Exposure of New Zealand-listed firms to global risks

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ABSTRACT

Motivated by rising global risks, this dissertation investigates how exchange rate and geopolitical risks are transmitted to firms in a small open economy by examining stock return exposure to these risks among New Zealand-listed companies. Using daily stock returns for 147 non-financial firms over 2012–2025, we first estimate firm-level sensitivities to exchange rate and geopolitical risks, followed by an analysis of how firms' international operations and risk management practices shape these exposures, and a test of whether geopolitical risk can aggravate firm-level exchange rate exposure. We find that at the aggregate level, appreciations of TWI, CNY, and USD, as well as increases in geopolitical risk, are associated with lower stock returns for New Zealand firms. At the firm level, only around 10–15% of firms exhibit statistically significant exchange rate exposure, and approximately 9–11% show significant sensitivity to geopolitical risk. Cross-sectional analysis shows that larger firms exhibit greater exposure to currencies of New Zealand's major trading partners. Export-oriented firms show greater sensitivity to AUD returns, while firms with stronger operational links to Australia exhibit significantly lower exposure to both AUD and TWI movements, consistent with operational hedging. These firms also show significantly greater sensitivity to geopolitical risk. There is no evidence that financial hedging reduces exposure to either exchange rate or geopolitical risks. We further find that geopolitical risk has a direct negative effect on firm-level exchange rate exposure but does not amplify it, with the only exception of AUD exposure increasing for firms reporting higher hedging activity during periods of elevated geopolitical risk. The findings suggest that firm-level exposure to global risks is shaped more by operational and geographic structures than by financial hedging. The results imply that risk managers of New Zealand-listed firms should prioritise strategic operational alignment and geographic diversification over traditional financial hedging instruments when managing exposure to both currency fluctuations and geopolitical volatility.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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CHAPTER 1

INTRODUCTION

Globalisation has intensified firms' exposure to international markets, making corporate performance and valuation increasingly sensitive to global shocks. While international integration expands market access and growth opportunities, it also heightens vulnerability to global uncertainties, particularly exchange rate volatility and geopolitical instability. Among global risks, exchange rate movements remain a key source of market risk because currency fluctuations affect revenues, costs, and competitiveness, and thus firm cash flows and value (Jorion, 1990). At the same time, geopolitical risk, which arises from conflicts, sanctions, trade disputes, and political tensions, has become an increasingly prominent driver of uncertainty that can disrupt operations, supply chains, and strategic planning (Gkillas et al., 2018; IMF, 2023). These concerns have been amplified in recent years, with persistently elevated geopolitical risk and recurrent spikes in foreign exchange volatility (Hajarath & Chaitanya, 2025; IMF, 2025b; Mathias & Vladyslav, 2022; Wenqian et al., 2025). Importantly, these risks may not operate in isolation: geopolitical shocks can change capital flows (Carney et al., 2024; Feng et al., 2023) and risk premia (Beirne & Renzhi, 2026; Pástor & Veronesi, 2013), potentially moving exchange rates (Hui, 2022; Iyke et al., 2022; Sharma et al., 2019) and altering how currency movements are transmitted into firm returns (Bampinas et al., 2025), while also affecting firms through non-currency channels such as trade restrictions and supply chain disruptions (Huynh & Le, 2025; IMF, 2023).

International finance theory predicts that exchange rate changes should be reflected in stock returns because they shift firms' global competitive positions and expected cash flows (Hodder, 1982). Early empirical studies, particularly for the US, often report weak or statistically insignificant exposure, with only a small proportion of firms showing significant foreign exchange exposure (Amihud, 1994; Bartov & Bodnar, 1994; Choi & Prasad, 1995; Jorion, 1990). This mismatch between theory and evidence became known as the "exchange rate exposure puzzle" (Bartram & Bodnar, 2007). More recent studies provide a more nuanced view. Research shows that exchange rate exposure is heterogeneous across firms and depends on firm characteristics and risk management behaviour. Using bilateral exchange rates and augmented asset-pricing models, several papers document more widespread and significant exposure than in earlier work (Bartram & Bodnar, 2012; Chaieb & Mazzotta, 2013; He et al., 2021; Hutson & Laing, 2014; Sikarwar, 2023). The literature further identifies firm-level determinants of exposure, particularly international engagement (Doidge et al., 2006; He et al., 2021) and hedging practices (Allayannis & Weston, 2001; Aretz & Bartram, 2010). Firms with greater foreign sales or overseas assets tend to exhibit higher underlying currency risk, while financial and operational hedging strategies reduce the extent to which this risk is reflected in equity returns. In addition, recent evidence indicates that exposure is not constant over time, it varies with macroeconomic conditions and often strengthens during periods of heightened uncertainty, when exchange rate volatility increases and firms' ability to hedge or adjust operations is constrained (Bartram et al., 2010; Chung & Zhou, 2012; Hossain et al., 2024; Sikarwar, 2023).

In addition, geopolitical risk has emerged as an important source of global macro-financial uncertainty. Geopolitical tensions have been shown to weaken economic activity, reduce international trade and investment, and increase financial market volatility (Caldara & Iacoviello, 2022; Carney, 2016). periods of heightened geopolitical tension are associated with higher risk premia, lower stock returns, and greater volatility, indicating that geopolitical shocks are priced in financial markets (Berkman et al., 2011; Gkillas et al., 2018; Afees A. Salisu et al., 2022; Yilmazkuday, 2024). Recent evidence also shows that these effects are heterogeneous across firms. Firms with stronger international engagement, through foreign sales, overseas assets, or reliance on global supply chains, tend to exhibit greater sensitivity to geopolitical shocks because disruptions to trade flows, logistics networks, and financing conditions directly affect operating cash flows and valuation (Bussy & Zheng, 2023; Zhou, 2025). Moreover, geopolitical risk is also linked to capital flow adjustments and heightened foreign exchange volatility (Choudhury, 2025; Ji, 2025; Yilmazkuday, 2025), suggesting that political uncertainty can influence firms not only directly through trade and investment channels but also indirectly through currency movements. These mechanisms imply that geopolitical risk may interact with exchange rate exposure rather than operate independently. Because geopolitical shocks increase currency volatility and constrain firms' ability to hedge or adjust operations, they may amplify the transmission of exchange rate movements to firm value. Despite these potential transmission channels, geopolitical risk and exchange rate exposure are typically examined separately in the empirical literature. Consequently, it remains largely unknown how geopolitical conditions affect firms' sensitivity to currency movements. This limits our understanding of how global shocks jointly affect firm valuations, particularly in highly open economies.

Although prior studies have investigated exchange rate exposure in several small open economies, the findings remain mixed and inconsistent across countries and settings. For example, Dutch and Belgian listed firms exhibit firm-specific exchange rate sensitivities that vary with international trade activity (Annelies et al., 2022), and Swedish firms in a highly open export-oriented economy show significant exposure to exchange rate movements (Nydahl, 1999). Evidence from Turkey highlights the role of macroeconomic and industry structure in shaping exposure, and that openness influences exposure (Akay & Cifter, 2014). Using a large sample of firms from 20 emerging markets, Ye et al. (2014) find that foreign exchange exposure is widespread, with roughly half of firms exhibiting significant sensitivity to exchange rate movements, both positive and negative. They also document that exposure is systematically higher in countries with pegged or non-floating exchange rate regimes than in countries with floating exchange rates. Overall, existing evidence suggests that exchange rate exposure in small economies is heterogeneous and shaped by country-specific factors such as trade structure, openness, and exchange rate regimes, implying that findings from one setting may not generalise to others.

These considerations are particularly pronounced in the New Zealand context. Although New Zealand shares characteristics with other small open economies, its economic structure makes it a distinctive and informative setting for studying firm-level exposure to global risks. New Zealand's external linkages are highly concentrated. Based on the RBNZ's TWI weights, China, Australia, and the US account for approximately 21.7%, 18.4%, and 15.6% of New Zealand's trade exposure in 2025, jointly representing more than half of

total trade. This concentration increases the likelihood that shocks originating in a small set of large economies can transmit strongly to domestic macroeconomic conditions and firm cash flows. On this point, the New Zealand Treasury assessed how cyclical shocks from China, the US, and Australia propagate into New Zealand macro-outcomes, including GDP, CPI, interest rates, and exchange rate, highlighting the broader vulnerability associated with concentrated external linkages (McKenzie, 2024). Furthermore, unlike many small European economies that operate within a currency union, New Zealand maintains a freely floating exchange rate regime, implying that international transactions are subject to direct currency risk. Geographic remoteness and reliance on imported inputs further limit firms' ability to rapidly adjust production or sourcing in response to external disruptions.

Accordingly, this dissertation addresses three questions. First, do New Zealand-listed firms exhibit significant exposure to exchange rate and geopolitical risks? Second, which firm characteristics explain cross-sectional differences in exposure? Third, do geopolitical conditions affect exchange rate exposure for firms with particular characteristics?

Using a sample of 147 New Zealand-listed non-financial firms over the period 2012–2025, after excluding financial firms and firms with insufficient data, we first estimate firm-year exposure using time-series regressions of daily stock returns on market returns and global risk factors, exchange rate returns, and measures of geopolitical risk changes (Adler & Dumas, 1984; Jorion, 1990). Second, we examine whether cross-sectional variation in exposures can be explained by a firm's characteristics, such as the degree of international involvement and financial risk management practices. Finally, we test the role of geopolitical risk as a moderator of the determinants of exchange rate exposure by adding interaction terms between geopolitical risk and these firm characteristics to the second-stage regression, examining whether geopolitical conditions amplify or dampen the impact of the determinants of exchange rate exposure.

The findings show that global risks negatively affect New Zealand firms' stock returns. Firstly, exchange rate risk is reflected in stock returns at the aggregate level, with foreign currency (TWI, CNY, and USD) appreciation associated with lower firm stock returns. However, at the firm level, only a small subset of firms (around 10–15%) shows significant exposure to currency risk, but the number of firms with significant negative exposure increases during periods of heightened uncertainty, particularly during the COVID-19 period. The cross-sectional analysis examines whether firms' international involvement and hedging practices explain differences in currency sensitivity and highlights that the determinants of exchange rate exposure are currency-specific. Larger firms have greater exposure to the currencies of New Zealand's major trading partners. International engagement (exports) increases exposure to AUD. Firms with stronger links to Australia also exhibit significantly lower exposure to AUD currency risk, consistent with operational hedging. Nevertheless, financial hedging shows limited evidence in reducing exchange rate exposure. Secondly, geopolitical risk also impacts New Zealand firms, though its impact is concentrated at the aggregate market level. At the firm level, only around 9–11% of firms exhibit significant exposure to geopolitical risk, however, the number of firms with significant negative exposure to these risks increases during periods of heightened

uncertainty, during the COVID-19 period (2020-2021), the war in Ukraine (2022), and Trump's second US Presidency (2025). Differences across firms are not systematically explained by international involvement or hedging activity. Instead, exposure appears more closely related to the geographic composition of operations, with firms more closely tied to Australia displaying greater exposure to geopolitical shocks. Last but not least, there is limited evidence that geopolitical conditions materially alter how firm characteristics shape exchange rate exposure. Elevated geopolitical uncertainty does not strengthen or weaken the roles of international involvement or hedging, suggesting that geopolitical risk primarily operates through broad market-wide effects rather than through firm-specific transmission channels.

This dissertation contributes to the literature in the following ways. First, it provides firm-level evidence on exchange rate exposure in a small open economy, a setting that has received considerably less attention than large developed markets. New Zealand's concentrated trade structure and freely floating currency offer a useful context for examining how global shocks are transmitted to stock prices. Second, the results indicate that exchange rate and geopolitical risk exposure are heterogeneous across firms and years. Estimating exposures on a firm-year basis reveals that negative exposure intensifies during periods of elevated uncertainty. This pattern suggests that static full-sample estimates may understate firms' currency risk and underscores the importance of assessing exposure under high-uncertainty conditions. Third, the dissertation integrates geopolitical risk directly into firm-level exposure analysis, bridging the geopolitical risk literature with the exchange rate exposure literature, which have largely evolved separately. Finally, we investigate whether higher levels of geopolitical risk are associated with exchange rate exposure, conditional on firms' degree of international involvement and hedging activity.

The dissertation is organised as follows: Chapter 2 reviews theory and evidence on exchange rate exposure and geopolitical risk. Chapter 3 presents data and methodology. Chapters 4 and 5 report results on global risk exposure and its determinants. Chapter 6 tests moderation and interaction channels. Chapter 7 provides robustness checks. Chapter 8 concludes.

CHAPTER 2

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

This chapter reviews the theoretical and empirical literature on exchange rate exposure and geopolitical risk, with a focus on firm-level stock return sensitivity in open economies. It discusses the empirical evidence on exchange rate exposure, particularly from small open economies such as New Zealand, and firm-level determinants such as international engagement and corporate hedging. The chapter further introduces geopolitical risk as an additional source of uncertainty. Finally, it develops testable hypotheses on exchange rate and geopolitical risk exposure and the role of geopolitical risk in moderating exchange rate exposure.

2.1. Exchange rate exposure

In international financial theory, exchange rate movements have long been considered an important source of risk for firms, as currency fluctuations can alter relative prices and affect expected cash flows (Choi & Prasad, 1995; Hodder, 1982). Exchange rate exposure captures the extent to which these currency-induced changes in cash flows are reflected in firm value and is commonly measured as the sensitivity of stock returns to movements in exchange rates (Adler & Dumas, 1984; Bartov & Bodnar, 1994).

A large empirical literature has examined whether exchange rate movements are reflected in stock returns, yet the evidence remains mixed. Early studies, particularly for the United States, often detect significant exposure for only a small proportion of firms (Amihud, 1994; Choi & Prasad, 1995; Chow et al., 1997; Jorion, 1990). Among the first studies examining exchange rate exposure, by regressing the monthly stock returns on the rate of change in the trade-weighted exchange rate and the US market index returns during the period from 1971 to 1987, Jorion (1990) finds significant exposure for only 15 of 287 multinational firms. Similarly, Miller and Reuer (1998) use the OLS to estimate the models that contain multiple currency pairs of the first and second largest trading partners with the US, and report that roughly 13–17 percent of US manufacturing firms exhibit sensitivity to exchange rate movements. Bartov and Bodnar (1994) analyse the impact of exchange rate movements in a sample of 208 US firms that had reported foreign currency adjustments in earlier annual reports and shared a common exposure direction. They also document weak contemporaneous relationships between exchange rates and stock returns.

These findings have given rise to what is commonly referred to as the “exchange rate exposure puzzle”, which highlights the mismatch between theoretical predictions and the mixed empirical evidence (Bartram & Bodnar, 2007). Economic theory suggests that firms with foreign sales, foreign currency costs, or internationally diversified assets should exhibit exposure to exchange rate movements because currency fluctuations affect expected cash flows and competitive positions (Adler & Dumas, 1984). However, a number of empirical studies report weak or statistically insignificant exchange rate exposure for the majority of firms, even in samples dominated by internationally active companies (Amihud, 1994; Bodnar & Gentry, 1993; Choi

& Prasad, 1995; Dominguez & Tesar, 2006; Griffin & Stulz, 2001; He & Ng, 1998; Jorion, 1990; Khoo, 1994). Rather than reflecting shortcomings in empirical methods, Bartram et al. (2010) argue that weak exposure may arise from firms' endogenous operational and financial hedging decisions. Because empirical estimates capture exposure after hedging, both firms with naturally low exposure and those that actively hedge substantial risks may exhibit only weak sensitivity to foreign exchange risk. In addition, low exchange rate volatility relative to firm-specific risk can reduce statistical power, implying that economically meaningful exposure may appear statistically insignificant (Tai, 2024).

Beyond the US, a number of studies have been done and provided broader international evidence. Using a sample of eight countries (Chile, France, Germany, Italy, Japan, the Netherlands, Thailand, and the UK), Dominguez and Tesar (2001) find that exchange rate exposure is pervasive at the firm level. Using augmented CAPM regressions, they show that a substantial share of firms exhibits statistically significant exposure, and that reliance on trade-weighted exchange rates systematically understates true exposure, as many firms are affected only by specific bilateral exchange rate returns. Firm-level exposure varies in both magnitude and sign, with positive and negative exposures observed across firms. Including exchange rate factors in the CAPM leads to meaningful increases in explanatory power, indicating that exchange rate movements are economically important for firm valuation. At the same time, He and Ng (1998) find that only a small subset of Japanese multinational firms with substantial foreign sales exhibit statistically significant exchange rate exposure, despite Japan's strong export orientation. Similarly, Hutson and O'Driscoll (2010), using data from Eurozone countries, document considerable cross-firm heterogeneity in exposure, with some firms displaying significant sensitivity to exchange rate movements while others show no meaningful exposure. These findings reinforce the view that, even in developed, export-oriented economies, exchange rate exposure is not fully priced into equity returns.

Evidence from emerging markets indicates that exchange rate exposure may be more pronounced in economies characterised by higher exchange rate volatility and greater dependence on international trade. He et al. (2021) analyse foreign exchange rate exposure among Chinese listed firms using daily data, a trade-weighted exchange rate index, and five major bilateral currencies. The results show statistically significant linear and nonlinear exposure to both bilateral and multilateral exchange rate movements, with nonlinear models identifying exposure for an additional 5.6 percent of firms. They further show that firm-level exchange rate exposure increases markedly following the 2015 exchange rate reform. Exchange rate exposure across a wide range of emerging economies, such as Brazil, Colombia, India, Indonesia, Korea, Peru, the Philippines, South Africa, Thailand, and Turkey, is also identified. Examining 1,523 firms across 20 emerging markets over 1999–2010, Ye et al. (2014) report that roughly half of firms exhibit statistically significant exchange rate exposure, with these results remaining robust across subperiods and major economic events such as the global financial crisis. Moreover, exposure magnitudes are larger in countries operating under pegged exchange rate regimes than in those with floating exchange rate regimes. Complementary evidence from Sikarwar's (2020) study of 751 firms across 10 emerging markets over 2001–2017 shows that nearly one-third of firms experience

significant exchange rate exposure when estimated using an augmented market model, and further highlights the role of foreign exchange interventions in shaping firm-level exposure.

The international evidence suggests that exchange rate exposure is more common in smaller, more open economies, where firms' revenues and costs are closely tied to international trade and where exchange rate movements directly affect firms' revenues, costs, and competitiveness. Bodnar and Gentry (1993), examining industry-level exposure in Canada and Japan, find that industries in Canada and Japan, both smaller and more open economies, exhibit a higher incidence and greater variability of exchange rate exposure than those in the US. Firm-level studies for export-oriented economies document a substantially high proportion of firms with statistically significant exchange rate exposure. Of 71 German firms, approximately 55 percent exhibit statistically significant exposure to movements in the USD, with all significant coefficients positive, suggesting that German firms benefit from domestic currency depreciations and are adversely affected by currency appreciations (Glaum et al., 2000). Using Dutch firms, De Jong et al. (2006) document that more than half of the listed firms exhibit statistically significant exchange rate exposure, with firm size and foreign sales positively related to exposure. Their results confirm that firms in highly open economies can benefit from currency depreciation and that exposure is more pronounced when exchange rates are matched to firms' actual trade patterns. While off-balance-sheet hedging through derivatives does not significantly reduce exposure, on-balance-sheet strategies such as foreign borrowing and overseas production are effective in mitigating exchange rate risk, highlighting the role of operational hedging. More recent evidence comparing Dutch and Belgian firms reinforces these findings and further emphasises heterogeneity in exposure even among small open economies. Annelies et al. (2022) show that Dutch firms experience stronger exchange rate exposure than Belgian firms, reflecting their greater reliance on trade outside the Eurozone. They also find that importing firms are more exposed than exporting firms. Using Swedish listed firms, Nydahl (1999) finds that approximately one quarter of firms exhibit statistically significant exchange rate exposure, a proportion substantially larger than that documented in many studies using US samples. These findings suggest that economic openness and export dependence increase the likelihood that exchange rate movements are reflected in firm value and that exchange rate exposure is shaped not only by the extent of international trade but also by trade composition, currency denomination, and firms' risk management strategies.

The exposure to global risks is especially relevant for small open economies such as New Zealand, which is tightly integrated with the global economy and subject to external spillovers, particularly through trade (Hawkesby, 2020; IMF, 2024). Given New Zealand's reliance on international markets, exposure theory implies that exchange rate movements can affect firms' competitiveness and cash flows, thereby influencing valuation. However, international evidence indicates that exposure is not guaranteed, even in open economies, and may vary across firms and over time.

Evidence from New Zealand, a small, highly open, and geographically remote economy, also highlights the persistent difficulty of detecting uniform exposure. Using a sample of 145 publicly listed firms over the period January 1990 to April 2004, Luo et al. (2006) examine firm- and industry-level exchange rate

exposure using daily stock returns and both the bilateral NZD/USD and trade-weighted exchange rate indices. They document mixed evidence, with some firms and industries exhibiting positive exposure and others negative exposure, and only a limited share showing statistically significant sensitivities. These results suggest that currency risk is not uniformly priced across firms but varies according to industry characteristics and firms' operations. However, their analysis focuses largely on industry-level aggregation and earlier data. Similarly, using daily data in 2004 and a sample including constituents of the NZX50 index, Randal et al. (2008) find weak evidence of exchange rate exposure among New Zealand firms, even though many firms in their sample are heavily engaged in international trade. Using semiannual returns for a broad sample of New Zealand-listed firms from January 1994 to December 1999, Chen et al. (2004) find that a substantial proportion of firms exhibit statistically significant sensitivity to exchange rate movements. Their study further highlights strong currency-specific effects, with firm values responding differently to movements in the USD and the AUD, implying that reliance on aggregate measures such as the trade-weighted index may mask meaningful exposure. Exchange rate sensitivity also varies across return horizons and industries, reinforcing the heterogeneous nature of exposure in the New Zealand market.

Exchange rate exposure is not expected to be uniform in direction. International finance theory suggests that the sign of exposure depends on firms' trade positions. Firms that generate a large share of revenues in foreign currencies, such as exporters, may benefit from foreign currency appreciations and therefore exhibit positive exposure, whereas firms that rely heavily on imported inputs or foreign currency liabilities may experience adverse cash-flow effects and display negative exposure (Bodnar & Gentry, 1993). Empirical studies document both positive and negative sensitivities across firms, reflecting differences in operational structure, pricing power, and hedging behaviour (Dominguez & Tesar, 2006; He & Ng, 1998). Consequently, the direction and magnitude of exposure are likely to differ across firms, particularly in small open economies where trade patterns vary. Given the mixed and dated evidence for New Zealand, this study re-examines whether exchange rate exposure is empirically identified using updated firm-level data, thereby assessing whether the exchange rate exposure puzzle persists under current global economic conditions.

Hypothesis 1*: New Zealand-listed companies have significant exposure to exchange rate movements.*

2.2. Determinants of exchange rate exposure

Understanding why exchange rate exposure varies across firms is essential for both corporate decision-making and risk management. In this section, drawing on the theoretical and empirical frameworks of (Adler & Dumas, 1984) and (Jorion, 1990), respectively, we identify two main firm-specific determinants, the firm's degree of international engagement and hedging practices, that affect the magnitude and direction of the sensitivity of the firm's stock returns to exchange rate changes.

2.2.1. International engagement

As firms increasingly engage in global trade, foreign exchange rate fluctuations have become an important source of uncertainty for non-financial corporations, as international revenues, costs, and assets expose firms to currency risk (Bartram et al., 2010).

Research documents a positive association between firms' international engagement and their exposure to exchange rate movements, with different studies emphasising distinct channels through which foreign involvement generates currency risk. Literature focuses on foreign sales. Firms that generate revenues in foreign currencies are directly affected by exchange rate fluctuations through the conversion of foreign revenues into domestic currency. When the foreign currency depreciates, the domestic value of foreign revenues declines, compressing profit margins and weakening price competitiveness in export markets. This effect is particularly pronounced for firms with limited pricing power, as they are unable to fully pass exchange rate changes through to foreign customers (Dominguez & Tesar, 2006). Empirical studies report a positive relationship between foreign sales ratio and exchange rate exposure, showing that firms with greater foreign sales are more likely to exhibit statistically significant sensitivity to currency movements (Bodnar & Wong, 2003; De Jong et al., 2006; Doidge et al., 2006; Hutson & Laing, 2014).

In addition, literature emphasises the role of multinational operations in shaping exchange rate exposure. Firms with overseas assets are exposed to currency risk not only through operating cash flows but also through valuation effects on balance sheet positions. Dominguez and Tesar (2006) highlight that exchange rate exposure arises from these broader operating and asset-valuation channels, as changes in exchange rates affect the domestic value of foreign assets in addition to foreign revenues. Doidge et al. (2006) show that firms with a greater share in foreign assets and multinational presence exhibit higher exchange rate exposure, reflecting the sensitivity of firm value to changes in the domestic currency value of foreign investments. Consistently, De Jong et al. (2006) find that multinational firms experience significant positive exposure arising from both operating and balance sheet channels, highlighting that exchange rate movements affect firm value through the revaluation of foreign assets as well as through long-term strategic positioning in international markets.

More recent studies stress that international engagement increases the complexity of exchange rate exposure. From a sample of 123 large US, UK, and Asia Pacific multinational firms, Faff and Marshall (2005) show that firms with more extensive international operations are exposed to multiple currencies and experience heterogeneous exposure patterns that vary across markets and over time. Using a sample of 953 US firms over the period 1999–2006, Hutson and Laing (2014) further demonstrate that internationally diversified firms face nonlinear and time-varying exposure, reflecting interactions between trade structures and firms' competitive environments.

Overall, the existing evidence suggests that international engagement increases firms' underlying exposure to exchange rate movements, but the extent to which this exposure is reflected in firm value depends on firms' ability to manage and absorb currency risk. This is particularly relevant in small open economies

such as New Zealand, where firms typically have limited pricing power. Being small relative to global competitors and often operating as price takers, New Zealand firms have limited ability to offset exchange rate fluctuations through price adjustments and rely heavily on foreign markets for both revenues and inputs. International engagement is therefore expected to be a key determinant of exchange rate exposure.

Hypothesis 2: *Firms with greater international engagement exhibit higher exchange rate exposure.*

2.2.2. Corporate hedging

Corporate hedging practices play a key role in shaping the extent to which exchange rate movements are reflected in firm value (Allayannis & Ofek, 2001; Geyer-Klingeberg et al., 2021). While international engagement exposes firms to currency fluctuations, they are not passive recipients of exchange rate risk. Instead, they can actively manage this risk through both financial and operational hedging strategies, thereby substantially reducing observed exchange rate exposure (Dewenter et al., 2005; Francis et al., 2008).

Theoretical work emphasises that firms hedge exchange rate risk to stabilise cash flows, reduce the likelihood of financial distress, and preserve investment capacity in the presence of costly external finance (Froot et al., 1993). By reducing cash-flow volatility, hedging can enhance firm value even when shareholders are well diversified. Adler and Dumas (1984) further argue that optimal hedging decisions depend on firms' operating structures and the currency composition of revenues and costs.

Empirical evidence supports the view that hedging attenuates exchange rate exposure. Using data from 1,150 manufacturing firms in 16 countries (both developed and emerging economies), Bartram et al. (2010) show that firms employing foreign currency derivatives exhibit significantly lower exchange rate sensitivity than non-hedging firms. Similarly, Hutson and Laing (2014) find that both financial hedging instruments and operational hedging, such as geographically diversified production and sourcing, reduce firms' exposure to currency movements. These findings suggest that firms' endogenous risk-management responses partially offset the observed exchange rate exposure (net exposure).

Operational hedging is particularly relevant for firms with international operations (Allayannis et al., 2001). By matching foreign-currency revenues with foreign-currency costs, adjusting production locations, or diversifying supply chains across currencies, firms can reduce their sensitivity to exchange rate movements without relying solely on financial instruments (Allayannis et al., 2001). Financial hedging, in contrast, relies on derivatives such as forwards, options, and swaps to manage short-term transaction exposure. The effectiveness of these strategies depends on firm characteristics, access to financial markets, and the cost of hedging (Allayannis & Ofek, 2001; Géczy et al., 1997).

Regarding New Zealand evidence, Chan et al. (2003) employ variance-minimisation, and expected utility approaches compare the hedging effectiveness of currency forwards and options for exporters in managing risk from NZD/USD. The study suggests that in a stable environment, exporters should opt for the forward market. In contrast, in the event of highly volatile exchange rates, exporters should choose options. Li et al. (2014) created a new dataset of New Zealand-listed non-financial firms in 2007 and employed textual

analysis to evaluate the relationship between hedging and firm value. Foreign currency derivatives variable is a dummy that takes the value of 1 if the firm reports any usage, and Tobin's Q is a proxy for the firm's market value. They report that for both firms with and without foreign sales, the firm value is not enhanced by using derivatives.

In the context of New Zealand, hedging decisions are likely to be particularly important. Firms operating in small open economies may be more exposed to exchange rate volatility due to their reliance on international trade, yet they may face constraints on hedging capacity stemming from firm size, market depth, or limited access to sophisticated financial instruments. As a result, differences in hedging behaviour may be a source of heterogeneity in observed exchange rate exposure among New Zealand-listed firms.

Hypothesis 3: *Firms that engage more extensively in financial and/or operational hedging exhibit lower exchange rate exposure.*

2.3. Geopolitical risk

Geopolitical risk (GPR) refers to uncertainty arising from war, military conflict, terrorism, and heightened geopolitical tensions that disrupt international political and economic relations (Caldara & Iacoviello, 2022). A growing body of research shows that geopolitical risk has significant macroeconomic consequences, including higher inflation, slower economic activity, and reduced international trade and investment (Caldara et al., 2022; Carney, 2016). At the firm level, heightened geopolitical uncertainty can disrupt cross-border operations, weaken supply chains, and increase uncertainty surrounding revenues, costs, and investment decisions, thereby affecting firm valuation (Bussy & Zheng, 2023).

Recent literature documents multiple channels through which geopolitical risk is transmitted to financial markets and corporate outcomes. Geopolitical risk affects capital flows and investor risk appetite, leading to changes in asset prices and risk premia (Caldara & Iacoviello, 2022; Ji, 2025). It is also associated with heightened asset prices and foreign exchange volatility, which can amplify valuation effects for firms exposed to international markets (Choudhury, 2025; Dodd et al., 2024; Li et al., 2025). Beyond financial channels, geopolitical risk disrupts trade flows and global supply chains, increasing uncertainty over input availability, production costs, and market access (Khalil et al., 2025; Su et al., 2025). Recent evidence shows that geopolitical risk also influences corporate investment behaviour by raising uncertainty and delaying or reducing capital expenditures (Nguyen et al., 2025). These transmission mechanisms imply that geopolitical risk is economically relevant for firms, but its impact is unlikely to be uniform across firms.

Empirical studies examining the relationship between geopolitical risk and stock returns provide evidence of a negative association between the change in geopolitical risk and stock returns. Using quarterly data of public Chinese firms from 2013 to 2017, Lee et al. (2021) show that policy-related risk has an adverse impact on firm equity financing. Rising geopolitical tensions are associated with higher volatility and negative stock returns, particularly during severe geopolitical crises (Berkman et al., 2011; Gkillas et al., 2018). More recent research indicates that stock markets in advanced economies respond more strongly to geopolitical

threats than to the actual realisation of geopolitical events (Afees A Salisu et al., 2022; Yilmazkuday, 2024). This asymmetry reflects the forward-looking nature of financial markets, as geopolitical threats increase uncertainty and risk premia before events materialise, whereas actual events are often anticipated and partially priced in.

Firms in small open economies are likely to be exposed to global geopolitical developments, given their dependence on international trade, capital flows, and external demand (McKenzie, 2024). Geopolitical shocks can therefore transmit to firm valuation through disruptions to export markets, imported inputs, and investor sentiment. Therefore, for New Zealand, geopolitical risk may represent an important source of uncertainty affecting firms' stock returns.

Hypothesis 4: *New Zealand firms' stock returns are negatively sensitive to changes in geopolitical risk.*

2.3.1. Determinants of firm-level geopolitical risk exposure

Although geopolitical risk originates at the global or national level, recent research emphasises that sensitivity to geopolitical risk shocks differs substantially across firms. Firm-level geopolitical risk exposure is shaped by differences in business models, operational structures, and the degree of international integration (Bussy & Zheng, 2023; Caldara & Iacoviello, 2022; Charpin & Cousineau, 2025; Fan & Xiao, 2023). Firms that are more internationally engaged through foreign sales, foreign assets, or reliance on global supply chains are more directly affected by geopolitical events such as wars, sanctions, and diplomatic tensions. Geopolitical shocks can restrict market access, raise trade costs, disrupt production networks, and increase uncertainty surrounding cross-border transactions, affecting firms' cash flows and valuation (Bussy & Zheng, 2023; Carney, 2016; Carney et al., 2024; Guo, 2024; Yan & Piao, 2025).

Empirical evidence supports the view that international engagement is a key determinant of firm-level geopolitical risk exposure. Using firm-level measures of geopolitical risk derived from earnings calls, Zhou (2025) finds that firms with greater international engagement exhibit stronger stock return sensitivity to geopolitical risk. Bussy and Zheng (2023) argue that geopolitical shocks disrupt cross-border supply chains and trade relationships, implying that firms more reliant on international markets face larger valuation effects. Overall, the evidence indicates that geopolitical shocks are more strongly transmitted to firms whose operations and revenues are closely tied to international markets.

In addition to international engagement, firms' risk management practices may influence how geopolitical risk is reflected in firm value. Exposure to global risks observed in stock returns reflects net exposure after firms' endogenous responses, including hedging, have been accounted for (Bartram et al., 2010). Geopolitical risk is associated with heightened exchange rate volatility, lower market liquidity, and increased transaction costs, raising costs and reducing the availability of derivative hedging instruments (IMF, 2025a). At the same time, geopolitical disruptions such as trade restrictions, sanctions, and supply chain frictions can constrain firms' ability to adjust production, sourcing, or pricing across markets, thereby weakening operational or natural hedges (Gupta et al., 2019; Hassan et al., 2019). Firms that hedge their currency risk

may be better able to weather the impact of geopolitical shocks on cash flows and valuation, resulting in weaker stock return sensitivity to changes in geopolitical risk.

Hypothesis 5: *Firms with greater international engagement exhibit higher exposure to geopolitical risk.*

Hypothesis 6: *Firms with a higher level of hedging activities exhibit lower exposure to geopolitical risk.*

2.3.2. Geopolitical risk as a moderator of exchange rate exposure

Beyond its direct impact on stock returns, geopolitical risk may also influence how firms are exposed to other sources of risk. In particular, heightened geopolitical uncertainty may alter firms' sensitivity to exchange rate movements by constraining operational flexibility and increasing the cost or effectiveness of risk management. Adler and Dumas (1984) note that exchange rate exposure is not constant over time and may vary as economic conditions change. Subsequent empirical evidence confirms that firm-level exchange rate exposure is time-varying and tends to intensify during periods of heightened uncertainty and macroeconomic stress (Bartram et al., 2010; Dominguez & Tesar, 2006).

Recent studies show that exchange rate exposure increases during crisis periods, when uncertainty rises, and firms' ability to hedge or adjust operations is reduced. Sikarwar (2023), for example, finds that during the COVID-19 pandemic, firm-level currency exposure rises significantly, and firm fundamentals such as international involvement, profitability, liquidity, and hedging capacity play a more important role in shaping exposure during this period. These findings indicate that exchange rate exposure depends not only on firms ' characteristics but also on broader macroeconomic and geopolitical conditions.

Geopolitical risk may amplify exchange rate exposure, particularly for international firms, through both financial and real economic channels. From a financial perspective, geopolitical risk is increasingly viewed as a component of global disaster risk that affects exchange rate dynamics and currency risk premia. Farhi and Gabaix (2016) argue that time-varying disaster risk is a key driver of exchange rates, leading to stronger, more volatile currency movements when perceived risks increase. This is also consistent with evidence by Bossman et al. (2023) and Yilmazkuday (2025) that geopolitical risk shocks are associated with significant exchange rate movements, particularly during high-risk periods. From a real economic perspective, geopolitical events disrupt global supply chains and cross-border operations, reducing firms' ability to adjust production, sourcing, and pricing in response to currency movements (Gupta et al., 2019; Hossain et al., 2024). As a result, firms with greater international involvement may experience a stronger transmission of exchange rate shocks to firm value when geopolitical risk is elevated.

As argued in section 2.3.2, firms' risk management practices play a significant role in shaping observed exchange rate exposure. However, hedging effectiveness is not constant over time and may deteriorate during periods of heightened uncertainty. Geopolitical risk is associated with increased market volatility, higher transaction costs, and greater counterparty risk, all of which can reduce the effectiveness of derivative-based hedging instruments and limit firms' ability to roll over or adjust hedge positions (Bossman et al., 2023; Caldara & Iacoviello, 2022).

At the same time, geopolitical disruptions can impair operational hedges by constraining firms' ability to reallocate production, adjust sourcing, or realign foreign-currency revenues and costs across locations. Trade restrictions, sanctions, border frictions, and supply chain disruptions associated with geopolitical events limit firms' operational flexibility and reduce their ability to offset exchange rate fluctuations through real adjustments (Gupta et al., 2019; Hassan et al., 2019). Bartram et al. (2010) show that exchange rate exposure varies over time and reflects changes in firms' risk management effectiveness. Ye et al. (2014) document a substantial rise in exchange rate exposure among emerging market firms during and immediately after the Global Financial Crisis, with a larger proportion of firms exhibiting statistically significant exposure and higher exposure coefficients, implying that periods of elevated uncertainty weaken firms' ability to manage currency risk and allow underlying economic exposure to be more fully reflected in stock returns. More recently, Sikarwar (2023) finds that firm-level exchange rate exposure increases significantly during crisis periods, despite hedging activities, suggesting that hedging becomes less effective as uncertainty rises sharply. Under such conditions, firms that rely on hedging to mitigate currency risk may experience a larger increase in net exchange rate exposure when geopolitical risk intensifies. Therefore, geopolitical risk may weaken the ability of hedging practices to protect firm value from exchange rate movements, leading to stronger observed exchange rate exposure during periods of heightened geopolitical uncertainty.

Hypothesis 7: *Geopolitical risk amplifies firms' exchange rate exposure, particularly for firms with greater international engagement and a higher level of hedging activities.*

CHAPTER 3

DATA AND METHODOLOGY

Chapter 3 describes the data and empirical methodology used in the study. It outlines the sample construction, data sources, and variable definitions, including disclosure-based measures of hedging and international orientation. The chapter also presents the empirical framework used to estimate firm-level exposure to exchange rate and geopolitical risks and to examine the firm-specific determinants of these exposures.

3.1. Sample

The final sample consists of 147 non-financial firms listed on the New Zealand Stock Exchange (NZX) from 2012 to 2025. Throughout the observed period, the sample originally included 208 entities. Financial institutions and funds are excluded, as their balance sheet structures and risk transmission mechanisms differ substantially from those of non-financial firms. Real estate companies are also removed from the sample because they are typically asset and liability-heavy and operate under different regulatory frameworks, and exhibit different risk transmission mechanisms (Feng et al., 2007; Harrison et al., 2011). Their returns tend to respond primarily to interest rate changes, funding costs, and shifts in asset valuations, whereas for other non-financial firms, returns are more directly linked to operating cash flows, input costs, export revenues, and competitive pressures (Lee et al., 2018). Firms with no data available are also excluded, resulting in a final sample of 147 firms, which represents approximately 70% of NZX-listed firms during the sample period and provides broad coverage of the New Zealand equity market.

3.2. Data

3.2.1. Exchange Rates, Geopolitical Risk, and other Market-level data

Exchange rate data include the nominal New Zealand trade-weighted index (TWI), which is a basket index reflecting the currencies of New Zealand's 17 major trading partners, and bilateral exchange rates. According to Stats NZ (2025), the top major trading partners of New Zealand are China, the US, and Australia. Therefore, the study will include bilateral exchange rates between New Zealand and these three major trading partners, which are NZD/CNY, NZD/USD, and NZD/AUD, to assess the sensitivity of firms to specific currencies. These series are obtained from Datastream and the Reserve Bank of New Zealand. All exchange rates are expressed as units of foreign currency per New Zealand dollar, so that an increase in the exchange rate indicates depreciation of the foreign currency, while a decrease indicates appreciation.

Geopolitical risk is measured using the global geopolitical risk index (GPR) developed by Caldara and Iacoviello (2022), available at https://www.matteoiacoviello.com/gpr.htm. This index is constructed using a text search method of the ten major US newspapers. The index is computed by counting articles that reference adverse geopolitical developments and expressing this count as a share of the total number of articles

published. The search terms are organized into eight categories covering war threats, peace threats, military buildups, nuclear threats, terror threats, the onset of war, war escalation, and terrorist acts. Based on these categories, the authors also construct two subindices, which are (1) the geopolitical threats index, including categories related to rising tensions and threats, and (2) the geopolitical acts index, capturing realised geopolitical events. Although country-specific measures may appear desirable, a daily New Zealand-specific GPR series is not available. The global index, therefore, provides the only high-frequency measure consistent with the daily stock return data used in this study. Moreover, because New Zealand is a small, highly open economy, exchange rates and firm performance can be influenced by global conditions. Therefore, we use the global GPR index to capture the overall risk environment relevant for firms' exchange rate exposure.

In addition to the TWI, this study incorporates bilateral exchange rates to capture firm-specific currency exposure, as a single aggregate exchange rate may not fully reflect heterogeneous exposure across firms. Diversification across currencies can weaken measured effects when using an aggregate index. Accordingly, the literature commonly employs bilateral exchange rates to examine the sensitivity of results to alternative exchange rate measures (Bartram & Bodnar, 2007; Dominguez & Tesar, 2001) .

The equity market index is proxied by the NZX 50 Index, obtained from Datastream, and market returns are calculated as the logarithmic difference of the index level.

3.2.2. Firm-specific data

Firm-specific financial data, including stock prices and accounting variables, are obtained from Datastream. A firm's international engagement is proxied using foreign sales/total sales and foreign assets/total assets ratios, which capture the extent of a firm's international operations. These measures are widely used in the literature on corporate foreign exchange exposure (Doidge et al., 2006; Dominguez & Tesar, 2006; Hutson & Stevenson, 2010; Krapl, 2017).

Country-related textual variables are constructed to capture the intensity with which firms discuss major foreign markets in their annual reports. A keyword dictionary is developed for China, the United States, and Australia, reflecting New Zealand's major trading partners. For each firm-year observation, the frequency of country-related keywords is normalised by the total number of words in the cleaned text, following Loughran and McDonald (2015). These variables measure the relative emphasis placed on each foreign market in firm disclosures rather than direct economic exposure. At the same time, these measures can proxy for operational hedging, as discussions of foreign markets may indicate the presence of foreign operations, revenues, or costs.

Text-based firm-level foreign exchange hedging practices are captured by 1) the level of firms' FX hedging-related disclosures, and 2) a dummy variable that equals 1 if a firm reports the use of derivatives and 0 otherwise. The detailed variable construction is shown in Section 3.2.3.

To isolate the effects of international engagement, hedging, and geopolitical risk on exchange rate exposure, the analysis controls for a set of firm characteristics that have been shown in the literature to

influence firms' sensitivity to currency movements and external shocks. Firm size is included as a control variable to capture differences in firms' scale of operations, market presence, and capacity to manage financial risks. Larger firms are typically more diversified across markets and may have greater access to financial instruments and more sophisticated treasury functions, which can influence observed exchange rate exposure (De Jong et al., 2006; Hutson & Laing, 2014). At the same time, firm size *(lnTotalAssets)* may proxy for the extent of international operations and organisational complexity, both of which can affect how exchange rate movements are transmitted to firm value. Following the literature, firm size is measured as the natural logarithm of total assets. Financial performance *(OPR)* is controlled to account for differences in firms' financial strength, pricing power, and operational flexibility. More profitable firms may be better able to absorb external shocks, adjust prices, or reallocate resources in response to exchange rate movements, which can dampen the sensitivity of stock returns to currency fluctuations (Aggarwal & Harper, 2010). Financial performance is measured using the operating profit margin, a commonly used indicator of firms' operating performance. Operational efficiency *(AssetTurnRatio)* is included to capture differences in operational efficiency and competitiveness across firms. Firms that use their asset base more efficiently may be better positioned to respond to changes in relative prices, input costs, and demand conditions induced by exchange rate movements. Prior studies suggest that higher operational efficiency is associated with lower sensitivity of stock returns to exchange rate fluctuations (Aggarwal & Harper, 2010; Ye et al., 2014). Operational efficiency is proxied by the asset turnover ratio. Financial flexibility *(DebtRatio* and *QuickRatio)* can capture differences in financial structure and risk management constraints. Firms with high leverage, which is measured by the debt ratio, may have stronger incentives to hedge currency risk in order to reduce cash flow volatility and avoid financial distress, therefore, less exposed to exchange rate risk (He et al., 2021). On the other hand, firms with high liquidity, as measured using the quick ratio, may rely less on formal hedging instruments because they can absorb currency losses internally, affecting observed exchange rate exposure (Bartram, 2004). In addition, financial strength and corporate liquidity may help firms absorb broader geopolitical shocks (Nance et al., 1993). However, because their effects are theoretically ambiguous, these variables are treated as conditioning factors rather than primary determinants. Growth opportunities *(PB)* are included as a control to account for differences in firms' investment incentives and risk-taking behaviour. Empirical evidence suggests that high-growth firms may prioritise expansion over risk management, potentially leaving them more exposed to exchange rate movements (He et al., 2021; Hutson & Stevenson, 2010; Krapl, 2017). Growth opportunities are proxied by the price-to-book ratio.

All accounting and textual variables are measured annually and used in the second-stage regression analysis.

3.2.3. Textual analysis variables

This section constructs firm-level measures of international engagement and risk management using textual analysis of annual reports. Specifically, two sets of variables are developed: (i) indicators of firms' financial hedging activities, based on disclosures related to foreign exchange derivatives, and (ii) country-

related measures that capture firms' operational exposure and potential operational hedging through geographic diversification.

We follow Hoberg and Moon (2017) and Alexandridis et al. (2021) to construct FX-hedging variables. After preprocessing annual reports (Appendix 1). Each paragraph is scanned for the co-occurrence of terms from three keyword groups: FX-related words (Group A), derivative instruments (Group B), and contractual or position descriptors (Group C) (refer to Appendix 2 for the list of keywords). A hedging "hit" is recorded when at least one keyword from each group appears within a 25-word window, consistent with prior studies to ensure semantic proximity while limiting spurious matches (Alexandridis et al., 2021; Hoberg & Moon, 2017). To mitigate false positives, we follow Han and Laing (2025) and Sun et al. (2022) to exclude paragraphs containing explicit negations, such as not material, insignificant, no foreign exchange derivatives, do not use, or do not engage. Additionally, when a paragraph referencing FX risk is accompanied by a negation either in the same or a subsequent paragraph, the firm's hedging indicator is set to zero to reflect explicit non-use of derivatives. For each firm-year observation, three variables are computed: HEDGE_Raw, the number of non-negated hedging hits; FXhedgingDummy, equal to 1 if HEDGE_Raw > 0; and FXhedging, defined as log(1 + HEDGE_Raw), which captures the level of firms' FX hedging-related disclosures.

The country-related textual variables capture the intensity with which firms discuss major foreign markets in their annual reports. A keyword dictionary for China, the United States, and Australia, the three major trade partners with New Zealand, is constructed to identify country names, currency symbols, and common market descriptors (refer to Appendix 2 for the list of keywords). Following Loughran and McDonald (2015), each report's total word count is computed from the cleaned text, and the normalised frequency of each keyword (keyword count divided by total words) is calculated. For each country group, the normalised keyword counts are summed to obtain three country-related textual measures (China, USA, and AUS), which reflect the relative emphasis placed on each foreign market in firm-year disclosures rather than direct economic exposure.

3.3. Models

The empirical strategy adopts a two-stage approach that is well established in the literature on exchange rate and geopolitical risk exposure (Dominguez & Tesar, 2006; Jorion, 1990; Sikarwar, 2023). This framework allows for a clear separation between the estimation of firms' risk exposures and the identification of their underlying determinants.

3.3.1. Estimating exposure

In the first stage, firm-specific risk exposures are estimated using time-series regressions of daily stock returns on market returns and on exchange rate returns or on changes in geopolitical risk. The use of daily data enables more precise identification of firms' sensitivity to short-term global risk shocks and reduces potential aggregation bias associated with lower-frequency data. Higher-frequency observations improve the efficiency of exposure estimates and mitigate measurement error when exchange rate and risk factor movements are

volatile (Chamberlain et al., 1997; Di Iorio & Faff, 2000). Global risk exposure of New Zealand companies is estimated using daily time-series OLS for each firm i and fiscal year y, as specified in the model below:

$$R_{it} = \beta_{0i} + \beta_{1i}R_{Mt} + \beta_{2i}R_{Riskt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the firm's daily log return $\ln(P_{it}/lagP_{i,t})$; R_{Mt} is the daily log return of the market index; and R_{Riskt} is the daily change in the risk factor, measured as either (1) the daily log return in the exchange rates, or (2) the delta change in GPR, $\Delta GPR = GPR_t - GPR_{t-1}$.

The coefficient of interest is β_{2i}, which measures firm i's sensitivity to a given risk factor based on changes in that factor within a fiscal year. The risk factors considered in this study include exchange rate risk and geopolitical risk. Exchange rate risk is measured using the New Zealand trade weighted index and bilateral exchange rates, while geopolitical risk is measured using the geopolitical risk index and its subcomponents, including the overall GPR index, the geopolitical acts index, and the geopolitical threats index. Exchange rates are quoted as the New Zealand dollar price of one unit of foreign currency. When β_{2i} is negative, an appreciation of foreign currencies is associated with lower firm stock returns. This interpretation follows from the exchange rate quotation convention used in this study, whereby an appreciation of foreign currencies corresponds to an increase in the exchange rate. Conversely, a positive β_{2i} implies that firm stock returns decline when foreign currencies depreciate. For geopolitical risk, a negative β_{2i} implies that firm returns decrease following an increase in geopolitical risk, as measured by a positive change in the GPR index. Conversely, a positive coefficient indicates that firm returns increase with rising geopolitical risk.

3.3.2. Explaining exposure

Following literature (Choi & Prasad, 1995; Faff & Marshall, 2005; He et al., 2021; Krapl, 2020), To examine the firm-level determinants of risk exposure, we relate the absolute value of the estimated exposure coefficients obtained from the first-stage regressions to firm characteristics using the following specification:

$$|\beta_{2Risk,i,y}| = \gamma_0 + \gamma_1 ForeSaleRatio_{i,y-1} + \gamma_2 FXHedging_{i,y-1} + \gamma_3 C_{i,y-1} + \gamma_4 X_{i,y-1} + \varepsilon_{iy} \quad (2)$$

where $|\beta_{2Risk,i,y}|$ denotes the absolute value of firm i's estimated sensitivity to the respective risk factors, either exchange rate risk or geopolitical risk, in financial year y, obtained from the first-stage regression. The use of absolute exposure measures captures the magnitude of firms' sensitivity to risk shocks. $ForeSaleRatio_{i,y-1}$ captures the degree of a firm's international involvement, measured as the ratio of foreign sales to total sales. $FXHedging_{i,y-1}$measures the extent of firms' foreign exchange risk management activity based on disclosures in annual reports. $C_{i,y-1}$represents a vector of country-orientation variables indicating firms' exposure to specific foreign markets, including textual references to the US, Australia, and China. These variables proxy for firms' geographic focus and potential channels through which international risk may affect firm value. The vector $X_{i,y-1}$ includes additional firm-level control variables capturing operational efficiency, firm size, profitability, growth opportunities, leverage, and liquidity. All explanatory variables are measured

using information available at the end of the year $(y-1)$ and lagged by one year to ensure proper temporal ordering, given that firm characteristics are disclosed at the end of the financial year.

Equation (2) is estimated using firm fixed effects to control for time-invariant unobserved firm heterogeneity, with standard errors clustered at the firm level. The error term is denoted by $\varepsilon_{i,y}$.

As New Zealand firms publish their annual reports at the end of the financial year, all independent variables in Equation (2) are lagged by one year to ensure proper temporal ordering. Equation (2) is estimated using firm fixed effects, with standard errors clustered at the firm level. The error term is denoted by ε_{iy}.

3.4. Descriptive statistics

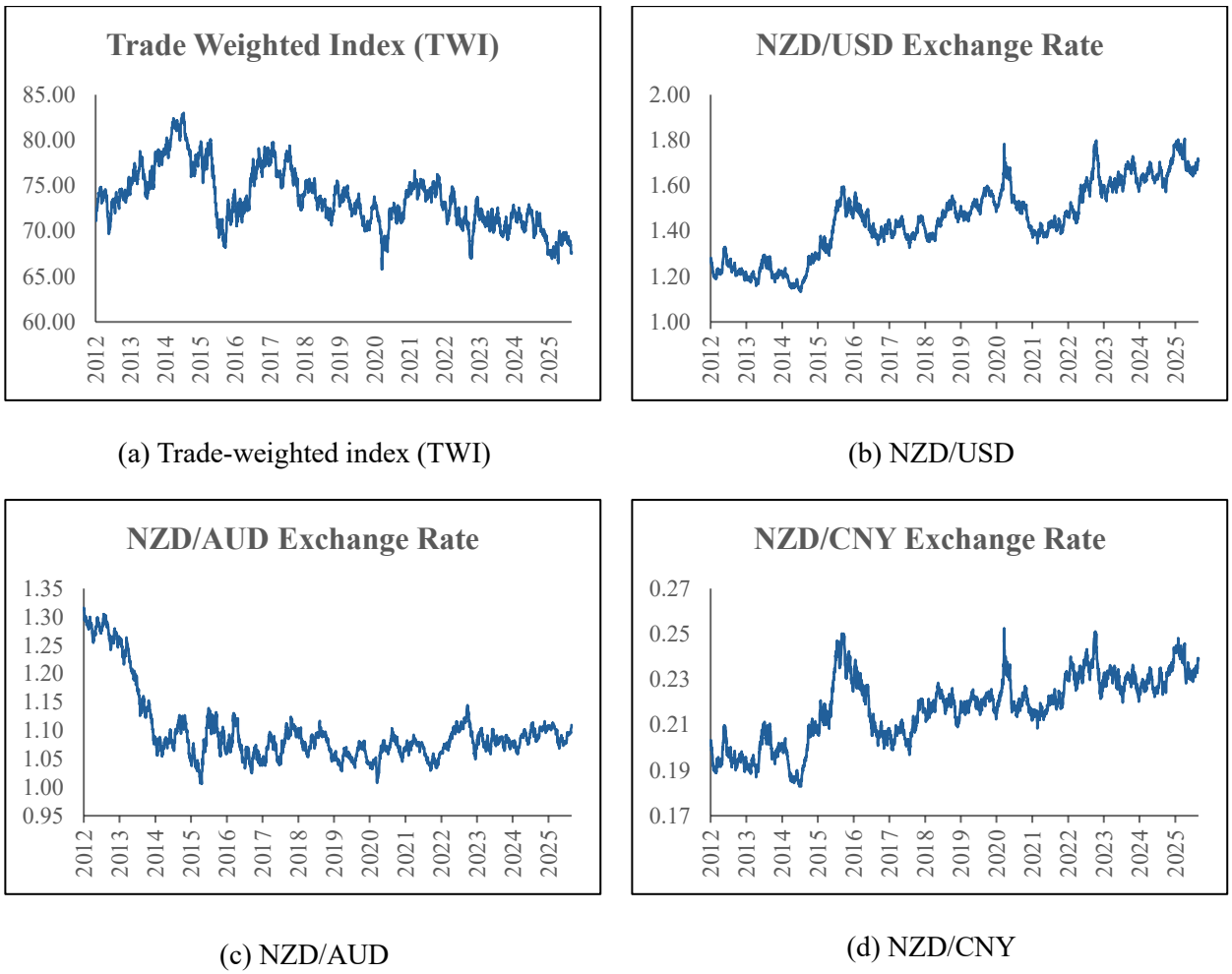
Table 1 reports descriptive statistics for the variables used in the analysis. Panel A summarizes daily log returns of firm stock prices, market returns, exchange rates, and changes in GPR indices. The mean daily stock price return is approximately zero with a standard deviation of 2.1%, showing daily volatility. The NZX50 index has lower volatility with a 0.7% standard deviation. Exchange rate returns show varying degrees of volatility. The USD is the most volatile, while the AUD is the least volatile among the three currency pairs. The GPR indices have considerable variation, with standard deviations ranging from 4.4% to 6.1%, and extreme values indicating substantial geopolitical shocks during the sample period. Figure 1 illustrates the evolution of the New Zealand dollar trade-weighted exchange rate and key bilateral exchange rates against the US dollar, Australian dollar, and Chinese renminbi, highlighting pronounced fluctuations over the sample period. Figure 2 shows the global GPR index, which exhibits sharp spikes during periods of elevated global uncertainty.

[Insert Table 1]

Panel B presents the distribution of firm-level exchange rate and geopolitical risk exposure coefficients estimated from Equation (1). Although the average exposure is close to zero, the exposure estimates exhibit considerable dispersion across firms, with both positive and negative values. This heterogeneity suggests that exchange rate and GPR shocks affect New Zealand-listed firms in distinct ways, motivating a cross-sectional analysis of exposure determinants.

Panel C shows firm characteristics used in Equation (2). The statistics reveal substantial variation in firm size, international engagement, leverage, liquidity, and hedging activity among New Zealand-listed firms. In particular, foreign sales ratio ranges from purely domestic firms to firms with fully foreign revenues, highlighting the importance of international operations in shaping exposure to global risks.

Figure 1: Exchange rates of the New Zealand dollar (2012–2025)



(a) Trade-weighted index (TWI)

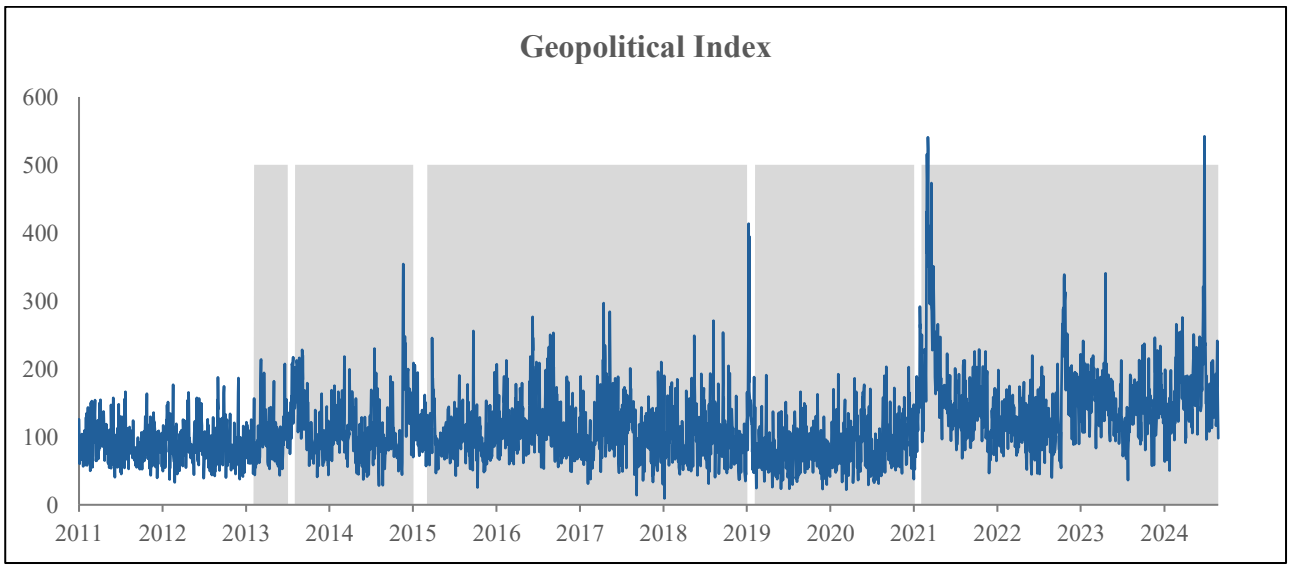
(b) NZD/USD

(c) NZD/AUD

(d) NZD/CNY

Source: Reserve Bank of New Zealand

Figure 2: Geopolitical index with major geopolitical events in the shaded area



Source: https://www.matteoiacoviello.com/gpr.htm

3.5. Correlations

Correlations among the variables used in Equation (1) are presented in Panel A. The returns of TWI show very high positive correlations with both the USD and CNY exchange rate returns, indicating the dominance of these currencies in New Zealand's trade basket. The correlation between USD and CNY is similarly high, suggesting these bilateral rates move closely together. The GPR changes (dGPR, dGPRACT, dGPRTHREAT) are highly correlated, which demonstrates that they are derived from the same underlying index decomposition. This high internal correlation suggests that these measures capture related but not identical dimensions of global geopolitical uncertainty. GPR variables show low correlations with both firm returns and exchange rates, indicating that GPR shocks do not co-move with daily financial market fluctuations and therefore provide meaningful independent variation for the regression analysis.

[Insert Table 2]

Panel B shows the correlation between the variables used in Equation (2). Absolute exchange rate and GPR exposure betas show weak associations with most firm characteristics. The FX hedging dummy variable shows significant positive correlations with the GPR beta and its components, suggesting that firms that engage in FX hedging tend to have higher GPR exposures. Geographic variables show positive correlations with the foreign sales ratio but weak, mostly insignificant correlations with both exchange rates and GPR betas, except for the AUS variable, which shows a significant positive correlation with the AUD beta exposure.

CHAPTER 4

RESULTS: EXCHANGE RATE EXPOSURE

This chapter presents the estimation results on exchange rate exposure among New Zealand-listed firms. It documents aggregate and firm-level sensitivity of stock returns to movements in trade-weighted and bilateral exchange rates and highlights substantial heterogeneity across firms and over time. The chapter further examines the firm-level determinants of exchange rate exposure, focusing on international engagement, hedging behaviour, and other firm characteristics.

4.1. Exchange rate exposure in New Zealand

To assess whether exchange rate risk is priced in equity markets, we first estimate aggregate exchange rate exposure for New Zealand-listed firms. Table 3 presents pooled regression results estimating the aggregate exchange rate risk exposure of NZX-listed firms. The lagged response is also included in the model to account for the mispricing, as proposed by Bartov and Bodnar (1994). In column (1), the coefficient on the contemporaneous change in the trade-weighted index is negative and statistically significant (-0.081, t = -7.10). This indicates that, on average, New Zealand firms experience lower stock returns when the foreign currency basket appreciates against the NZD. A 1% appreciation of the foreign currency basket is associated with an approximately 0.08% decline in daily firm stock returns, holding other factors constant. The first and second lags of the TWI are also negative and statistically significant, suggesting that the adverse effect of foreign currency appreciation persists for several days rather than being fully incorporated into stock prices immediately.

[Insert Table 3]

A similar pattern is observed for USD and CNY bilateral exchange rates. The coefficients on the contemporaneous changes in these exchange rates are both negative and statistically significant, implying that a 1% appreciation of the US dollar and the Chinese yuan against the NZD is associated with a 0.06% and 0.05% decrease in daily firm stock returns, respectively. The corresponding lagged coefficients remain negative and statistically significant, indicating persistent exchange rate effects across bilateral currency measures.

In contrast, the AUD exchange rate exhibits a different dynamic pattern. The contemporaneous coefficient in column (3) is negative but statistically insignificant (-0.013, t = -1.06), whereas the first and second lag coefficients are positive and statistically significant. This suggests that movements in the AUD exchange rate have limited immediate effects on stock returns but are associated with delayed positive responses over subsequent days. The absence of significant contemporaneous exposure suggests that AUD exchange rate returns are transmitted to firm value more gradually. Exchange rate changes between closely integrated trading partners such as New Zealand and Australia are likely to affect firms primarily through

operating and competitiveness channels, including relative pricing, cost structures, and market shares. These channels typically require time to adjust, particularly when export contracts, sourcing arrangements, and production decisions are not instantaneously renegotiated. As a result, the valuation effects of AUD fluctuations may only be incorporated into stock prices with a lag, once their implications for firm-level cash flows become observable (Bartov & Bodnar, 1994). Unlike the exposure patterns observed for the USD and CNY exchange rates, which are more closely linked to global pricing and demand conditions. Movements in these exchange rates directly affect export revenues, margins, and expectations about foreign demand, leading to immediate and persistent valuation effects that are reflected contemporaneously in stock returns. By comparison, AUD movements primarily capture bilateral economic adjustments between two structurally similar and highly integrated economies, where exchange rate changes influence firm value through gradual competitiveness effects rather than immediate financial market sentiment.

The pooled estimation results suggest that New Zealand firms are adversely affected by NZD depreciation, particularly against the TWI, USD, and CNY. This is consistent with Chen et al. (2004) and might be attributed to the New Zealand market having more importers than exporters, or exporters actually taking actions to hedge against exchange rate risk. This pattern contradicts the conventional view of New Zealand as an export-dominated economy and is consistent with evidence that export orientation does not necessarily imply positive currency exposure due to hedging and trade structure (Dominguez & Tesar, 2006).

We then take a closer look at the firm's exposure across financial years in the sample period. Table 4 reports the sign distribution of firm-level exchange rate exposure coefficients estimated from Equation (1), disaggregated by fiscal year and exchange rate. Firms are classified according to whether the estimated exposure coefficient is positive, negative, or statistically insignificant at the 10% level. This table provides descriptive evidence on the direction and time variation of exchange rate exposure among NZX-listed firms.

[Insert Table 4]

A prominent feature across all exchange rate measures is the predominance of statistically insignificant firm-level exposure. For the TWI, USD, and CNY exchange rates, roughly 80–90% of firms exhibit insignificant exposure in a typical year, with the proportion even higher for AUD. Under normal economic conditions, most New Zealand firms do not exhibit strong short-run sensitivity of equity returns to exchange rate fluctuations.

However, during periods of high uncertainty, particularly the COVID-19 period (2020–2021), the war in Ukraine (2022), and Trump's second US Presidency (2025), the percentage of firms with significant exposure increases, with negative exposure exceeding positive exposure. This suggests that exchange rate risk becomes more salient during periods of heightened macroeconomic uncertainty, when elevated exchange rate volatility, supply chain disruptions, and tighter financial conditions may weaken firms' ability to offset currency risk through operational or financial hedging.

Among firms with statistically significant exposure, negative exposure outnumbers positive exposure for the TWI, USD, and CNY. Stock returns of firms with exposure tend to decline when foreign currencies appreciate, consistent with the pooled regression results (Table 3). In contrast, exposure to AUD seems more balanced between positive and negative signs, which may reflect the close economic integration between New Zealand and Australia and the presence of natural hedging through aligned revenue and cost structures.

The results from Tables 3 and 4 jointly support Hypothesis 1. Exchange rate exposure is statistically significant at the aggregate level, while firm-level exposure is heterogeneous rather than uniformly distributed across firms. These findings indicate that exchange rate risk is a relevant factor for New Zealand firms, even though its impact varies across firms and economic conditions.

4.2. Determinants of exchange rate exposure

The preceding section documented the distribution of exchange rate exposure across firms, revealing substantial heterogeneity in both the magnitude and the sign of estimated exposure coefficients. The aim of this section is to examine the firm-level determinants of exchange rate exposure.

Table 5 reports the estimation results of Equation (2) using foreign sales as a proxy for international engagement. The foreign sales ratio exhibits a statistically significant association with exchange rate exposure only in the AUD specification, indicating that firms with a higher share of foreign sales experience stronger exposure to bilateral exchange rate movements vis-à-vis the Australian dollar. In contrast, the corresponding coefficients for the other currency pairs are positive but statistically insignificant. This pattern suggests that international involvement amplifies New Zealand firms' exchange rate exposure primarily when their foreign activities are concentrated in closely integrated bilateral markets rather than uniformly across all foreign currencies. The result is consistent with Chen et al. (2004) and suggest that even in a highly open economy, exchange rate exposure does not arise mechanically from global engagement.

[Insert Table 5]

Country-specific variables show currency-specific effects. Firms with a stronger Australian orientation exhibit significantly lower exposure in both the TWI and AUD specifications. The coefficient on AUS is -40.83 (t = -2.362) in column (1) and -54.98 (t = -2.493) in column (3). This could reflect the presence of natural hedging mechanisms arising from aligned revenue and cost structures between New Zealand and Australia. In contrast, the USA and China variables are not statistically significant in any specification, suggesting that references to these markets in annual reports do not systematically explain variation in exposure after controlling for other firm characteristics.

FX hedging activity is negatively associated with exposure across all currency pairs, but none of the estimated coefficients are statistically significant. The estimated hedging activity does not significantly reduce exchange rate exposure. For firms operating in a small open economy such as New Zealand, foreign exchange risk management is largely routine and institutionalised, with many firms employing stable hedging policies

(Chan et al., 2003). Such practices could reduce cross-sectional variation in disclosure-based hedging measures. In addition, New Zealand firms also rely on operational and natural hedging strategies, such as currency-matching of revenues and costs or invoicing practices, which are not fully captured by derivative-related textual measures.

Among the firm-level control variables, lnTotalAssets is a significant, positive determinant of exchange rate exposure. Larger firms exhibit stronger sensitivity to exchange rate returns, reflecting greater exposure to global factors, such as sourcing, financing, or cross-border operations. The coefficient for QuickRatio is positive and significant in all specifications except AUD, suggesting that more liquid firms tend to exhibit greater exchange rate sensitivity across most currency measures, potentially because they face lower financing constraints and therefore hedge less intensively, leaving a larger portion of their foreign exchange exposure unhedged. OPR shows mixed effects across currencies, positive for TWI, USD, and CNY., and negative for AUD. Other control variables (AssetTurnRatio, PB, and DebtRatio) do not exhibit consistent or statistically significant relationships with exposure across specifications.

These results partially support Hypothesis 2. Measures of international involvement, including the share of foreign sales and the geographic orientation toward Australia, are significantly associated with exposure to AUD. This suggests that firms with greater engagement in international markets tend to exhibit stronger sensitivity to exchange rate movements, though these effects are currency-specific rather than universal. In contrast, Hypothesis 3 receives no empirical support. The absence of a statistically significant relationship between FX hedging activity and exchange rate exposure suggests that hedging does not affect firms' underlying sensitivity to exchange rate returns.

Robustness checks using alternative measures support these conclusions. Appendix 4 replaces the foreign sales measure with the foreign assets ratio as a proxy for international involvement, while Appendix 5 uses a hedging dummy variable instead of the continuous hedging intensity measure. The results remain unchanged in both cases.

CHAPTER 5

RESULTS: GEOPOLITICAL RISK EXPOSURE

Chapter 5 examines the impact of changes in global geopolitical risk on stock returns of New Zealand firms, distinguishing between threat-based and event-based measures. The chapter also investigates how firm characteristics, geographic orientation, and financial structure shape firm-level sensitivity to geopolitical risk.

5.1. Geopolitical risk exposure in New Zealand

To provide a benchmark for firm-level analyses, we first estimate the aggregate sensitivity of New Zealand firms' stock returns to geopolitical risk using pooled regressions. The average effect of changes in geopolitical risk on New Zealand firm stock returns is shown in Table 6. The contemporaneous change in the global geopolitical risk index is negative and statistically significant (-0.004, t = -4.146), indicating that unexpected changes in geopolitical risk are associated with lower daily firm stock returns. The lagged coefficients are negative but statistically insignificant, suggesting that the effect of geopolitical risk shocks is largely contemporaneous.

[Insert Table 6]

By comparison, changes in the geopolitical acts index are negative but statistically insignificant (column (2)). This indicates that realised geopolitical actions have a weaker and less immediate association with daily stock returns than changes in perceived threats.

Furthermore, changes in perceived geopolitical threats exert a negative and statistically significant contemporaneous effect on stock returns, while lagged effects remain weak and insignificant, as reported in column (3). This finding suggests that New Zealand equity markets rapidly incorporate new information about geopolitical uncertainty into prices, in contrast to the more persistent exchange rate effects documented in Table 3. Overall, the results in Table 6 support Hypothesis 4 by showing that New Zealand firms' stock returns are sensitive to geopolitical risk, with this sensitivity concentrated in unexpected increases in geopolitical risk and perceived geopolitical threats rather than realised geopolitical events.

Table 7 reports the distribution of firm-level exposure to geopolitical risk. A notable feature across all three geopolitical risk measures is the high proportion of firms with statistically insignificant exposure in most years. For the overall GPR, GPRACT, and GPRTHREAT indices, approximately 85% to 95% of firms exhibit no statistically significant response in a typical year. This pattern indicates that average market-level responses to geopolitical risk, as documented in Table 6, conceal substantial heterogeneity at the firm level, with most firms displaying negligible short-run sensitivity. Negative coefficients again consistently outnumber positive ones among firms with statistically significant exposure across all three geopolitical risk measures. This implies that when geopolitical risk increases, affected firms are more likely to experience declines in stock returns rather than gains. Consistent with the market-level evidence, exposure to perceived geopolitical threats

is more prevalent than exposure to realised geopolitical actions. Firms are more likely to exhibit statistically significant responses to changes in geopolitical threats than to actual geopolitical events, reinforcing the conclusion that financial markets respond more strongly to changes in uncertainty and expectations than to events that may already be partially anticipated or priced in.

[Insert Table 7]

Similar to the exchange rate results, the percentage of firms with negative exposure increases noticeably during the COVID-19 period (2020-2021), the war in Ukraine (2022), and Trump's second US Presidency (2025). This pattern indicates that geopolitical risk becomes more relevant in times of heightened uncertainty. Overall, on average, only 2% of firms display statistically significant geopolitical risk exposure, while the vast majority show no significant response.

5.2. Determinants of geopolitical risk exposure

While the market-level results provide strong support for Hypothesis 4, the firm-level analysis reveals substantial cross-sectional and temporal heterogeneity in geopolitical risk exposure. The fact that most firms exhibit statistically insignificant exposure, alongside a small group of negatively exposed firms during periods of heightened uncertainty, suggests that geopolitical risk transmission depends on underlying firm characteristics. This motivates a deeper examination of the determinants of geopolitical risk exposure in this section.

Table 8 reports cross-sectional regressions examining firm-level determinants of geopolitical risk exposure. The results suggest that broad international involvement, measured by foreign sales, does not systematically explain cross-sectional variation in firms' exposure to geopolitical risk. Similar to results from cross-sectional analysis of exchange rate exposure, FX hedging activity is negatively associated with GPR exposure in all specifications, but none of the coefficients are statistically significant. This finding indicates that while hedging activity is directionally consistent with a mitigating role, it does not significantly reduce geopolitical risk exposure.

[Insert Table 8]

A key result is the strong and economically meaningful role of exposure to Australia. The coefficient on the Australia orientation variable is positive and statistically significant in the overall GPR specification (414.8, t = 2.363) and remains positive and marginally significant in the GPR Threat. These findings indicate that firms with stronger economic linkages to Australia exhibit substantially higher sensitivity to geopolitical risk, particularly to threat-driven shocks. Firms with greater exposure to Australia are likely more vulnerable to shifts in geopolitical uncertainty, such as trade tensions, strategic rivalry, or policy uncertainty, which disproportionately affect expectations and risk premia rather than immediate operational outcomes.

Control variables capture different messages. Larger firms in the sample exhibit lower exposure to geopolitical threat shocks. This can result from greater diversification, operational flexibility, or superior

access to risk management tools. Financial leverage is positively and significantly related to both GPR and GPR Threat exposure, suggesting that more highly leveraged firms are more sensitive to geopolitical risk shocks. Growth opportunities show a weakly significant negative association with GPR Threat exposure, while other control variables do not exhibit consistent or statistically significant effects.

These results provide only partial support for Hypothesis 5 and no support for Hypothesis 6. While the foreign sales ratio is not significantly associated with geopolitical risk exposure, firms with stronger geographic linkages, particularly to Australia, exhibit greater exposure. FX hedging activity likewise shows no statistically meaningful effect.

CHAPTER 6

GPR AS A MODERATOR OF EXCHANGE RATE EXPOSURE

This chapter integrates the analyses of exchange rate and geopolitical risk by examining whether geopolitical risk moderates firms' exchange rate exposure. It tests whether heightened geopolitical uncertainty amplifies exchange rate exposure through international engagement and whether corporate hedging mitigates this effect. We extend the baseline second-stage exposure regression by interacting each firm characteristic with the financial year mean geopolitical risk index. Let $Z_{i,y-1}$ denote the vector of baseline firm characteristics used in Equation (2). The moderation specification is as follows:

$$| \beta_{2Risk,i,y} | = \gamma_0 + \Gamma' Z_{i,y-1} + \gamma_G GPR_y + \gamma_I \left(M_{i,y-1} \times GPR_y \right) + \varepsilon_{i,y}, \quad (3)$$

where GPR_y is the annual average (level) geopolitical risk index in the financial year y, which captures the prevailing level of geopolitical uncertainty faced by firms during the year rather than short-term changes. This specification treats geopolitical risk as a persistent state variable that characterises the macro-financial environment, consistent with our objective of examining whether exchange rate exposure differs across high- and low-uncertainty regimes. $M_{i,y-1}$ is either $ForeSaleRatio_{i,y-1}$ or $FXHedging_{i,y-1}$. The interaction coefficient γ_I captures whether geopolitical risk moderates the relationship between the firm characteristic and exposure, indicating whether this effect strengthens or weakens when geopolitical risk is higher. All the explanatory variables are at the end of year $(y-1)$. The dependent variable is the absolute value of firm-level exchange rate exposure estimated from Equation (1).

Table 9 reports the estimation results of Equation (3) for Foreign Sales. The coefficient on the interaction term between foreign sales and geopolitical risk is statistically insignificant across all specifications, providing no evidence that high geopolitical risk amplifies exchange rate exposure, conditional on the firm's degree of internationalisation. Examining the main effect of foreign sales, the coefficient is positive and significant for TWI and USD. This differs from the baseline results (Table 5), where the coefficient of the foreign sales ratio is significant for AUD only. Once geopolitical risk is controlled for, foreign sales reflect broader international activity rather than trade with any specific region. Since the US dollar is widely used in international trade and financing, firms can be exposed to USD movements even without substantial business operations in the US. Regarding GPR, it shows a negative and statistically significant direct effect on exchange rate exposure across TWI, CNY, and USD. This suggests that during periods of elevated uncertainty, stock returns are increasingly driven by broad risk premia and market-wide shocks rather than currency-specific fundamentals, thereby reducing exchange rate sensitivity.

[Insert Table 9]

Table 10 reports the estimation results of Equation (3) for Hedging. The interaction term between hedging and geopolitical risk is generally insignificant across specifications, indicating limited evidence that

geopolitical risk systematically amplifies or dampens the association between hedging activity and exchange rate sensitivity. The only exception is the AUD specification, where the interaction coefficient is positive and weakly significant, suggesting that, for firms reporting greater hedging activity, exchange rate exposure increases when geopolitical risk is high. However, this effect is not observed for other currencies. The main effect of hedging is negative only for AUD, indicating that hedging reduces exposure under normal conditions, but this benefit does not persist in high-risk periods. Again, the GPR coefficient is negative and statistically significant across all currency specifications. This indicates that higher levels of geopolitical uncertainty are associated with lower exchange rate exposure, implying that firms' stock returns become less sensitive to currency movements during periods of elevated risk. This pattern suggests that broad macroeconomic and risk-premium effects dominate firm-specific exchange rate channels in times of geopolitical stress, thereby compressing measured exposure. Given that the interaction terms are largely insignificant, this direct, market-wide effect appears to be the primary channel through which geopolitical risk influences exchange rate sensitivity.

[Insert Table 10]

The interaction terms between geopolitical risk and firms' international engagement or hedging activity are mostly statistically insignificant, indicating that geopolitical risk does not amplify exchange rate exposure for firms with greater foreign sales or more extensive hedging activities. Except for a weak effect for AUD in the hedging specification, there is no consistent evidence that exposure becomes stronger for internationally oriented or actively hedged firms during periods of heightened geopolitical uncertainty. Instead, the dominant pattern is a negative and significant direct effect of geopolitical risk on exchange rate exposure across currencies, suggesting that elevated uncertainty reduces firms' overall sensitivity to exchange rate movements. These findings do not support Hypothesis 7 and indicate that high geopolitical risk directly affects exposure rather than differentially intensifying exposure for firms with greater international involvement or hedging activity.

CHAPTER 7

ROBUSTNESS

We conduct a comprehensive set of robustness checks to check whether the main findings are sensitive to alternative variable definitions and alternative measures of exposure. For the cross-sectional analysis, the main analysis uses absolute exposure coefficients ($|\beta_2|$), foreign sales ratio as a proxy for international engagement, and a text-based measure of the level of FX hedging activities. The robustness exercises complement this by (1) using alternative proxies for international involvement and hedging, and (2) evaluating exposure with subsample regressions.

7.1. Alternative measure of international involvement: foreign assets ratio (Appendix 4)

We re-estimate the determinants of the exchange rate and geopolitical risk exposure using an alternative measure of international involvement. Specifically, the foreign sales ratio is replaced with the foreign assets ratio, which captures firms' overseas asset holdings rather than revenue exposure. This measure reflects a more balance-sheet-oriented channel of international exposure.

The results for exchange rate exposure remain largely unchanged when the foreign assets ratio is used in place of foreign sales. Foreign assets exposure is positively and statistically significant for the AUD exchange rate, with an economically larger coefficient relative to the foreign sales measure, indicating that asset-based linkages to Australia capture exchange rate exposure more strongly. Geographic orientation toward Australia continues to be negatively and statistically significant for exposure to TWI and AUD, with a larger coefficient than in the baseline specification, reinforcing the role of concentrated regional linkages in shaping exchange rate sensitivity. Other firm characteristics, including firm size, operational profitability, liquidity, and leverage, retain similar signs and significance levels to those observed in the baseline specifications, suggesting that the determinants of exchange rate exposure are robust to alternative measures of internationalisation.

Turning to geopolitical risk exposure, the robustness results closely mirror the baseline findings. Foreign assets ratio does not exhibit a statistically significant relationship with exposure to geopolitical risk across the GPR, GPRACT, or GPRTHREAT specifications, confirming that broad international involvement, whether measured through sales or asset holdings, does not explain variation in geopolitical risk exposure. In contrast, China orientation emerges as an important determinant when using the foreign assets ratio. The coefficient is positive and statistically significant for GPR and GPR Threat, whereas it is insignificant in the baseline specification. This result implies that firms with stronger linkages to the Chinese market exhibit greater sensitivity of stock returns to geopolitical risk shocks, consistent with heightened vulnerability to trade disruptions, regulatory actions, and policy uncertainty associated with China-related tensions. Consistent with the baseline results, FX hedging activity is negatively associated with geopolitical risk exposure and becomes weakly significant in the overall GPR specification when foreign assets exposure is used. This suggests that hedging may play a limited mitigating role when geopolitical risk operates through balance sheet channels.

However, the absence of significance for GPR Threat indicates that the level of hedging activities cannot offset sudden increases in expected uncertainty.

7.2. Alternative hedging measure: FX hedging dummy (Appendix 5)

To examine whether the insignificance of the continuous FX hedging variable reflects measurement issues, Appendix 5 replaces the text-based level of hedging activities measure with a binary hedging dummy equal to one if the firm reports any derivative usage and zero otherwise. The exchange rate exposure results remain largely unchanged when the FX hedging dummy is employed. The FX hedging dummy is generally statistically insignificant across most exchange rate specifications, except for a positive effect on the exposure to the CNY exchange rate. This suggests that the decision to hedge does not systematically eliminate exchange rate exposure, consistent with the view that firms hedge selectively or incompletely rather than fully neutralising currency risk. The results using the FX hedging dummy remain compared to the findings in the cross-sectional analysis of geopolitical risk exposure. The hedging dummy exhibits a negative sign across the GPR, GPRACT, and GPRTHREAT specifications, although none of the coefficients are statistically significant.

7.3. Positive and negative exposure subsamples

To further explore heterogeneity in exposure, the sample is split into firms with positive exposure and firms with negative exposure, and Equation (2) is estimated separately for each subsample.

7.3.1. Positive beta exposure (Appendix 6)

For currency risk exposure, several determinants that are significant in the baseline magnitude regressions become weaker when the sample is restricted to firms with positive exposure. In the baseline specification, lnTotalAssets, QuickRatio, and OPR are statistically significant across exchange rate measures, and geographic orientation toward Australia is strongly associated with TWI and AUD exposure. In contrast, under the positive-exposure subsample, most of these effects lose statistical significance. The foreign sales ratio remains significant only for AUD. Overall, the reduced significance suggests that the determinants identified in the baseline largely capture general exposure rather than being uniformly driven by positive exposure.

Regarding geopolitical risk exposure, foreign sales and FX hedging continue to be statistically insignificant across the GPR, GPRACT, and GPRTHREAT specifications, suggesting that general international involvement and risk management activities do not systematically explain cross-sectional differences in geopolitical risk exposure. Country-related variables remain the primary determinant. Australia orientation continues to be positively associated with overall GPR exposure, consistent with the baseline results (Table 8), while lnTotalAssets becomes more strongly negatively related to exposure, suggesting that larger firms exhibit lower sensitivity to geopolitical shocks. For GPR Threat, exposure shifts toward US orientation and selected

firm characteristics, suggesting that positive exposure is driven by specific geographic and firm-level factors rather than broad internationalisation.

7.3.2. Negative beta exposure (Appendix 7)

The results remain broadly consistent with the baseline determinants of exchange rate exposure, although several differences emerge. Foreign sales continue to exhibit a positive association with exposure, but significance shifts from the AUD specification in the baseline to the CNY and USD measures, suggesting that downside exposure is more closely linked to broader international currency risk rather than region-specific trade linkages. In contrast, the strong Australia orientation effect observed in the baseline becomes insignificant, indicating that geographic concentration primarily explains the overall magnitude of exposure rather than specifically negative sensitivity. Notably, FX hedging activity becomes weakly negatively related to exposure for the AUD measure, providing some evidence that a higher level of FX hedging is associated with lower downside currency sensitivity to AUD. The positive association between lnTotalAssets and exposure weakens in the negative subsample, remaining significant only for CNY and USD.

For geopolitical risk exposure, the determinants differ meaningfully from the baseline results. The foreign sales ratio is positively and statistically significant for both GPR and GPRACT, indicating that firms with greater international revenue exposure exhibit higher negative geopolitical sensitivity. China orientation is also significant and positively associated with GPR, suggesting that adverse geopolitical shocks are concentrated among firms with closer links to China. In contrast, the previously significant Australia orientation effect observed in the baseline disappears across all specifications, indicating that geographic concentration primarily explains the overall magnitude of exposure rather than specifically negative sensitivity. FX hedging becomes negatively related to GPRTHREAT, implying that firms with greater hedging activity experience lower negative exposure to expected geopolitical shocks.

7.4. Zeroing non-significant exposure (Appendix 8)

This section conducts an additional robustness check by re-estimating Equation (2) using absolute beta exposure estimated from Equation (1), where insignificant exposures are set to zero, and statistically significant exposures retain their estimated values. The results in Appendix 8 for currencies are broadly consistent with the baseline findings. Several differences emerge relative to the baseline results. The positive effect of foreign sales becomes insignificant. The size effect also weakens considerably, indicating that its baseline significance may partly reflect numerous small exposures. Geographic orientation toward the US becomes significant for TWI, and OPR becomes more strongly associated with exposure to AUD, suggesting that large exposures are more closely linked to specific geographic and firm-level characteristics.

The results for geopolitical exposure differ from the baseline model in several respects. For overall GPR, the previously significant Australia orientation effect disappears, while China orientation becomes positively associated with exposure, suggesting that material geopolitical sensitivity is more closely linked to China-related exposure than to regional trade concentration. lnTotalAssets also shows a weak negative

relationship with GPR once insignificant exposures are zero. For GPRACT, FX hedging activity becomes negatively and significantly related to exposure, and PB remains negatively associated, indicating that risk management and firm fundamentals play a larger role when attention is restricted to substantial exposure. In contrast, the determinants of GPRTHREAT become insignificant, implying that the baseline results for threat-based exposure may partly reflect smaller or noisier coefficients.

CHAPTER 8

CONCLUSION

This dissertation investigates how global risks are transmitted to firms in a small open economy by examining exchange rate and geopolitical risk exposure among New Zealand-listed companies. Motivated by the longstanding exchange rate exposure puzzle, where theory predicts currency risk should be priced, but firm-level evidence is often weak, and by the rising importance of geopolitical shocks as an additional source of uncertainty, the study evaluates whether these risks are reflected in firm value and which firm characteristics shape such exposure. Using firm-level daily return data from 2012 to 2025, the results show that TWI, CNY, and USD currency returns are negatively linked with New Zealand firms' stock returns at the aggregate level, with foreign currency appreciations associated with lower stock returns. Most firms exhibit insignificant sensitivity, while significant exposure becomes more prevalent during periods of heightened uncertainty. This pattern indicates that currency risk becomes more visible when volatility rises, and firms' ability to hedge or adjust operations is constrained. In contrast, while geopolitical risk negatively affects stock returns at the market level, firm-level exposure to geopolitical shocks is largely insignificant and does not systematically depend on firms' international engagement or hedging behaviour. Moreover, geopolitical conditions do not substantially amplify the relationship between firm characteristics and exchange rate exposure. Instead, geopolitical risk appears to influence returns primarily through broad market-wide effects rather than firm-specific transmission channels.

These findings extend the exchange rate exposure literature with new firm-level evidence from a small open economy, thereby broadening the geographic scope of the literature. The findings further indicate cross-sectional heterogeneity in estimated exposures, with firm sensitivity to FX risk differing across firms and across years. Furthermore, the study incorporates geopolitical risk alongside exchange rate changes, connecting the exchange rate exposure and geopolitical risk literature. It shows that geopolitical uncertainty has measurable effects on firm returns at the aggregate level. Finally, the analysis evaluates whether geopolitical conditions alter the determinants of exchange rate exposure. The results suggest that geopolitical risk primarily operates through broad market-wide channels, with limited evidence of strong firm-specific moderation effects. The study has several practical implications for corporate risk management. First, exposure estimates based on normal market conditions may understate firms' vulnerability, as currency sensitivity tends to increase during periods of uncertainty. Firms should therefore incorporate scenario analysis into their evaluation of exchange rate risk, rather than relying solely on historical outcomes. Second, the results suggest that financial hedging alone may not be sufficient to mitigate currency risk. Differences in exposure across firms are more closely associated with operational alignment than with the reported use of derivatives. Strategies such as matching foreign-currency revenues and costs, diversifying production and sourcing locations, and structuring operations across markets appear more effective in reducing net exposure. This highlights the importance of natural and operational hedges alongside financial instruments. The evidence

indicates that firms operating in small open economies should treat exchange rate and geopolitical shocks as persistent strategic risks rather than temporary financial fluctuations. Building operational flexibility and resilient supply chains may therefore be as important as short-term financial hedging in managing exposure to global uncertainty.

Several limitations point to directions for future research. The measures of hedging and operational alignment rely on textual disclosures, which may not fully capture the scale or timing of actual risk management activities. The use of linear models and daily data may also overlook nonlinear effects or slower-moving operational adjustments. In addition, the global geopolitical risk index may not fully reflect specific shocks most relevant to New Zealand firms. Addressing these issues with more granular data, alternative modelling approaches, or country-specific risk measures would provide an insightful future analysis.

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Table 1: Descriptive statistics

Panel A: Daily returns and risk factors

Variable	Obs.	Mean	Std. dev.	Min	P25	Median	P75	Max
logR_Price	341,953	0.000	0.021	-0.087	-0.004	0.000	0.004	0.087
logR_NZX50	381,381	0.000	0.007	-0.079	-0.003	0.000	0.004	0.069
logR_TWI	381,381	0.000	0.005	-0.024	-0.003	0.000	0.003	0.038
logR_NZDUSD	381,381	0.000	0.007	-0.029	-0.004	0.000	0.004	0.053
logR_NZDAUD	381,381	0.000	0.004	-0.016	-0.002	0.000	0.002	0.029
logR_NZDCNY	381,381	0.000	0.006	-0.037	-0.004	0.000	0.004	0.051
dGPR	381,381	0.000	0.044	-0.233	-0.027	0.000	0.027	0.257
dGPRACT	381,381	0.000	0.057	-0.278	-0.035	0.000	0.034	0.383
dGPRTHREAT	381,381	0.000	0.061	-0.395	-0.035	0.000	0.035	0.325

Panel B: Estimated risk exposures

Variable	Obs.	Mean	Std. dev.	Min	P25	Median	P75	Max
$\lvert\beta_{2\_TWI}\rvert$	1,395	0.268	0.281	0.000	0.080	0.190	0.350	3.219
$\lvert\beta_{2\_USD}\rvert$	1,395	0.198	0.222	0.000	0.062	0.136	0.255	3.309
$\lvert\beta_{2\_AUD}\rvert$	1,395	0.316	0.335	0.000	0.088	0.218	0.420	4.328
$\lvert\beta_{2\_CNY}\rvert$	1,395	0.201	0.218	0.000	0.065	0.143	0.261	3.273
$\lvert\beta_{2\_GPR}\rvert$	1,395	2.415	2.714	0.000	0.779	1.673	3.182	29.576
$\lvert\beta_{2\_GPRACT}\rvert$	1,395	1.871	2.387	0.000	0.551	1.241	2.330	39.406
$\lvert\beta_{2\_GPRTHREAT}\rvert$	1,395	1.851	2.861	0.000	0.581	1.317	2.362	81.267

Panel C: Firm characteristics

Variable	Obs.	Mean	Std. dev.	Min	P25	Median	P75	Max
ForeSaleRatio	855	30.160	34.762	0.000	0.000	8.670	65.950	100.000
AssetTurnoverRatio	1,335	0.898	0.774	0.000	0.268	0.726	1.286	3.542
lnTotalAssets	1,335	12.164	2.311	6.031	10.612	12.348	13.861	16.481
OPR	1,301	-37.630	247.890	-2153.460	0.770	7.250	14.950	56.830
PB	1,223	2.802	3.672	-4.450	1.000	1.680	3.230	22.630
DebtRatio	1,296	26.284	22.821	0.000	10.750	22.390	36.150	140.190
QuickRatio	1,316	1.628	2.891	0.040	0.505	0.885	1.455	21.050
China	1,186	0.000	0.001	0.000	0.000	0.000	0.000	0.006
USA	1,186	0.001	0.001	0.000	0.000	0.000	0.001	0.011
AUS	1,186	0.001	0.001	0.000	0.000	0.001	0.002	0.007
FXhedging	1,218	1.117	0.883	0.000	0.000	1.099	1.946	3.258
FXhedgingDummy	1,218	0.560	0.497	0.000	0.000	1.000	1.000	1.000

Note: This table reports descriptive statistics for the variables used in the analysis for the period 2012–2025. Panel A presents daily log returns of firm stock prices, the NZX50 market index, exchange rates, and first differences of the geopolitical risk indices (GPR, GPRACT, and GPRTHREAT), which serve as inputs to Equation (1). Panel B reports absolute annual firm-level exchange rate and geopolitical risk exposure coefficients estimated from Equation (1). Panel C reports firm characteristics used in the cross-sectional analysis. All continuous variables are winsorised at the 1st and 99th percentiles. Firm-level exposure measures and accounting variables are measured at the annual frequency, with accounting variables lagged by one year to mitigate simultaneity concerns, as New Zealand firms typically release financial statements after the fiscal year end.

Table 2: Correlation table

Panel A: *Correlation of return variables*

Variables	logR_Price	logR_NZX50	logR_TWI	logR_NZDUSD	logR_NZDAUD	logR_NZDCNY	dGPR	dGPRACT	dGPRTHREAT
logR_Price	1.000								
	(0.000)								
logR_NZX50	0.147	1.000							
	(0.000)	(0.000)							
logR_TWI	-0.030	-0.081	1.000						
	(0.000)	(0.000)	(0.000)						
logR_NZDUSD	-0.036	-0.121	0.945	1.000					
	(0.000)	(0.000)	(0.000)	(0.000)					
logR_NZDAUD	0.019	0.144	0.554	0.361	1.000				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
logR_NZDCNY	-0.031	-0.113	0.947	0.940	0.382	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
dGPR	-0.009	-0.018	-0.023	-0.024	0.003	-0.029	1.000		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.086)	(0.000)	(0.000)		
dGPRACT	-0.004	-0.020	0.011	0.008	0.008	0.011	0.655	1.000	
	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
dGPRTHREAT	-0.008	-0.009	-0.033	-0.031	-0.009	-0.039	0.836	0.205	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: Panel A reports pairwise Pearson correlation coefficients among the return variables. P-values are reported in parentheses.

Panel B: *Correlation beta exposure and accounting variables*

	$\lvert\beta_{2\_TWI}\rvert$	$\lvert\beta_{2\_USD}\rvert$	$\lvert\beta_{2\_AUD}\rvert$	$\lvert\beta_{2\_CNY}\rvert$	$\lvert\beta_{2\_GPR}\rvert$	$\lvert\beta_{2\_GPRACT}\rvert$	$\lvert\beta_{2\_GPRTHREAT}\rvert$	ForeSaleRatio	AssetTurnRatio	lnTotalAssets	OPR	PB	DebtRatio	QuickRatio	China	USA	AUS	FXhedging	FXhedgingDM
$\lvert\beta_{2\_TWI}\rvert$	1.000																		
	(0.000)																		
$\lvert\beta_{2\_USD}\rvert$	0.919	1.000																	
	(0.000)	(0.000)																	
$\lvert\beta_{2\_AUD}\rvert$	0.336	0.297	1.000																
	(0.000)	(0.000)	(0.000)																
$\lvert\beta_{2\_CNY}\rvert$	0.916	0.933	0.301	1.000															
	(0.000)	(0.000)	(0.000)	(0.000)															
$\lvert\beta_{2\_GPR}\rvert$	0.305	0.340	0.308	0.347	1.000														
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)														
$\lvert\beta_{2\_GPRACT}\rvert$	0.304	0.395	0.257	0.395	0.636	1.000													
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)													
$\lvert\beta_{2\_GPRTHREAT}\rvert$	0.311	0.440	0.274	0.453	0.715	0.545	1.000												
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)												
ForeSaleRatio	0.110	0.106	0.170	0.117	0.058	0.068	0.086	1.000											
	(0.001)	(0.002)	(0.000)	(0.001)	(0.093)	(0.051)	(0.013)	(0.000)											
AssetTurnRatio	0.052	0.052	0.111	0.058	0.013	0.036	0.058	0.720	1.000										
	(0.167)	(0.170)	(0.003)	(0.123)	(0.735)	(0.340)	(0.124)	(0.000)	(0.000)										
lnTotalAssets	0.000	0.010	-0.003	-0.002	-0.009	0.038	-0.002	0.161	0.141	1.000									
	(0.993)	(0.721)	(0.909)	(0.944)	(0.754)	(0.178)	(0.954)	(0.000)	(0.000)	(0.000)									
OPR	-0.107	-0.110	-0.120	-0.139	-0.211	-0.205	-0.205	-0.065	-0.051	-0.076	1.000								
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.064)	(0.180)	(0.008)	(0.000)								
PB	-0.142	-0.144	-0.151	-0.173	-0.238	-0.203	-0.236	-0.116	-0.024	-0.159	0.902	1.000							
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.525)	(0.000)	(0.000)	(0.000)							
DebtRatio	-0.056	-0.069	-0.092	-0.071	-0.122	-0.095	-0.126	0.033	0.048	0.182	0.198	0.304	1.000						
	(0.050)	(0.015)	(0.001)	(0.013)	(0.000)	(0.001)	(0.000)	(0.333)	(0.194)	(0.000)	(0.000)	(0.000)	(0.000)						

QuickRatio	0.101	0.074	0.100	0.099	-0.003	0.058	0.038	0.128	0.046	0.104	-0.003	-0.258	-0.144	1.000					
	(0.000)	(0.010)	(0.000)	(0.001)	(0.910)	(0.044)	(0.182)	(0.000)	(0.234)	(0.000)	(0.911)	(0.000)	(0.000)	(0.000)					
China	0.064	0.068	0.067	0.103	0.059	0.036	0.054	0.085	-0.052	-0.225	-0.274	-0.327	-0.500	0.097	1.000				
	(0.023)	(0.016)	(0.017)	(0.000)	(0.037)	(0.199)	(0.054)	(0.014)	(0.162)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)				
USA	0.073	0.073	0.022	0.058	0.022	-0.017	0.000	-0.080	0.116	0.004	-0.091	-0.011	0.089	-0.169	-0.303	1.000			
	(0.010)	(0.010)	(0.446)	(0.041)	(0.445)	(0.550)	(0.987)	(0.019)	(0.002)	(0.884)	(0.002)	(0.680)	(0.002)	(0.000)	(0.000)	(0.000)			
AUS	0.036	0.040	0.034	0.041	0.044	0.008	0.049	0.365	0.171	0.013	0.087	0.026	0.019	0.035	0.005	-0.047	1.000		
	(0.217)	(0.168)	(0.243)	(0.158)	(0.130)	(0.796)	(0.091)	(0.000)	(0.000)	(0.649)	(0.003)	(0.368)	(0.527)	(0.233)	(0.878)	(0.111)	(0.000)		
FXhedging	0.067	0.074	0.031	0.081	0.038	0.049	0.053	0.326	0.339	0.032	0.042	-0.034	-0.027	0.223	0.039	-0.132	0.053	1.000	
	(0.022)	(0.011)	(0.284)	(0.006)	(0.198)	(0.093)	(0.069)	(0.000)	(0.000)	(0.271)	(0.154)	(0.250)	(0.356)	(0.000)	(0.188)	(0.000)	(0.067)	(0.000)	
FXhedgingDM	-0.030	-0.024	-0.041	-0.029	0.028	0.005	0.016	0.364	0.462	0.023	0.241	0.205	0.042	0.040	-0.039	0.005	0.094	0.033	1.000
	(0.309)	(0.415)	(0.164)	(0.328)	(0.344)	(0.869)	(0.581)	(0.000)	(0.000)	(0.425)	(0.000)	(0.000)	(0.156)	(0.178)	(0.188)	(0.854)	(0.001)	(0.257)	(0.000)

Note: Panel B reports pairwise Pearson correlation coefficients among the beta exposure and accounting variables. P-values are reported in parentheses.

Table 3: Exchange rate exposure – Pooled regression

	Dependent Variable: logR_Stock returns			
	TWI	CNY	AUD	USD
	(1)	(2)	(3)	(4)
logR_NZX50	0.457***	0.456***	0.462***	0.454***
	(-13.685)	(-13.661)	(-13.945)	(-13.594)
logR_TWI	-0.081***			
	(-7.097)			
L1_logR_TWI	-0.019**			
	(-2.287)			
L2_logR_TWI	-0.020**			
	(-2.544)			
logR_NZDCNY		-0.052***		
		(-6.119)		
L1_logR_NZDCNY		-0.020***		
		(-3.164)		
L2_logR_NZDCNY		-0.018***		
		(-2.991)		
logR_NZDAUD			-0.013	
			(-1.060)	
L1_logR_NZDAUD			0.036***	
			(-3.949)	
L2_logR_NZDAUD			0.027***	
			(-3.022)	
logR_NZDUSD				-0.062***
				(-7.321)
L1_logR_NZDUSD				-0.022***
				(-3.258)
L2_logR_NZDUSD				-0.022***
				(-3.681)
Constant	-0.000***	-0.000***	-0.000***	-0.000***
	(-4.640)	(-4.578)	(-4.626)	(-4.453)
Firm FE	Yes	Yes	Yes	Yes
Observations	341,757	341,757	341,757	341,757
R-squared	0.022	0.022	0.022	0.022

Note: This table reports pooled time-series regressions of daily firm stock returns on market returns and exchange rate returns over the period from 2012 to 2025. The dependent variable is the daily log return of firms' stock prices. Exchange rates are quoted as the NZD price per unit of foreign currency, therefore, an increase in the exchange rate indicates appreciation of foreign currencies, and vice versa. Each column includes the NZX50 market return and one exchange rate return, along with its first (L1) and second (L2) lags to capture short-run dynamic effects of exchange rate movements. Robust t-statistics are reported in parentheses below the coefficients. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Table 4: Firm-level Exchange rate exposure by year

		TWI			CNY			AUD			USD		
FY	**No of Firms**	**% pos**	**% neg**	**% non-sig**	**% pos**	**% neg**	**% non-sig**	**% pos**	**% neg**	**% non-sig**	**% pos**	**% neg**	**% non-sig**
2012	116	1	3	91	1	5	89	1	0	97	1	4	89
2013	121	3	3	88	2	2	88	2	2	88	2	2	88
2014	120	1	3	88	3	3	88	1	2	93	3	4	90
2015	119	3	1	93	3	1	89	3	5	90	3	1	89
2016	115	3	2	88	3	3	90	2	2	87	3	1	92
2017	111	2	2	86	0	1	86	3	5	85	3	3	84
2018	109	4	2	83	4	2	86	3	3	88	3	3	84
2019	105	2	3	90	3	4	89	5	3	86	3	3	88
2020	106	1	8	75	3	6	78	3	3	89	0	8	75
2021	104	0	10	74	1	11	78	2	0	91	0	6	74
2022	103	1	7	83	2	8	83	2	3	85	2	6	85
2023	100	0	3	91	1	6	89	0	5	89	1	4	88
2024	94	2	1	84	5	3	83	2	1	88	4	1	87
2025	87	2	3	78	3	3	82	3	1	91	0	6	80
Average	-	2	3	85	2	4	85	2	2	89	2	4	85

Note: This table reports the sign distribution of firm-level exchange rate exposure coefficients estimated from Equation (1) for each fiscal year. For each exchange rate, firms are classified according to whether the estimated exposure coefficient is positive, negative, or statistically insignificant at the 10% level using robust standard errors. Percentages are calculated relative to the total number of firms with available estimates in each year. The final row reports the average percentage across all years for each exchange rate.

Table 5: Exchange rate exposure – Determinants

	Dependent Variable: $\|\beta_2\|$			
	TWI	CNY	AUD	USD
	(1)	(2)	(3)	(4)
ForeSaleRatio	0.00154	0.000634	0.00288***	0.00122
	(-1.392)	(-0.997)	(-2.986)	(-1.569)
China	26.21	20.12		
	(-1.016)	(-1.106)		
AUS	-40.83**		-54.98**	
	(-2.362)		(-2.493)	
USA	15.28			20.85
	(-0.62)			(-1.104)
FXhedging	-0.00603	-0.00161	-0.0226	-0.0115
	(-0.260)	(-0.100)	(-0.937)	(-0.639)
AssetTurnRatio	0.0229	0.034	0.0569	0.0252
	(-0.57)	(-1.083)	(-1.183)	(-0.785)
lnTotalAssets	0.0420**	0.0267*	0.0650**	0.0362**
	(-2.017)	(-1.803)	(-2.245)	(-2.026)
OPR	0.0106**	0.00658**	-0.0115**	0.00338
	(-2.138)	(-2.242)	(-2.046)	(-0.827)
PB	0.00461	0.00272	-0.00561	0.00255
	(-0.966)	(-0.745)	(-1.037)	(-0.656)
DebtRatio	0.0014	0.000715	0.00328*	0.000506
	(-1.063)	(-0.683)	(-1.825)	(-0.509)
QuickRatio	0.0270***	0.0170***	-0.0121	0.0169***
	(-5.051)	(-3.542)	(-1.153)	(-3.397)
Constant	-0.43	-0.281	-0.677*	-0.407*
	(-1.619)	(-1.562)	(-1.719)	(-1.761)
Firm FE	Yes	Yes	Yes	Yes
Observations	747	747	747	747
R-squared	0.046	0.025	0.056	0.037
Number of firms	102	102	102	102

Note: This table reports results from Equation (2) examining firm-level determinants of exchange rate exposure. The dependent variable is the absolute value of the annual exchange rate exposure coefficient, $|\beta_2|$ estimated from Equation (1) based on alternative exchange rate measures. Taking the absolute value captures the magnitude of exchange rate exposure regardless of direction. The regressions include measures of firms' international exposure, risk management activities, and firm-level characteristics such as size, operational efficiency, profitability, growth opportunities, leverage, and liquidity. All firm characteristics are lagged by one year. Firm fixed effects are included in all specifications. Country-related variables are excluded when they are perfectly collinear with the exchange rate used to construct the dependent variable. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Geopolitical risk exposure – Pooled regression

	Dependent Variable: logR_Stock returns		
	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)
logR_NZX50	0.461***	0.462***	0.462***
	(13.818)	(13.832)	(13.827)
dGPR	-0.004***		
	(-4.146)		
L1_dGPR	-0.001		
	(-1.416)		
L2_dGPR	-0.000		
	(-0.560)		
dGPRACT		-0.001	
		(-1.243)	
L1_dGPRACT		-0.001	
		(-1.063)	
L2_dGPRACT		-0.001	
		(-1.395)	
dGPRTHREAT			-0.003***
			(-4.697)
L1_dGPRTHREAT			-0.001*
			(-1.679)
L2_dGPRTHREAT			0.000
			(0.400)
Constant	-0.000***	-0.000***	-0.000***
	(-4.690)	(-4.693)	(-4.692)
Firm FE	Yes	Yes	Yes
Observations	341,757	341,757	341,757
R-squared	0.022	0.022	0.022

Note: This table reports pooled time-series regressions of daily firm stock returns on market returns and changes in geopolitical risk measures over the period from 2012 to 2025. The dependent variable in all specifications is the daily log return of firm stock prices. Columns (1)-(3) present regressions using changes in the overall geopolitical risk index (GPR), the geopolitical risk action index (GPRACT), and the geopolitical risk threat index (GPRTHREAT), respectively. All geopolitical risk variables enter the regressions in first differences and are scaled by 1,000. Each specification includes the NZX50 market return and the contemporaneous change in the relevant geopolitical risk measure, together with its first (L1) and second (L2) lags, to capture short-run dynamic effects. Firm fixed effects are included in all regressions. Robust standard errors are clustered at the firm level, and t-statistics are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Table 7: Firm-level Geopolitical risk exposure by year

		GPR			GPRACT			GPRTHREAT		
FY	**No of Firms**	**% pos**	**% neg**	**% non-sig**	**% pos**	**% neg**	**% non-sig**	**% pos**	**% neg**	**% non-sig**
2012	116	2	1	87	3	1	91	3	3	89
2013	121	2	2	92	0	3	92	1	1	88
2014	120	1	3	91	2	1	92	3	2	90
2015	119	0	1	94	3	0	92	1	3	94
2016	115	2	1	93	1	1	90	1	2	95
2017	111	2	1	88	6	2	89	1	2	86
2018	109	2	2	90	4	0	90	4	2	92
2019	105	4	3	91	2	0	95	3	2	90
2020	106	1	4	89	0	6	86	0	4	89
2021	104	2	8	86	5	2	88	1	6	86
2022	103	2	3	85	0	1	92	1	1	85
2023	100	3	3	89	1	0	96	3	2	88
2024	94	1	1	89	1	2	90	0	3	89
2025	87	0	2	85	1	3	89	2	5	86
Average	-	2	2	89	2	2	91	2	3	89

Note: This table reports the sign distribution of firm-level geopolitical risk exposure coefficients estimated from first-stage time-series regressions for each fiscal year. The three panels correspond to exposure to the overall GPR, the GPRACT, and the GPRTHREAT, respectively. For each measure, firms are classified according to whether the estimated exposure coefficient is positive, negative, or statistically insignificant at the 10% level using robust standard errors. Percentages are calculated relative to the total number of firms with available estimates in each year. The final row reports the average proportion of firms in each category across all sample years.

Table 8: Geopolitical risk exposure – Determinants

	Dependent Variable: $\|\beta_2\|$		
	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)
ForeSaleRatio	0.00189	0.00499	0.000408
	(-0.402)	(-1.232)	(-0.103)
China	-71.78	-9.863	17.97
	(-0.522)	(-0.0691)	(-0.129)
AUS	414.8**	116	236.0*
	(-2.363)	(-1.176)	(-1.675)
USA	127	71.15	57.56
	(-0.953)	(-0.857)	(-0.627)
FXhedging	-0.244	-0.191	-0.0762
	(-1.574)	(-1.639)	(-0.800)
AssetTurnRatio	-0.0775	-0.158	-0.187
	(-0.286)	(-0.783)	(-0.714)
lnTotalAssets	-0.176	0.0537	-0.275**
	(-1.062)	(-0.575)	(-2.031)
OPR	0.0261	-0.0405	0.00397
	(-0.521)	(-1.303)	(-0.103)
PB	-0.0479	-0.0163	-0.0570*
	(-1.066)	(-0.554)	(-1.811)
DebtRatio	0.0139*	-0.00759	0.0158**
	(-1.877)	(-1.458)	(-2.264)
QuickRatio	0.0551	0.00637	-0.0029
	(-0.857)	(-0.189)	(-0.0754)
Constant	4.164*	1.123	5.003***
	(-1.858)	(-0.907)	(-2.673)
Firm FE	Yes	Yes	Yes
Observations	747	747	747
R-squared	0.021	0.012	0.027
Number of firms	102	102	102

Note: This table reports results from Equation (2) examining firm-level determinants of geopolitical risk exposure. The dependent variable is the absolute value of the geopolitical risk exposure coefficient, $|\beta_2|$ estimated from Equation (1) based on alternative geopolitical risk measures. Taking the absolute value captures the magnitude of firms' sensitivity to geopolitical risk regardless of direction. The regressions include firm characteristics related to international exposure, risk management, and geographic orientation, as well as controls for operational efficiency, size, profitability, valuation, leverage, and liquidity. All firm characteristics are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Moderating effect of GPR (ForeSaleRatio x GPR)

	Dependent Variable: $\|\beta_2\|$			
	TWI	CNY	AUD	USD
	(1)	(2)	(3)	(4)
ForeSaleRatio x GPR_FY	-0.00171	-0.00127	-0.00047	-0.0013
	(-1.402)	(-1.434)	(-0.283)	(-1.272)
ForeSaleRatio	0.00367*	0.00223	0.00343	0.00287*
	(-1.851)	(-1.642)	(-1.56)	(-1.782)
GPR_FY	-0.134**	-0.0803*	0.0122	-0.118**
	(-2.389)	(-1.897)	(-0.172)	(-2.528)
China	-1.192	2.891		
	(-0.0483)	(-0.169)		
AUS	-46.61***		-54.99**	
	(-2.730)		(-2.515)	
USA	-2.424			5.954
	(-0.105)			(-0.36)
FXhedging	-0.00868	-0.00604	-0.0226	-0.0138
	(-0.392)	(-0.391)	(-0.920)	(-0.795)
AssetTurnRatio	0.0444	0.0446	0.0574	0.0435
	(-0.988)	(-1.312)	(-1.23)	(-1.15)
lnTotalAssets	0.0932***	0.0574***	0.0667*	0.0743***
	(-4.041)	(-3.449)	(-1.936)	(-3.875)
scaled_OPR	0.00991**	0.00558*	-0.0115**	0.00299
	(-2.143)	(-1.969)	(-2.070)	(-0.774)
PB	0.0033	0.00112	-0.0058	0.00151
	(-0.738)	(-0.324)	(-1.069)	(-0.434)
DebtRatio	0.00128	0.00058	0.00325*	0.000434
	(-0.912)	(-0.533)	(-1.768)	(-0.406)
QuickRatio	0.0252***	0.0156***	-0.0121	0.0155***
	(-4.896)	(-3.364)	(-1.167)	(-3.673)
Constant	-0.941***	-0.590***	-0.712*	-0.778***
	(-3.323)	(-3.056)	(-1.691)	(-3.204)
Firm FE	Yes	Yes	Yes	Yes
Observations	747	747	747	747
R-squared	0.081	0.055	0.057	0.082
Number of firms	102	102	102	102

Note: This table reports results from Equation (3) examining whether geopolitical risk moderates firms' exchange rate exposure. The dependent variable is the absolute value of the annual exchange rate exposure coefficient, estimated from Equation (1) based on alternative exchange rate measures. The regressions include firms' foreign sales ratio, firm-level geopolitical risk, their interaction term, FX hedging activity, and additional firm characteristics related to operational efficiency, size, profitability, valuation, leverage, and liquidity. All firm characteristics are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Moderating effect of GPR (FXhedging x GPR)

	Dependent Variable: $\|\beta_2\|$			
	TWI	CNY	AUD	USD
	(1)	(2)	(3)	(4)
FXhedging x GPR_FY	-0.00902	0.00479	0.133*	-0.0107
	(-0.189)	(-0.149)	(-1.885)	(-0.289)
FXhedging	0.000661	-0.0119	-0.175*	-0.00225
	(-0.0117)	(-0.300)	(-1.964)	(-0.0499)
GPR_FY	-0.175**	-0.127**	-0.187*	-0.145**
	(-2.354)	(-2.480)	(-1.682)	(-2.300)
ForeSaleRatio	0.00166	0.000746	0.00291***	0.00134*
	(-1.566)	(-1.204)	(-3.002)	(-1.752)
China	3.081	5.46		
	(-0.125)	(-0.313)		
AUS	-47.13***		-54.73**	
	(-2.705)		(-2.466)	
USA	-0.527			6.975
	(-0.0227)			(-0.417)
AssetTurnRatio	0.0423	0.0438	0.0588	0.0421
	(-0.967)	(-1.313)	(-1.238)	(-1.151)
lnTotalAssets	0.0880***	0.0540***	0.0651*	0.0712***
	(-3.732)	(-3.167)	(-1.919)	(-3.698)
OPR	0.00949*	0.00562*	-0.00823	0.00257
	(-1.928)	(-1.967)	(-1.474)	(-0.623)
PB	0.00386	0.00155	-0.00615	0.00194
	(-0.84)	(-0.435)	(-1.163)	(-0.553)
DebtRatio	0.0014	0.000668	0.00324*	0.000522
	(-0.991)	(-0.607)	(-1.834)	(-0.485)
QuickRatio	0.0249***	0.0155***	-0.00973	0.0151***
	(-4.94)	(-3.383)	(-0.997)	(-3.361)
Constant	-0.827***	-0.493**	-0.466	-0.707***
	(-2.917)	(-2.602)	(-1.030)	(-3.002)
Firm FE	Yes	Yes	Yes	Yes
Observations	747	747	747	747
R-squared	0.078	0.051	0.064	0.078
Number of firms	102	102	102	102

Note: This table reports results from Equation (3) examining whether geopolitical risk moderates firms' exchange rate exposure. The dependent variable is the absolute value of the annual exchange rate exposure coefficient, estimated from Equation (1) based on alternative exchange rate measures. The regressions include firms' foreign sales ratio, firm-level geopolitical risk, FX hedging activity, their interaction term, and additional firm characteristics related to operational efficiency, size, profitability, valuation, leverage, and liquidity. All firm characteristics are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX

Appendix 1: Preprocessing textual analysis variables

Annual reports were collected for each firm in the sample (147 firms in total) during the period from 2012 to 2025. The total number of reports collected is 1332. This number is due to the fact that some firms did not have issue reports for a particular year or several years, or some firms did not have report data available. At the same time, during the analysis process, some reports were not processed because they were not in the correct format. The reports were still in PDF format but were scanned images, so no extraction results could be obtained from such reports.

To construct the textual analysis variables, I extract and preprocess the full text of each annual report. Each PDF is parsed using the PyMuPDF library, with all pages concatenated into a single string and converted to lowercase. To preserve the semantic integrity of multi-word FX expressions, spaces within such phrases are replaced with underscores. The text is then segmented into paragraphs, defined as blocks separated by at least one blank line; when no separators are present, the entire document is treated as a single paragraph. Within each paragraph, special characters (other than underscores) are stripped, multiple spaces are collapsed, leading and trailing whitespace are removed, and plural forms are normalised to their singular counterparts.

Appendix 2: List of keywords used for textual analysis

1. FX hedging variables

Group	Purpose	Keywords
A	Identifies currency context	Currency, foreign exchange, exchange rate
B	Captures derivatives and hedging language	Forward, future, option, swap, spot, collar, cap, ceiling, floor, lock, derivative, hedge, hedging, hedged
C	Captures contracting/position language often used around hedging disclosure	Contract, position, instrument, agreement, obligation, transaction, strategy

2. Country-related variables

Category	Keywords
USA	united states; united states of america; the us; usa; u.s.; u.s.a.; usd; us dollar; u.s. dollar; american dollar; us$; us $
AUS	australia; australian; aud; australian dollar; au$; au $
China	china; chinese; cny; rmb; renminbi; yuan; ¥; ￥

Appendix 3: Variable description

Variable	Explanation	Frequency	Data source
logR_Price	Daily log return of firms' stock price	Daily	Datastream
logR_NZX50	Daily log return of the S&P/NZX50 index	Daily	Datastream
logR_TWI	Daily log return of New Zealand's Trade Weighted Index	Daily	RBNZ
logR_NZDAUD	Daily log return of the NZD/AUD bilateral exchange rate	Daily	RBNZ
logR_NZDCNY	Daily log return of the NZD/CNY bilateral exchange rate	Daily	RBNZ
logR_NZDUSD	Daily log return of the NZD/USD bilateral exchange rate	Daily	RBNZ
dGPR	Daily change in GPR index scaled	Daily	Caldara & Iacoviello
dGPRACT	Daily change in the GPR act index scaled	Daily	Caldara & Iacoviello
dGPRTHREAT	Daily change in the GPR threat index scaled	Daily	Caldara & Iacoviello
$\lvert\beta_2\rvert$	Estimated risk exposure from Equation (1)	Annual	Analysis
ForeSaleRatio	Ratio of foreign sales to total sales	Annual	Datastream: WC08731
ForeAssetRatio	Ratio of foreign assets to total assets	Annual	Datastream: WC08736
AssetTurnRatio	Asset turnover ratio: Net sales/Total assets	Annual	Datastream
lnTotalAssets	Natural log of total assets (firm size)	Annual	Datastream: WC02999
OPR	Operating profit margin	Annual	Datastream: WC08316
PB	Price to book ratio	Annual	Datastream: PTBV
QuickRatio	Quick ratio	Annual	Datastream: WC08101
DebtRatio	Debt ratio: Total debt to Total assets	Annual	Datastream: WC08236
China	Share of China-related words in annual reports	Annual	Annual reports
USA	Share of US-related words in annual reports	Annual	Annual reports
AUS	Share of Australia-related words in annual reports	Annual	Annual reports
FXhedgingDummy	A dummy variable equals 1 if firms report the use of FX derivative hedging, and 0 otherwise	Annual	Annual reports
FXhedging	Log of one plus the firm's total number of textual mentions of foreign currency derivative instruments in its annual report in a given year	Annual	Annual reports

Appendix 4: Alternative proxy for international involvement

	Dependent Variable: $\|\beta_2\|$						
	TWI	CNY	AUD	USD	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ForeAssetRatio	0.000265	-0.000733	0.00335***	-0.00024	-0.00223	0.00221	0.00423
	(-0.301)	(-1.195)	(-3.705)	(-0.394)	(-0.268)	(-0.384)	(-0.742)
China	16.25	16.38			439.6**	182.7	286.1*
	(-0.598)	(-0.878)			(-2.16)	(-1.495)	(-1.913)
AUS	-52.99**		-86.11***		173.1	14.69	93
	(-2.391)		(-3.551)		(-1.1)	(-0.141)	(-0.915)
USA	-15.53			5.339	54.27	-185.3	-107.9
	(-0.471)			(-0.227)	(-0.283)	(-1.017)	(-0.638)
Fxhedging	-0.00983	-0.00871	-0.0238	-0.0158	-0.325*	-0.106	-0.101
	(-0.358)	(-0.478)	(-0.785)	(-0.707)	(-1.883)	(-0.787)	(-0.909)
AssetTurnRatio	0.0376	0.0253	0.0784*	0.0325	0.116	-0.169	-0.061
	(-0.881)	(-0.759)	(-1.716)	(-0.914)	(-0.411)	(-0.806)	(-0.208)
lnTotalAssets	0.0672**	0.0351*	0.103***	0.0449**	-0.0181	0.0851	-0.173
	(-2.43)	(-1.865)	(-2.881)	(-2.094)	(-0.0934)	(-0.597)	(-1.072)
OPR	0.0151***	0.00769***	-0.00138	0.00726***	0.0216	-0.0136	-0.0106
	(-5.555)	(-4.479)	(-0.276)	(-3.085)	(-0.453)	(-0.383)	(-0.241)
PB	0.00257	0.000143	-0.00806	-0.00121	-0.0744	-0.0315	-0.0294
	(-0.412)	(-0.0313)	(-1.369)	(-0.249)	(-1.167)	(-0.791)	(-0.871)
DebtRatio	0.00193	0.00108	0.0029	0.00103	0.0129	-0.00625	0.0152**
	(-1.467)	(-0.999)	(-1.608)	(-0.959)	(-1.563)	(-1.077)	(-2.02)
QuickRatio	0.0255***	0.0140***	-0.0051	0.0146***	0.0441	0.000487	-0.034
	(-4.445)	(-2.935)	(-0.338)	(-3.813)	(-0.624)	(-0.0102)	(-0.693)
Constant	-0.710*	-0.35	-1.134**	-0.479*	1.991	0.896	3.483
	(-1.979)	(-1.476)	(-2.431)	(-1.733)	(-0.788)	(-0.468)	(-1.552)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	635	635	635	635	635	635	635
R-squared	0.042	0.024	0.061	0.024	0.024	0.013	0.03
Number of firms	93	93	93	93	93	93	93

Note: This table reports results from Equation (2) examining firm-level determinants of risk exposure. The dependent variable is the absolute value of firms' exposure coefficients estimated from Equation (1) based on alternative exchange rate and geopolitical risk measures. The regressions include firm characteristics related to international exposure, risk management, and geographic orientation, including foreign assets ratio, FX hedging activity, and additional controls for operational efficiency, size, profitability, valuation, leverage, and liquidity. All explanatory variables are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix 5: Alternative hedging variable

	Dependent Variable: $\|\beta_2\|$						
	TWI	CNY	AUD	USD	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ForeSaleRatio	0.00165	0.000738	0.00285***	0.00126	0.00117	0.00452	-0.000168
	(-1.485)	(-1.147)	(-2.857)	(-1.603)	(-0.236)	(-1.04)	(-0.0420)
China	25.76	20.08			413.7**	114.9	236.8*
	(-0.978)	(-1.072)			(-2.267)	(-1.082)	(-1.699)
AUS	-42.68**		-54.63**		141.6	81.01	68.26
	(-2.559)		(-2.478)		(-1.031)	(-0.953)	(-0.735)
USA	8.151			15.18	-119.1	-51.04	19.7
	(-0.371)			(-0.891)	(-0.885)	(-0.355)	(-0.152)
FXhedgingDummy	0.0403	0.0317*	-0.0072	0.018	-0.142	-0.0794	-0.165
	(-1.489)	(-1.672)	(-0.207)	(-0.94)	(-0.853)	(-0.571)	(-1.348)
AssetTurnRatio	0.0215	0.0315	0.0542	0.0243	-0.0844	-0.165	-0.186
	(-0.537)	(-1.024)	(-1.091)	(-0.752)	(-0.312)	(-0.813)	(-0.719)
lnTotalAssets	0.0426**	0.0263*	0.0619**	0.0357**	-0.2	0.036	-0.285**
	(-2.092)	(-1.834)	(-2.111)	(-2.051)	(-1.206)	(-0.406)	(-2.130)
OPR	0.0112**	0.00677**	-0.0111**	0.00396	0.0324	-0.0352	0.00457
	(-2.437)	(-2.358)	(-1.991)	(-1.026)	(-0.649)	(-1.111)	(-0.12)
PB	0.00525	0.00284	-0.005	0.00318	-0.0393	-0.00936	-0.0555*
	(-1.139)	(-0.776)	(-0.954)	(-0.831)	(-0.916)	(-0.329)	(-1.805)
DebtRatio	0.00136	0.000664	0.00332*	0.000508	0.0146*	-0.00712	0.0161**
	(-1.036)	(-0.628)	(-1.856)	(-0.51)	(-1.98)	(-1.372)	(-2.323)
QuickRatio	0.0271***	0.0169***	-0.012	0.0170***	0.0578	0.00849	-0.00208
	(-4.928)	(-3.41)	(-1.156)	(-3.377)	(-0.893)	(-0.246)	(-0.0550)
Constant	-0.468*	-0.297*	-0.66	-0.426*	4.247*	1.16	5.140***
	(-1.820)	(-1.704)	(-1.653)	(-1.886)	(-1.872)	(-0.971)	(-2.75)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	747	747	747	747	747	747	747
R-squared	0.049	0.03	0.055	0.038	0.019	0.009	0.029
Number of firms	102	102	102	102	102	102	102

Note: This table reports results from Equation (2) examining firm-level determinants of risk exposure using alternative measures of international involvement and hedging activity. The dependent variable is the absolute value of firms' exposure coefficients estimated from Equation (1) based on alternative exchange rate and geopolitical risk measures. The regressions include firm characteristics related to international exposure, risk management, and geographic orientation, including foreign sales ratio, FX hedging indicators, and additional controls for operational efficiency, size, profitability, valuation, leverage, and liquidity. All explanatory variables are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix 6: Positive beta

	Dependent Variable: positive β_2						
	TWI	CNY	AUD	USD	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ForeSaleRatio	0.000845	-1.35E-05	0.00479**	-0.000431	0.0045	0.00397	0.0017
	(-0.797)	(-0.0194)	(-2.604)	(-0.551)	(-0.776)	(-0.493)	(-0.316)
China	14.76	18.11			-43.64	44.69	-99.15
	(-0.255)	(-0.527)			(-0.118)	(-0.261)	(-0.544)
AUS	-0.74		-77.62*		373.7*	80.01	159.7
	(-0.0331)		(-1.665)		(-1.724)	(-0.563)	(-1.06)
USA	-4.127			24.09	87.21	-230.5	504.1***
	(-0.0767)			(-0.442)	(-0.266)	(-0.593)	(-2.857)
FXhedging	-0.00979	-0.021	-0.0285	-0.0169	-0.38	-0.156	-0.0375
	(-0.320)	(-1.011)	(-0.727)	(-0.679)	(-1.504)	(-0.962)	(-0.313)
AssetTurnRatio	0.0897	-0.0179	0.0638	-0.0254	-0.433	-0.477	-0.199
	(-1.034)	(-0.370)	(-0.796)	(-0.413)	(-0.850)	(-1.596)	(-0.526)
lnTotalAssets	0.069	0.0262	0.0609	0.0344*	-0.539**	-0.334*	-0.400*
	(-1.552)	(-1.054)	(-1.611)	(-1.7)	(-2.417)	(-1.761)	(-1.896)
OPR	0.0136	-0.00845	0.0314*	-0.0131	-0.590*	-0.157	-0.0651*
	(-1.585)	(-0.854)	(-1.736)	(-1.026)	(-1.693)	(-1.427)	(-1.867)
PB	0.00614	0.00418	-0.0107	0.000237	-0.0864	0.0123	-0.0991**
	(-0.711)	(-0.649)	(-1.225)	(-0.0287)	(-1.236)	(-0.266)	(-2.365)
DebtRatio	-0.000979	-0.0024	0.00217	-0.00179	0.00412	-0.00603	0.0165
	(-0.420)	(-1.469)	(-1.111)	(-1.213)	(-0.369)	(-0.658)	(-1.429)
QuickRatio	0.0464**	0.011	0.0167	-0.00328	0.0114	-0.198	0.121
	(-2.368)	(-0.84)	(-0.622)	(-0.216)	(-0.107)	(-1.645)	(-1.246)
Constant	-0.866	-0.129	-0.646	-0.228	9.493***	6.803***	6.034**
	(-1.461)	(-0.420)	(-1.171)	(-0.759)	(-3.075)	(-2.712)	(-2.197)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	301	317	367	289	338	345	353
R-squared	0.064	0.04	0.12	0.036	0.043	0.029	0.055
Number of firms	92	93	97	91	90	90	92

Note: This table reports results from Equation (2) for the subsample of firms with positive exposure coefficients. The dependent variable is the firm-level positive exposure measure, defined as the estimated exposure coefficient from Equation (1), conditional on being positive. The exposure measures are constructed using alternative exchange rate and geopolitical risk indicators. The regressions include firm characteristics related to international involvement, risk management, and geographic orientation, including foreign sales ratio, FX hedging activity, and additional controls for operational efficiency, size, profitability, valuation, leverage, and liquidity. All explanatory variables are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix 7: Negative beta

	Dependent Variable: negative β_2						
	TWI	CNY	AUD	USD	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ForeSaleRatio	0.00166	0.00115*	0.00192	0.00167*	0.00804*	0.00692*	0.00235
	(-1.539)	(-1.703)	(-1.47)	(-1.874)	(-1.861)	(-1.85)	(-0.48)
China	34.16	11.59			560.0***	195.8	254.3
	(-1.034)	(-0.492)			(-2.932)	(-0.986)	(-1.621)
AUS	-40.85		-20.24		95.13	127.4	22.31
	(-1.518)		(-0.718)		(-0.62)	(-1.268)	(-0.153)
USA	-8.677			-13.51	-134.9	200.8	-142.7
	(-0.205)			(-0.493)	(-0.793)	(-1.119)	(-0.622)
FXhedging	-0.0063	-0.00945	-0.0591*	-0.0169	-0.187	-0.213	-0.233*
	(-0.178)	(-0.444)	(-1.839)	(-0.656)	(-1.232)	(-1.537)	(-1.921)
AssetTurnRatio	0.0167	0.0675*	0.0922	0.0418	0.00612	-0.186	0.0257
	(-0.315)	(-1.877)	(-1.113)	(-1.009)	(-0.0142)	(-0.599)	(-0.0555)
lnTotalAssets	0.0529	0.0380*	0.0435	0.0722**	-0.0412	0.268*	-0.114
	(-1.425)	(-1.691)	(-1.038)	(-2.126)	(-0.222)	(-1.749)	(-0.508)
OPR	0.108*	0.0165***	-0.0629	0.0118***	0.0316	-0.149***	-0.031
	(-1.705)	(-4.309)	(-1.113)	(-2.685)	(-0.618)	(-3.608)	(-0.558)
PB	0.0127	0.00118	-0.0149	0.00528	-0.0407	-0.0602	-0.0331
	(-0.983)	(-0.235)	(-1.092)	(-1.041)	(-0.640)	(-1.252)	(-0.541)
DebtRatio	0.00208	0.00166	0.00547	0.000323	0.0183	-0.0167*	0.0218**
	(-1.139)	(-1.348)	(-1.586)	(-0.29)	(-1.467)	(-1.726)	(-2.042)
QuickRatio	0.00233	0.00391	-0.00976	0.00293	0.0554	0.156***	-0.0511
	(-0.102)	(-0.44)	(-0.468)	(-0.274)	(-0.926)	(-3.158)	(-1.072)
Constant	-0.539	-0.448	-0.416	-0.848*	2.031	-1.788	2.908
	(-1.111)	(-1.519)	(-0.755)	(-1.900)	(-0.831)	(-0.900)	(-0.89)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	446	430	380	458	409	402	394
R-squared	0.072	0.059	0.063	0.068	0.041	0.058	0.044
Number of firms	92	89	86	91	93	94	90

Note: This table reports results from Equation (2) for the subsample of firms with negative exposure coefficients. The dependent variable is the firm-level negative exposure measure, defined as the estimated exposure coefficient Equation (1), conditional on being negative. The exposure measures are constructed using alternative exchange rate and geopolitical risk indicators. The regressions include firm characteristics related to international involvement, risk management, and geographic orientation, including foreign sales ratio, FX hedging activity, and additional controls for operational efficiency, size, profitability, valuation, leverage, and liquidity. All explanatory variables are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix 8: Non-significant exposure = 0

	Dependent Variable: $\|\beta_2\|$						
	TWI	CNY	AUD	USD	GPR	GPRACT	GPRTHREAT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ForeSaleRatio	0.00153	0.000489	0.0012	0.000965	-0.00531	-0.0024	0.00269
	(-1.236)	(-0.76)	(-1.149)	(-1.302)	(-1.224)	(-0.769)	(-0.864)
China	37.63*	19.58			478.9*	-124.4	320.6
	(-1.746)	(-1.305)			(-1.861)	(-1.541)	(-1.486)
AUS	-34.01*		-17.51		174.9	141.5	116.8
	(-1.681)		(-0.697)		(-1.585)	(-1.64)	(-1.27)
USA	51.02**			22.41	18.46	80.33	128.9
	(-2.016)			(-1.152)	(-0.166)	(-0.641)	(-1.502)
FXhedging	-0.0234	0.0026	-0.0243	-0.00681	-0.12	-0.247**	-0.125
	(-1.075)	(-0.16)	(-1.233)	(-0.380)	(-0.991)	(-2.466)	(-1.427)
AssetTurnRatio	0.0315	0.0430*	0.00096	0.0343	-0.0826	-0.228	-0.15
	(-1.065)	(-1.711)	(-0.017)	(-1.235)	(-0.404)	(-1.267)	(-0.818)
lnTotalAssets	0.0167	0.0167	-0.0391*	0.0338	-0.222*	0.00879	-0.0424
	(-0.859)	(-1.194)	(-1.689)	(-1.596)	(-1.739)	(-0.0764)	(-0.376)
OPR	-0.00447	-0.00386	-0.0179***	-0.00302	0.0286	-0.00454	-0.0166
	(-0.855)	(-1.461)	(-3.220)	(-0.941)	(-1.288)	(-0.245)	(-1.180)
PB	0.000864	-0.00118	-0.00302	0.00246	-0.0729*	-0.0688**	-0.0121
	(-0.13)	(-0.249)	(-0.483)	(-0.483)	(-1.812)	(-2.075)	(-0.499)
DebtRatio	0.00145	0.00104	0.00235	0.000408	0.0111	-0.00891	-0.00156
	(-1.173)	(-1.028)	(-1.215)	(-0.383)	(-1.483)	(-1.326)	(-0.273)
QuickRatio	0.0254***	0.0222***	0.0154	0.0257***	0.019	-0.0333	0.0064
	(-3.944)	(-3.377)	(-1.347)	(-5.569)	(-0.508)	(-0.919)	(-0.227)
Constant	-0.241	-0.263	0.556*	-0.490*	3.449**	1.125	0.947
	(-0.960)	(-1.560)	(-1.788)	(-1.846)	(-2.049)	(-0.782)	(-0.613)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	747	747	747	747	747	747	747
R-squared	0.032	0.023	0.019	0.034	0.021	0.017	0.016
Number of firms	102	102	102	102	102	102	102

Note: This table reports results from Equation (2). The dependent variable is the absolute exposure obtained from Equation (1), with insignificant firm-level exposure coefficients set to zero. The exposure measures are based on alternative exchange rate and geopolitical risk indicators. The regressions include firm characteristics related to international involvement, risk management, and geographic orientation, including foreign sales ratio, FX hedging activity, and additional controls for operational efficiency, size, profitability, valuation, leverage, and liquidity. All explanatory variables are lagged by one year. Firm fixed effects are included in all specifications. Robust t-statistics clustered at the firm level are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.