia paid in domestic mergers and acquisitions (M&A). Particularly, this study intends to examine whether the impact of the U.S. re-joining the PA on acquisition premia is equal for acquisitions of targets located in U.S. states exhibiting different levels of environmental scores. Additionally, this research aims to assess whether the impact of the U.S. re-joining the PA is equal for transactions conducted by acquirers demonstrating different levels of environmental performance. The utilized sample consists of 604 M&A transactions conducted in the time period between June 2017 and February 2023. A generalised difference-in-difference estimation with industry- and state fixed effects is employed. The results indicate that the environmental score where the target company is located significantly and positively contributes to the net effect of the U.S. re-joining the PA on acquisition premia. Additionally, the findings indicate that the environmental performance of the acquirer does not significantly contributes to the effect of the U.S. re-joining the PA on acquisition premia. The findings highlight the unequal distribution of the economic implications of the implementation of federal environmental regulation within the U.S., reflecting the relevance of this study for U.S. policymakers, with the results that need to be considered when formulating environmental policy.

Keywords: Paris Agreement, Acquisition Premia, State-Level Disparity, Difference-in-Difference Estimation

JEL Classification: G34, G38, K32, L51, O38

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CHAPTER 1 Introduction

President Joe Biden announced the reinstatement of the U.S. to the PA on January 20, 2021, at his first day in office, signalling strong commitment to combatting climate change with the announcement reflecting clear departure from the decision of the former U.S. President, Donald Trump, to withdraw from the multilateral environmental agreement, on June 1, 2017 (Zhang et al., 2017). The dedication of the Biden administration towards the catalysation of global climate action is characterized by the primary objectives of the U.S. to limit global warming to 1.5 ℃, achieve net zero greenhouse gas (GHG) emissions in 2050, and strengthen environmental justice (The White House, 2023).

Alongside the extensively studied environmental risks that are accompanied with global warming, empirical literature increasingly acknowledges climate change to be profound in global financial decision-making, highlighting the importance of environmental considerations in M&A activities to progressively increase (Furukawa et al., 2020). In response to the persistent strengthening of environmental regulation, M&A participants are progressively integrating environmental factors in business strategies, strengthening firms' positioning to respond to sustainability-linked opportunities and risks (Financial Times, 2022). Accordingly, environmental factors tend to emerge as critical in all aspects of M&A, including e.g., target identification, likelihood of successful deal completion, target valuation, and post-merger integration (Afsharipour, 2022). Despite increasing availability of empirical research on environmental considerations in M&A, literature studying the effect of environmental regulation on different aspects of M&A transactions is limited. Understanding the complete economic implications of the implementation of environmental regulation is essential for policymakers in order to evaluate the relevance and effectiveness of policy decisions and identify policy-induced market trends in takeover activity. Moreover, transparency on the effect of policy implementation allows market participants to identify climate-related risks and opportunities in acquisitions and act upon market developments. Accordingly, this thesis extends the literature by researching the impact of the implementation of stringent environmental regulation on acquisition premia, reflecting a crucial aspect of the M&A process, for which the following research question is developed.

Does the decision of the United States re-joining the Paris Agreement have an effect on acquisition premia paid in domestic mergers and acquisitions?

This thesis aims to examine the effect of a regulatory exogenous shock, reflecting the implementation of environmental policy, on acquisition premia, defined as the excess amount that the acquirer is willing to pay over the target's market value prior to the acquisition announcement, which reflects the expected synergies from integration of the target firm (Sirower, 1997). In particular, this study researches whether the magnitude of the effect of the U.S. re-joining the PA on acquisition premia is equal for transactions

involving targets located across different U.S. states that exhibit different environmental state scores. Additionally, the differential effect of the re-implementation of the PA on acquisition premia is studied for M&A transactions conducted by acquirers demonstrating different levels of environmental performance. A generalised difference-in-difference estimation is employed to test the latter viewpoints.

1.1 Environmental Regulation in the United States

Although the PA, developed by the United Nations Framework Convention on Climate Change (UNFCCC) and signed by 196 nations, is of nonbinding legal nature, the announcement of the U.S. to unilaterally withdraw from the PA was met with widespread international condemnation and led to significantly slowed long-term U.S. momentum to achieve carbon neutrality (Paris Agreement, 2015; Borunda, 2020). Accordingly, the U.S. termination of political commitment to the PA represented a severe impediment in the international cooperative effort of mitigating climate change (Clark & Stothard, 2015). The federal approach of the Trump administration towards climate policy has been characterized by substantial environmental deregulation, in which President Trump officially reversed, revoked, or otherwise rolled back 112 environmental policies, reflecting an abrupt shift in environmental responsibility and commitment from federal- to state-level governments (Popovich et al., 2021). In order to resist federal retrenchment, several U.S. states pledged to continue to work towards meeting the emission reduction goals set out in the PA and rolled out ambitious climate strategies, however, a substantial number of predominantly Republican-led states supported the decision of U.S. withdrawal and weakened priority on regulating climate change, which introduced substantial state-level differences in environmental aspirations (Plumer, 2019).

Federal climate regulation undergone a significant shift since President Biden took office on January 20, 2021, characterized by the prioritization of environmental legislation and strengthened federal adaptation efforts to achieve environmental justice (Vangala et al., 2022; The White House, 2022). Despite the federal environmental policymaking being subject to maintained polarized attitudes between conservative- and progressive states and faced by strong resistance from Republican state officials, the Biden administration is recognized to have implemented environmental legislation to a significantly greater extent compared to prior administrations (Cha et al., 2022). The presence of environmental injustice within the U.S., reflecting the disproportionate impacts of climate change with certain subgroups being more vulnerable to the environmental- and economic impacts of the mitigating efforts to combat climate change, and the strong state-level differences in environmental political stance, suggest that the implementation of federal environmental legislation, e.g., the re-implementation of the PA, might have unequal consequences within the U.S. across different states and subgroups of the population (Fusi et al., 2022).

1.2 Regulatory Shocks and Acquisition Premia

Acquisition activity tends to be affected by exogenous shocks, with the nature of the shock typically reflecting an unanticipated economic-, technological-, geopolitical-, or regulatory event (Mitchell & Mulherin, 1996). Similarly, Harford (2005) indicates that an exogenous shock of economic-, technological-, or regulatory nature, tends to induce periods of instantaneous increasing acquisition activity, attributable to M&A functioning as a facilitation method for companies to adjust to the changed environment. Additionally, regulatory shocks tend to affect several other aspects of M&A transactions alongside the potential implications on acquisition activity. According to Alimov (2015), the implementation of stringent labour regulation induces increased synergetic gains and enhanced post-merger operating performance in a sample of cross-border acquisitions with the target companies located in the country that implemented the regulation. Furthermore, Nguyen and Phan (2017) indicate policy uncertainty to affect the method of payment and acquisition premia paid in M&A transactions. In context of the implementation of environmental regulation, Tsai and Wang (2008) argue that M&A functions as effective method to acquire external technology and -innovation in order to anticipate strengthening environmental policy. Moreover, Kwon et al. (2018) highlight that the acquisition of environmentally friendly start-ups by acquirers operating in industries that are sensitive to environmental regulation tends to reduce policy compliance costs for the acquiring firms, leading to enhanced synergetic gains. Additionally, the authors highlight that the sensitivity of the industry to environmental regulation is likely to induce increased competition in terms of number of bidders, which instigates acquisition premia to increase and potentially results in overpayment.

Alternatively, Boelaars (2020) studied the effect of environmental deregulation, reflecting the decision of the U.S. to withdraw from the PA, on acquisition premia, demonstrating that acquisition premia, on average, increased following U.S. withdrawal from the PA. Additionally, the author indicates that the acquisition premia paid in acquisitions of targets located in higher-ranked states in terms of environmental scores enhanced to a greater extent following U.S. withdrawal from the environmental agreement, relative to the acquisition premia paid in acquisitions of targets located in lower-scoring states. The latter findings, in conjunction with the described potential effects of a regulatory shock on M&A dynamics, indicate that the decision of the U.S. to re-join the PA affects acquisition premia paid. There is no empirical research available that studies the effect of the (re-)implementation of the PA on acquisition premia, accordingly, this thesis extends the existing body of literature.

The results of this thesis demonstrate that the environmental score of the U.S. state where the target company is located positively contributes to the net effect of the U.S. re-joining the PA on acquisition premia. Whereas the latter result of this thesis is statistically significant, the findings on the differential effect of the policy implementation for varying levels of environmental performance of the acquirer indicate that the acquisition premia paid in domestic M&A transactions following the U.S. re-joining

the PA are not significantly different for varying environmental pillar scores of the acquirer. This indicates that the level of environmental performance of the acquirer does not significantly contributes to the effect of the U.S. re-joining the PA on acquisition premia. The latter result indicates to be in line with the findings of Jost et al. (2022), highlighting the substantial complexity that is accompanied with the employment of environmental scores in empirical research and demonstrating environmental performance of neither the acquirer, nor the target, to significantly affect acquisition premia paid.

1.3 Contributions

This thesis contributes to the existing body of literature in five aspects. The first contribution is to test the effect of the implementation of environmental regulation, reflecting the U.S. re-joining the PA, on acquisition premia. Existing literature on the subject is predominantly divided into two subsets of research, primarily focusing on either the impact of environmental regulation on firm innovation and -productivity, or on the relationship between firm productivity and acquisition premia. Accordingly, this thesis extends the literature by testing the direct effect of the implementation of environmental regulation on acquisition premia. Policymaking institutions, particularly the U.S. federal government and the state legislature, can utilize the results of this thesis to reflect on the economic implications of the U.S. re-joining the PA, representing the second contribution this thesis makes. Additionally, the presented findings of this study need to be considered when formulating environmental policies, in order to ensure effectiveness and to understand the unequal distribution of the economic implications within the U.S. that result from the implementation of federal environmental regulation. The third contribution of this thesis reflects the relevance of the findings for companies engaging in acquisitions. M&A participants benefit from the presented results following the enhanced positioning to identify potential opportunities and risks related to environmental regulation and to anticipate accordingly.

The fourth contribution this thesis makes is to test the applicability of the neoclassical theory and the Porter hypothesis, which are further detailed in Section 2.2.1. Thereby, this thesis contributes to the existing literature on the relationship between environmental regulation and firm productivity in context of the U.S. re-joining the PA, which has not been researched within the literature. Additionally, this thesis examines the validity of the shareholder expense theory and the stakeholder value maximization view, in light of the implementation of environmental research, which is further detailed in Section 2.2.4.

Lastly, this study controls for the potential effects of recent periods of macroeconomic uncertainty, i.e., Covid-19 and the Russia-Ukraine war, on acquisition premia. Accordingly, the results contribute to the limited availability of literature on the implications of socioeconomic crises on acquisition premia.

This thesis is structured as follows. Section 2 presents the relevant literature, including a review of the PA and the environmental policy implications following U.S. withdrawal, the theories that are tested in this thesis, and the economic implications of periods of macroeconomic uncertainty. Additionally, the hypotheses that are tested are presented in Section 2. Section 3 describes the data that is utilized in this study. Section 4 presents the methodology of the model that is employed to test the hypotheses, details the validity of the assumptions corresponding to the model, and addresses potential endogeneity concerns. Section 5 interprets the results and presents a sensitivity scenario that is performed to test robustness. Section 6 provides the conclusion in which the hypotheses are accepted or rejected, allowing the research question to be answered. Additionally, the limitations of this thesis and suggestions for future research are presented in Section 6.

CHAPTER 2 Literature Review

2.1 Paris Agreement

The PA represents a multilateral environmental agreement, which is adopted on December 12, 2015, by 196 parties at the twenty-first session of the Conference of the Parties (COP), which is the annual meeting of all participants of the UNFCCC (United Nations, 2015). The annual conferences are held to assess global progress in combatting climate change and to negotiate and implement measures to reduce GHG emissions (United Nations Climate Change, n.d.). The objective of the PA is to strengthen the global response to climate change with the primary objective to limit global warming to well below 2°C and pursuing efforts of limiting global heating to 1.5°C (United Nations, 2015). Contributing to the purpose of the environmental agreement, participating countries have filed extensive national climate action plans and agreed to convene every five years to evaluate the progress made in achieving the long-term objectives (European Commission, n.d.). These five-yearly review sessions enable a 'naming and shaming' strategy, with peer pressure and international monitoring serving as the primary multilateral instruments for Parties to strengthen the credibility of their commitments (Falkner, 2016).

There is an abundance of literature examining the robustness of the agreement's framework to foster sustainable political commitment, presenting contradicting viewpoints. Falkner (2016) claims that the PA represents a more realistic approach to internationally coordinated CO_2 emission reduction compared to its predecessor, the Kyoto Protocol, as it addresses two major limitations that hindered international cooperation in the past. First, the author indicates that the PA acknowledges that heavy polluting countries are hesitant to be legally committed to a tight framework of required pollution reduction. Second, the Falkner (2016) mentions that the PA avoids the international discussion on the distribution of the emission reduction burden which is resolved by the 'naming and shaming' strategy, that follows from the non-binding legal nature of the national climate action plans. In contrast, Clémençon (2016) mentions that the lack of legally binding commitments causes an absence of country-level accountability to achieve quantifiable progress. Furthermore, the author highlights that the agreement fundamentally lacks specifics on financial support for developing countries. The latter argument is further stressed in a study of the legal character of the PA, in which Bodansky (2016) highlights that the obligation of developed countries to provide financial resources to developing countries, and to report on this accordingly, applies to 'developed countries' as a group instead of 'each developed country', which solely implies collective commitment. The author argues that there is a lack of individual responsibility or obligations, presenting complexity in mandating nations to provide financial support. Moreover, Pauw et al. (2020) stress that the promised financial support from developed countries would not be sufficient to cover the costs of implementing all nationally determined action plans of developing countries, weakening the feasibility of these action plans.

The analysis on the effectiveness of the PA remains challenging considering the described conflicting assessments of the agreement amongst the literature. In light of the non-binding nature of the determined commitments, the described flexibility has allowed both advances and setbacks in terms of actual progress of the implementation of the PA. A growing number of Parties, including amongst others the European Union (EU), have adopted legally binding net zero commitments, which is considered as a promising and powerful development (Carver, 2021). However, during the previous eight years, the optimistic trends have been offset by unfavourable moves with the most striking being the U.S. withdrawal of the agreement. The implication of the non-binding legal nature of the nation's pledges allowed the U.S. to withdraw from the PA without legal consequences, which is further detailed in Section 2.1.1.

2.1.1 United States Withdrawal

The U.S. officially withdrew from the PA on November 4, 2020, following the terms of the agreement that a country is able to submit a notice of withdrawal three years after the agreement enters into force for that country, with the withdrawal becoming effective one year later (Bodansky, 2016). Although the U.S. remained involved in the COP following the official announcement of U.S. withdrawal by President Trump on June 1, 2017, the level of engagement altered, and the country acted as observer without a formal role in the decision-making process (Gurol & Starkmann, 2021). In a critical analysis on the deficiencies of the PA in light of U.S. withdrawal, Xiaolong (2021) concludes that the announcement of the Trump administration triggered the general perception of a leadership vacuum in terms of global environmental policy, adversely affecting other Parties' compliance willingness. The author additionally stresses that U.S. withdrawal caused the burden of GHG emission reduction to shift to the remaining Parties in the PA, further exacerbating the nations' willingness to comply. Furthermore, the U.S. decision to withdraw from the agreement has reinforced the initial criticism of the legal structure of the PA, related to the described collective commitment in providing financial aid to developing nations as opposed to individual country commitment (Kemp, 2017). Zhang et al. (2017) indicate that the insufficient financial climate aid that developed nations pledged to developing countries is further threatened by the U.S. refusal to contribute. Prior to withdrawal, the U.S. had been a top contributor to the Green Climate Fund, a fund established by the UNFCCC to provide financial support to developing nations for the implementation of their action plans (Cui & Huang, 2018). However, following the official withdrawal announcement in June 2017, the U.S. pledge of $3.0 billion to the fund was terminated, thereby jeopardizing the ability of developing counties to fulfil their climate action plans (Popovich & Fountain, 2021). Although the initial prediction of a domino effect with other countries following the U.S. in their decision to withdraw or terminate financial aid pledges did not materialize, there is consensus amongst the literature that the consequences of U.S. withdrawal are widespread, slowing down long-term momentum to combat climate change (Chestnoy & Gershinkova, 2018).

The announcement of President Trump to withdraw from the PA was met with widespread condemnation from the international community, with multiple leaders and representatives from other Parties expressing their disappointment and concern about the decision (Watts & Connolly, 2017). Despite global consensus on the disapproval of the withdrawal announcement, reactions within the U.S. were mixed with a significant number of Republican U.S. states supporting President Trump's announcement (Friedman, 2019). Republican politicians have expressed scepticism about the science of climate change and criticised the PA as a burden on the economy and a threat to existing jobs, which would adversely impact the economic international competitiveness of the country (McCarthy & Gambino, 2017). Accordingly, multiple states governed by a Republican majority substantially weakened priority on regulating climate change after the country withdrew from the PA, in line with the federal stance of President Trump (Friedman, 2019). In contrast, over 3,800 leaders of U.S. states, city halls, and companies pledged to continue to work towards meeting the emission reduction goals set out in the PA, representing the 'We Are Still In' movement (Chestnoy & Gershinkova, 2018). Following the announcement of U.S. withdrawal from the PA, the United States Climate Alliance (USCA) was created in 2017, representing a bipartisan coalition of U.S. states that pledge to reduce GHG emissions and adhere to the goals of the PA, despite the federal government's decision to withdraw (United States Climate Alliance, n.d.). Consequently to the announcement of the formation of the alliance by the governors of California, New York, and Washington, 24 states have joined the USCA, representing 58% of the U.S. economy and 54% of the U.S. population (United States Climate Alliance, 2022). The latter disparity in environmental aspirations among individual states presented the U.S. with a policy dilemma. The federal government espoused a pro-fossil fuel stance, while a notable number of states were pursuing a contrasting course, characterized by the focus on GHG emission reduction and increasingly ambitious climate policy in place (Cooper, 2018). The existence of state disparity is confirmed by the study of Boelaars (2020), analysing the effect of the U.S. withdrawal of the PA on acquisition premia. The author confirms the presence of state-level differences in environmental legislation after the U.S. announced to withdrew from the PA, highlighting that the state-level differences in sustainable policy courses are reflected by the strong disparity in environmental scores between U.S. states.

The post-withdrawal subnational compliance of the U.S. to the PA boosted the observer status of the country and substantially enhanced the importance of state-level legislation in maintaining momentum towards reducing emissions (Gurol & Starkmann, 2021). This is in line with the described contrasting responses within the U.S. to the withdrawal announcement and consistently indicate strong disparities in environmental policy courses and accompanied environmental state scores among individual states.

2.1.2 President Biden

On January 20, 2021, President Joe Biden took office and signed an executive order directing the U.S. to re-join the PA on the first day in office, demonstrating commitment to multinational cooperation and signalling the return of the country to a leadership role within the PA, in contrast to the prior observer status (Milman, 2021). The decision to re-join the agreement intends to tackle the policy dilemma of a disparity in environmental legislation among individual states, with the commitment further reinforced by the creation of the White House Office of Domestic Climate Policy, a cabinet post dedicated to prioritising federal environmental policy and incorporating climate considerations into all domestic policy (Bomberg, 2021). Literature is available that praises the pivotal stance of the Biden administration in terms of environmental legislation and its corresponding progress, while there is also research that criticises the progress achieved. Cha et al. (2022) study the U.S. environmental justice policies in the first year of the Biden administration and mention that the environmental policymaking has revealed reliance on administrative actions to progress climate priorities and strongly increased resistance from Republican state officials. However, the authors conclude that, despite these challenging circumstances, the Biden administration successfully implemented federal environmental legislation to a greater extent compared to prior administrations. This indicates that the implementation of stringent climate policy at federal level potentially reduces the disparity in environmental state regulation. In contrast, in a critical analysis on U.S. carbon emissions, Shao (2023) stresses that the country demonstrated limited progress in reducing GHG emissions since President Biden took office, with a 1.3% year-on-year increase in emissions in 2022, particularly stemming from the highest-emitting sectors, including transportation and industry. The latter argument is further supported by Puko (2023), directly linking the slowed down U.S. progress to the country falling behind schedule on the development and implementation of federal environmental legislation. Lacking implementation of climate policy at federal level potentially indicates the persistence of state-level disparities in environmental ambitions, contradicting the viewpoint of Cha et al. (2022).

There is no literature that assesses the state-level differences in environmental policy stances within the U.S., nor has any study researched the potential economic implications of the state-level disparity. This indicates a research gap, for which this thesis extends the literature by assessing the role of state-level differences in environmental scores in the effect of the implementation of stringent federal environmental regulation on acquisition premia paid in domestic M&A transactions.

2.2. Paris Agreement and the United States' Economy

Although the literature has widely acknowledged the profound economic implications of global warming, there exists a disconnect between the scientific literature on the effects of climate change and the assessment of economic costs and benefits of emission reduction efforts, due, in part, to limited

available literature on the quantification of the relative economic benefits of mitigating climate change (Dell et al., 2012; Auffhammer et al., 2013). Limited available empirical research on described topic generally employs an Integrated Assessment Model (IAM), which incorporates both the direct effect of global warming on economic growth, as well as the economic costs of emission reduction efforts, across a variety of potential scenarios (Estrada & Botzen, 2021). Glanemann et al. (2020) conduct a global economic cost-benefit assessment of the PA, utilizing an IAM that incorporates two separate cost curves, identified as the damage-cost curve and the mitigation-cost curve. The authors conclude that the PA presents an economically optimal global warming target of 2℃ by assessing global economic impact in terms of cumulative Gross Domestic Product (GDP) loss until the year 2100. While the study does not focus on geographical distribution of economic impact, the authors highlight that the economic effects of climate change are not identical between poor- and rich countries.

Estrada and Botzen (2021) identify a limitation of the IAM employed by Glanemann et al. (2020) in a study of the costs and risks associated to the mitigation efforts towards the PA and the consequences of nonadherence of major polluting countries. The authors stress that the employed IAM by Glanemann et al. (2020) assumes full compliance of all participating nations, however, lacks to anticipate on amendments of nation's short-term emission reduction targets and partial compliance or complete withdrawal from the agreement. Estrada and Botzen (2021) present an alternative IAM that incorporates a variety of policy scenarios. The authors indicate that the discounted long-run economic costs of global warming of 4℃ for the U.S., expressed as percentual loss of current GDP, ranges from 90% to 208%, against the discounted economic benefits of full compliance of the country to the PA ranging from 52% to 119% of current U.S. GDP. The results reflect the accumulated economic costs and benefits until the year 2100. Noncompliance of the U.S. to the PA would result in elimination of the economic benefits, alongside further expansion of the projected climate change-induced economic losses of 5% of current U.S. GDP per annum, according to the results of the study.

Kompas et al. (2018) employ an IAM to research the geographical distribution of the long-run economic impacts of climate change under multiple warming scenarios, incorporating the economic benefits of complying to the PA. The authors indicate substantial variations in economic impact across different regions in the world, with the poorest countries being the most adversely affected. Focusing solely on the U.S., the results indicate that an increase of the global temperature of 4℃ would result in an annual U.S. GDP loss of 0.89% until the year 2100, in contrast to the annual U.S. GDP loss of 0.39% in the scenario of a 2℃ increase in global temperature. The latter results are expressed in terms of annual GDP loss, which cannot be directly compared to accumulated economic costs as percentage of current GDP, as reported by Estrada and Botzen (2021), limiting interpretation of a comparison. However, both studies suggest global warming to have a negative net economic effect and indicate that compliance with the PA would mitigate the economic losses. In spite of the described consensus amongst the literature that

the 2℃ global heating scenario limits economic impact, compared to potential scenarios with the global temperature increasing more than 2℃, Kompas et al. (2018) stress that the annual U.S. GDP loss under a 1℃ increase in global temperature would amount to 0.18%, indicating the 1℃ scenario to be economically optimal for the U.S, contradicting the results of Glanemann et al. (2020).

Despite the increasing focus of scientific literature on the utilization of IAM's to assess the economic implications of climate change by additionally incorporating pollution reduction efforts in terms of monetary values, minimal literature is available that studies the relative effect of (non)compliance to the PA on microeconomic variables at firm-level, including e.g., acquisition behaviour, which is specifically of interest in this thesis. This indicates that the available body of literature provides an incomplete assessment of the full range of economic implications associated with environmental policy, in particular the PA, highlighting the necessity for further research to provide a complete understanding of the economic consequences of the multilateral environmental agreement.

2.2.1 Neoclassical Theory and the Porter Hypothesis

Alongside the limited availability of research on the microeconomic effects of the PA in the U.S., literature that studies the general relationship between environmental regulation and environmental firm performance in U.S. is additionally limited. According to McWilliams et al. (2006), the scarce availability of literature is attributable to the U.S. reporting standard, which incorporates environmental investments under regular financial accounts, restricting the ability of quantifying and isolating environmental spending for U.S. companies. Accordingly, Barnea and Rubin (2010) indicate that literature on this topic employs inconsistent substitutes to capture environmental performance, including e.g., company corporate social responsibility (CSR) ratings, research and development (R&D) spending, and variables reflecting firm productivity and firm innovation. However, it is important to acknowledge that the latter described proxies capture a subset of environmental firm performance.

In light of the latter described proxy of environmental performance, i.e., company productivity and innovation, the general relationship between environmental regulation and firm productivity is extensively studied within the literature, presenting two conflicting viewpoints. The conventional perception on the stringency of environmental regulation argues that sustainable policy implementation is detrimental to productivity growth following increased policy compliance costs for companies, adversely affecting the international competitive position (Albrizio et al., 2017). This viewpoint reflects the neoclassical theory, which is based on the assumptions of perfectly rational profit-maximizing firms and efficient markets (Palmer et al., 1995). Following the latter assumptions, the neoclassical theory contends that profit-maximizing innovation will always be deliberately implemented by firms in the absence of a regulatory stimulus due to firm rationality, hence, neoclassical environmental economists

argue that regulation merely functions as constraint on firms and limits the ability to exploit profit-enhancing opportunities (Hilliard, 2004). Notable contributions to the neoclassical theory include several studies that ascribe the trend of slowed down labour productivity in the U.S. between 1946 and 1980 to the increased stringency of U.S. environmental regulation (Christainsen & Haveman, 1981; Gray, 1987). Gray and Shadbegian (2002) perform a more targeted study that assesses the effect of environmental regulation on total factor productivity in the U.S. paper industry and find significantly lower productivity levels for paper mills that are subject to more stringent environmental policy. Duque-Grisales and Aguilera-Caracuel (2019) validate the neoclassical theory from an alternative perspective, arguing that environmental investment significantly negatively impacts financial performance in a sample of 104 multinationals headquartered in Latin America. The authors indicate that the lack of environmental regulation in Latin America resulted in managers generally neglecting the importance of environmental innovation, leading to substantial trade-offs between financial performance and environmental performance once sustainable investments were pursued. This indicates that unanticipated environmental investments are considered value destructive, in line with the neoclassical theory.

Contradicting to the neoclassical viewpoint, the Porter hypothesis indicates that stringent environmental regulation enhances company performance by stimulating firm innovation, which, in turn, improves economic competitiveness in comparison to foreign competitors (Porter, 1991; Porter & van der Linde, 1995). The hypothesis acknowledges regulation-induced short-term costs to increase following the necessity to redesign products and processes. Although the latter may threaten the competitive advantage, Porter (1991) argues that the long-term benefits of increased company efficiency will stimulate the international competitive advantage of a country imposing stringent environmental regulation. Porter and van der Linde (1995) highlight that companies systematically overlook productivity-enhancing innovations, rejecting the assumption of the neoclassical theory that firms are perfectly rational and profit-maximizing. Moreover, the Porter hypothesis argues that a competitive position is not necessarily reduced by the implementation of sustainable policy as other countries are implementing similar regulations, suggesting that environmental regulation creates a level playing field that encourages firms to compete based on innovation and efficiency, rather than environmental degradation (Porter, 1991).

Literature that intends to validate the Porter hypothesis exhibits a bifurcation in methodological approaches, with the first subset of literature testing the hypothesis by assessing the impact of environmental regulatory stringency on R&D output (Lanoie et al., 2008). Jaffe and Palmer (1997) validate the Porter hypothesis through the application of an industry fixed effects model on a panel of U.S. manufacturing companies, testing the relationship between environmental regulatory stringency, quantified by policy compliance expenditures, and innovative effort, proxied by R&D expenditures. The

authors find a positive and significant relationship between the latter two variables. According to Popp (2006), the implementation of environmental policy on sulphur dioxide in the U.S. and nitrogen dioxide in Germany and Japan is accompanied with a significant increase in the number of successful patent applications. The authors highlight that the tightening of U.S. regulation results in increased domestic patenting activity, however, has no effect on foreign patenting, indicating companies to be more responsive to domestic policy as opposed to foreign policy implementations.

Conversely, the second subset of literature that validates the Porter hypothesis evaluates the effect of sustainable regulation on firm performance, considering e.g., productivity and financial performance. Berman and Bui (2001) study the impact of sustainable regulation on total factor productivity of oil refineries located in Los Angeles, a region subject to heavily increased air pollution regulation between 1979 and 1992. The authors compare the results to productivity of U.S. oil refineries that are not subject to the regulations and indicate that the Los Angeles refineries enjoy significantly higher total factor productivity, enhancing financial performance. Furthermore, de Santis et al. (2021) validate the Porter hypothesis for 18 OECD countries, reporting a significant positive effect of environmental regulation on labour- and multifactor productivity growth.

2.2.2 Innovation and Mergers and Acquisitions

Literature on the role of innovation in M&A suggests that firm innovation reflects an important factor in acquisition decisions, indicating innovative effort to be a determining factor of the acquisition premia paid. Acquisition premia, defined as the excess amount that the acquirer is willing to pay over the target's market value prior to the acquisition announcement, is considered to reflect the expected synergies from integration of the target firm, assuming combined performance to increase beyond expected performance of the acquirer and target separately (Urbšienė et al., 2015; Sirower, 1997). Accordingly, empirical research on acquisition premia employs the metric to reflect acquirers' willingness to pay the target above the perception of the market on the pre-takeover value (Simonyan, 2014).

Hall (1988) studies the level of R&D investment of target companies in U.S. M&A transactions in the manufacturing industry between 1976 and 1986 and indicates the target's R&D stock to significantly positively affect acquisition premium. Consistently, Laamanen (2007) demonstrates acquisition premia to increase for acquisitions of target companies that have higher levels of R&D-related assets in a sample of 458 U.S. acquisitions between 1989 and 1999. The author indicates that the higher levels of acquisition premia do not reflect overpayment and are instead justified by the technological resources of the target firm that are generally accompanied with additional complexity for the market to accurately value. Furthermore, Fulghieri and Sevilir (2009) argue that target firms are able to bargain for increased

acquisition premia in case the acquirer operates in a highly competitive industry, following the elevated pressure on the acquirer to attract innovation externally and gain a competitive advantage against their peers. This contributes to the findings of Tsai and Wang (2008), arguing that M&A functions as effective method to externally acquire technology and innovation. Moreover, Zhao (2009) indicates that, on average, acquirers tend to be less innovative compared to targets. In line with the described findings, Wu and Chung (2019) study the effect of innovation on the likelihood of a company to be acquired and the takeover premia paid in U.S. M&A transactions between 1980 and 2011 and conclude that firms with increased innovation output are substantially more likely to be acquired, relative to a control group of peers, with acquisition premia significantly increasing for target firms with higher innovative output. Furthermore, the authors highlight that acquirers assign increased importance to innovation levels of targets in case of an exogenous shock that alters the competitive landscape of the industry. This indicates that the implementation of regulation, reflecting an exogenous shock, potentially enhances acquisition premia.

The described findings on the role of innovation of both the acquirer and the target in M&A behaviour indicate that, on average, acquirers tend to exhibit lower levels of innovation, compared to target companies. This suggests that the acquisition of a company potentially functions as a means of strengthening proprietary innovative performance. Despite the latter results focusing primarily on innovative effort, which solely reflects a subcategory of environmental performance, Barnea and Rubin (2010) highlight that firm innovation is generally utilized as proxy for sustainable innovation and environmental performance, as detailed in Section 2.2.1. Accordingly, this suggests that firms engage in acquisitions to attract environmental innovation, which enhances acquirers' proprietary environmental performance, indicating that the environmental performance of the target company is generally higher, in comparison to the acquirer.

This thesis studies the effect of stringent environmental regulation on the acquisition premia paid in domestic M&A transactions between June 2017 and February 2023, by testing the applicability of the neoclassical theory and the Porter hypothesis. The neoclassical theory argues that stringent environmental regulation constraints firms by limiting productivity growth, with the additional regulatory compliance costs jeopardizing firm performance. This indicates that re-joining the PA will limit firm productivity, which, in context of M&A transactions, negatively affects acquisition premia. Following the strong disparity in environmental policy courses between U.S. states after the country withdrew from the PA, it is expected that the exogenous shock of President Biden announcing to re-join the PA and the accompanied pivotal environmental policy stance adopted at federal level, impacted states that exhibited lower environmental rankings to a greater extent, compared to states that exhibited higher environmental scores and already prioritized environmental policy. The latter viewpoint, in context of the neoclassical theory, indicates that the implementation of the PA negatively impacted the

productivity growth and performance of target firms located in lower-environmentally-ranked states to a greater extent, which, in turn, results in a stronger reduction in acquisition premia paid, relative to acquisitions of target firms located in higher-ranked states.

Contrarily, following the Porter hypothesis, the implementation of sustainable regulation will stimulate firm innovation and performance, which, in turn, enhances acquisition premia. In context of the effect of the U.S. re-joining the PA being more pronounced in U.S. states that exhibited lower environmental scores, it is expected that the policy-induced effect of strengthened firm innovation and financial performance is stronger for target firms located in the lower-ranked states. Hence, following the Porter hypothesis, this suggests that the acquisition premia increase to a greater extent in acquisitions of target firms in lower-scoring states, compared to acquisitions of target firms located in states that already prioritized environmental policy, exhibiting higher environmental scores. To test the two contrasting viewpoints, the following hypothesis, in line with the Porter hypothesis, is developed and tested in this thesis.

Hypothesis 1. Acquisition premia paid in domestic mergers and acquisitions increased following the re-joining of the United States to the Paris Agreement, with the increase being more pronounced for acquisitions of targets located in states that demonstrated lower environmental scores pre-re-joining, compared to acquisitions of targets located in states exhibiting higher environmental scores pre-re-joining.

2.2.3 Other Determinants of Acquisition Premia

The determinants of acquisition premia have been widely studied amongst strategic- and financial research, highlighting a wide range of drivers that can be categorized into deal-specific- and firm-specific effects.

Literature presents mixed empirical evidence on the relationship between deal size and acquisition premia. Behavioral economists suggest that overconfident managers typically tend to bid for large targets, which is associated with further overestimation of the acquisition gains and subsequent overpayment (Hayward & Hambrick, 1997). Additionally, biased managers often acquire companies for personal incentives, which are maximized for larger deal sizes, stimulating managers to pay additional acquisition premia to ensure successful deal completion (Harford & Li, 2007). In contrast, Alexandridis et al. (2013) argue that the integration of large target firms is associated with additional complexity, limiting expected synergies. This indicates that the relative size of the target, compared to the size of the acquirer, affects the magnitude of expected synergetic gains. Although the latter notion is not directly comparable to the described effect of the standalone deal value on expected synergetic gains and acquisition premia, Alexandridis et al. (2013) further stress that larger sized deals and the accompanied

integrational complexity typically results in fewer potential acquirers, with the reduction in competition negatively affecting acquisition premia. Accordingly, literature presents inconclusive empirical findings on the relationship between deal size and acquisition premia. Healy et al. (1997) identify deal attitude as an important deal-specific driver of acquisition premia, indicating that friendly transactions are accompanied with lower acquisition premia, compared to hostile takeovers. Moreover, acquisition premium tends to be positively affected by the percentage of target shares acquired as target shareholders require additional compensation following increasing levels of loss of control (Jarrel et al., 1988). Furthermore, following the conventional perception that strategic acquirers enjoy higher synergetic gains compared to financial acquirers, Gorbenko and Malenko (2014) stress that acquisitions conducted by strategic buyers are accompanied with higher acquisition premia in comparison to acquisitions executed by financial buyers. Moreover, literature identifies method of payment as determinant of acquisition premia, with cash acquisitions being associated to higher acquisition premia compared to transactions that utilize securities as method of payment (Wansley, 1983). Additionally, Shleifer and Vishny (2003) demonstrate that cash offers are accompanied with increased hostility from the target company, which, in turn, tends to be accompanied with increased acquisition premia. Furthermore, literature identifies the level of diversification as deal-specific determinant of acquisition premia, with inter-industry acquisitions considered to be value-destroying following increased complexity of post-merger integration (Morck et al., 1990). Accordingly, intra-industry acquisitions tend to be accompanied with higher acquisition premia (Haunschild, 1994). Lastly, Dionne et al. (2015) argue acquisition premia to increase for transactions characterized by substantial information asymmetry among the bidders and the target company, indicating that uninformed bidders pay higher acquisition premia to compensate for the risk associated with the lack of information.

Alongside the deal-specific variables, the literature presents several firm-specific determinants of acquisition premia. Lang et al. (1989) identify Tobin's Q ratio as a potential firm-related determinant of acquisition premia, which is expressed as the firm's market value divided by the replacement value of total assets. The authors indicate that a target Tobin's Q of above one suggests that the market believes the company to have valuable intangible assets and investment opportunities, accompanied with strong growth potential, which positively affects acquisition premia paid in M&A transactions. However, due to computational complexity of the asset replacement value, literature employs inconsistent definitions of Tobin's Q, with the ratio regularly expressed as equity market value divided by total assets, or equity market value divided by equity book value. The latter modified version of Tobin's Q ratio is similar to the price-to-book ratio, which proxies misvaluation, for which a higher target price-to-book ratio is considered to negatively affect acquisition premia (Dong et al., 2006). Furthermore, Harris and Ravenscraft (1991) indicate the level of intangible assets and R&D intensity of the target firm to positively affect the acquisition premium following enhanced synergetic value to the acquirer. However, Gomes and Marsat (2018) identify the substantial complexity of the consistent valuation of intangible

assets as limitation in the assessment of the relationship between intangible assets and acquisition premia. Within the literature on financial synergetic determinants of acquisition premia, Baldi and Salvi (2022) argue that financial synergies for the merged firm are reflected by the ratio of total debt divided by the equity value of the target, indicating the target leverage ratio to be inversely related to acquisition premia. The authors argue that a lower level of the target's leverage ratio reduces the default probability, attributable to limited future debt obligations and enhanced future debt capacity of the merged firm. Zemskova (2016) identifies the ratio of total deal value divided by the target net asset value, identified as the net asset value ratio, as proxy for goodwill and demonstrates the net asset value ratio to affect acquisition premia significantly and positively. In addition to the described target firm-specific determinants of acquisition premia, Kim et al. (2011) identify organic growth of the acquiring company to affect acquisition premia, indicating that acquirers' that are persistently unable to grow the company organically, reflecting strong eagerness for external growth, are more likely to overpay in acquisitions and increase acquisition premia. Lastly, within the literature on firm-specific determinants of acquisition premia, CSR performance of both the acquirer and the target company are recognized to affect acquisition premia, which is further detailed in Section 2.2.4.

In opposition to the described widely accepted deal-specific- and firm-specific determinants of acquisition premia, Simonyan (2014) indicates that the latter described variables fail to provide evidence for the variability in acquisition premia over time, and identifies market misvaluation, momentum, and industry consolidation as additional determinants of acquisition premia. The author demonstrates that during periods of market overvaluation, acquisition premia tend to be lower as acquirers hold the belief that the intrinsic value of the target firm is lower than the market value, consistent to the described findings of Dong et al. (2006), indicating that higher levels of the price-to-book ratio indicate overvaluation and therefore negatively affect acquisition premia. Second, Simonyan (2014) argues that momentum exists in acquisition premia, reflecting a positive correlation between current acquisition premia and acquisition premia paid in prior year acquisitions. Lastly, the author indicates that consolidating industries, characterized by excess capacity and an abundance of active firms, are associated with elevated levels of acquisition premia.

2.2.4 Shareholder Expense Theory and the Stakeholder Value Maximization View

The relationship of CSR performance and acquisition premia is limitedly discussed in the literature, presenting contradicting results based on two opposing viewpoints being the shareholder expense theory and the stakeholder value maximization view. The shareholder expense theory, presented by Friedman (1970), implies that the social responsibility of a firm leads to inefficient use of company resources, resulting in shareholder return deterioration. In line with the primary objective of firms to maximize shareholder value, it is rational to anticipate that the level of CSR expenditure would align with this objective, however, the shareholder expense theory contends that managers may be incentivized to

increase CSR expenditure beyond the threshold that optimizes firm value, due to personal motives related to reputation (Barnea & Rubin, 2010). Accordingly, the shareholder expense theory suggests that CSR practices lead to value destruction for company shareholders. Hussaini et al. (2021) validate the shareholder expense theory in context of M&A transactions, particularly examining acquisition premia, and demonstrate CSR performance of the acquirer to positively affect acquisition premia paid in a sample of 564 U.S. M&A transactions. The authors suggest that the findings indicate the presence of an agency problem where managers of acquiring firms employ CSR practice to enhance personal reputation and obtain private benefits, leading to the execution of value-destroying investments at expense of the company shareholders, reflecting the payment of higher acquisition premia. No literature is available that studies the shareholder expense theory in context of the effect of CSR performance on acquisition premia from a target company perspective.

The stakeholder view, proposed by Freeman (1984), suggests that CSR practice and profit maximization are not mutually exclusive, implying that CSR activity is associated with improved financial performance. Fatemi et al. (2015) validate the stakeholder view by demonstrating that CSR engagement positively affects medium- and long-term cash flow, increases the probability of firm survival, and reduces the cost of capital, thereby providing further evidence of the value-creating potential of CSR practice. Krishnamurti et al. (2018) provide evidence supporting the stakeholder view in context of acquisition premia paid in M&A transactions and indicate that CSR-oriented acquirers are less likely to overpay in M&A transactions, demonstrating CSR performance of the acquirer to negatively affect acquisition premia paid in 776 Australian M&A transactions. The authors attribute the findings to CSR-oriented acquirers having more ethical managers, demonstrating fewer traits of overconfidence, hubris, and narcissism, and acting in best interest of all company stakeholders. Furthermore, the authors highlight that CSR-oriented bidders prefer to acquire high-CSR targets relative to targets that exhibit lower CSR practice. Gomes and Marsat (2018) study the relationship between CSR and acquisition premia from a target company perspective, indicating CSR performance of the target to positively affect acquisition premia paid in a sample of 588 international M&A transactions. The authors attribute the positive relationship to increased expected synergetic gains for high-CSR targets and thereby validate the stakeholders view in respect of CSR-induced economic benefits. Similarly, Qiao and Wu (2019) argue that acquirers are willing to pay higher levels of acquisition premia for target companies that demonstrate strong levels of CSR performance in a sample of 252 cross-border acquisitions. The authors attribute the positive effect to enhanced CSR practice of the combined firm, which induces improved long-term financial performance, strengthening of the acquirer's social networks, and increased debt capacity following the trend of financial institutions presenting favorable treatments to CSR-involved companies. Lastly, Cho et al. (2020) validate the stakeholder value maximization view and demonstrate that acquisitions in which the target CSR performance is higher than the acquirer CSR performance, yield higher cumulative abnormal return for the target shareholders. Despite the latter result expressed

as the sum of the abnormal stock returns of the target in reaction to the acquisition announcement, which is not directly comparable to the described results that utilize acquisition premium, the findings indicate target CSR performance to be positively valued by acquirers.

Despite increasing interest within the literature, Jost et al. (2022) stress the substantial complexity in assessing the potential relationship between CSR performance and acquisition premia, reporting CSR performance of neither the acquirer nor the target to significantly affect acquisition premia. The complexity of utilizing CSR ratings for empirical research is additionally highlighted by Christensen et al. (2022), demonstrating the substantial disagreement across rating agencies in assigning ratings to individual firms. The authors stress that greater firm CSR disclosure exacerbates CSR rating disagreement, limiting the interpretation of conclusions drawn upon CSR ratings.

The described ambiguous evidence indicates that the available body of literature provides an incomplete assessment of the role of CSR practice in acquisition behavior, highlighting the necessity for further research. This thesis extends the literature by assessing the applicability of the stakeholder value maximization view compared to the shareholder expense theory from an acquirer's perspective in M&A transactions, in light of the implementation of federal environmental regulation following the U.S. re-joining the PA. The shareholder expense theory argues acquirer's CSR performance to positively affect acquisition premia, reflecting value destruction for acquirer's shareholders. Considering that coercive pressure has a substantial positive impact on firm greenness by strongly incentivizing companies to engage in environmentally friendly activities, it is expected that the implementation of environmental regulation positively affects firms' environmental performance (Murphy & Gouldson, 2000). Hence, following the shareholder theory, the implementation of environmental regulation by re-joining the PA is expected to positively affect acquisition premia paid, with the increase being more pronounced for acquirers demonstrating higher levels of environmental scores, compared to lower scoring acquirers. In contrast, the stakeholder value maximization view argues that acquirer's environmental performance negatively affect acquisition premia paid. This indicates that the re-joining of the U.S. to the PA will negatively affect acquisition premia, with the effect being stronger for acquirers that demonstrate higher environmental scores, compared to lower-scoring acquirers.

This thesis researches the applicability of the described contrasting viewpoints. In line with the stakeholder value maximization view, the following hypothesis is constructed and tested.

Hypothesis 2. Acquisition premia paid in domestic mergers and acquisitions decreased following the re-joining of the United States to the Paris Agreement, with the reduction being more pronounced for transactions executed by acquirers that demonstrate higher environmental pillar scores, compared to transactions conducted by acquirers exhibiting lower environmental scores.

2.3 Mergers and Acquisitions During Periods of Macroeconomic Uncertainty

Within the extensive literature on the determinants of acquisition premia, there is a limited subset of research that particularly analyses M&A characteristics and acquisition premia during times of macroeconomic uncertainty. Existing literature on the effect of socioeconomic crises on acquisition behaviour demonstrates consensus on crisis-induced slowed down transaction volume, attributable to firms prioritizing the concern of liquidity shortages, instead of focusing on long-term growth strategies (Bauer et al., 2022). Despite deteriorating transaction volumes, Kengelbach et al. (2020) indicate that acquisition premia generally tend to increase in periods of crisis. The authors attribute this relationship to acquiring companies pursuing strategic M&A agendas that allow companies to surpass industry-average growth as the economy rebounds, enabling an acceleration out of the recession and thereby justifying elevated levels of acquisition premia. Consistently, Fralich and Papadopoulos (2018) demonstrate acquisition premia to significantly increase at the onset of the global financial crisis in a sample of M&A transactions conducted by firms included in the S&P500. The authors ascribe the trend of increasing acquisition premia to information asymmetry that is further exacerbated by the economic turmoil, restricting acquirer's ability to distinguish general market conditions from firm-specific developments, which induces overpayment. Furthermore, Ang and Mauck (2011) attribute observed increasing acquisition premia during periods of crisis to acquirers' widespread reliance on the 52-week high of the target share price as primary reference in the assessment of the fundamental value of the target. The authors highlight that, in periods of market distress, acquirers generally perceive the depressed share price of the target company as transitory, directly resulting in elevated levels of acquisition premia. Lastly, Simonyan (2014) indicates acquisition premia to be higher in periods of investor pessimism and stock market volatility, with the latter economic circumstances being generally present in periods of crisis.

The most recent periods of socioeconomic crisis comprise the outbreak of the Covid-19 pandemic and the war between Russia and Ukraine. The outbreak of the global pandemic in early 2020 triggered a severe economic crisis accompanied with substantial supply- and demand shocks (Kooli & Lock Son, 2021). A supply shock refers to an exogenous shock that jeopardizes an economy's production capacity to supply goods and services at given prices, with the Covid-19-induced supply shock reflecting deteriorated potential output that predominantly resulted from withdrawn amount of labour and disrupted supply chains (Brinca et al., 2020). The negative demand shock following the outbreak of Covid-19 reflects the severe collapse in consumer spending, which is a major source of economic activity, predominantly attributed to declining purchasing power due to job loss, government-imposed lockdowns that limited demand in certain industries, and precautionary behaviour that shifted consumer preferences (Ruch & Taskin, 2022). Despite Brinca et al. (2021) reporting the initial expectation of the negative supply shock to be of temporary nature, attributable to the strong relatedness of the labour supply shock to the health crisis, the authors demonstrate persistence in the supply disruptions during

Covid-19. In contrast, following the effective vaccine rollout in the U.S. as of the first quarter of 2021, consumer demand gradually recovered, further strengthened by increasing consumer confidence and accumulated savings, enabling the global economic activity to rebound (Remes et al., 2021). Accordingly, the Covid-19 period is distinguishable into two time periods, identified as the collapse phase and the recovery phase, with the first period reflecting the negative supply- and negative demand shock in 2020, and the second period reflecting the positive demand shock in 2021 (Ferriani & Natoli, 2021).

The Russian invasion of Ukraine on February 24, 2022, marks a steep escalation of the Russo-Ukrainian war and reflects a catastrophic humanitarian crisis, severely impacting the global economy (Orhan, 2022). The war instigated multi-faceted supply disruptions, including agricultural disruption and energy price increases, further exacerbating the pre-existing Covid-19-induced negative global supply shock (Ben Hassen & El Bilali, 2022). Considering that both countries had been major exporters of agricultural commodities prior to the war, the disruption in Ukraine's agricultural production and the imposed economic sanctions restricting direct and indirect trading with Russia and Belarus resulted in substantial global food security challenges, culminating in significantly elevated global food prices (Jagtap et al., 2022). Additionally, the war instigated a strong hike in energy prices as countries progressively announced to reduce or eliminate oil and gas import from Russia (Horton & Palumbo, 2023).

Although the effect of the Russia-Ukraine war on acquisition behaviour and -premia has not been researched within the literature, research on the effect of the first, collapse phase of the Covid-19 pandemic on acquisition premia is available, although limitedly. Magnanelli et al. (2022) demonstrate the average acquisition premia paid during 2020, reflecting the collapse phase of the Covid-19 pandemic, to be 18% higher in comparison to the average acquisition premia paid in 2019, in a relatively small sample of 174 global M&A transactions, with the limited sample size attributable to the severe reduction in acquisition activity in 2020. The authors ascribe the observed increase in acquisition premia during the first phase of Covid-19 to target shareholders that refuse to adjust the price expectations to the market volatility and downward market pressure as the depressed share price is deemed temporary and attributable to the general market circumstances, hence, target shareholders tend to utilize a pre-crisis benchmark for the expected offer price. In contrast to the substantially reduced acquisition activity during the collapse phase of the global pandemic, reflecting a period of severe investor pessimism, Deyong and Pryor (2022) report U.S. M&A activity in 2021 to substantially surpass expectations with a 99% year-on-year increase in deal value, compared to 2020, indicating strong momentum and a confident acquisition market. Although no prior research is available that studies the acquisition premia paid during the recovery phase of Covid-19, Simonyan (2014) reports acquisition premia to decrease in periods of investor optimism attributed to the accompanied market overvaluation and increased takeover activity. Accordingly, it is expected that the recovery phase of Covid-19 in 2021 is accompanied with

lower levels of acquisition premia. According to Harding et al. (2023), strong U.S. acquisition activity persisted in the first half of 2022, however, the M&A market substantially slowed down in the second half of 2022 following multi-faceted macroeconomic uncertainty due to the Russia-Ukraine war, inducing geopolitical tension, strongly increased inflation and interest rates, reduced capital availability, and persistent supply chain uncertainty. The authors identify June 16, 2022, as turning point for the U.S. M&A market, reflecting the announcement of the Federal Reserve System to increase the benchmark interest rate by 0.75 percentage points, marking the most aggressive hike since 1994. The pessimistic investor sentiment on the emerging recessionary environment contributed to a 40% year-on-year decline in U.S. deal value in 2022 (Levy et al., 2023). Accordingly, following Simonyan (2014), arguing investor pessimism to be associated with market undervaluation which, in turn, results in lower acquisition premia, it is expected that acquisition premia decreased following the intense period of macroeconomic uncertainty induced by the Russia-Ukraine war.

The described limited availability of research provides an incomplete assessment of the implications of periods of macroeconomic uncertainty on acquisition premia. Accordingly, this thesis extends the available body of literature, for which the following hypothesis is developed and tested.

Hypothesis 3. Acquisition premia paid in domestic mergers and acquisitions increased following the exogenous shock of the Covid-19 pandemic in 2020, decreased following the recovery phase of the global pandemic in 2021, and increased following the Russian invasion of Ukraine.

CHAPTER 3 Data

3.1 Sample Selection

The data utilized in this thesis is retrieved from the Refinitiv Eikon Deal Screener, which is a database consisting of transaction data on global M&A activity. The original sample of the studied period in this thesis consisted of 7,496 observations and was filtered prior to analysing the data. The selected sample includes domestic M&A transactions, with both the acquirer and the target headquartered in the U.S., which are announced and completed within the time period from June 1, 2017, until February 9, 2023. The start date of the utilized sample period marks the date of President Trump announcing U.S. withdrawal of the PA. Utilizing this sample period enables the identification and comparison of two separate time periods preceding- and following the event date. The selected event date is January 20, 2021, reflecting the date of President Biden officially signing the executive order directing the U.S. to re-join the PA. The selected sample period includes approximately three and a half years of transactions prior to the event date and two years of transactions post-event date. Transactions with a deal value below $1.0 million and transactions with a deal value of less than 1% of the market value of the acquirer are eliminated from the sample. Following the objective of this thesis to study the acquisition premia paid in M&A transactions, only deals involving publicly listed target companies are included in the sample, yielding a total sample size for the relevant sample period of 604 transactions.

Relevant variables that are included in the analysis are extracted from the Deal Screener database and variable definitions are presented in Appendix A. The acquisition premia one day-, one week-, and four weeks prior to the acquisition announcement are included. Acquisition premium is defined as the offer price per share in the acquisition divided by the share price of the target one day-, one week-, or four weeks prior to the announcement, with this thesis focusing on the four-weeks acquisition premia following Li & Ang (2000), indicating that the share price of the target four weeks prior to the announcement is least likely to be impacted by information leakage in the market. The one-day and one-week acquisition premium are included in the analysis for sensitivity objectives, which will be further detailed in Section 5.6. Other relevant variables that are included are the announcement date of the acquisition, the name of the acquiring company and the target firm, deal value, offer price per target share, state where the acquirer and target are headquartered, target share price one day-, one week-, and four weeks prior to the acquisition announcement, percentage of shares acquired in the transaction, enterprise value and equity value of the target at the announcement, Tobin's Q ratio of the target, leverage ratio of the target, the level of total debt of the target company, and the net asset value ratio of the target. To allow the difference-in-difference analysis to control for industry fixed effects, string variables indicating the primary SIC groups of the acquirer and target are included in the analysis and encoded to numerical variables. Additionally, in order to merge data, the CUSIP of both the acquirer and target are retrieved, reflecting the unique identification number. Several dummy variables are

constructed and included in the analysis, with the first variable indicating the deal attitude of the acquisition, i.e., whether the takeover is friendly or hostile, and the second dummy variable indicating whether the acquirer is a strategic buyer or a financial buyer. The third dummy variable is constructed to reflect whether the acquisition is a diversifying transaction, yielding one for acquisitions with the acquirer and target operating in the same SIC industry. Lastly, three additional dummy variables are created to control for the potential effects of periods of macroeconomic uncertainty on acquisition premia. To capture the effect of the exogenous shock of the Covid-19 pandemic, a dummy variable is constructed that reflects the first, collapse phase, of the global pandemic, yielding a value of one for acquisitions announced in 2020, and zero otherwise. The recovery phase of Covid-19 is reflected by a dummy variable yielding a value of one for acquisitions announced in 2021, and zero otherwise. Lastly, to capture the potential effect of the Russian invasion of Ukraine, a dummy variable is constructed, yielding one for acquisitions that are announced after June 16, 2022, and zero otherwise. June 16, 2022, reflects the announcement of the Federal Reserve System to increase the benchmark interest by 0.75 percentage points, representing the turning point for the U.S. M&A market, as indicated by Harding et al. (2023) and detailed in Section 2.3.

Following the lack of data on CSR performance and environmental information in the Refinitiv Eikon Deal Screener database, additional variables are retrieved from DataStream, which is a global database including financial- and macroeconomic information. Utilizing DataStream allows to retrieve the environmental pillar score of both the acquirer and the target. The environmental pillar scores reflect companies' sustainable performance and range from zero to one hundred, for which the companies are assessed on resource usage, emission reduction effort, and innovative output. However, following limited availability of the environmental pillar scores of acquirers and further limited availability of environmental pillar scores of the target companies included in the sample, this thesis solely includes the environmental pillar scores of the acquirer, which is further detailed in Section 4.1.

Within the available literature, there is a lack of consistent annual data on U.S. state-level environmental scores. Hence, environmental data presented in the Sustainable Development Reports of the U.S. is utilized, which is an analysis of the individual progress of U.S. states towards achieving the Sustainable Development Goals (SDG's), presenting a framework of 17 goals established by the United Nations that stimulates global action on social equality, economic growth, and environmental sustainability (Sustainable Development Solutions Network, 2018; Sustainable Development Solutions Network, 2021). Although the U.S. Sustainable Development Reports are not published annually, utilizing the available reports that are published in September 2018 and December 2021, allow to observe the evolution of the potential disparity in environmental rankings as the 2018 report corresponds to the time period between the U.S. withdrawal announcement from the PA in 2017 and the announcement of the U.S. to re-join the PA in January 2021, and the 2021 report corresponding to the time period

subsequently to the U.S. re-joining the PA. Thereby, the limitation of lacking consistent annual data is mitigated. To allow for an accurate and isolated assessment of environmental rankings, this thesis utilizes the state-level scores on SDG 13, 'Climate Action', as the sole indicator of states' progress towards environmental sustainability. The state-level environmental scores are merged in the main dataset to match the scores to the U.S. state where the target company is located. The environmental state scores are presented in Appendix B.

3.2 Descriptive Statistics

Descriptive statistics of the variables utilized are presented in Table 1. Detailed definitions of the variables are presented in Appendix A. Appendix C presents the descriptive statistics for separate time periods, in which the total sample is divided into the pre-event sample, reflecting all transactions announced between June 2017 and January 2021, and the post-event sample, reflecting all transactions announced between January 2021 and February 2023. The total sample consists of 604 transactions. Boxplots and histograms are employed to determine whether log-transformation and winsorizing was required. Log-transformation is applied to reduce skewness and conform to normality, and winsorizing allowed for the elimination of potential outliers. The variables for acquisition premia, deal size, Tobin's Q ratio, and leverage ratio are log-transformed. Acquisition premia, Tobin's Q ratio, leverage ratio, and net asset value ratio are winsorized at 1%. Skewness and kurtosis remain high for certain variables, as detailed in Table 1, including the dummy variable indicating whether the acquisition was announced after the Russian invasion of Ukraine, the friendly dummy, and the percentage of shares acquired in the transaction. However, non-symmetry is attributable to the limited number of transactions during the Russia-Ukraine war, nearly all transactions reporting a friendly nature, and a high proportion of deals that acquire 100% of the target, respectively. Moreover, no winsorizing at higher levels is applied to prevent bias. To test for multicollinearity, the variance inflation factor (VIF) of all explanatory variables is constructed. Multicollinearity of the interaction term is accounted for by standardizing the time dummy, the environmental state score of the target, and the environmental pillar score of the acquirer. Post-standardization, the VIF values did not exceed 1.46, providing no incentive to additionally standardize variables. Accordingly, the assumption of no multicollinearity can be satisfied. The Breusch-Pagan test and White's test are performed to assess the presence of heteroskedasticity, with the results providing no evidence of heteroskedasticity. This is graphically supported by the residual versus fitted values plots. Despite the latter results indicating homoscedasticity to be present, potential presence of heteroskedasticity is further mitigated by employing robust standard errors, as suggested by Arellano (1987). Standard errors are clustered at target firm-level to mitigate serial correlation, as suggested by Bertrand et al. (2004). The correlation matrix of the variables utilized in the analysis is presented in Appendix D.

Table 1. Descriptive Statistics.

This table provides descriptive statistics of the complete sample, consisting of +26 months of mergers and acquisitions post-event date, and -42 months of mergers and acquisitions prior to the event date, with the event date identified as January 20, 2021, reflecting the official re-joining of the U.S. to the PA. Log-transformation is applied to the four-weeks acquisition premia, deal value, Tobin's Q ratio, and leverage ratio to conform to normality. The time dummy, environmental score of the U.S. state where the target is located, and environmental pillar score of the acquirer are standardized to mitigate multicollinearity. Winsorizing at the 1% level is applied to the four-weeks acquisition premia, Tobin's Q ratio, the leverage ratio, and the net asset value ratio to eliminate the effect of potential outliers.

	Descriptive statistics							
Variables	Mean	P50	Std. error	Min	Max	Skewness	Kurtosis	N
Ln(acquisition premia four-weeks)	3.376	3.446	0.041	-0.868	5.762	-0.498	4.315	604
Time dummy	0.007	-0.659	0.041	-0.659	1.515	0.840	1.706	604
Environmental state score target	-0.005	0.289	0.041	-1.960	1.217	-0.579	2.007	604
Environmental pillar score acquirer	0.114	0.138	0.052	-1.302	1.932	-0.009	1.555	378
Dummy Covid-19 collapse phase	0.122	0	0.327	0	1	2.312	5.990	604
Dummy Covid-19 recovery phase	0.203	0	0.403	0	1	1.476	3.180	604
Dummy Russia-Ukraine war	0.048	0	0.214	0	1	4.218	18.788	604
Ln(deal value)	6.673	6.753	0.075	2.032	11.372	-0.039	2.507	604
Dummy friendly	0.993	1	0.003	0	1	-12.166	149.007	604
Dummy strategic acquirer	0.762	1	0.017	0	1	-1.228	2.507	604
Percentage of shares acquired	96.766	100	0.548	8.09	100	-4.520	23.187	604
Dummy intra-industry	0.409	0	0.020	0	1	0.370	1.137	604
Ln(Tobin's Q ratio)	-0.166	-0.160	0.058	-3.317	2.959	0.176	2.321	512
Ln(leverage ratio)	0.526	0.372	0.620	0	3.238	1.888	7.376	512
Net asset value ratio	3.718	2.110	0.458	-2.364	56.95	0.680	12.719	512

3.3 Control Variables

This thesis controls for a number of variables, which are categorized into deal-specific- and firm-specific variables, in line with existing literature on the determinants of acquisition premia, as detailed in Section 2.2.3. Definitions of the variables included are presented in Appendix A.

Literature presents inconsistent evidence on the effect of deal size on acquisition premia, with Harford and Li (2007) indicating deal size to have a positive effect on acquisition prima, while Alexandridis et al. (2013) demonstrate a negative relationship between deal size and acquisition premia. Accordingly, this thesis controls for deal size. Following Healy et al. (1997), deal attitude tends to affect acquisition premia, for which friendly takeovers are accompanied with lower acquisition premia, in comparison to hostile takeovers. This thesis includes a dummy variable indicating whether the acquisition is of friendly nature. Furthermore, a dummy variable reflecting the type of acquirer is included in the analysis as deal-specific control variable, following Gorbenko and Malenko (2014), indicating strategic acquirers typically paying higher levels of acquisition premia, in comparison to financial acquirers. Moreover,

according to Jarrel et al. (1988), acquisition premia tend to increase with the percentage of target shares acquired following target shareholders requiring additional compensation for higher levels of loss of control. Hence, the percentage of shares acquired is included as deal-specific control variable in the analysis. Lastly, the literature indicates diversifying mergers to be value-destructive, demonstrating intra-industry M&A transactions to generate enhanced synergetic gains, positively affecting acquisition premia paid (Haunschild, 1994). Accordingly, a dummy variable is constructed indicating whether the acquirer and target operate in the same primary SIC industry groups, which is included as deal-specific control variable in the analysis.

According to Lang et al. (1989), Tobin's Q ratio of the target company positively affects acquisition premia as a higher Tobin's Q ratio signals that the target firm has valuable intangible assets and investment opportunities. Accordingly, Tobin's Q ratio is included as firm-specific control variable. Baldi and Salvi (2022) indicate that lower levels of target debt-to-equity ratio imply reduced default probability of the target firm and enhanced future debt capacity of the merged firm, highlighting target leverage ratio to be inversely related to acquisition premia. Accordingly, target debt-to-equity ratio is included in the analysis. Lastly, Zemskova (2016) argues the target net asset value ratio to positively affect acquisition premia, with the ratio reflecting a proxy of goodwill. Hence, the net asset value ratio of the target is included as firm-specific control variable.

Alongside the deal-specific- and firm-specific control variables, this thesis controls for potential effects of periods of macroeconomic uncertainty on acquisition premia. The periods that are controlled for reflect the collapse phase- and the recovery phase of Covid-19, and the Russia-Ukraine war. Dummy variables reflecting the three distinguishable periods of macroeconomic uncertainty are constructed and included in the analysis, denoting one for acquisitions announced in 2020, 2021, and after June 16, 2022, respectively, and zero otherwise.

Chapter 4 Method

4.1 Difference-in-Difference Method

This thesis employs a generalized difference-in-difference model combined with industry- and state fixed effects to test Hypothesis 1, indicating that the acquisition premia paid in domestic M&A transactions, on average, increased after the U.S. announced to re-join the PA, with the increase being more pronounced for acquisitions of targets located in states that demonstrated lower environmental scores pre-re-joining, compared to acquisitions of targets located in states exhibiting higher environmental scores pre-re-joining. The standard difference-in-difference estimation is a quasi-experimental design that utilizes longitudinal data divided into a treatment- and control group to estimate the effect of a specific treatment or intervention, e.g., policy implementation, program evaluations, and medical treatments (Lechner, 2011). Utilizing the difference-in-difference estimation attempts to control for permanent differences between the control group and the treatment group and controls for biases resulting from comparison of the treatment group attributed to trends (Wooldridge, 2007). The sample utilized in this thesis is not divided into separate treatment- and control groups as, in theory, all U.S. states are exposed to equivalent federal regulation following the U.S. re-joining the PA. However, it can be assumed that the implementation of stringent environmental regulation at federal level impacted U.S. states that exhibited lower environmental scores prior to the U.S. re-joining the PA to a greater extent, compared to higher-ranked states, following the latter group of states already prioritizing environmental state-level regulation in the period after the U.S. withdrew from the agreement. Hence, lower-ranked U.S. states are assumed to be impacted to a substantially greater extent by the policy implementation.

Following the research design of this thesis, a generalised difference-in-difference model with industry- and state fixed effects is employed and detailed in Equation (1), where *i* refers to the individual M&A transaction, *t* represents the time of the acquisition announcement, and β_0 reflects the constant. The dependent variable in Equation (1) is the four-weeks acquisition premium, reflected by $Acquisition\ premium_{it}$. The dummy variable $Tdummy_t$ indicates whether the M&A transaction was conducted post-treatment, denoting one in case the transaction was announced after the U.S. re-joined the PA in January 2021. The variable $Statescore_i$ represents the environmental score of the state where the target is located, expressed as a continuous variable. The environmental state scores are detailed in Appendix B. The interaction variable is reflected by $Statescore_i * Tdummy_t$. This thesis controls for five specifications of variables with Equation (1) including all variables considered in the specifications. To control for the potential effects of the exogenous shock of Covid-19 on acquisition premia, the dummy variable $Covid1_i$ is included, yielding a value of one for acquisitions announced in 2020, reflecting the collapse phase of the Covid-19 pandemic, and zero otherwise. The dummy variable $Covid2_i$ reflects the recovery phase of the global pandemic, denoting one for acquisitions announced in 2021, and zero

otherwise. Acquisitions announced during the war between Russia and Ukraine, are represented by the dummy variable $Ukraine_i$, yielding one for acquisitions announced after June 16, 2022, and zero otherwise. The latter three dummy variables are included to control for the potential effects of periods of macroeconomic uncertainty on acquisition premia, and thereby testing Hypothesis 3, indicating that the acquisition premia increased following the exogenous shock of the Covid-19 pandemic in 2020, decreased following the recovery phase of the global pandemic in 2021, and increased following the Russian invasion of Ukraine. The variable $Deal\ value_i$ indicates the total size of the transaction, and the dummy variables $Friendly_i$ and $Strategic_i$ indicate the deal attitude, denoting one for friendly acquisitions, and the type of acquirer, denoting one in case of a strategic acquirer, respectively. The percentage of acquired target shares is represented by $Sharesacquired_i$. The dummy variable $Intraindustry_i$ reflects whether the transaction is a diversifying acquisition, denoting one for non-diversifying mergers with acquirers and targets operating in the same industry, and zero otherwise. Tobin's Q ratio of the target is identified by $TobinsQ_i$. The leverage ratio of the target is reflected by $Leverageratio_i$ and the target net asset value ratio is identified by NAV_i. Lastly, the employed model includes industry- and state fixed effects in all five specifications, represented by α_i and γ_i, respectively, following the potential presence of industry- and state-specific factors that explain variation in acquisition premia, as indicated by Madura et al. (2012). To control for time-invariant confounding factors, the model incorporates year fixed effects, reflected by δ_t. The error term ε_{it} is assumed to be a mean zero. Detailed definitions of the variables included are presented in Appendix A.

$$\begin{aligned} Acquisition\ premium_{it} &= \beta_0 + \beta_1 Tdummy_t + \beta_2 Statescore_i + \beta_3 (Tdummy_t * Statescore_i) \\ &+ \beta_4 Covid1_i + \beta_5 Covid2_i + \beta_6 Ukraine_i + \beta_7 Deal\ value_i + \beta_8 Friendly_i + \beta_9 Strategic_i \\ &+ \beta_{10} Sharesacquired_i + \beta_{11} Intraindustry_i + \beta_{12} TobinsQ_i + \beta_{13} Leverageratio_i + \beta_{14} NAV_i \\ &+ \alpha_i + \gamma_i + \delta_t + \varepsilon_{it} \end{aligned} \quad (1)$$

This thesis controls for five specifications of variables. All specifications include industry- and state fixed effects and the first four specifications control for potential effects of macroeconomic uncertainty by including the three dummy variables $Covid1_i$, $Covid2_i$, and $Ukraine_i$. Specification (1) solely includes the independent variables $Tdummy_t$ and $Statescore_i$ and eliminates all other variables that are detailed in Equation (1), resulting in a standard ordinary least-square regression. Hypothesis 1 is tested by means of the following four specifications, which represent the generalized difference-in-difference method. Specification (2) includes the dependent variables $Tdummy_t$ and $Statescore_i$, and includes the interaction term $(Tdummy_t * Statescore_i)$. Specification (3) includes the variables detailed for Specification (2), and additionally incorporates deal-specific control variables, including the variable $Deal\ value_i$, the dummy variables $Friendly_i$ and $Strategic_i$, the variable $Sharesacquired_i$, and the dummy

variable $Intraindustry_i$. Specification (4) includes firm-specific control variables $TobinsQ_i$, $Leverageratio_i$, and NAV_i, in addition to the variables included in Specification (3). To control for potential time-invariant factors, Specification (5) incorporates year fixed effects, reflected by δ_t in Equation (1), in addition to all variables included under specification (4). Following the inclusion of year fixed effects, the three dummy variables reflecting the periods of macroeconomic uncertainty are excluded in Specification (5).

Hypothesis 2 indicates that the acquisition premia paid in domestic M&A transactions decrease following the U.S. re-joining the PA, with the reduction being more pronounced for transactions executed by acquirers that demonstrate higher environmental pillar scores, compared to transactions conducted by acquirers exhibiting lower environmental scores. This hypothesis mitigates the potential limitation that environmental state-scores fail to capture the level of firm greenness. The described generalized difference-in-difference method is employed to test Hypothesis 2, which is detailed in Equation (2). The sole discrepancy between Equation (1) and Equation (2) is the replacement of the $Statescore_i$ variable by the $Acquirerscore_i$ variable, with the latter variable reflecting the environmental pillar score of the acquirer. Equation (2) controls for equivalent specifications of control variables, as detailed for Equation (1). The employed variation of the standard difference-in-difference method allows to determine the differential impact of the treatment, reflecting the adoption of the PA, on acquisition premia paid for transactions executed by acquirers that have differing levels of environmental performance. However, the utilization of environmental pillar scores presents a limitation in the interpretation of the results, reflecting the limited availability of environmental pillar scores provided by Refinitiv Eikon. This results in a substantially reduced sample size, including 378 observations. In addition to the latter limitation, it is important to note that, as detailed in Section 2.2.4, in parallel to the environmental score of the acquirer, the environmental pillar score of the target has an additional potential effect on acquisition premia, according to Gomes and Marsat (2018). Following Krishnamurti et al. (2018), the level of target greenness is valued differently for acquirers exhibiting different levels of environmental performance. This thesis intended to control for the latter two effects by including the environmental pillar score of the acquirer and target separately, and to include an interaction term that combines the environmental pillar score of the acquirer and a dummy variable indicating whether the environmental pillar score of the target is above the median. The inclusion of the latter interaction term would allow to assess whether acquisition premia in an acquisition of a green target firm would be enhanced to a greater extent for acquirers that exhibit higher levels of environmental performance, compared to acquirers that demonstrate lower environmental pillar scores. However, due to the substantially reduced sample size resulting from the limited availability of acquirer environmental pillar scores, and the even further limited availability of environmental pillar scores of target firms, this approach is deemed unfeasible. Nonetheless, it is important to acknowledge both the

standalone effect of the environmental performance of the target company on acquisition premia, and the potential differential effect of the acquirer's environmental profile on the valuation of target greenness in terms of acquisition premia.

$$\begin{aligned} Acquisition\ premium_{it} &= \beta_0 + \beta_1 Tdummy_t + \beta_2 Acquirerscore_i + \beta_3 (Tdummy_t * Acquirerscore_i) \\ &+ \beta_4 Covid1_i + \beta_5 Covid2_i + \beta_6 Ukraine_i + \beta_7 Deal\ value_i + \beta_8 Friendly_i + \beta_9 Strategic_i \\ &+ \beta_{10} Sharesacquired_i + \beta_{11} Intraindustry_i + \beta_{12} TobinsQ_i + \beta_{13} Leverageratio_i + \beta_{14} NAV_i \\ &+ \alpha_i + \gamma_i + \delta_t + \varepsilon_{it} \end{aligned} \quad (2)$$

4.2 Acquisition Premia

The definition of the dependent variable $Acquisition\ premium_t$ is detailed in Equation (3) where t is time in days. Acquisition premium is defined as the price paid by the acquirer for each target share, reflected by $Offer\ price\ per\ share_t$, divided by the market share price of the target four weeks prior to the acquisition announcement, reflected by $Target\ share\ price_{t-28}$. This thesis utilizes the four-weeks acquisition premia, as the share price of the target four weeks prior to the announcement is least likely to be impacted by information leakage in the market which induces anticipation effects, as highlighted by Li and Ang (2000). In contrast, Cho and Arthurs (2018) argue that the four-weeks acquisition premium is more susceptible to the impact of distracting events, indicating that the one-day premium accurately isolates the premium paid by the acquirer. Accordingly, sensitivity scenarios are included that employ the one-day- and one-week acquisition premia, which is further detailed in Section 5.6.

$$Acquisition\ premium_t = \frac{Offer\ price\ per\ share_t}{Target\ share\ price_{t-28}} - 1 \quad (3)$$

4.3 Parallel Trends Assumption

The parallel trends assumption reflects a fundamental assumption of the difference-in-difference method, indicating that the differences in expected outcomes over time in the absence of treatment, after controlling for relevant covariates, are not related to being in the treated- or control group post-treatment (Angrist & Pischke, 2009). Essentially, if the treated group had not been subject to treatment, the trend in the outcome variable for both the treated- and control group would have been identical, conditional on the relevant vector of covariates. The parallel trends assumption, detailed in Equation (4), is proven to be fundamental in order to identify the causal effect of treatment by comparing the difference in outcomes prior to- and post-treatment between the treated- and control group (Lechner, 2011). Equation (4) indicates that the expected average difference in outcome between the post-treatment- and pre-treatment period are equal in case of the absence of treatment, with $Y_{i,2}(0)$ and $Y_{i,1}(0)$ reflecting the

average outcome post-treatment and pre-treatment, respectively. The treated group is identified by $D_i=1$ and the non-treated group is represented by $D_i=0$.

$$E[Y_{i,2}(0) - Y_{i,1}(0) | D_i=1] = E[Y_{i,2}(0) - Y_{i,1}(0) | D_i=0] \quad (4)$$

In context of this study, the assumption indicates that the expected average difference in acquisition premia post-event and pre-event is equal for acquisitions with targets located in all U.S. states, in case the U.S. would not re-join the PA. Within the literature, there is no consensus on the validation of the parallel trends assumption by means of a statistical test due to the inability to determine the time trend of the treatment group in case of absence of treatment, reflected by $(Y_{i,2}(0) | D_i=1)$ in Equation (4). Empirical validation of the assumption is therefore commonly performed through pre-trends falsification tests, which is an analysis of pre-treatment trends (Friedman, 2015). However, the interpretation of these results is generally limited following the low explanatory power and statistical implications of pre-trends tests (Rambachan & Roth, 2023). Despite literature inconsistency, this thesis employed a pre-trend falsification test to validate the parallel trends assumption, which is further detailed in Section 5.5.

Roth et al. (2022) highlight a second essential assumption that follows from the parallel trend assumption for the difference-in-difference estimation to hold, identified as the no-anticipation assumption, indicating that there is no causal effect of the treatment, prior-implementation, as detailed by Equation (5). In case of violation of this assumption, the estimated effect due to treatment implementation is biased following the anticipatory effect in the pre-treatment period. Equation (5) indicates the average outcome in the pre-treatment period for non-treated observations, reflected by $Y_{i,1}(0)$, to be equal to the average outcome in the pre-treatment period for treated observations, reflected by $Y_{i,1}(1)$, for all observations that belong to the treatment group, identified by $D_i=1$. This indicates that acquisition premia paid in acquisitions with targets located in lower-scoring U.S. states in terms of environmental pillar scores in the years prior to the U.S. re-joining the PA, were not affected by the potential re-joining of the country to the PA.

$$Y_{i,1}(0) = Y_{i,1}(1) \text{ for all } i \text{ with } D_i=1 \quad (5)$$

The no-anticipation assumption is validated through economic reasoning, as suggested by Rambachan and Roth (2023). The implementation of a certain type of environmental regulation might have been expected within market prior to the event date, reflecting the U.S. officially re-joining the PA on January 20, 2021, with the potential anticipatory period starting on November 7, 2020, which marks the date of President Biden winning the presidential election (Maizland et al., 2021). However, following Aktas et

al. (2016), indicating the typical duration of an M&A process from start to announcement to be seven months, the absence of anticipatory effects between November 2020 and the U.S. officially re-joining the PA in January 2021 can be assumed as the transactions announced within that time period were already initiated prior to President Biden winning the presidential election, limiting the potential for acquisition participants to anticipate on the probable implementation of environmental regulation. Accordingly, the latter reasoning indicates the no-anticipation assumption to hold.

4.4 Endogeneity

Potential endogeneity, reflecting correlation between the explanatory variables included and the error term of the model, induces biased and inconsistent estimates, limiting the interpretation. Endogeneity concerns stem from sample selection bias, omitted variables, simultaneity, and measurement error, and are addressed in this section.

The segmentation of the total sample of M&A transactions utilized in this thesis that is predicated on the U.S. state in which the target company is headquartered, results in certain subgroups having a relatively large number of transactions while other subgroups only have a few, attributable to the variation in the number of firms headquartered in different states. The differential number of transactions amongst the subgroups, i.e., U.S. states, can be attributed to the presence of location effects, reflecting the impact of geographical corporate location on various business aspects, including e.g., capital structure, investment decisions, and corporate strategies (John et al., 2011). The location effects are strengthened by the strong reliance of U.S. firms on corporate state law, representing the legal framework that primarily regulates U.S. firms, which is characterized by substantial non-uniformity, resulting in a strong concentration of corporate establishments in certain states, including e.g., Delaware, Florida, California, New York, and Texas (Morabito, 2023). Particularly, despite being the second-smallest U.S. state by land area, Delaware was home to 64% of Forbes 500 companies in 2021, further demonstrating the concentration of corporate location (Bullock, 2022). This might suggest the under-coverage bias to be present, which is a type of selection bias and implies certain segments of the population to be underrepresented in the selected sample, limiting the representativeness and potentially introducing endogeneity (Bethlehem, 2010). For the under-coverage bias to occur, specific segments of the population must not have been included in the selected sample, with the included segments differing from the excluded segments in terms of the variables of interest (Bethlehem, 2010). In essence, part of the research population would not be represented adequately. However, the unbalanced sample employed in this thesis, reflecting unbalanced number of transactions between different U.S. states, does not reflect the under-coverage bias as the population is accurately represented, and no segment of the population has been intentionally or unintentionally excluded.

A problem that does exists in case of varying cluster sizes is highlighted by Cameron and Miller (2015), indicating that the default cluster-robust standard errors, which are generally employed in a difference-in-difference estimation to account for intra-cluster correlation and heteroskedasticity across clusters of observations, are more likely to be downward biased. Consistently, Mackinnon and Webb (2016) indicate that the rejection frequencies for fifty clusters proportional to U.S. state populations, compared to fifty equal-sized clusters, are generally higher. Although the sample distribution in this thesis is based on company location instead of population distribution, the heterogeneous cluster sizes might result in downward-biased standard errors, potentially inducing increased rejecting frequencies. Mackinnon and Webb (2016) stress that the severe over-rejection in a fixed effects difference-in-difference estimation can be mitigated by the wild cluster bootstrapping procedure, which is a statistical resampling technique that allows for the creation of new samples from the original data. Accordingly, the standard errors of the regressions were bootstrapped 4000 times.

Winship et al. (1992) identify the presence of general selection bias as potential source of endogeneity, with the bias reflecting both the non-random selection process of the sample, as well as the non-random assignment of observations to the treatment- and control group. Non-random selection process of the sample potentially results in the sample being systematically different from the target population, limiting the ability to extrapolate results from the sample to the target population. However, the random selection of the sample utilized in this thesis, which is based on accurate and quantifiable inclusion criteria, as described in Section 3.1, indicates that there is no evidence of the presence of selection bias related to selection of the complete sample. Selection bias related to the selection of the treatment- and control group is relevant to consider in difference-in-difference estimations and reflects the non-random assignment of the observations to the treatment group, with the selection based on observable or unobservable systematic differences between the treatment- and control group (Roberts & Whited, 2013). The potential presence of unobservable differences between the treatment- and control group in this thesis is mitigated by including a number of deal-specific- and firm-specific control variables, and including industry- and state fixed effects, thereby reducing potential unobserved heterogeneity. Additionally, following the research design of a difference-in-difference estimation, the presence of the selection bias related to the assignment of observations to the treatment- and control group based on unobservable permanent differences between the two groups can be rejected as a result of the validity of the parallel trend assumption. Accordingly, the absence of the selection bias related to the selection of the control- and treatment group is reflected by Equation (4), detailed in Section 4.3, indicating that the difference in the trend in the outcome variable between the treated- and control group would have been identical if the treated group had not been subject to treatment. The results of testing the parallel trend assumption are presented in Section 5.5.

Omitted variable bias reflects an additional potential source of endogeneity and is introduced in case the model excludes one or more confounding variables, which causes the effect of the excluded variables to appear in the error term of the model (Roberts & Whited, 2013). The Ramsey RESET test is performed to assess the presence of omitted variables, with the results indicating that the employed model in this thesis has no omitted variables. Nevertheless, the exclusion of the environmental pillar score of target companies in Equation (2), detailed in Section 4.1, potentially indicates the omitted variable bias to be present. As detailed in Section 2.2.4, green targets are more likely to be acquired by environmental-oriented acquirers, with the environmental performance of targets valued differently by acquirers exhibiting different levels of environmental performance (Krishnamurti et al., 2018). Accordingly, this thesis intended to control for the latter effect by including an interaction variable that combines the environmental pillar score of both the acquirer and target firm. However, due to limited availability of environmental pillar scores, particularly at target-level, this approach is deemed unfeasible. It is important to acknowledge that, despite the results of the Ramsey RESET test indicating no presence of omitted variable bias, the exclusion of the environmental pillar score potentially induces biased estimates of the environmental pillar score of the acquirer and might reduce significance. Moreover, three potential determinants of acquisition premia that are detailed in Section 2.2.3, i.e., the method of payment, the level of R&D output of the target firm, and the organic growth rates of the acquirer, are excluded from the analysis due to data availability constraints. Similarly, exclusion of the latter two variables introduces endogeneity concerns, which is mitigated by the results of the Ramsey RESET test indicating no presence of omitted variables. Furthermore, the omitted variable bias is potentially introduced through unobserved differences between U.S. states or unobserved differences between industries that induce variation in acquisition premia paid. This is accounted for by including industry fixed effects and state fixed effects in the difference-in-difference estimation.

Simultaneity bias is a type of endogeneity that occurs in case of a two-way causal relationship between the dependent variable and the independent variable in the model, resulting in the explanatory variable to be correlated with the error term (Chenhall & Moers, 2007). Presence of the simultaneity bias is potentially introduced following the relationship between acquisition premia and the level of growth opportunities of the acquiring firm, with the latter factor debatably affecting independent variables included in Equation (1) and Equation (2). As detailed in Section 2.2.3, Kim et al. (2011) indicate acquirers with persistently low levels of organic growth opportunities to be increasingly likely to overpay in M&A transactions. Additionally, the level of acquirers' growth opportunities potentially simultaneously affects independent variables in the employed difference-in-difference estimation, with the environmental pillar score of the acquirer included in Equation (2) reflecting the variable that is most likely to be affected. It might be expected that acquirers demonstrating persistently low levels of organic growth will be subject to additional challenge to achieve strong environmental performance, thereby leading to lower environmental pillar scores. In case the latter notion holds, the results of the estimations

of Equation (2) are potentially subject to the simultaneity bias following the potential simultaneous effect of the level of organic growth of the acquirer on both acquisition premia and the environmental pillar score of the acquirer. However, despite existing correlation between acquisition premia and the environmental pillar score of the acquirer, as detailed in the correlation matrix presented in Appendix D, there is no indication to expect acquisition premia to directly affect the environmental pillar score of the acquirer. Nonetheless, it is important to acknowledge that the exclusion of the organic growth of the acquirer in the difference-in-difference estimation might introduce the simultaneity bias, which potentially induces biased estimates of the results of Equation (2) and might reduce significance.

Lastly, measurement error potentially introduces endogeneity, reflecting imperfect measurement of the variables utilized in the model. Measurement error is potentially present since this thesis employs two proxy variables, i.e., Tobin's Q ratio and the net asset value ratio, to measure unobserved variables of interest. As detailed in Section 2.2.3, literature generally includes Tobin's Q ratio, defined as the company's market value to the replacement value of the assets, to proxy the level of a company's intangible assets and investment opportunities, reflecting growth potential (Lang et al., 1989). Additionally, due to the complexity in the quantification of the replacement value of a company's assets, the value of total assets is utilized as a proxy of the asset replacement value, resulting in a second modification to the true unobserved variable of interest. Consequently, the discrepancy between the true variable of interest, which is the unobserved growth potential of a company, and the proxy of the unobserved variable, which is the modified Tobin's Q ratio including the proxy of the asset replacement value, leads to measurement error. Similarly, presence of a measurement error in the net asset value ratio is reflected by the discrepancy between the true variable of interest, which is goodwill, and the proxy of this unobserved variable, which is the net asset value ratio. The presence of measurement errors in Tobin's Q ratio and the net asset value ratio potentially results in an attenuation bias, reflecting downward biased estimates towards zero. However, following the measurement error of Tobin's Q and the net asset value ratio to be random and uncorrelated to the error term, it is expected that the attenuation bias is not present. Aside from the described two variables, no further proxies are utilized in this thesis for unobserved variables of interest, indicating no evidence of measurement errors to be present in the other variables included.

CHAPTER 5 Results

5.1 Neoclassical Theory

Table 2 presents the results of the difference-in-difference estimation detailed in Equation (1) in Section 4.1, to test Hypothesis 1, which indicates that the acquisition premia paid in domestic M&A transactions increased following the re-joining of the U.S. to the PA, with the increase being more pronounced for acquisitions of targets located in states that demonstrated lower environmental scores pre-re-joining, compared to acquisitions of target companies located in states exhibiting higher environmental scores pre-re-joining.

Assessing whether the U.S. re-joining the PA has a positive or negative net effect on acquisition premia is complex in a difference-in-difference estimation, as both effects of the time dummy and the effect of the interaction variable are considered, with the latter effect being unfeasible to quantify considering the continuous nature of the state score variable. Nevertheless, assessing the net effect of the U.S. re-joining the PA is feasible through the examination of Specification (1) of Table 2, which reflects the standard ordinary least-square regression, as described in Section 4.1. The negative estimation of the time dummy coefficient in Specification (1) of Table 2 indicates the acquisition premia on average to decrease following the U.S. re-joining the PA. However, statistical insignificance of the latter result limits interpretation and does not allow conclusions to be drawn on the sign of the net effect of PA re-implementation on acquisition premia. Despite increased significance of the time dummy in the difference-in-difference estimation, presented in Specification (2) until Specification (5), indicating acquisition premia to be statistically different following the re-joining of the U.S. to the PA, no conclusion can be drawn on the sign of the net effect of the re-implementation of the PA on acquisition premia following the described continuous nature of the state score variable.

The estimated coefficient of the interaction variable, time dummy*state score is positive and significant at the 5% level in Specification (2) until Specification (5) of Table 2. The estimation of the interaction variable in Specification (5) is deemed most relevant as this specification controls for time-invariant factors by incorporating year fixed effects and yields the highest level of significance for both the interaction variable and the time dummy, i.e., significance at the 5% level. The result on the interaction variable indicates that the effect of the U.S. re-joining the PA on acquisition premia paid varies for different levels of the state score variable. If assumed that the stand-alone, net effect, of the re-implementation of the PA on acquisition premia is positive, the results demonstrate that acquisitions of targets located in U.S. states that exhibit higher environmental scores, increase to a greater extent as a result of the U.S. re-joining the PA, compared to acquisitions of targets located in lower-ranked states. The opposite reasoning is applied for the assumption of a negative stand-alone, net effect, of the re-implementation of the PA on acquisition premia, with the latter assumption potentially deemed more

likely following the negative, although insignificant, estimation of the time dummy coefficient in Specification (1). In case the latter assumption holds, acquisition premia decrease to a lesser extend following the re-implementation of the PA for acquisitions of targets located in U.S. states demonstrating higher environmental scores, relative to the decrease in acquisition premia for acquisitions of targets located in lower-ranked states. This contradicts the Porter hypothesis. Considering the effect of the implementation of the PA to be more pronounced for firms located in states exhibiting lower environmental scores, the Porter hypothesis suggests that acquisition premia paid for targets located in lower-ranked states would increase to a greater extent, due to the implementation of sustainable policy, positively affecting firm productivity to a higher degree in these states. The effect of the re-implementation of the PA on firm productivity is assumed to affect firms in higher-scoring states to a lesser extent as this group of states remained prioritizing environmental policy. Hence, the described results on the interaction variable contradict the Porter hypothesis, thereby rejecting Hypothesis 1.

The results indicate to be in line with the neoclassical theory, presented by Palmer et al. (1995), arguing that the implementation of stringent environmental regulation is detrimental to productivity growth and firm performance. The neoclassical viewpoint indicates that policy implementation solely functions as constraint on companies by imposing substantial regulatory compliance costs (Albrizio et al. 2017). The positive coefficient of the interaction variable, significant at the 5% level in Specification (2) until Specification (5) of Table 2, contributes to the latter viewpoint. Depending on the sign of the net effect, the positive coefficient of the interaction variable indicates that the acquisition premia of acquisitions of target firms located in lower-ranked states decreased to a greater extent in case of a net negative effect, or increased to a lesser extent in case of a net positive effect, compared to targets located in higher-ranked states, following the implementation of the PA. Hence, the environmental state score of the target positively contributes to the net effect of the re-implementation of the PA on acquisition premia.

The described results of the positive coefficient of the interaction variable are potentially attributed to the relationship between innovative output of the target firm and acquisition premia, as detailed in Section 2.2.2. If assumed that the net effect of the re-implementation of the PA on acquisition premia is negative, the latter results, in conjunction with the neoclassical theory, potentially indicate that target companies located in higher-ranked U.S. states that remained ambitious in the environmental policy stance post-withdrawal of the PA, maintained stronger levels of innovative output in terms of e.g., R&D investments and total factor productivity, in spite of the contrasting federal stance in terms of deprioritizing environmental regulation. Consistently, the U.S. re-joining the PA, reflecting the exogenous shock of a pivotal federal stance in environmental policy, potentially impacted the latter group of target companies, located in higher-ranked states, to a lesser extent in terms of pressure to innovate, considering the companies maintained strong innovative effort post-PA-withdrawal. This, in turn, is expected to substantially limit the increase in policy compliance costs for the described group of

target companies following the re-joining to the PA, thereby limiting the potential negative effect of increased policy compliance costs on firm productivity, which ultimately limits the negative effect on acquisition premia. Hence, following the neoclassical theory, it is reasonable to expect that policy implementation constraints firms, as policy compliance costs increase, which negatively affects acquisition premia.

Accordingly, the described findings contradict the Porter hypothesis and reject Hypothesis 1. The results indicate to be in line with the neoclassical theory.

Table 2. Results difference-in-difference estimation, environmental state score target.

This table provides the results of the difference-in-difference estimation, detailed in Equation (1). The dependent variable is the four-weeks acquisition premia. The sample consists of transactions +26 months post-event, and -42 months prior-event, with the event date identified as January 20, 2021, reflecting the re-joining of the U.S. to the PA. Five specifications of control variables are considered, with all specifications including industry- and state fixed effects. Specification (1) presents the results of a multivariate regression, including the time dummy, state score, Covid-19 dummy variables reflecting the collapse phase and the recovery phase, and the Russia-Ukraine war dummy variable. Time dummy indicates whether the acquisition was announced post-event and state score reflects the environmental score of the U.S. state where the target is located. Environmental scores per state are detailed in Appendix B. Specification (2) until Specification (5) present the results of the difference-in-difference estimation. Specification (2) additionally includes the interaction variable time dummy*state score; (3) additionally includes firm-specific control variables; (4) additionally includes deal-specific control variables; and (5) includes year fixed effects, thereby excluding the dummy variables for Covid-19 and the Russia-Ukraine war. The definitions of the variables are presented in Appendix A. The interaction variable in Specification (5) is positive and significant at the 5% level, indicating that acquisitions with targets in higher-scoring states are accompanied with a lower decrease in the acquisition premia after the U.S. re-joined the PA, if assumed that the net effect of the U.S. re-joining the PA on acquisition premia is negative, as indicated, although insignificant, by the negative coefficient on the time dummy in Specification (1). This contradicts the Porter Hypothesis and is in line with the neoclassical theory. Log-transformation is applied to the four-weeks acquisition premia, deal size, Tobin's Q ratio, and leverage ratio to conform to normality. Time dummy and state score are standardized to mitigate multicollinearity. Winsorizing at 1% is applied to the four-weeks acquisition premia, Tobin's Q ratio, leverage ratio, and net asset value ratio to eliminate the effect of potential outliers. Heteroskedasticity-robust standard errors are clustered at target firm-level to account for serial correlation and presented in parentheses. Employing robust standard errors restrict utilization of the adjusted R-squared, accordingly, non-adjusted R-squared is presented. Significance of 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Variables	(1)	(2)	(3)	(4)	(5)
Time dummy	-0.032	-0.384*	-0.385*	-0.399*	-0.523**
	(0.056)	(0.202)	(0.205)	(0.224)	(0.257)
State score	0.092	0.006	0.005	0.002	0.031
	(0.065)	(0.004)	(0.004)	(0.004)	(0.074)
Dummy Covid-19 collapse phase	0.248	0.257	0.246	0.215	
	(0.176)	(0.178)	(0.175)	(0.199)	
Dummy Covid-19 recovery phase	0.050	0.072	0.093	0.097	
	(0.197)	(0.197)	(0.202)	(0.205)	
Dummy Russia-Ukraine war	0.210	0.209	0.172	0.165	
	(0.288)	(0.294)	(0.297)	(0.324)	
Time dummy*state score		0.006**	0.006**	0.007**	0.007**
		(0.003)	(0.003)	(0.003)	(0.003)
Ln(deal value)			-0.106***	-0.149***	-0.149***
			(0.037)	(0.045)	(0.043)
Dummy friendly			-0.557	-0.548	-0.547
			(0.931)	(1.182)	(1.153)

Table 2 (continued)

Dummy strategic acquirer			0.152	0.198	0.194
			(0.176)	(0.205)	(0.203)
Percentage of shares acquired			0.004	0.006	0.005
			(0.006)	(0.006)	(0.007)
Dummy intra-industry			-0.046	-0.063	-0.064
			(0.130)	(0.150)	(0.150)
Ln(Tobin's Q ratio)				0.117	0.130
				(0.092)	(0.094)
Ln(leverage ratio)				0.069	0.060
				(0.130)	(0.137)
Net asset value ratio				0.007	0.007
				(0.006)	(0.006)
2018					-0.153
					(0.250)
2019					-0.009
					(0.257)
2020					0.146
					(0.300)
2021					0.295
					(0.358)
2022					0.301
					(0.410)
2023					1.622*
					(0.849)
Observations	604	604	604	512	512
R-squared	0.355	0.363	0.385	0.451	0.453
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	Yes

5.2 Shareholder Expense Theory

Table 3 presents the results of the difference-in-difference estimation detailed in Equation (2) in Section 4.1, to test Hypothesis 2, which indicates that the acquisition premia paid in domestic M&A transactions decrease after the U.S. re-joined the PA, with the reduction being more pronounced for transactions executed by acquirers that demonstrate higher environmental pillar scores, compared to transactions conducted by acquirers exhibiting lower environmental scores. The sole discrepancy between Table 2 and Table 3 is the replacement of the environmental state score of the target company, which is included in Table 2, by the environmental pillar score of the acquirer, which is included in Table 3. Hypothesis 2 is in line with the stakeholder value maximization view, which argues that companies' environmental performance enhances firms' financial performance (Freeman, 1984). Krishnamurti et al (2018) validate the stakeholder value maximization view in context of acquisition premia, indicating that acquirers that demonstrate strong CSR performance are less likely to overpay in M&A transactions, arguing that acquirer CSR is negatively related to acquisition premia. Following coercive pressure to significantly incentivize companies to engage in environmental innovation, which strengthens environmental performance, the stakeholder value maximization view indicates that the implementation of

environmental regulation would negatively affect acquisition premia, with that effect being more pronounced for acquirers demonstrating higher environmental pillar scores.

Similar to the interpretation of the results of Table 2, detailed in Section 5.1, the assessment of the sign of the net effect of the re-implementation of the PA in Table 3 is unfeasible following the continuous nature of the variable reflecting the environmental pillar score of the acquirer. In line with the results on the time dummy variable in Table 2, the estimation of the time dummy coefficient in Specification (1) of Table 3 is negative, indicating acquisition premia to decrease following the U.S. re-joining the PA. However, statistical insignificance of the estimation limits interpretation, and does not allow conclusions to be drawn on the magnitude and sign of the net effect of the re-implementation of the PA on acquisition premia.

The results of the interaction variable time dummy*acquirer score in Specification (2) until Specification (5) of Table 3 are positive, however, statistically insignificant. This indicates that the magnitude of the effect of the re-implementation of the PA on acquisition premia paid is not statistically different for varying levels of environmental performance of the acquirer. Accordingly, Hypothesis 2 cannot be rejected, nor accepted. Insignificance of the results on the interaction variable time dummy*acquirer score, and additional insignificance of the acquirer score variable in Table 3, are in line with the results of Jost et al. (2022), demonstrating CSR performance of neither the acquirer, nor the target, to significantly affect acquisition premia. The authors highlight the presence of substantial complexity in assessing the potential relationship between CSR performance and acquisition premia. Insignificance of the findings presented in Table 3 are potentially attributed to four factors.

Insignificance of the described two variables of interest is potentially attributed to the reliability of this thesis on the environmental pillar scores provided by Refinitiv Eikon. Christensen et al. (2022) indicate that increasing company CSR disclosure induces greater disagreement between different rating agencies in assigning ratings to individual firms, weakening the reliability of the scores provided and limiting interpretation. Although this thesis employs environmental ratings provided by a single rating agency, i.e., Refinitiv Eikon, the presence of rating disagreement across different rating agencies that is exacerbated by CSR disclosure potentially indicates that rating disagreement across rating analysts within a single rating agency might be present. Rating disagreement within a rating agency, potentially exacerbated by CSR disclosure, would weaken reliability of the environmental ratings provided, restricting comparability, and substantially limiting conclusions to be drawn based upon the ratings provided.

Second, insignificance of the results on the described variables can alternatively be attributed to the potential presence of the omitted variable bias. As detailed in Section 4.4, exclusion of the environmental

pillar score of the target company might result in the omitted variable bias following the potential relationship between environmental performance of the target and acquisition premia, which, in turn, introduces endogeneity. However, inclusion of the environmental pillar scores of the target in the analysis would severely reduce the sample size employed. Hence, inclusion was deemed unfeasible.

Third, insignificance of the results on the interaction variable can potentially be attributed to the lagged effect of the U.S. re-joining the PA on environmental pillar scores. Companies are likely to respond to the federal coercive pressure that is imposed by the re-implementation of the PA by strengthening environmental performance, however, anticipation to the changed regulatory environment is expected to require a transitional time period. Accordingly, it is not expected that the enhancing environmental firm performance in response to the U.S. re-joining the PA is directly reflected by an immediate improvement of environmental pillar scores. Hence, insignificance is potentially attributed to the lagged adjustment of environmental pillar scores in response to the U.S. re-joining the PA.

Lastly, insignificance can potentially be attributed to the substantially reduced sample size following the limited availability of environmental pillar scores of the acquirer within Refinitiv Eikon, weakening the feasibility of the model.

Table 3. Results difference-in-difference estimation, environmental pillar score acquirer.

This table provides the results of the difference-in-difference estimation, detailed in Equation (2). The dependent variable is the four-weeks acquisition premia. The sample consists of transactions +26 months post-event, and -42 months prior-event, with the event date identified as January 20, 2021, reflecting the re-joining of the U.S. to the PA. Five specifications of control variables are considered, with all specifications including industry- and state fixed effects. Specification (1) presents the results of a multivariate regression, including the time dummy, acquirer score, Covid-19 dummy variables reflecting the collapse phase and the recovery phase, and the Russia-Ukraine war dummy variable. Time dummy indicates whether the acquisition was announced post-event and acquirer score reflects the environmental pillar score of the acquirer, provided by Refinitiv Eikon. Specification (2) until Specification (5) present the results of the difference-in-difference estimation. Specification (2) additionally includes the interaction variable time dummy*acquirer score; (3) additionally includes firm-specific control variables; (4) additionally includes deal-specific control variables; and (5) includes year fixed effects, thereby excluding the dummy variables for Covid-19 and the Russia-Ukraine war. The definitions of the variables are presented in Appendix A. The results of the variable of interest, time dummy*acquirer score, are not significant, potentially attributable to omitted variable bias following the exclusion of the environmental pillar score of the target company. Accordingly, no conclusions can be drawn from the results presented. Log-transformation is applied to the four-weeks acquisition premia, deal size, Tobin's Q ratio, and leverage ratio to conform to normality. Time dummy and acquirer score are standardized to mitigate multicollinearity. Winsorizing at 1% is applied to the four-weeks acquisition premia, Tobin's Q ratio, leverage ratio, and net asset value ratio to eliminate the effect of potential outliers. Heteroskedasticity-robust standard errors are clustered at target firm-level to account for serial correlation and presented in parentheses. Employing robust standard errors restrict utilization of the adjusted R-squared, accordingly, non-adjusted R-squared is presented. Significance of 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Variables	(1)	(2)	(3)	(4)	(5)
Time dummy	-0.024	-0.023	-0.049	0.073	-0.200
	(0.152)	(0.151)	(0.159)	(0.161)	(0.263)
Acquirer score	0.061	0.053	0.137	0.086	0.089
	(0.088)	(0.089)	(0.091)	(0.111)	(0.114)

Table 3 (continued)

Dummy Covid-19 collapse phase	-0.009 (0.211)	0.010 (0.212)	0.031 (0.205)	-0.204 (0.236)	
Dummy Covid-19 recovery phase	0.093 (0.320)	0.094 (0.318)	0.168 (0.338)	-0.020 (0.345)	
Dummy Russia-Ukraine war	-0.024 (0.438)	-0.026 (0.437)	0.024 (0.446)	-0.373 (0.498)	
Time dummy*acquirer score		0.062 (0.059)	0.054 (0.060)	0.023 (0.073)	0.024 (0.075)
Ln(deal value)			-0.106** (0.045)	-0.105** (0.050)	-0.104** (0.050)
Dummy friendly			-0.459 (0.898)	-0.48 (1.111)	-0.44 (1.096)
Dummy strategic acquirer			-0.037 (0.343)	0.096 (0.396)	0.094 (0.393)
Percentage of shares acquired			0.007 (0.006)	0.004 (0.007)	0.004 (0.007)
Dummy intra-industry			0.027 (0.169)	0.052 (0.191)	0.056 (0.189)
Ln(Tobin's Q ratio)				-0.025 (0.148)	-0.030 (0.151)
Ln(leverage ratio)				0.034 (0.167)	0.022 (0.173)
Net asset value ratio				0.013 (0.008)	0.012 (0.008)
2018					-0.084 (0.319)
2019					-0.074 (0.345)
2020					-0.263 (0.348)
2021					0.479 (0.605)
2022					0.403 (0.688)
Observations	378	378	378	334	334
R-squared	0.481	0.484	0.502	0.552	0.551
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	Yes

5.3 Macroeconomic Uncertainty

Hypothesis 3, indicating that the acquisition premia paid in domestic M&A transactions increased following the exogenous shock of the Covid-19 pandemic in 2020, decreased following the recovery phase of the global pandemic in 2021, and increased following the Russian invasion of Ukraine, is tested according to the results on the estimations of the two Covid-19 dummy variables, reflecting the collapse phase and the recovery phase of the global pandemic, and the dummy variable reflecting the Russia-Ukraine war. Considering increased significance and -sample size, the examination of the effect of the periods of macroeconomic uncertainty on acquisition premia will focus on the results presented in Table 2, reflecting the difference-in-difference estimation detailed in Equation (1) in Section 4.1.

The results on the estimated coefficients of the three dummy variables reflecting distinguishable periods of macroeconomic uncertainty in Specification (1) until Specification (4) of Table 2 are positive, however, statistically insignificant. This indicates that acquisition premia are not significantly affected by the collapse phase of Covid-19, the recovery phase of Covid-19, and the Russia-Ukraine war. Consistently, the results on the estimated coefficients of the year 2020 and 2021 in Specification (5) of Table 2, are insignificant. Accordingly, Hypothesis 3 cannot be rejected, nor accepted. The insignificant result on the dummy variable reflecting the Covid-19 collapse phase contradicts the result of Kengelbach et al. (2020), indicating that the exogenous shock of Covid-19 induced acquisition premia to be significantly higher. Additionally, the insignificant results on the three dummy variables reflecting periods of macroeconomic uncertainty contradict the findings of Ang and Mauck (2011) and Simonyan (2014), demonstrating that acquisition premia tend to increase during periods of crisis, and that periods of investor pessimism and stock market volatility are accompanied with higher acquisition premia, respectively.

Insignificance of the results can be potentially attributed to the relatively small size of the sub-samples, reflecting the substantially limited number of transactions conducted in 2020, 2021, and during the Russia-Ukraine war. This observation is in line with the findings of Bauer et al. (2022), indicating that a socioeconomic crisis significantly slows down transaction volume, attributable to firms prioritizing the concern of liquidity shortages, instead of focusing on long-term growth strategies. Accordingly, following the limited number of transactions in the sample that are conducted in the periods of macroeconomic uncertainty, interpretation is limited.

5.4 Control Variables

This section examines the results of the estimated coefficients of the control variables in comparison to the empirical evidence on the effect of the employed variables on acquisition premia, which is detailed in Section 2.2.3 and Section 3.3. Considering increased significance and -sample size, the examination of the results of the control variables will focus on the results presented in Table 2, reflecting the difference-in-difference estimation detailed in Equation (1) in Section 4.1.

Literature on the effect of deal size on acquisition premia paid presents mixed empirical evidence. Behavioural economists suggest that overconfident managers tend to bid for larger sized deals, with managers having the general tendency to overestimate acquisition gains, which, in turn, induces overpayment (Hayward & Hambrick, 1997). Consistently, biased managers tend to acquire companies for personal incentives, which are maximized for larger deal sizes, stimulating managers to increase acquisition premia to ensure successful deal completion (Harford & Li, 2007). Contrarily, Alexandridis et al. (2013) argue that the integration of larger sized target firms is accompanied with additional

complexity, limiting expected synergies, which, in turn, induces reduced competition in terms of lower number of bidders which negatively affects acquisition premia. The negative coefficients on the deal value variable in Specification (3) until Specification (5) in Table 2 are significant at the 1% level, indicating the deal value to inversely affect acquisition premia. This is in line with the findings of Alexandridis et al. (2013).

Healy et al. (1997) indicate deal attitude to significantly affect acquisition premia, with friendly acquisitions being accompanied with lower premia compared to hostile takeovers. The results on the friendly dummy in Table 2 in all specifications are negative and statistically insignificant. Insignificance can be potentially attributed to the questionable accuracy of the variable included. As detailed in Section 3.2, the friendly dummy is skewed and subject to substantial kurtosis, as 99.3% of the acquisitions included in the sample report to be of friendly nature. It is expected that this is not an accurate representation of the actual number of friendly acquisitions in the population, limiting interpretation of the results on the friendly dummy in Table 2.

Gorbenko and Malenko (2014) indicate acquisitions conducted by strategic acquiring companies to be associated with higher acquisition premia following elevated expected synergetic gains, compared to acquisitions conducted by financial acquirers. According to the results on the strategic acquirer dummy in Specification (3) until Specification (5) in Table 2, acquisition premia are not statistically different for strategic acquirers, in comparison to financial acquirers, contradicting the results of Gorbenko and Malenko (2014).

The results on the variable reflecting the percentage of shares acquired in the transaction are insignificant in all specifications, indicating that acquisition premia are not statistically different for varying levels of target shares acquired. This contradicts the findings of Jarrel et al. (1988), indicating that target shareholders require additional compensation following their loss of control. Insignificance is potentially attributed to the relatively high proportion of deals involving 100% target shares acquired, inducing the data to be skewed and subject to kurtosis, which, in turn, limits interpretation.

The results on the intra-industry dummy in Specification (3) until Specification (5) indicate that acquisition premia paid in acquisitions with acquirers and targets operating in the same primary SIC industry are not statistically different from acquisition premia paid in inter-industry acquisitions. This contradicts the findings of Haunschild (1994), indicating that diversifying mergers with acquirers and targets operating in different industries tend to be accompanied with elevated complexity of post-merger integration, classifying inter-industry acquisitions as value destructive and consequently accompanied with lower acquisition premia. Insignificance can potentially be attributed to the dependency of the intra-

industry dummy variable that is utilized on the primary SIC industry groups, which define industry groups overly narrow.

The results on the estimate of the coefficient of Tobin's Q ratio Specification (4) and (5) in Table 2 indicate an insignificant positive relationship between Tobin's Q and acquisition premia paid. The finding is inconsistent with the results of Lang et al. (1989), indicating that higher levels of Tobin's Q ratio reflect the target company to have valuable intangible assets and investment opportunities, accompanied with strong growth potential. Insignificance of the coefficient potentially stems from measurement error, reflecting the discrepancy between the true variable of interest, which is the unobserved growth potential of a company, and the proxy of the unobserved variable, which is the modified Tobin's Q ratio including the proxy of the asset replacement value. This potentially introduces endogeneity.

Baldi and Salvi (2022) indicate that the leverage ratio of the target company reflects the magnitude of financial synergetic gains in M&A transactions, arguing the level of the debt-to-equity ratio to be inversely related to acquisition premia. The authors attribute the negative relationship to higher leveraged target companies having elevated default probabilities, with higher leverage ratios limiting future debt capacity of the merged firm. The estimates of the leverage ratio coefficient in Specification (4) and Specification (5) in Table 2 are positive and insignificant, contradicting the described findings.

Lastly, the results on the coefficient of the net asset value ratio in Specification (4) and Specification (5) are statistically insignificant. Insignificance potentially stems from measurement error, resulting from the discrepancy between the true variable of interest, which is target company goodwill, and the employed proxy, which is the net asset value ratio. Additionally, insignificance potentially results from multicollinearity following the net asset value ratio to be correlated to a number of other control variables, including deal value, Tobin's Q ratio, and leverage ratio, as detailed in the correlation matrix that is presented in Appendix D. However, correlation is reasonable following the level of codependency of the variables, and additionally mitigated by the variables proxying distinguishable metrics. Additionally, multicollinearity is mitigated by the results of the VIF scores that provided no incentive to additionally standardize variables. Accordingly, potential presence of multicollinearity is mitigated.

5.5 Parallel Trend Assumption

The parallel trend assumption, detailed in Section 4.3, is tested by means of a falsification test, as suggested by Friedman (2015). The falsification test employs the same difference-in-difference estimation that is presented in Section 4.1, detailed by Equation (1), and utilized to test Hypothesis 1, with the sole discrepancy being the replacement of the time dummy, by a placebo time dummy. The

utilized sample in the falsification test includes all transactions announced between June 2017 until January 2021, reflecting the original pre-event sample, with the placebo time dummy identified as April 1, 2019. This allows to divide the falsification sample in -22 months of transactions prior to the placebo event date, and +22 months of transaction post-placebo event date. The results of the falsification test are presented in Appendix E. The statistically insignificant results on the estimations of the coefficient of the interaction variables under all specifications demonstrate no significant effect of the placebo event on acquisition premia, indicating the absence of a pre-trend. Accordingly, it can be assumed that the expected average difference in outcome between the post-treatment- and pre-treatment period are equal in case of the absence of treatment. The results validate the parallel trend assumption, strengthening the robustness of the initial results, presented in Table 2.

Additionally, the validity of the parallel trend assumption confirms the absence of selection bias related to the assignment of observations to the treatment- and control group, as detailed in Section 4.3. Absence of the selection bias is reflected by the difference between treated- and non-treated observations being independent of receiving treatment. Accordingly, validity of the parallel trend assumption additionally validates the absence of the selection bias.

5.6 Robustness

Robustness tests are performed to verify the reliability of the results. This thesis utilizes the four-weeks acquisition premia, as the share price of the target four weeks prior to the announcement is least likely to be impacted by information leakage in the market, which induces anticipation effects, as highlighted by Li and Ang (2000). In contrast, Cho and Arthurs (2018) argue that the four-weeks acquisition premium is more susceptible to the impact of distracting events, indicating that the one-day premium accurately isolates the premium paid by the acquirer. Accordingly, sensitivity scenarios are performed that employ the one-day- and one-week acquisition premia. Definitions of the alternative acquisition premia are presented in Appendix A. The results of the robustness check are detailed in Appendix F. Significance of the interaction variable in Specification (1) and Specification (2) at the 5% and 10% level, respectively, indicate the that the estimations on the effect of the interaction variable are robust for utilizing the one-day acquisition premia as dependent variable. Insignificance of the interaction variable in Specification (3) and Specification (4) indicate that the results are not robust for utilizing the one-week acquisition premia. Accordingly, the described results demonstrate that the employed analysis is sensitive to the definition of acquisition premia that is utilized.

CHAPTER 6 Conclusion

This thesis studied the potential effect of the U.S. re-joining the PA on January 20, 2021, on acquisition premia paid in domestic M&A transactions. The latter research question is answered predicated on three hypotheses, with Hypothesis 1 indicating that the acquisition premia paid in domestic M&A transactions increased following the U.S. re-joining the PA, with the increase being more pronounced for acquisitions of targets located in U.S. states that demonstrated lower environmental scores pre-re-joining, compared to acquisitions of targets located in U.S. states exhibiting higher environmental scores pre-re-joining. The latter hypothesis reflects the Porter hypothesis, indicating that the implementation of environmental regulation stimulates company performance by inducing firm innovation and enhancing company efficiency (Porter, 1991). Following the strong disparity in environmental policy courses between different states post-withdrawal of the PA, it is assumed that the re-implementation of the PA impacted lower-scoring states to a greater extent, as higher-scoring states remained prioritizing environmental policy at state level. Accordingly, the Porter hypothesis suggests policy-induced productivity growth to be more pronounced for firms in lower-scoring states following the exogenous shock of President Biden announcing to re-join the PA.

The ordinary least squares regression, assessing the stand-alone effect of the U.S. re-joining the PA on acquisition premia, yielded insignificant results, precluding any conclusions to be drawn on the sign of the stand-alone effect of the re-implementation of the environmental agreement on acquisition premia. In contrast, the difference-in-difference estimation employed to test Hypothesis 1 yielded significant results of the variables of interest at the 5% level. Although still no inferences can be derived regarding the sign of the net effect of the re-joining the PA on acquisition premia, the results demonstrate that the environmental state-score of the target positively contributes to the net effect of the U.S. re-joining the PA. This indicates that the acquisition premia paid in acquisitions of targets located in higher-ranked states increased to a greater extent following the re-joining of the U.S. the PA, if assumed that the stand-alone, net effect, of the re-implementation of the PA on acquisition premia is positive. The opposite reasoning is applied for the assumption of a negative stand-alone, net effect, implying that acquisition premia paid in acquisitions of targets located in higher-ranked states decreased to a lesser extent following the re-joining of the U.S. to the PA. This contradicts the Porter hypothesis and thereby rejects Hypothesis 1. The latter results indicate to be in line with the neoclassical theory, arguing that environmental regulation is detrimental to firm productivity following increased policy-compliance costs. In case a negative net effect of the re-implementation of the PA on acquisition premia is assumed, the neoclassical theory implies that the exogenous shock of the U.S. re-joining the PA negatively affects acquisition premia, with the magnitude of the described shock to be more pronounced in lower-scoring states following the greater pivotal stance of environmental policy. The results indicate to be in line with the latter notion.

The second hypothesis tests the validity of the shareholder expense theory and the stakeholder value maximization view. The shareholder expense theory argues that acquirer CSR practice is detrimental to shareholder wealth which induces higher levels of acquisition premia paid. In contrast, the stakeholder value maximization view implies acquirer CSR practice to be associated with the payment of lower acquisition premia. Hypothesis 2 reflects the latter viewpoint and indicates that acquisition premia paid in domestic M&A transactions decreased following the U.S. re-joining the PA, with the reduction being more pronounced for transactions executed by acquirers that demonstrate higher environmental pillar scores, compared to transactions conducted by acquirers exhibiting lower environmental pillar scores. The difference-in-difference estimation employed to test the second hypothesis yielded insignificant results, indicating that the effect of the U.S. re-joining the PA on acquisition premia did not significantly differ for acquirers that exhibited different levels of environmental pillar scores. Accordingly, Hypothesis 2 cannot be rejected, nor accepted. Insignificance is potentially attributed to the exclusion of the environmental pillar score of the target following the potential relationship between environmental performance of the target company and acquisition premia, with the exclusion of the variable potentially introducing omitted variable bias. Inclusion of the environmental pillar score was deemed unfeasible following substantially limited availability of environmental pillar scores provided by Refinitiv Eikon, particularly for target companies. The insignificant results are in line with the findings of Jost et al. (2022), indicating the severe complexity of utilizing environmental scores in empirical research and demonstrating environmental performance of neither the acquirer, nor the target, to significantly affect acquisition premia.

Lastly, this thesis tested whether periods of macroeconomic uncertainty affect acquisition premia, following the described consensus among the literature, indicating that acquisition premia tend to increase during socioeconomic crises, reflecting periods characterized by investor pessimism and stock market volatility. The latter viewpoint is reflected in Hypothesis 3, indicating that the acquisition premia paid in domestic M&A transactions increased following the exogenous shock of the Covid-19 pandemic in 2020, decreased following the recovery phase of the global pandemic in 2021, and increased following the Russian invasion of Ukraine. The findings indicate that the three periods of macroeconomic uncertainty do not significantly affect acquisition premia, therefore, Hypothesis 3 cannot be rejected, nor accepted.

Upon examining the acceptance or rejections of the aforementioned hypotheses, the research question can be answered. This study concludes that the effect of the U.S. re-joining the PA on acquisition premia paid in domestic M&A transactions is not equal across the U.S. and differs depending on the location of the target company. Specifically, the environmental score of the state where the target is located significantly positively contributes to the net effect of the U.S. re-joining the PA on acquisition premia. This suggests that the exogenous effect of the U.S. announcement to re-join the PA and the pivotal

stance in terms of environmental aspirations has a more considerable impact on companies in U.S. states that demonstrated lower environmental scores, implying that higher-scoring U.S. states continued to prioritize environmental regulation following withdrawal of the PA in June 2017. These results provide evidence of state-level disparities in environmental policy aspirations and suggest that the state-level differences potentially persist even after the federal re-implementation of the PA, highlighting the existence of a policy dilemma. The policy dilemma conveys that while higher-scoring states continue to prioritize environmental regulation, lower-scoring states are more vulnerable to the effects of changes in federal environmental policy. This presents a challenge for policymakers, as efforts to strengthen federal environmental regulation may face opposition from states that exhibit lower environmental scores. Additionally, the presence of state-level disparities in environmental performance may result in uneven distribution of the benefits and costs of federal environmental regulation across different regions, raising concerns about environmental justice. The results of this thesis are therefore relevant for policymakers of the U.S., particularly for the White House Office of Domestic Climate Policy, and must be taken into consideration when formulating environmental policies, to ensure effectiveness, equitable distribution of the benefits and costs, and consider the diverse needs and preferences of different regions of the country. Accordingly, this highlights the relevance of this study, reflecting its contribution to comprehensive understanding of the complex dynamics between federal- and state-level environmental policies in the U.S. and the economic implications of these dynamics for achieving environmental goals.

Alongside the described relevance of this study to environmental policymakers in the U.S., the results of this thesis are relevant in the context of the growing concern about global warming and the urgent need to combat climate change. This study contributes to the understanding of the implications of environmental policy on corporate behaviour and performance, highlighting the relevance of the findings for M&A participants in order to anticipate on the potential effects of sustainable regulation and accordingly, be better positioned to make informed decisions. M&A participants need to understand the implications of potential environmental regulation in order to position themselves to anticipate the dynamic regulatory landscape in terms of sustainable policy.

This study makes several contributions to the existing literature. First, the results contribute to the limited available research on the presence of a disparity between U.S. states in environmental aspirations, shedding light on the accompanied economic implications of the state-level differences. Second, despite increasing emphasis within the literature on the implications of the PA in terms of macroeconomic factors, this study extends the literature on the microeconomic implications of the implementation of the PA. Third, this study tests the applicability of the Porter hypothesis and the neoclassical theory, contributing to the literature on the relationship between environmental regulation and firm productivity, particularly in context of the U.S. re-joining the PA. Additionally, this thesis examines the validity of the shareholder expense theory and stakeholder value maximization view from

the perspective of the acquiring company, in light of the implementation of federal environmental regulation. Lastly, this study contributes to the limited research on the implications of periods of macroeconomic uncertainty, particularly during recent periods of socioeconomic crisis, i.e., Covid-19 and the Russia-Ukraine war, on acquisition premia. Accordingly, this thesis makes notable contributions to the existing literature that are relevant for future research.

Limitations

This study is subject to several limitations that should be acknowledged. The first limitation follows from the exclusion of the environmental pillar score of the target company in the second difference-in-difference estimation, reflected by Equation (2) in Section 4.1, with the results presented in Table 3. Environmental performance of target companies potentially affects acquisition premia paid in M&A transactions, hence, excluding this variable might generate omitted variable bias, which potentially introduces endogeneity. Additionally, exclusion of control variables that reflect subcategories of environmental performance, e.g., firm productivity, environmental innovation, and R&D investment, limits interpretation, as the level of firm greenness cannot be fully captured by the differences in coercive pressure between U.S. states. The limited availability of quantifiable metrics reflecting companies' environmental performance presents a challenge in the utilization of environmental scores and other proxies of sustainable performance in empirical research. Moreover, the presence of rating disparity between different rating agencies further limits reliability of the indicators of environmental performance. Future research could therefore explore alternative methods to proxy companies' environmental performance or include consistent and reliable environmental ratings provided by a single rating agency. Accordingly, the environmental performance of both the acquirer and the target can be included in the assessment whether the U.S. re-joining the PA has a differential effect on acquisition premia across acquiring- and target companies exhibiting different levels of environmental performance. Additionally, inclusion of the environmental scores of both the acquirer and target allows to assess whether environmental performance of the target is valued differently in terms of acquisition premia for acquirers exhibiting different levels of environmental performance.

A second limitation stems from the reliance of this research on environmental state scores that correspond to a single year, which follows from the lack of consistent and annually provided environmental assessments of U.S. states, including corresponding environmental rankings. Utilizing environmental state scores that are annually provided would allow for a more comprehensive assessment of the development of the state-level disparity in environmental performance over time. Following the progressively increasing emphasis within the literature on sustainability, it is expected that future research will provide frequent and consistent state-level assessments of environmental performance. Accordingly, once available, future research could incorporate reliable annual state rankings to assess

whether the effect of the implementation of the PA on acquisition premia is equal across different states. Specifically, future research could match the environmental state score to the acquisitions conducted in the corresponding year, thereby improving the research design presented in this study.

Limited availability of data reflects a third limitation of this study, which resulted in a reduction of the sample size following the exclusion of observations that demonstrated substantial missing data on the variables of interest. Additionally, data availability constraints led to the exclusion of several variables that potentially affect acquisition premia, leading to omitted variable bias which potentially introduces endogeneity. To mitigate this limitation, future research could explore the data availability of the variables of interest within other databases. Although Refinitiv Eikon is considered as a comprehensive and reliable source of financial data, the data platform has limited availability of ESG-related information. As this study was subject to restricted access to certain data providers, future research could therefore explore the availability of environmental performance indicators within other data providers, including e.g., Sustainalytics and MSCI ESG.

This study encountered a fourth limitation in the assessment of the effect of periods of macroeconomic uncertainty on acquisition premia, reflecting the limited number of transactions in the employed sample that are conducted during the three distinguishable periods of crisis, i.e., the collapse phase of Covid-19, the recovery phase of the global pandemic, and the Russia-Ukraine war. This potentially induced the observed statistical insignificance of the results. Future research could therefore consider relaxing the inclusion criteria for transactions to be included in the sample or expanding the geographical scope of the study on the relationship between macroeconomic uncertainty and acquisition premia.

This thesis focused on the effect of the U.S. re-joining the PA on acquisition premia paid, however, the effect of the implementation of environmental policy on other elements of M&A behaviour, including e.g., the likelihood of deal completion, expected synergetic gains, and target valuation, is not examined. Future research could therefore assess the potential impact of the U.S. re-joining the PA on other aspects of the M&A process, and similarly, study whether this effect is different for varying levels of e.g., environmental rankings of the state where the target is located or the environmental performance of the acquirer. Additional research in the described direction would provide a comprehensive understanding of the economic implications of the implementation of federal environmental regulation, in context of M&A transactions.

Furthermore, as this research did not focus on a specific industry, future research could examine the effects of strengthening environmental policy on acquisition premia paid in M&A transactions, focused on a particular industry. Alternatively, future research could analyse whether the effect of the U.S. re-joining the PA on acquisition premia is equal for acquisitions across different industries. It can be

expected that, due to industry-specific effects, the magnitude of the effect of the U.S. re-joining the PA on acquisition premia might differ for companies operating in a highly sustainable sector, relative to a major polluting industry.

Lastly, future research could consider the effect of the implementation of other types of environmental regulation, i.e., the Inflation Reduction Act, implemented on August 16, 2022, on acquisition premia. The Inflation Reduction Act includes $500 billion in new spending and tax breaks, which intends to catalyse investments in clean energy by fostering R&D in environmental technology, promote domestic manufacturing capacity, and allocates funds directly to environmental justice concerns. Accordingly, examining whether the implementation of the Inflation Reduction Act has an equal effect on acquisition premia for acquisitions across all U.S. states would enable a comparison of the findings to the results of this study, thereby extending the literature.

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APPENDIX A Variable Definitions

Appendix A. Variable Definitions.
The following table provides the definitions of the dependent-, independent-, and control variables utilized in this thesis.

Variable	Variable Description
Acquisition premia four-weeks	$Acquisition\ premia\ four-weeks = \frac{Offer\ price\ per\ share_t}{Target\ shareprice_{t-28}} - 1$
Acquisition premia one-week	$Acquisition\ premia\ one-week = \frac{Offer\ price\ per\ share_t}{Target\ shareprice_{t-7}} - 1$
Acquisition premia one-day	$Acquisition\ premia\ one-day = \frac{Offer\ price\ per\ share_t}{Target\ shareprice_{t-1}} - 1$
Deal value	Total consideration paid by the acquirer to the target, expressed in USD millions.
Dummy Covid-19 collapse phase	Dummy variable yielding one for acquisitions announced in 2020, and zero otherwise.
Dummy Covid-19 recovery phase	Dummy variable yielding one for acquisitions announced in 2021, and zero otherwise.
Dummy friendly	Dummy variable yielding one for acquisitions of friendly nature, and zero for hostile takeovers.
Dummy intra-industry	Dummy variable yielding one for transactions with acquirers and targets operating in the same major SIC industry, and zero inter-industry transactions.
Dummy Russia-Ukraine war	Dummy variable yielding one for acquisitions announced after June 16, 2022, and zero otherwise.
Dummy strategic acquirer	Dummy variable yielding one for strategic acquirers, and zero for financial acquirers.
Environmental pillar score acquirer	Environmental score assigned by Refinitiv Eikon, assessing companies on resource usage, emissions, and innovative output. Scores range from zero to one hundred.
Environmental state score target	Environmental state scores reflecting states' progress towards meeting sustainable development goal thirteen, Climate Change. The state scores are retrieved from the United States Development Reports, and presented in Appendix B.
Leverage ratio	$Leverage\ ratio_t = \frac{Total\ debt_t}{Shareholders\ equity_t}$
Net asset value ratio	$Net\ asset\ value\ ratio_t = \frac{Deal\ value_t}{Net\ assets_t}$
Percentage of shares acquired	Percentage of target shares acquired in the transaction
Time dummy	Dummy variable yielding one for transactions that are announced post-event date, reflecting the official re-joining of the U.S. to the PA on January 20, 2021.
Tobin's Q ratio	$Tobin's\ Q\ ratio_t = \frac{Equity\ value_t}{Total\ assets_t}$

APPENDIX B Environmental State Rankings

Appendix B. Environmental State Rankings.

The following table provides the environmental scores of 50 U.S. states, reflecting states' performance on SDG 13, 'Climate Change'. The environmental scores range from 0 to 100 and the score reflects the state's current environmental impact and progress towards combatting climate change. States are ranked by the environmental score in 2018. The environmental scores are retrieved from the United States Development Report 2018 and United States Development Report 2021, https://www.sdgindex.org/reports/sustainable-development-report-of-the-united-states-2018/us-states. sdgindex.org/rankings.

Rank	State	Environmental Score, 2018	Environmental Score, 2021
1	New York	80.72	73.90
2	Maryland	79.58	76.13
3	California	76.12	64.01
4	Virginia	75.50	72.46
5	Oregon	75.18	60.52
6	Washington	73.83	73.51
7	North Carolina	72.70	55.09
8	New Jersey	71.68	75.76
9	Hawaii	70.20	61.63
10	Connecticut	69.86	79.49
11	Rhode Island	66.18	61.85
12	Massachusetts	65.36	62.65
13	Delaware	64.63	65.57
14	Vermont	64.29	59.23
15	Maine	64.17	76.05
16	New Hampshire	62.34	57.22
17	Florida	61.72	47.99
18	Pennsylvania	60.06	62.26
19	Minnesota	59.67	57.20
20	Arizona	58.07	48.54
21	South Carolina	57.24	52.37
22	Illinois	56.04	58.15
23	New Mexico	55.58	50.28
24	Colorado	55.41	58.43
25	Iowa	53.66	39.56
26	Alaska	52.36	41.83
27	Nevada	51.29	53.67
28	Montana	49.37	48.58
29	Michigan	48.57	66.15
30	Georgia	48.37	34.73
31	Wisconsin	46.55	50.94
32	Kentucky	46.39	50.57
33	Utah	46.24	53.35
34	Ohio	44.77	39.63
35	Idaho	43.92	37.45
36	Missouri	41.69	32.70
37	Tennessee	41.46	41.25
38	Nebraska	38.76	47.31
39	South Dakota	35.65	18.84
40	Kansas	35.23	33.68
41	North Dakota	34.83	38.17
42	West Virginia	33.84	46.95
43	Arkansas	33.65	26.39
44	Louisiana	33.28	41.93
45	Wyoming	33.18	49.71
46	Alabama	33.06	41.44
47	Indiana	31.00	35.32
48	Texas	30.15	26.55
49	Mississippi	26.93	31.05
50	Oklahoma	26.90	22.42

APPENDIX C Descriptive Statistics Sample Split

Appendix C.1. Descriptive Statistics Pre-Event Sample.

This table provides descriptive statistics of the pre-event sample, consisting of mergers and acquisitions announced from June 1, 2017, until the event date, with the event date identified as January 20, 2021, reflecting the official re-joining of the U.S. to the PA. Log-transformation is applied to the four-weeks acquisition premia, deal value, Tobin's Q ratio, and leverage ratio to conform to normality. The time dummy, environmental score of the U.S. state where the target is located, and environmental pillar score of the acquirer are standardized to mitigate multicollinearity. Winsorizing at the 1% level is applied to the four-weeks acquisition premia, Tobin's Q ratio, the leverage ratio, and the net asset value ratio to eliminate the effect of potential outliers.

Descriptive statistics								
Variables	Mean	P50	Std. error	Min	Max	Skewness	Kurtosis	N
Ln(acquisition premia four-weeks)	3.326	3.378	0.049	-0.868	5.762	-0.541	4.653	394
Time dummy	-0.659	-0.659	0.000	-0.659	-0.659	0.000	0.000	394
Environmental state score target	0.005	0.310	0.049	-1.960	1.217	-0.592	1.996	394
Environmental pillar score acquirer	0.147	0.218	0.061	-1.302	1.849	-0.080	1.545	272
Dummy Covid-19 collapse phase	0.184	0	0.019	0	1	1.633	3.667	394
Dummy Covid-19 recovery phase	0.021	0	0.146	0	1	6.540	43.772	394
Dummy Russia-Ukraine war	0	0	0	0	0	0	0	394
Ln(deal value)	6.628	6.752	0.096	2.032	11.372	-0.000	2.457	394
Dummy friendly	0.993	1	0.004	0	1	-11.69	137.674	394
Dummy strategic acquirer	0.776	1	0.020	0	1	-1.321	2.747	394
Percentage of shares acquired	96.828	100	0.637	8.09	100	-4.615	24.640	394
Dummy intra-industry	0.420	0	0.024	0	1	0.324	1.105	394
Ln(Tobin's Q ratio)	-1.164	-0.174	0.069	-3.317	2.959	0.264	2.495	360
Ln(leverage ratio)	0.535	0.419	0.029	0	3.238	1.727	7.016	360
Net asset value ratio	4.160	2.095	0.544	-37.890	56.950	1.242	13.994	360

Appendix C.2. Descriptive Statistics Post-Event Sample.

This table provides descriptive statistics of the post-event sample, consisting of merger and acquisitions announced from January 20, 2021, reflecting the event date of President Biden signing the executive order to re-join the PA, until February 4, 2023. Log-transformation is applied to the four-weeks acquisition premia, deal size, Tobin's Q ratio, and leverage ratio to conform to normality. The time dummy, environmental score of the U.S. state where the target is located, and acquirer environmental pillar score are standardized to mitigate multicollinearity. Winsorizing at the 1% level is applied to the four-weeks acquisition premia, Tobin's Q ratio, the leverage ratio, and the net asset value ratio to eliminate the effect of potential outliers.

Descriptive statistics								
Variables	Mean	P50	Std. error	Min	Max	Skewness	Kurtosis	N
Ln(acquisition premia four-weeks)	3.490	3.592	0.073	0.457	5.762	-0.390	3.426	210
Time dummy	1.515	1.515	0.000	1.515	1.515	0.000	0.000	210
Environmental state score target	-0.027	0.095	0.072	-1.960	1.217	-0.549	2.037	210
Environmental pillar score acquirer	0.028	-0.031	0.101	-1.279	1.932	0.172	1.625	106
Dummy Covid-19 collapse phase	0	0	0	0	0	0	0	210
Dummy Covid-19 recovery phase	0.6192	1	0.487	0	1	-0.491	1.241	210
Dummy Russia-Ukraine war	0.159	0	0.366	0	1	1.865	4.478	210
Ln(deal value)	6.776	6.754	0.118	2.391	10.246	-0.098	2.369	210
Dummy friendly	0.995	1	0.005	0	1	-13.491	183.005	210
Dummy strategic acquirer	0.730	1	0.033	0	1	-1.035	2.070	210
Percentage of shares acquired	96.637	100	1.064	17.020	100	-4.313	20.417	210
Dummy intra-industry	0.384	0	0.036	0	1	0.478	1.228	210
Ln(Tobin's Q ratio)	-0.173	0.018	0.110	-2.919	2.934	-0.010	2.015	152
Ln(leverage ratio)	0.449	0.199	0.047	0	3.238	2.126	8.280	152
Net asset value ratio	2.674	2.140	0.841	-37.890	42.830	-0.628	9.252	152

APPENDIX D Correlation Matrix

Appendix D. Correlation Matrix.

This table presents the correlation matrix for the complete sample, including all relevant variables incorporated in the main regression of this thesis, detailed in Equation (1) and Equation (2). Definitions of the variables included are presented in Appendix A. Significance of 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Acquisition premia four-weeks	1.000														
Time dummy	0.043	1.000													
Environmental state score target	0.230***	0.045	1.000												
Environmental pillar score acquirer	0.217***	-0.081	0.081	1.000											
Dummy Covid-19 collapse phase	0.030	-0.201***	0.063	0.067	1.000										
Dummy Covid-19 recovery phase	-0.004	0.538***	0.010	-0.047	-0.159***	1.000									
Dummy Russia-Ukraine war	0.093	0.350***	0.022	-0.054	-0.070	-0.009*	1.000								
Ln(deal value)	0.039	-0.023	-0.048	0.452***	0.072	0.018	-0.094*	1.000							
Dummy friendly	-0.026	0.003	0.064	0.010	0.038	-0.019	0.023	0.034	1.000						
Dummy strategic acquirer	0.020	0.054	0.071	0.043	0.021	0.039	0.025	0.059	0.139**	1.000					
Percentage of shares acquired	0.075	0.028	0.148***	-0.079	0.001	0.000	0.009	0.060	-0.009	0.094	1.000				
Dummy intra-industry	-0.001	0.007	0.035	-0.025	0.054	0.009	-0.039	0.139**	0.044	-0.074	0.087	1.000			
Ln(Tobin's Q ratio)	0.357***	-0.067	0.173***	0.485***	0.037	-0.154***	0.079	0.340***	-0.018	0.043	-0.061	0.031	1.000		
Ln(leverage ratio)	-0.017	-0.035	-0.127**	0.124**	-0.007	-0.025	-0.031	0.043	0.029	-0.069	-0.089	-0.042	-0.206***	1.000	
Net asset value ratio	0.199***	-0.092*	0.069	0.191***	0.129**	-0.124**	0.046	0.156***	0.065	-0.002	-0.102*	0.070	0.414***	0.223***	1.000

APPENDIX E Falsification Test

Appendix E. Results difference-in-difference estimation, falsification test.

This table provides the results of the falsification test of the difference-in-difference estimation. The dependent variable is the four-weeks acquisition premia. The sample consists of transactions +22 months post-placebo event, and -22 months prior-placebo event, with the placebo event date identified as April 1, 2019. Five specifications of control variables are considered, with all specifications including industry- and state fixed effects. Specification (1) presents the results of a multivariate regression, including the placebo time dummy, state score, and two Covid-19 dummy variables reflecting the collapse phase and the recovery phase of global pandemic. The placebo time dummy indicates whether the acquisition is announced post-placebo event date and state score reflects the environmental score of the U.S. state where the target is located. Environmental scores per state are detailed in Appendix B. Specification (2) until Specification (5) present the results of the difference-in-difference estimation. Specification (2) additionally includes the interaction variable time dummy*state score; (3) additionally includes firm-specific control variables; (4) additionally includes deal-specific control variables; and (5) includes year fixed effects, thereby excluding the dummy variables for Covid-19. The definitions of the variables are presented in Appendix A. The insignificant results on the estimations of the coefficient of the interaction variables under all specifications indicates no significant effect of the placebo event on acquisition premia, reflecting the absence of a pre-trend. The results validate the parallel trend assumption, strengthening the robustness of the initial results, presented in Table 2. Log-transformation is applied to the four-weeks acquisition premia, deal size, Tobin's Q ratio, and leverage ratio to conform to normality. Placebo time dummy and state score are standardized to mitigate multicollinearity. Winsorizing at 1% is applied to the four-weeks acquisition premia, Tobin's Q ratio, leverage ratio, and net asset value ratio to eliminate the effect of outliers. Heteroskedasticity-robust standard errors are clustered at target firm-level to account for serial correlation and presented in parentheses. Employing robust standard errors restrict utilization of the adjusted R-squared, accordingly, non-adjusted R-squared is presented. Significance of 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Variables	(1)	(2)	(3)	(4)	(5)
Placebo time dummy	0.118 (0.078)	0.115 (0.078)	0.096 (0.075)	0.086 (0.087)	0.016 (0.158)
State score	0.038 (0.089)	0.041 (0.089)	0.006 (0.095)	-0.035 (0.099)	-0.026 (0.103)
Dummy Covid-19 collapse phase	0.103 (0.194)	0.128 (0.196)	0.124 (0.196)	0.116 (0.195)	
Dummy Covid-19 recovery phase	0.003 (0.126)	0.014 (0.127)	0.031 (0.127)	0.025 (0.126)	
Placebo time dummy*state score		0.055 (0.085)	0.086 (0.082)	0.097 (0.091)	0.083 (0.093)
Ln(deal value)			-0.152*** (0.051)	-0.199** (0.059)	-0.190*** (0.059)
Dummy friendly			-0.511 (1.013)	-0.433 (1.1294)	-0.398 (1.196)
Dummy strategic acquirer			0.381* (0.231)	0.435 (0.281)	0.413 (0.289)
Percentage of shares acquired			0.005 (0.007)	0.011 (0.007)	0.012 (0.007)
Dummy intra-industry			0.116 (0.160)	0.019 (0.189)	0.029 (0.185)
Ln(Tobin's Q ratio)				0.216* (0.129)	0.226* (0.131)
Ln(leverage ratio)				0.108 (0.21)	0.088 (0.236)
Net asset value ratio				0.008 (0.011)	0.008 (0.011)
2018					-0.274 (0.276)
2019					-0.099 (0.346)

Appendix E (continued)					
2020					0.005 (0.470)
2021					0.314 (0.568)
Observations	394	394	39	360	360
R-squared	0.380	0.382	0.426	0.501	0.508
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	No	Yes

APPENDIX F Robustness Check

Appendix F. Results difference-in-difference estimation, robustness check.

This table provides the results of the robustness check. The sensitivity scenario reflects the utilization of different definitions of the dependent variable, including the one-day- and one-week acquisition premia. The sample consists of transactions +26 months post-event, and -42 months prior-event, with the event date identified as January 20, 2021, reflecting the re-joining of the U.S. to the PA. Four specifications of control variables are considered, with all specifications including industry- and state fixed effects. Specification (1) presents the results of the difference-in-difference estimation with the one-day acquisition premia as dependent variable, including the time dummy, state score, interaction variable, deal specific-, and firm specific control variables. Specification (2) additionally includes time fixed effects. Specification (3) and Specification (4) are equal to the latter two specifications, with the sole discrepancy being the utilization of the one-week acquisition premia as dependent variable. Time dummy indicates whether the acquisition was announced post-event date and state score reflects the environmental score of the state where the target is located. Environmental state scores are detailed in Appendix B. Definitions of the variables are presented in Appendix A. Significance of the estimates of the interaction variable in Specification (1) and (2) at the 5% and 10% level, respectively, indicate that the results on the interaction variable are robust for utilizing the one-day acquisition premia. Insignificance of the interaction variable in Specification (3) and (4) indicate that the results are not robust for utilizing the one-week acquisition premia. Log-transformation is applied to the one-day- and one-week acquisition premia, deal size, Tobin's Q, and leverage ratio to conform to normality. Time dummy and state score are standardized to mitigate multicollinearity. Winsorizing at 1% is applied to the one-day- and one-week acquisition premia, Tobin's Q, leverage ratio, and net asset value ratio to eliminate the effect of outliers. Standard errors are presented in parentheses and clustered at target firm to account for serial correlation. Significance of 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Variables	(1)	(2)	(3)	(4)
Time dummy	0.068	-0.098	0.068	-0.024
	(0.070)	(0.166)	(0.059)	(0.124)
State score	0.090	0.093	0.086	0.084
	(0.074)	(0.075)	(0.063)	(0.064)
Dummy Covid-19 collapse phase	0.098		0.203	
	(0.227)		(0.177)	
Dummy Covid-19 recovery phase	-0.115		0.044	
	(0.242)		(0.188)	
Dummy Russia-Ukraine war	0.172		0.027	
	(0.431)		(0.336)	
Time dummy*state score	0.119**	0.116*	0.080	0.084
	(0.060)	(0.061)	(0.062)	(0.064)
Ln(deal value)	-0.168***	-0.160***	-0.165***	-0.167***
	(0.048)	(0.048)	(0.042)	(0.042)
Dummy friendly	-1.053	-1.044	-0.773	-0.780
	(0.918)	(0.898)	(0.874)	(0.920)
Dummy strategic acquirer	0.126	0.100	0.138	0.131
	(0.229)	(0.232)	(0.188)	(0.191)
Percentage of shares acquired	0.001	0.001	0.006	0.006
	(0.006)	(0.006)	(0.005)	(0.005)
Dummy intra-industry	-0.124	-0.112	-0.037	-0.051
	(0.167)	(0.167)	(0.137)	(0.140)
Ln(Tobin's Q ratio)	0.177	0.175	0.147	0.155*
	(0.112)	(0.111)	(0.090)	(0.091)
Ln(leverage ratio)	0.092	0.073	0.163	0.168
	(0.182)	(0.186)	(0.126)	(0.130)
Net asset value ratio	-0.001	-0.001	-0.004	-0.004
	(0.010)	(0.010)	(0.005)	(0.005)
2018		-0.173		0.016
		(0.271)		(0.242)
2019		-0.091		0.174
		(0.304)		(0.254)
2020		-0.006		0.277
		(0.316)		(0.277)

Appendix F (continued)				
2021		0.166 (0.405)		0.284 (0.326)
2022		0.397 (0.458)		0.271 (0.364)
2023		3.251*** (0.956)		2.336*** (0.833)
Observations	512	512	512	512
R-squared	0.468	0.471	0.527	0.529
Dependent variable	One-day premium	One-day premium	One-week premium	One-week premium
Industry fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes