SELF-SANCTIONING: INTERNATIONAL STOCK MARKET RESPONSE TO THE RUSSIAN BUSINESS EXODUS

By

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Abstract

This paper investigates how financial markets valued corporate decisions to withdraw from Russia following its 2022 invasion of Ukraine. Using a novel dataset of corporate withdrawal announcements, this employs both event study and difference-in-differences methodologies to analyze market reactions. The event study reveals that companies making complete withdrawals experienced significantly better cumulative abnormal returns compared to firms that only partially curtailed operations, particularly in European markets. The difference-in-differences analysis confirms that Grade A withdrawals were associated with a rebound in market returns positive impact on returns compared to the negative baseline market reaction. While European companies showed higher Russian market exposure pre-invasion, there were no significant differences between U.S. and European market reactions after controlling for firm characteristics. Using an ordered logistic model, I show that withdrawal decisions were significantly influenced by firm size, growth prospects, and industry membership, with healthcare and financial services firms showing particular reluctance to exit. These results provide insights into how investors evaluate corporate responses to geopolitical crises and suggest growing convergence in global ESG expectations.

Keywords: Corporate Self-Sanctioning, Geopolitical Risk, Event Study, ESG Convergence, Stakeholder Theory

CONTENTS

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INTRODUCTION

In the wake of Russia's full-scale military invasion of Ukraine in early 2022, an unparalleled wave of punitive economic measures was implemented by various nations, chief among them the US, UK, and EU. These measures included restrictions on specific Russian exports, prohibitions on the import of crucial strategic goods into Russia, the expulsion of Russian financial entities from global payment systems, and the seizure of assets belonging to the Russian government and individuals with close ties to the state. However, the initial scale of the sanctions on the operations of Western companies in Russia was limited, and for the most part, they were legally able to continue their operations (Balyuk and Fedyk, 2023). What coincided with the first wave of sanctions was an unprecedented multinationals exodus from Russia. The decisions made by companies with exposure to Russia were voluntary and preceded sectoral sanctions imposed by Western countries. Over the span of the first year of the full-scale invasion, over 1,000 global multinationals withdrew from Russia. (Sonnenfeld et al., 2023) The Leave Russia project, managed by the Kyiv School of Economics, includes over 4,000 entries of companies that continued or curtailed their Russian operations.

This paper investigates the rationality of corporate divestment decisions in response to the 2022 Russian invasion of Ukraine by examining whether these decisions were commensurate with subsequent stock market returns, across US and major European markets. It also looks at the determinants of propensity to exit Russia such as country of origin, size and pre-war exposure to Russia. Prior to the invasion, many multinational enterprises (MNEs) anticipated continued stability and growth in the Russian market, as evidenced by surveys indicating that 53% of such firms planned to increase their presence in Russia (EY, 2021), while the opposite materialized. Therefore, to support the main research problem, this paper investigates what companies were most likely to withdraw from Russia, how the stock market rewarded them, and whether there exist differences between international capital markets in how the response unfolded.

As the full-scale Russian invasion of Ukraine nears its third anniversary, these questions

remain increasingly pertinent. Western sanctions are imposed well beyond Russia, on other adversary countries such as China, or Venezuela and are used as an economic weapon to support political aims of liberal democracies. In a push towards reshoring operations, companies often are faced with a choice between remaining or divesting from a country, where operating can still be legal, but exposes the company to a heightened geopolitical tension, political and reputation risk, as it has been the case with Russia.

Multinational companies face conflicting incentives with regards to a divestment. From the standpoint of financial accounting, companies need to either write-off their assets, or sell them, plausibly at a discount to their intrinsic value. However, a divestment can lead to a lowered risk profile and reputation benefits for a company. This preliminary analysis does not give a clear answer from the standpoint of maximizing shareholder value. At the same time, companies may face pressure - explicit, or implicit from the government where they operate to withdraw from Russia, while the sanction regime itself may allow for continued operations. This paper seeks to understand whether the cumulative stock market response to these decisions reflects a rational assessment of the value implications of withdrawal, thereby addressing the question of whether divestment was a value-creating or value-destroying strategy.

This paper contributes to the ongoing discussion on market responses to the Russian business retreat. It builds upon the work of Sonnenfeld et al. (2022) by expanding both the dataset and methodology. The analysis incorporates rating changes over time, providing a more nuanced picture of financial health surrounding divestment decisions. Additionally, this paper examines both US and non-US companies, allowing for a more detailed analysis of pre-war and post-war exposure to Russia across a broader geographic scope. By focusing on the critical period between February 2022 and August 2022, this study captures the timeframe when the issue of continued operations in Russia was most salient. This period falls just before the introduction of new restrictions in August 2022, (UNCTAD, 2022) which severely limited companies ability to withdraw from Russia, thus possibly impacting how investors would view future financial impact of company divestment announcements.

To investigate the question of market rationality, the following null hypotheses are tested. The first null hypothesis is the standard event study hypothesis, stating that curtailment announcements have no effect on the mean or variance of returns. The second null hypothesis posits that there is no difference in market reaction between various levels of curtailment, implying that the extent of a company's withdrawal from Russia does not impact its stock performance. The third null hypothesis asserts that there is no difference in aggregate cumulative abnormal returns across international stock markets, after adjusting for sector, capitalization, and magnitude of Russian operations and other confounding financial characteristics. Testing these hypotheses will provide valuable insights into how investors perceive corporate social responsibility and whether their preferences vary across different markets.

This study reveals several key findings regarding the stock market's reaction to corporate withdrawals from Russia following the Ukraine invasion. First, the difference-in-differences analysis rejected the null hypothesis that withdrawal announcements have no effect on the mean or variance of returns, showing instead that complete withdrawals were associated with a significant positive impact on cumulative abnormal returns compared to the negative baseline market reaction. Second, the analysis also rejected the null hypothesis of no differential market response based on withdrawal level, finding that Grade A withdrawals resulted in significantly more favorable returns compared to partial curtailments or continuing operations. However, the third null hypothesis of no difference between US and European market reactions could not be rejected after controlling for confounding factors, suggesting a more unified global investor perspective on the importance of decisive corporate action in the face of geopolitical crises. The event study and ordered logistic regression provided further context, showing that complete withdrawals elicited the most positive market response, especially in Europe, and that withdrawal decisions were significantly influenced by firm characteristics such as size, growth, liquidity, and industry.

The remainder of this paper is structured as follows. First, the paper reviews the relevant literature, examining corporate social responsibility theory, market responses to CSR initiatives, and the business exodus from Russia following the invasion of Ukraine. Second, the paper de-

scribes the novel hand-gathered dataset of corporate curtailment decisions and presents summary statistics. Third, it analyzes the determinants of corporate withdrawals through an ordered logistic regression model that examines how company characteristics and industry factors influenced exit decisions. Next, it employs an event study methodology to measure market reactions to curtailment announcements. The paper uses difference-in-differences analysis to examine two key comparisons: the market response to complete withdrawals versus partial curtailments, and the divergent reactions between European and American stock markets. Finally, it discusses the implications of these findings for corporate governance, stakeholder theory, and geopolitical risk management.

LITERATURE REVIEW

This paper is related to four major strands of finance literature: the responsibility of the firm to the society, market response to corporate social responsibility, geopolitical risk as well as non-standard preferences and biases. It is also informed by previous studies of Western business self-sanctioning in Russia.

Corporate Social Responsibility

The core debate within corporate social responsibility (CSR) centers on the fundamental question of to whom a corporation is responsible. This debate has profound implications for understanding corporate actions in situations like the Russian invasion of Ukraine, where companies faced pressure to consider ethical and social concerns alongside financial ones.

Milton Friedman's influential argument for shareholder primacy (Friedman, 1970) posits that a company's sole responsibility is to maximize profits for its shareholders. This perspective, rooted in agency theory (Jensen and Meckling, 1976a), emphasizes the potential for misalignment between managers and owners and advocates for governance mechanisms (Fama, 1980) that ensure managerial focus on shareholder wealth maximization (Rappaport, 1986). This shareholder-centric view suggests that corporate actions, including decisions to remain in or withdraw from a market, should be evaluated primarily based on their impact on shareholder value. In the context of the

Russia-Ukraine conflict, this perspective would suggest that companies should have remained in Russia if it was financially beneficial, regardless of ethical considerations.

However, this shareholder-centric view has been challenged by stakeholder theory (Freeman, 1984), which argues that corporations have responsibilities to a broader range of stakeholders, including employees, customers, suppliers, and the communities in which they operate. Carroll's CSR pyramid (Carroll, 1991) provides a useful framework for understanding these broader responsibilities, encompassing economic, legal, ethical, and philanthropic dimensions. This stakeholder perspective suggests that companies should consider the impact of their actions on all stakeholders, not just shareholders. In the context of the Russian invasion, this perspective would suggest that companies had a responsibility to consider the ethical implications of continuing to operate in Russia, even if it was financially viable. The stakeholder theory also emphasizes the importance of the relationship between the company and its stakeholders to the success of the organization (Beurden and Gössling, 2008). This view is shared by influential business leaders and scholars who have argued that CSR is in company's best interests and have advocated for stakeholder capitalism (Fink, 2022; WEF, 2021; Beurden and Gössling, 2008).

Market response to Corporate Social Responsibility

The relationship between Corporate Social Responsibility (CSR) and firm financial performance has been a subject of extensive debate. One perspective, often associated with instrumental stakeholder theory (Donaldson and Preston, 1995), suggests that engaging in CSR activities can enhance a firm's financial performance by improving operational efficiency, enhancing reputation, and attracting socially conscious consumers and investors (Orlitzky et al., 2003; Margolis and Walsh, 2003). The idea of stakeholder capitalism builds on this notion, arguing that creating long-term value for all stakeholders ultimately benefits shareholders. (Freeman et al., 2007) This perspective is further reinforced by the shifting demographics of investors, who show a growing preference for companies with strong ESG credentials, (Lopez-de Silanes et al., 2024) driving up their market value and presenting a profitable proposition for investors interested in ethical business practices.

Some studies suggest that investors with non-standard preferences (Jappelli and Pistaferri, 2017; Hong and Kacperczyk, 2009) may react differently to CSR activities. These investors may be willing to accept lower financial returns in exchange for supporting companies that align with their social or ethical values. This can lead to a valuation premium for socially responsible firms and a discount for those perceived as irresponsible. However, as Hong and Kacperczyk (2009) argue, these discounts might be temporary, as other investors less concerned with social responsibility may eventually enter the market.

Corporate social responsibility, when viewed as going beyond legal compliance (McWilliams and Siegel, 2001) can be conceptualized through a real options framework (Husted, 2005). In the context of operating in an adversary country like Russia, maintaining a business presence represents a series of strategic real options rather than a singular, binary decision. While extant research on corporate strategy under uncertainty suggests that firms often prefer to preserve optionality through partial measures like equity carve-outs or spin-offs, rather than executing full divestitures (Damaraju et al., 2015), this approach may impose significant indirect costs when the underlying volatility does not resolve favorably.

Geopolitical risk and CSR

Geopolitical risk captures a range of events related to tension among states, war and terrorism, from their threat, through realization to escalation. (Dario Caldara et al., 2018) Geopolitical events can generate significant market volatility (Smales, 2021) and impact asset prices (Cheng and Chiu, 2018; Pástor and Veronesi, 2013). Firms respond to geopolitical risks by adjusting their strategies and risk management practices (Pantzalis et al., 2001; Cuervo-Cazurra and Genc, 2008).

Geopolitical corporate responsibility (Freeman, 2022) argues that businesses have a role to play in upholding the international rules-based order and contributing to global stability. Survey results also challenge shareholder primacy view, suggesting that companies have responsibilities that extend beyond maximizing profits, by emphasizing social and geopolitical dimensions of business. (Edelman, 2022)

Reputational risk becomes a particularly salient concern in situations of geopolitical conflict. As Fombrun (2005) argues, corporate reputation is a valuable asset that can be significantly damaged by negative publicity or stakeholder backlash. Geopolitical events can trigger intense media attention and public scrutiny, making companies vulnerable to reputational damage if their actions are perceived as unethical or irresponsible. The Brent Spar case, analyzed by Zyglidopoulos (2002), provides a stark example of how stakeholder pressure and reputational damage can force companies to alter their decisions, even when those decisions are based on seemingly sound economic logic. Companies that remained in Russia faced consumer boycotts across geographies such as Poland and Indonesia (Reshetnikova et al., 2024; Suhud et al., 2024), mobilized by i.e. NGOs who can exert pressure on companies to adopt more socially responsible practices. Spar and La Mure (2003)

Non-standard preferences and biases

Another area of research focuses on the behavior of investors with non-standard preferences (Jappelli and Pistaferri, 2017), who tend to adjust their investment strategies based on a company's social and environmental impact. These investors might devalue stocks associated with negative impacts and are willing to pay more for those perceived as socially responsible, potentially leading to a valuation premium for ethical companies and a discount for those deemed harmful. Despite initial price dips for the latter, evidence suggests that such stocks might eventually attract investors less concerned with social responsibility, normalizing their prices over time. This indicates a potential compromise on financial returns for those investors prioritizing ESG considerations. (Hong and Kacperczyk, 2009) (Bolton and Kacperczyk, 2021)

Nonstandard preferences refer to systematic deviations from purely financial considerations in investment decisions, Kahneman and Tversky (1979) often incorporating social, ethical, or cultural factors into economic choices. Döttling and Kim (2021) Investors may have non-pecuniary preferences related to holding assets with exposure to a country waging war on another, in particular with respect to public equities labeled as a sin stock. Hong and Kacperczyk (2009) Investors

could also prefer stocks observing environmental, social and governance factors due to their risk-mitigating preferences, Yoo (2023) associated in particular with the risk of the loss of business due to sanctions, nationalization by the Russian government, or the reputation risk of continued operations in Russia which fits the broader scheme of standard pecuniary preferences.

Cultural and institutional differences between US and European markets may lead to systematically different valuations of corporate social responsibility (CSR) initiatives Habisch et al. (2011). European investors, particularly in countries like Germany, operate in economies with stronger stakeholder-oriented corporate governance traditions Bottenberg et al. (2017) and may place higher value on companies' socially responsible decisions, even when these come at the expense of short-term profits. In contrast, US markets, which traditionally emphasize shareholder primacy, might respond less favorably to corporate decisions that prioritize social responsibility over immediate financial returns.

Russian Business Retreat

Recent scholarship studies the scale of the withdrawals of Western companies from Russia following the full-scale Russian invasion of Ukraine on February 24, 2022. Two datasets and their respective grading schemes compiled by Yale Chief Executive Leadership Institute and Kyiv School of Economics serve as a point of reference for scholars. (Sonnenfeld et al., 2023). The withdrawal of Western companies has been argued as one of the key elements contributing to the weakening of the Russian economy. (Sonnenfeld, 2022); (Meyer et al., 2023); (Bobrovskiy, 2023). Research on market reactions to withdrawal decisions has yielded important insights, particularly regarding U.S. companies. Sonnenfeld (2022) demonstrates that equity markets rewarded companies for leaving Russia while penalizing those that remained, as evidenced by total stock market returns. Balyuk and Fedyk (2023) find that firms that were heavily exposed to Russia saw a downward trend in their stock returns prior to the day of the announcement of withdrawal, which stopped the day they announced their decision to withdrawal from Russia.

Self-sanctioning represents a form of corporate decision-making that anticipates or extends

beyond regulatory requirements, driven by a combination of reputational concerns, operational challenges, and strategic risk assessment. (Pajuste and Toniolo, 2022) Unlike regulatory sanctions, which establish clear legal boundaries and penalties, self-sanctioning operates through market mechanisms and stakeholder pressures. For companies that are deciding on a broader policy of not conducting a business in a given country, or dealing with certain actors, it can be thought of as a variant of private regulation. (O'Rourke, 2003; Kinderman, 2016)

DATA

General Overview

This paper is based on a comprehensive, hand-gathered data set of publicly traded US-based and international company decisions to curtail the extent of their operations in Russia. The curtailment decision dataset includes 4059 private and public companies based on the Yale CELI and Kyiv School of Economics databases. Other relevant data regarding company financials was retrieved from the Bloomberg and Compustat databases. Fama-French factors were retrieved from Kenneth French (2024) Data Library. A detailed explanation of the data collection process and methodology will be provided in the following section.

Since March 2022 researchers at Yale Chief Executive Leadership Institute and the Kyiv School of Economics hand-gathered data on company decisions with respect to continuing or curtailing business in Russia. The dataset includes both private, as well as public companies across 106 countries and all major industries. The cornerstone of the research are company statements.

Each company was assigned a grade by the research team, which compartmentalizes the companies into five groups through a grade-like scale from Grade A ("Withdrawal") to Grade F ("Digging In"). Below are the definitions as provided by Sonnenfeld et al. (2022)

On top of the above mentioned categories, Kyiv School of Economics also uses Exit to demarcate companies that successfully exited Russia. However, the difference in the classification criteria and terminologies used by the Yale School of Management and Kyiv School of Economics datasets does not significantly impact the overall analysis of corporate responses to Russia's in-

Grade	Description
A	Withdrawal: Companies making a clean break or permanent exit from Russia, leaving behind no operational footprint.
B	Suspension: Companies temporarily suspending all or almost all Russian operations without permanently exiting or divesting.
C	Scaling Back: Companies suspending a significant portion (but not all) of their business in Russia.
D	Buying Time: Companies pausing new investments or minor operations in Russia but largely continuing substantive business.
F	Digging In: Companies defying demands for exit or reduction of activities, largely conducting business as usual.

Table 1: Company Categories Based on Operations in Russia

vasion of Ukraine. Both databases rely on comprehensive ground-up methodologies to evaluate corporate operations in Russia, with daily updates ensuring accuracy and consistency. (Sonnenfeld et al., 2023) For the purposes of this study, the difference between completed exits and withdrawals will not be significant, as the announced forward-looking withdrawals in the first months of the full-scale war in Ukraine could be treated by financial markets as indicatory of further corporate follow-through.

Curtailment Examples and Rationale

The classification of company responses to the Russian invasion follows a systematic methodology that evaluates both the substance and language of corporate announcements. The key differentiating factors include the permanence of the action, the scope of business affected, and the clarity of commitment. Below are representative examples that illustrate the nuances between different grades of corporate response.

Scaling Back (Grade C)

> **Tennant Company (March 22, 2022):** "As each day brings new details of Russia's devastating attack on Ukraine, Tennant Company is saddened by the loss of life and concerned for the safety and well-being of all who are affected by the invasion.
>
> We recognize the role businesses must play in helping create a world in which all

thrive. We've heard feedback from our employees, our customers, and our partners, and with acknowledgment of the unprecedented nature of this war, we are substantially suspending sales to Russia and Belarus immediately.

In addition to fully adhering to all sanctions, we will continue to monitor developments in the region and will choose our course of action based on what is right."

The statement warrants a Grade C classification for several key reasons. First, the use of "substantially" rather than "completely" indicates a partial reduction in operations. Second, the phrase "continue to monitor developments" suggests a reactive rather than decisive approach. Third, the commitment is limited to "sales" while potentially maintaining other business activities. The language reflects a measured response that falls short of full suspension or withdrawal, characteristic of the scaling back category.

Suspension (Grade B)

Nike Inc. (March 3, 2022): "Nike Inc. said on Thursday it would temporarily close all its stores in Russia, joining a slew of Western brands that have suspended their businesses in the country following Moscow's invasion of Ukraine.

The company also said its foundation would be donating $1 million to the United Nations Children's Fund and the International Rescue Committee to support relief efforts."

Nike's announcement exemplifies Grade B classification criteria through several elements. The explicit use of "temporarily" indicates a non-permanent nature of the action. However, the scope is comprehensive ("all its stores"), distinguishing it from partial measures. While the statement demonstrates decisive immediate action, the temporary nature leaves open the possibility of future market re-entry, a key characteristic of Grade B responses. The humanitarian donation, while commendable, does not affect the grading which focuses on operational decisions.

Withdrawal (Grade A)

> **Salesforce (March 7, 2022):** "We are heartbroken by the violence and loss of life due to the invasion of Ukraine. We stand in solidarity with the Ukrainian people and are hopeful for an expedient path to peace.
>
> We do not have a material business in Russia. Through resellers and other channels, we have a very small number of Russia-based customers, and we began exiting those relationships last week."

Salesforce's statement meets Grade A criteria through several distinct elements. First, it uses definitive language ("exiting") without qualifiers like "temporary" or "substantial." Second, it addresses all business relationships, including indirect ones through "resellers and other channels." Third, the action is presented as already in progress ("began exiting") rather than conditional or future-oriented. The comprehensiveness of the exit and the absence of caveats about future return characterize true withdrawal decisions, even though the company's Russian exposure was limited.

These examples illustrate how the grading methodology considers both the substance and rhetoric of corporate announcements. The classification system distinguishes between partial reductions (Grade C), comprehensive but temporary suspensions (Grade B), and complete, permanent withdrawals (Grade A), providing a framework for evaluating the varying degrees of corporate response to the invasion, further used in the database analyzed in this paper.

Database construction

The first step in the creation of the database was selecting only public companies listed on exchanges in the United States, United Kingdom, France and Germany. If a company is cross-listed between stock exchanges, data from the US stock exchange is selected.

Second, to be included in the analysis, the company had to make a public announcement of their decision to curtail their Russian operations, based on the Yale CELI methodology. (Sonnenfeld et al., 2023) Press reports that were first to announce such a decision, and include a quote from

Category	Number of Companies
Continue Operations (F)	1753
Pausing Investments (D)	140
Scaling Back (C)	362
Suspension (B)	793
Withdrawal (A)	559
Exit Completed	452
Total	**4059**

Note: This table shows the number of companies in each investment action category.

Table 2: Investment Actions and Totals

a company representative are also treated as such for the purposes of the study. However, company announcements made during earnings calls or in quarterly, or yearly reports are excluded, due to confounding factors associated with the periodic release of financial data, obscuring the company's decision to withdraw from Russia. This narrows the dataset to companies genuinely curtailing their Russia operations i.e. grades C, B and A.

Third, the company could have made a number of curtailment decisions in the time window of the study i.e. a change from suspension of its operations in Russia to a complete withdrawal. In such a case, additional events dates are added to the company, further augmenting the original Yale and KSE datasets. The dates of company announcements were hand collected by the author through an extensive web search. Given that the available datasets do not include the dates of company decisions, this may result in discrepancies between the dates that a company decision was noted and published in Yale and KSE databases. However, limiting the dataset to public announcements independent of information revealed and publicized in the databases, allows for studying investor reactions based on public information. The dataset was then merged with financial and price data from Compustat and Bloomberg.

The analysis focuses on the period between the onset of the full-scale invasion (February 24, 2022) and August 2022, capturing the first wave of corporate withdrawals from Russia. This temporal restriction strenghtens the internal validity of the study in several ways. First, this period was characterized by minimal regulatory constraints on corporate operations in Russia, meaning withdrawal decisions were predominantly voluntary rather than compliance-driven. Second, com-

panies still maintained significant control over their exit process, as the Russian government had not yet implemented strict exit controls or begun widespread asset seizures. Third, this period saw a high concentration of withdrawal announcements with limited confounding events, as companies were reacting primarily to the invasion itself rather than to subsequent developments like realized risks or peer pressure. Finally, during this early phase, before the full implementation of Western sanctions, corporate announcements represented clear, discrete updates to market expectations about firms' exposure to Russian market risks, strategic priorities, and risk management approaches. This clean setting allows for more precise identification of how markets valued different approaches to managing geopolitical risk when companies still maintained full discretion over their Russian operations.

A Russia exposure index was constructed to quantify companies' pre-war involvement in the Russian market. The index combines two key metrics: the percentage of company revenue derived from Russian operations (based on Kyiv School of Economics data, as well as 10-K filings, Russian Tax Services data and other reports) and mentions of Russia in company 10-K reports. The index employs a scale from 0 to 4, defined as follows:

$$\text{Russia Exposure} = \begin{cases} 0 & \text{if no Russia revenue or "Russia" 10-K mentions} \\ 1 & \text{if only "Russia" 10-K mentions or Russia revenue } \leq 0.25\% \\ 2 & \text{if } 0.25\% < \text{Russia revenue} \leq 0.50\% \\ 3 & \text{if } 0.50\% < \text{Russia revenue} \leq 0.75\% \\ 4 & \text{if Russia revenue} > 0.75\% \end{cases} \tag{1}$$

This graduated scale allows for differentiation between companies with varying levels of Russian market involvement, providing a more comprehensive measure than binary indicators or revenue percentages alone. Due to limited revenue data for companies in the dataset, it provides a proxy for companies which maintained Russia subsidiaries without disclosing their financial data.

Market	Grade	Number of Companies
EU	A	33
	B	27
	C	11
	Other	7
EU Total		**78**
US	A	42
	B	95
	C	35
	Other	7
US Total		**179**

Note: This table shows the distribution of companies by market and grade.

Table 3: Number of Companies by Grade

Summary Statistics

The summary statistics reveal distinct patterns in the financial and operational profiles of companies based on their withdrawal decisions from Russia.

Companies making complete withdrawals (Grade A) show substantial mean assets ($94.80 billion) and moderate market capitalization ($63.00 billion), with high standard deviations indicating significant variation within this group. Their median asset value of $10.21 billion suggests a mix of both large and smaller firms chose complete withdrawal. These companies show moderate Russia exposure (index: 1.16) and Russian revenue ($0.08 billion), indicating that withdrawal decisions were not limited to firms with minimal Russian presence.

Companies announcing suspensions (Grade B) present a different profile. Despite having smaller mean assets ($44.82 billion), they show the highest market capitalization ($107.20 billion), suggesting that markets assigned higher valuations to these firms despite their more measured approach to Russian operations. These companies show the lowest Russian exposure (index: 0.82) and revenue ($0.02 billion), which may explain their ability to maintain a more flexible stance through suspension rather than complete withdrawal.

Companies that scaled back operations (Grade C) demonstrate the highest mean employee count (85.44K) and relatively high assets ($91.84 billion), but more moderate market capitalization ($61.59 billion). They show the highest Russian exposure (index: 1.33) and moderate Russian

Variable	Group	Mean	Median	Standard Deviation
Financial Metrics				
Assets	A Grade	94.80B	10.21B	415.76B
	B Grade	44.82B	9.43B	101.09B
	C Grade	91.84B	18.70B	241.64B
Market Cap	A Grade	63.00B	15.30B	205.16B
	B Grade	107.20B	15.38B	379.25B
	C Grade	61.59B	26.77B	149.58B
2021 Sales	A Grade	22.32B	8.99B	30.49B
	B Grade	21.78B	5.66B	61.51B
	C Grade	25.72B	7.13B	46.14B
2020 Sales	A Grade	19.68B	8.78B	26.56B
	B Grade	17.96B	4.58B	49.60B
	C Grade	22.89B	5.85B	41.20B
Sales Growth	A Grade	0.18	0.13	0.42
	B Grade	0.22	0.16	0.24
	C Grade	0.30	0.18	0.75
Employees	A Grade	47.47K	14.00K	69.36K
	B Grade	53.22K	14.00K	154.55K
	C Grade	85.44K	34.05K	135.75K
Tobin's Q	A Grade	2.77	1.76	2.88
	B Grade	3.59	2.71	2.79
	C Grade	2.44	1.92	2.01
Current Ratio	A Grade	1.68	1.47	1.10
	B Grade	1.74	1.55	0.93
	C Grade	1.67	1.30	1.50
EBITDA/Interest	A Grade	-0.22	4.77	113.88
	B Grade	-32.61	5.98	504.48
	C Grade	15.55	4.23	36.66
Financial Leverage	A Grade	6.45	3.15	11.66
	B Grade	8.74	3.33	32.56
	C Grade	6.64	3.13	15.84
Russia Exposure (Index)	A Grade	1.16	1.00	1.22
	B Grade	0.82	1.00	0.96
	C Grade	1.33	1.00	1.48
Russia Revenue	A Grade	0.08B	0.00B	0.27B
	B Grade	0.02B	0.00B	0.08B
	C Grade	0.05B	0.00B	0.17B

Table 4: Summary Statistics by Grade

Variable	Group	Mean	Median	Standard Deviation
Financial Metrics				
Assets	EU	160.44B	13.34B	490.55B
	US	39.13B	10.76B	78.81B
Market Cap	EU	49.00B	11.10B	198.51B
	US	98.81B	25.80B	322.96B
2021 Sales	EU	26.78B	8.78B	45.93B
	US	20.85B	6.22B	51.26B
2020 Sales	EU	23.10B	7.13B	39.08B
	US	17.73B	5.54B	41.99B
Sales Growth	EU	0.22	0.14	0.35
	US	0.23	0.16	0.46
Employees	EU	81.47K	26.42K	115.52K
	US	49.63K	16.00K	133.19K
Tobin's Q	EU	2.17	1.32	2.35
	US	3.45	2.56	2.72
Current Ratio	EU	1.81	1.31	2.26
	US	1.72	1.51	1.10
EBITDA/Interest	EU	6.06	5.28	114.86
	US	-20.19	4.82	416.42
Financial Leverage	EU	6.36	3.29	9.34
	US	8.47	3.14	28.67
Russia Exposure	EU	1.49	1.00	1.37
	US	0.91	1.00	1.12
Russia Revenue	EU	0.08B	0.00B	0.22B
	US	0.04B	0.00B	0.18B

Table 5: Summary Statistics by Region

Variable	Group	Mean	Median	Standard Deviation
Ownership Statistics				
Institutional Ownership	A Grade	79.4%	83.8%	23.1%
	B Grade	82.6%	86.2%	25.4%
	C Grade	79.9%	85.6%	25.5%
US Ownership	A Grade	60.8%	73.2%	26.1%
	B Grade	65.7%	76.1%	26.3%
	C Grade	67.8%	77.8%	21.9%
Institutional Ownership	EU	60.7%	58.9%	24.0%
	US	89.2%	91.9%	19.1%
US Ownership	EU	31.5%	30.9%	19.6%
	US	78.1%	79.5%	11.4%

Table 6: Ownership Statistics by Grade and Region

Variable	Group	% Breakdown
Sector Breakdown		
Healthcare Sector	EU	5.1%
	US	7.3%
Tech Sector	EU	12.8%
	US	25.7%
Manufacturing	EU	26.9%
	US	17.3%
Other Sectors	EU	20.5%
	US	20.1%
Mining & Energy	EU	2.6%
	US	1.7%
Financial Services	EU	14.1%
	US	12.8%
Consumer Goods	EU	17.9%
	US	15.1%

Table 7: Sector Breakdown by Region

revenue ($0.05 billion), suggesting that deeper operational entrenchment may have influenced their decision to maintain partial operations rather than execute complete withdrawals.

Geographic comparisons reveal important differences between European and U.S. companies. European firms show substantially larger mean assets ($160.44 billion vs $39.13 billion) but lower market capitalizations ($49.00 billion vs $98.81 billion) compared to their U.S. counterparts. European companies also show higher Russian exposure (1.49 vs 0.91) and revenue ($0.08 billion vs $0.04 billion), indicating greater pre-war economic ties to Russia.

Ownership patterns also differ significantly across regions. U.S. companies show notably higher institutional ownership (89.2% vs 60.7% for EU firms) and more concentrated U.S. ownership (78.1% vs 31.5%). This ownership structure may influence corporate decision-making, with U.S. firms potentially more responsive to institutional investor preferences.

The sector breakdown reveals different industry concentrations across regions. U.S. companies show higher representation in technology (25.7% vs 12.8%) and healthcare (7.3% vs 5.1%), while European firms have greater concentration in manufacturing (26.9% vs 17.3%) and consumer goods (17.9% vs 15.1%). These sector differences may influence both the ability and willingness of companies to withdraw from Russian markets.

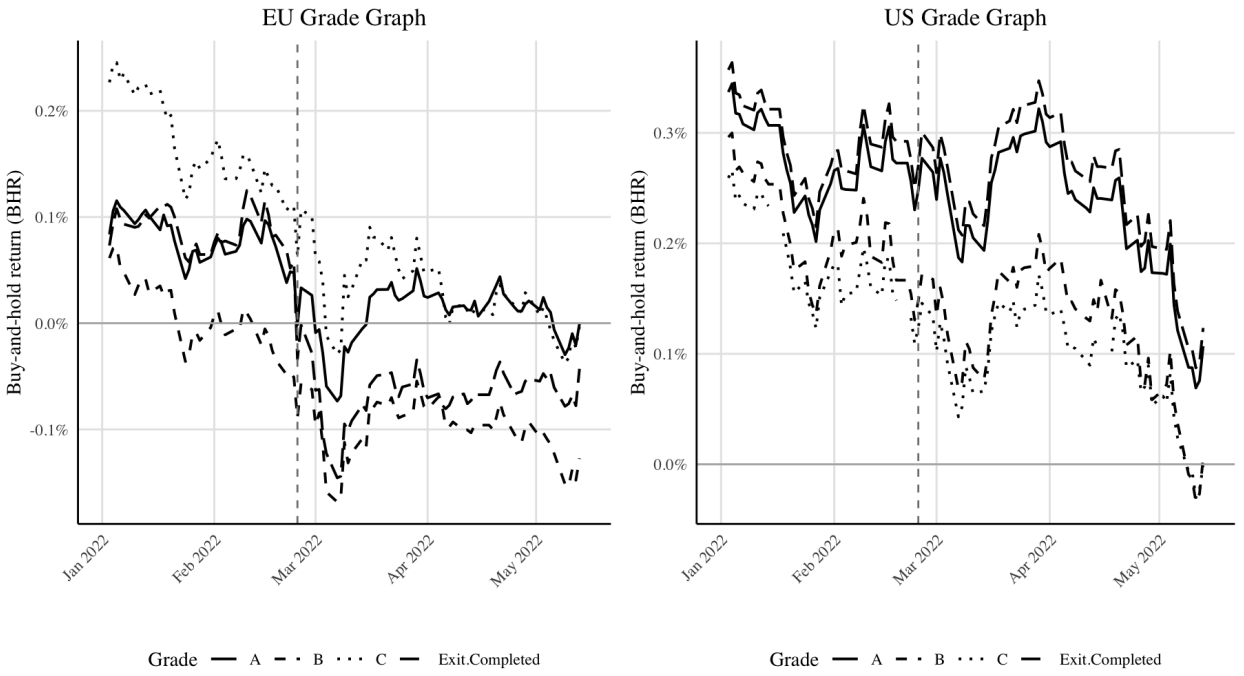

Figure 1: Buy and Hold Return between 1 January 2022 and 15 May 2022

Figure 1 shows the different pathways for returns of companies withdrawing from Russia, which includes all the public companies from the US, Great Britain, France and Germany contained in the dataset. Both European and Ameircan companies that withdraw from Russia (A grade) achieve substantially better buy-and-hold return than companies merely suspending or scaling back their Russian operations. Companies taking on a decision to exit Russia were rewarded with a premium over their peers that did not such a decisive action.

ORDERED LOGISTIC MODEL SPECIFICATION AND RESULTS

This analysis examines the determinants of corporate withdrawal decisions from Russia following the invasion of Ukraine. The dependent variable is ordinal, representing four distinct levels of corporate response: scaling operations (level 0), suspension (level 1), withdrawal (level 2), and full exit (level 3). Given the ordered nature of these responses, we employ an ordered logistic regression model.

The probability of a firm i choosing a withdrawal level j is specified as:

$$P(Y_i = j) = P(\gamma_{j-1} < Y_i^* \leq \gamma_j) \tag{2}$$

where Y_i^* is a latent continuous variable representing the propensity to withdraw, and γ_j are threshold parameters. The latent variable is modeled as:

$$\begin{aligned} Y_i^* = {} & \beta_1 \log(\text{Sales}_{2020,i}) + \beta_2 \log(\text{Employees}_i) + \beta_3 \log(\text{Assets}_{2021,i}) \\ & + \beta_4 \log(\text{Market Cap}_{2021,i}) + \beta_5 \text{Sales Growth}_i + \beta_6 \text{Current Ratio}_i \\ & + \beta_7 \text{EBITDA Interest Ratio}_i + \beta_8 \text{Tobin's Q}_i + \beta_9 \text{Financial Leverage}_i \\ & + \beta_{10} \text{Institutional Ownership}_{2021,i} + \sum_{k=11}^{16} \beta_k \text{Industry}_{k,i} + + \beta_{17} \text{European HQ}_i \\ & + \epsilon_i \end{aligned} \tag{3}$$

where ϵ_i follows a logistic distribution. The model includes financial characteristics, operational metrics, and industry indicators. All continuous variables are standardized to facilitate interpretation of the coefficients.

The ordered logistic regression analysis reveals multifaceted determinants of corporate withdrawal decisions from Russia following the invasion of Ukraine. The results demonstrate significant effects across financial metrics, firm characteristics, industry membership, and Russian market exposure levels.

Firm size exhibits contrasting effects through different metrics. The coefficient on employee count is negative and statistically significant ($\beta = -0.315$, $p < 0.01$), while the coefficient on sales volume is positive and significant ($\beta = 0.218$, $p < 0.01$). In ordered logistic regression, these coefficients represent changes in the log-odds of being in a higher withdrawal category, holding other variables constant. For a one standard deviation increase in log employees, the log-odds of choosing a more complete withdrawal decrease by 0.315, while a one standard deviation increase in log sales is associated with a 0.218 increase in the log-odds of more complete with-

	Coefficient
salesgrowth	-0.2760***
	(0.141)
currentratio	-0.3318***
	(0.127)
ebitdainterestratio	-0.0208
	(0.097)
tobinq	0.0911
	(0.133)
finleverageratio	-0.0616
	(0.102)
healthcare	-2.0168***
	(0.704)
tech	-0.9490***
	(0.343)
manufacturing	-0.6121**
	(0.347)
miningenergy	-0.2749
	(0.766)
financialservices	-1.1649***
	(0.387)
consumergoods	-0.8523***
	(0.375)
institutional_per_held_2021	0.5863
	(0.594)
$\ln_{\text{sales2020}}$	0.2178***
	(0.075)
$\ln_{\text{employees}}$	-0.3146***
	(0.105)
$\ln_{\text{assets2021}}$	-0.0211
	(0.046)
$\ln_{\text{marketcapend2021}}$	0.1138*
	(0.081)
eu	0.3818*
	(0.310)
0.0/1.0	-0.9606
	(1.800)
1.0/2.0	0.7778***
	(0.081)
2.0/3.0	-0.4619***
	(0.149)

Robust standard errors are reported in parentheses.
*$p < 0.15$; **$p < 0.10$; ***$p < 0.05$

Table 8: Ordered Logistic Regression Results for Withdrawal Level

drawal. The opposing signs suggest that operational complexity (as measured by employee count) and financial scale (as measured by sales) had competing influences on withdrawal decisions. This dichotomy suggests that labor-intensive operations faced greater constraints in executing market exits, while sales-oriented firms had more flexibility in their response strategies.

Financial metrics reveal interesting patterns: companies with higher current ratios showed significantly lower withdrawal propensity ($\beta = -0.332$, $p < 0.01$), and firms with stronger sales growth were also less likely to withdraw ($\beta = -0.276$, $p < 0.05$). However, other financial indicators including EBITDA interest coverage, Tobin's Q, and financial leverage showed no significant relationship with withdrawal decisions. This suggests that while liquidity and growth trajectories influenced exit decisions, market valuation and debt capacity played minimal roles.

Industry effects emerge as particularly strong determinants. Healthcare ($\beta = -2.017$, $p < 0.01$), technology ($\beta = -0.949$, $p < 0.01$), and financial services ($\beta = -1.165$, $p < 0.01$) all exhibited significantly lower withdrawal propensities. Consumer goods companies also showed similar reluctance ($\beta = -0.852$, $p < 0.05$), while manufacturing firms demonstrated marginally lower withdrawal tendencies ($\beta = -0.612$, $p < 0.10$). These strong industry effects likely reflect sector-specific operational constraints, and regulatory concerns.

In particular, healthcare sector's markedly lower withdrawal propensity ($\beta = -2.017$, $p < 0.01$)compared to other industries reflects the unique position of medical goods and services within the international sanctions framework. While Western governments imposed comprehensive sanctions on Russia following the invasion of Ukraine, they explicitly carved out humanitarian exceptions for healthcare and pharmaceuticals. The U.S. Treasury's Office of Foreign Assets Control (OFAC) and the European Union both issued specific exemptions for medical supplies, pharmaceutical products, and related services. Pharmaceutical companies such as Pfizer (2022) cited humanitarian reasons for continued provision of medicines to Russia: *Pfizer concluded that a voluntary pause in the flow of our medicines to Russia would be in direct violation of our foundational principle of putting patients first.* Critics of this narrative (Cordell, 2022) point out the effort of pharmaceutical companies to retain access to the $38 billion Russian market for medicine

(Statista, 2024) and their indirect participation in propping up the Russian regime. (Varney, 2022) It helps explain the the strongest negative coefficient in our analysis, indicating significantly lower likelihood of withdrawal compared to firms in other sectors that faced more stringent sanctions without a compelling outward-facing narrative.

The exposure thresholds reveal a complex relationship between Russian market presence and withdrawal decisions. Companies with moderate exposure to Russia (between 0.25% and 0.5% of revenue) showed distinctly different behavior ($\beta = 0.778$, $p < 0.001$) compared to those with higher exposure levels (0.5%-0.75% of revenue) ($\beta = -0.462$, $p < 0.01$). This non-linear relationship suggests that moderate exposure might have provided both the incentive and capability to withdraw, while higher exposure levels may have created exit barriers through operational entrenchment or revenue dependencies.

Interestingly, institutional ownership and European headquarters location (compared to other regions) did not significantly influence withdrawal decisions, suggesting that ownership structure and geographic headquarters location were not decisive factors in shaping corporate responses to the invasion. The results indicate that withdrawal decisions were primarily driven by operational characteristics (particularly employee base and sales volume), industry-specific factors, and the degree of Russian market exposure, rather than where the company was headquartered and its debt capacity.

EVENT STUDY

The core question of this paper is whether and how financial markets valued companies' decisions to withdraw from Russia following the invasion of Ukraine. To answer this question, we need to isolate the effect of withdrawal announcements from other factors affecting stock returns. An event study methodology provides the ideal framework for this analysis by comparing actual returns around withdrawal announcements to counterfactual returns that would be expected in the absence of such announcements.

The Fama-French five-factor model (Fama and French, 2015) serves as our primary con-

trol framework, accounting for systematic variations in returns that could otherwise be conflated with the effects of withdrawal announcements. By controlling for market, size, value, profitability, and investment factors, we aim to isolate the abnormal returns specifically attributable to companies' Russian exit decisions. This approach helps address potential confounding effects from broader market movements and firm characteristics that might influence returns independently of withdrawal decisions.

These factor exposures are estimated over a 180-day window ending 60 days before each announcement, ensuring the parameter estimates are both stable and uncontaminated by anticipation of withdrawal decisions. The model uses region-specific factors for U.S. and European markets to account for geographical differences in risk premia.

The difference between actual returns and this counterfactual - the abnormal return - can be attributed to the withdrawal announcement because the Fama-French model already accounts for other systematic sources of variation in stock returns. By cumulating these abnormal returns over a window from 10 days before to 5 days after each announcement (CAR[-10,+5]), we capture the full market response to withdrawal decisions, including any anticipation or delayed reaction.

The model is specified as:

$$\begin{aligned} R_{it} - R_{ft} = \alpha_i &+ \beta_{i,MKT}(R_{mt} - R_{ft}) \\ &+ \beta_{i,SMB} SMB_t \\ &+ \beta_{i,HML} HML_t \\ &+ \beta_{i,RMW} RMW_t \\ &+ \beta_{i,CMA} CMA_t \\ &+ \epsilon_{it} \end{aligned} \tag{4}$$

where R_{it} is the return on security i at time t, R_{ft} is the risk-free rate, R_{mt} is the market return, SMB_t represents the size factor ("Small Minus Big"), HML_t captures the value factor ("High Minus Low" book-to-market ratio), RMW_t represents the profitability factor ("Robust Minus Weak" operating profitability), and CMA_t captures the investment factor ("Conservative

Minus Aggressive" investment patterns). The coefficients $\beta_{i,j}$ represent the sensitivity of security i to factor j, and ϵ_{it} is the error term.

Given the international nature of our sample, we utilize market-specific Fama-French factors for both U.S. and European markets to account for regional variations in factor returns. Abnormal returns (AR) for each firm i on day t during the event window are calculated as:

$$\begin{aligned} AR_{it} = R_{it} - (\hat{\alpha}_i &+ \hat{\beta}_{i,MKT}(R_{mt} - R_{ft}) \\ &+ \hat{\beta}_{i,SMB} SMB_t \\ &+ \hat{\beta}_{i,HML} HML_t \\ &+ \hat{\beta}_{i,RMW} RMW_t \\ &+ \hat{\beta}_{i,CMA} CMA_t) \end{aligned} \tag{5}$$

where the hat notation denotes estimated parameters from the estimation window. To capture the full effect of the announcements, we calculate cumulative abnormal returns (CAR) over the event window:

$$CAR_i = \sum_{t=-10}^{10} AR_{it} \tag{6}$$

Finally, to assess the average impact across all events, we compute the cumulative average abnormal return (CAAR):

$$CAAR = \frac{1}{N} \sum_{i=1}^{N} CAR_i \tag{7}$$

where N is the number of events in our sample.

The statistical significance of abnormal returns is assessed using both parametric and non-parametric tests to ensure robustness. For the parametric test, we employ a standard t-test of the null hypothesis that CAAR equals zero. The test statistic is calculated as:

$$t = \frac{CAAR}{\sigma(CAAR)} \sim t(N-1) \tag{8}$$

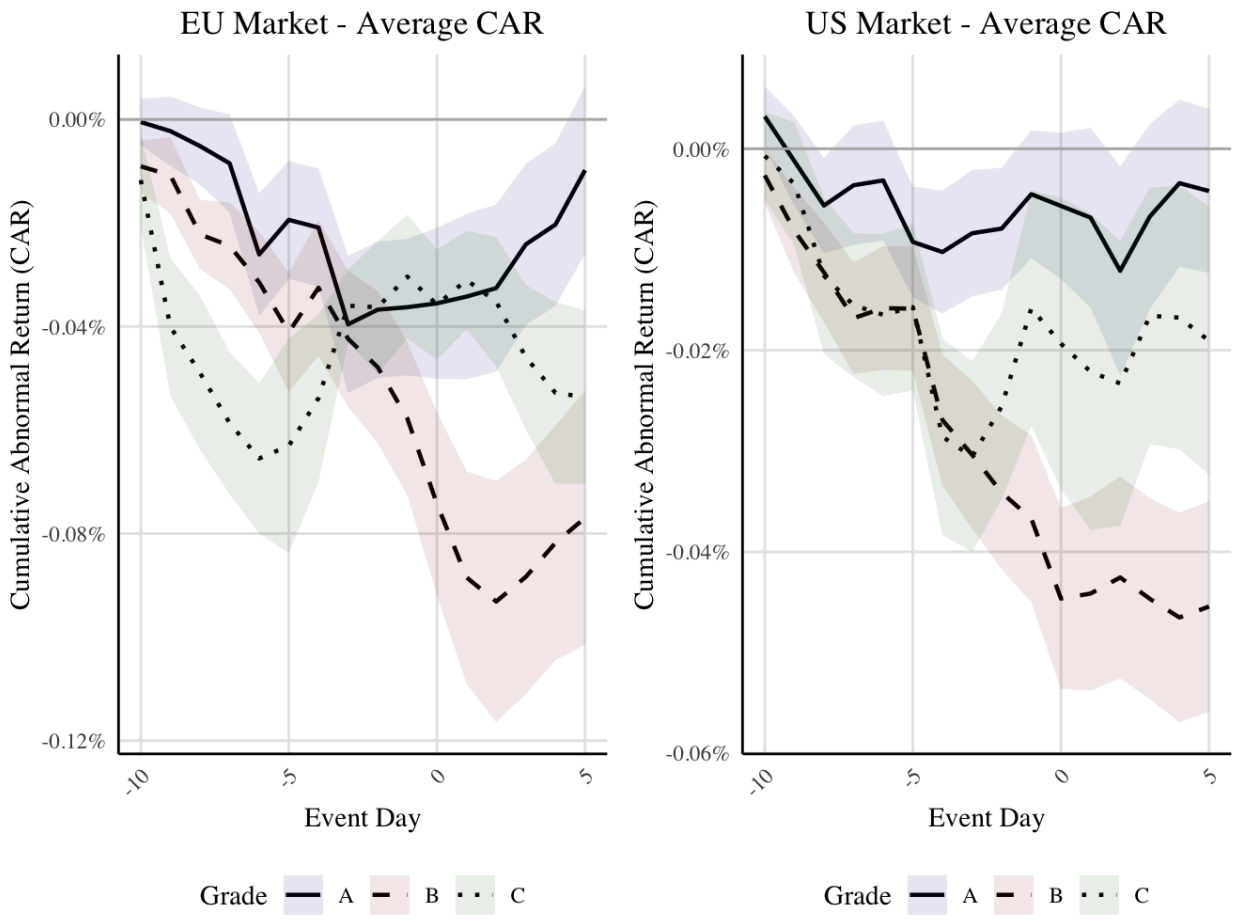

Figure 2: Cumulative Abnormal Return for EU and US companies by grade

where $\sigma(CAAR)$ is the standard error of the CAAR estimate.

Our methodology explicitly accounts for cross-sectional correlation in abnormal returns that may arise from event date clustering, as many firms announced their Russian market responses in close temporal proximity following the invasion. This consideration is particularly important for maintaining appropriate statistical inference in our setting, where announcement timing may be partially endogeneous to the underlying event that triggered the corporate responses.

For greater discussion of the model, please see Appendix.

Companies announcing complete withdrawals (Grade A) show the most favorable post-announcement pattern, especially in European markets. While these companies initially suffered from their Russian exposure like their peers (negative pre-event CARs), they experience a signif-

Market	Event Grade	Mean	Standard Deviation
EU	A	-0.0205	0.0740
EU	B	-0.0489	0.0908
EU	C	-0.0437	0.0417
US	A	-0.0050	0.0592
US	B	-0.0292	0.0739
US	C	-0.0177	0.0619

Table 9: Mean and Standard Deviation of Event Grades by Market

icant rebound following their withdrawal announcements. The recovery brings their cumulative returns back within statistical bounds of their pre-invasion levels, suggesting that markets viewed complete withdrawal as effectively neutralizing their Russian risk exposure. This pattern indicates that decisive exit announcements served as a credible signal of risk mitigation to investors.

In contrast, companies announcing suspensions (Grade B) show a markedly different pattern. Despite taking action to reduce their Russian exposure, these firms continue to experience negative abnormal returns post-announcement, with European markets showing particularly pronounced negative reactions (mean CAR of -4.89%). This suggests that markets viewed suspension announcements as insufficient half-measures that left companies exposed to residual Russian market risks while sacrificing current revenues. The persistence of negative CARs for Grade B firms indicates that markets placed a premium on decisive action and penalized companies that maintained ambiguity about their long-term presence in Russia.

Companies that merely scaled back operations (Grade C) show the least favorable pattern, particularly in European markets (mean CAR of -4.37%). These firms experience significant negative returns pre-announcement and fail to generate any meaningful recovery post-announcement. This pattern suggests that markets viewed scaling back announcements as particularly underwhelming responses to the crisis, potentially reflecting investor skepticism about the effectiveness of partial measures in mitigating either operational or reputational risks. The stability in post-announcement returns, rather than continued decline, suggests that markets had already priced in their disappointment with these limited responses.

The contrast between European and U.S. market reactions is particularly noteworthy. While

both markets show similar directional patterns, the magnitude of responses is consistently larger in European markets across all grades. This geographic divergence suggests that European investors placed greater emphasis on the completeness of withdrawal decisions and were more willing to reward decisive action while penalizing partial measures.

DIFFERENCE-IN-DIFFERENCES HYPOTHESIS TESTING

The primary goal of the Difference-in-Differences (DiD) analysis in this study is to evaluate and test specific null hypotheses regarding the stock market's reaction to corporate decisions to withdraw from or continue operations in Russia. This approach seeks to determine whether the observed differences in Cumulative Abnormal Returns (CARs) are statistically significant and whether they vary systematically based on firm characteristics such as the degree of withdrawal (Grade A) and geographic location (US vs. EU).

The null hypotheses tested are as follows:

- **$H_{0,1}$:** Withdrawal announcements (measured by $Post_t$) have no effect on the mean or variance of CARs.
- **$H_{0,2}$:** There is no differential market reaction between firms with Grade A withdrawals and those with lesser or no withdrawals.
- **$H_{0,3}$:** There is no difference in CARs between US-based firms and EU-based firms, after controlling for other factors.

To address these hypotheses, the following model is specified:

$$CAR_{it} = \beta_0 + \beta_1 Post_t + \beta_2 GradeA_i + \beta_3 (Post_t \times GradeA_i) + \beta_4 US_i + \beta_5 (Post_t \times US_i) + \gamma X_i + \epsilon_{it}$$

Key components of the analysis include:

- **Interaction Terms:**

- β_3 quantifies the differential impact of Grade A withdrawals during the post-announcement period, representing the reward (or lack thereof) for companies that made decisive curtailment decisions.
- β_5 measures the differential effect of withdrawal announcements for US firms compared to their European counterparts, highlighting potential regional disparities in investor responses.

- **Control Variables:** The vector X_i includes financial and operational variables such as $log(assets)$, $log(market\ cap)$, $log(sales)$, $Russia\ exposure$, financial ratios, and industry dummies to account for firm-specific heterogeneity.

The DiD estimators for β_3 and β_5 are formally expressed as:

$$\beta_3 = (CAR_{GradeA,post} - CAR_{GradeA,pre}) - (CAR_{Other,post} - CAR_{Other,pre})$$

$$\beta_5 = (CAR_{US,post} - CAR_{US,pre}) - (CAR_{EU,post} - CAR_{EU,pre})$$

This specification enables the identification of causal effects by leveraging the temporal and cross-sectional variation in the data. The null hypotheses are tested using statistical inference on the estimated coefficients β_3 and β_5. A rejection of these null hypotheses would indicate significant differences in how the stock market perceives and values corporate decisions based on withdrawal severity and geographic location.

Ultimately, this analysis aims to uncover whether investors reward firms for socially responsible actions (e.g., full withdrawal) and whether such rewards differ across international markets. The findings contribute to the broader discussion on the intersection of corporate social responsibility, market valuation, and regional investment preferences.

The first null hypothesis posited that curtailment announcements have no effect on the mean or variance of returns. Contrary to this hypothesis, the empirical results clearly show that corporate decisions to reduce or terminate operations in Russia significantly alter the stock market's reaction.

	Coefficient
Intercept	-0.0760*
	(0.062)
post	-0.0181***
	(0.006)
withdrawal	0.0109**
	(0.006)
post:withdrawal	0.0164**
	(0.008)
eu_company	-0.0319**
	(0.017)
post:eu_company	-0.0106
	(0.010)
currentratio	-0.0032
	(0.004)
tobinq	-0.0016
	(0.001)
russiaexposureindex	-0.0003
	(0.003)
healthcare	-0.0042
	(0.016)
tech	-0.0105*
	(0.012)
manufacturing	-0.0010
	(0.011)
other	-0.0297***
	(0.011)
miningenergy	-0.0109
	(0.027)
financialservices	-0.0082
	(0.013)
consumergoods	-0.0115*
	(0.013)
$\ln_{\text{assets2021}}$	-0.0007
	(0.001)
$\ln_{\text{marketcapend2021}}$	0.0043**
	(0.003)
$\ln_{\text{sales2020}}$	0.0029*
	(0.003)
institutional_per_held_2021	0.0030
	(0.021)
geo_ownership_us	-0.0412*
	(0.032)

Robust standard errors are reported in parentheses.
$^{*}p < 0.15$; $^{**}p < 0.10$; $^{***}p < 0.05$

Table 10: Difference-in-Differences analysis for Cumulative Abnormal Returns (CAR)

The baseline post-invasion period is associated with negative average returns, yet firms announcing complete withdrawals counteract this downward trend and experience a relative improvement in their cumulative abnormal returns. This observation is inconsistent with the notion that such announcements do not matter; therefore, the first null hypothesis is rejected.

The second null hypothesis held that there are no differences in market reactions between various levels of curtailment. The analysis demonstrates otherwise. The results indicate that the "post" period is associated with an overall decline in CARs, reflecting the general market climate of elevated uncertainty following the initial stages of the Russian invasion. This negative shift in baseline sentiment is, however, significantly offset for those companies taking the strongest action—those that fully withdraw from Russia (Grade A). The positive and significant interaction coefficient for the post-announcement period and Grade A firms reveals that once firms announce a complete exit, investors respond more favorably, effectively reversing the underlying downward trend. In other words, while the default market trajectory after the invasion is negative, companies making a clean break from Russia experience a relative improvement in CARs compared to those employing less decisive strategies. This finding supports the idea that markets reward firms for taking clear, unequivocal measures that minimize risk and signal strong corporate resolve, suggesting that such actions may be viewed as prudent long-term strategic decisions rather than costly concessions.

The third null hypothesis stated that there would be no difference in cumulative abnormal returns across international stock markets after controlling for factors such as sector, firm size, and the degree of Russian involvement. Although preliminary observations indicated that European and U.S. investors might differ in how they react to corporate self-sanctioning, the Difference-in-Differences analysis, which accounts for a wide range of control variables, does not confirm a robust distinction between these markets once confounding factors are held constant, even though minor variations remain. This implies that the global capital market's response to decisive corporate action in a crisis scenario may be more harmonized than initially expected. Rather than reflecting deeply divergent market cultures, the data suggest that investors across the Atlantic share

similar views on the importance of transparency and decisive, risk-mitigating actions in face of the Russian invasion of Ukraine.

DISCUSSION

The empirical results present three puzzles that warrant deeper examination. First, companies making complete withdrawals from Russia experienced better market performance despite sacrificing revenue and potentially valuable assets, suggesting that markets valued risk mitigation and reputational benefits above immediate financial costs. Second, despite this clear market preference for complete withdrawal, a significant number of companies chose partial measures (Grades B and C) that were ultimately penalized by investors, indicating potential miscalculation by management in balancing operational, reputational, and financial considerations. Third, while the initial analysis suggested geographic variation in market responses, the more rigorous difference-in-differences analysis reveals no significant difference between European and U.S. markets after controlling for firm characteristics. This discussion will explore a framework based on thinking about corporate social responsibility and divestments in terms of real options, and potential behavioral explanations for a suboptimal pattern of withdrawal from Russia.

Real Options Approach

Real options theory provides a framework for valuing managerial flexibility in the face of uncertainty. It recognizes that strategic investments often create opportunities for future actions, contingent on how uncertainties resolve. These opportunities, termed 'real options,' grant the right, but not the obligation, to pursue specific courses of action, such as expanding into new markets, scaling back operations, or abandoning a project altogether. (Trigeorgis, 1996) Unlike traditional investment appraisal methods, real options theory explicitly accounts for the value of this managerial flexibility, recognizing that the ability to adapt to changing circumstances can significantly enhance firm value, especially in volatile environments. (Bansal, 2003)

Within the real options framework, each level of withdrawal (A, B, or C) can thus be inter-

preted as a distinct choice regarding how aggressively to exercise or forgo these embedded options under heightened geopolitical uncertainty. In this framework, the "CSR option" is not a conventional financial derivative; rather, it is an intangible strategic asset that hedges against negative stakeholder reactions and long-term reputational damage. As stakeholder theory reminds us, companies operate in a complex web of relationships with diverse entities — consumers, employees, NGOs, governments, and socially conscious investors — each of whom can influence firm value through mechanisms beyond immediate financial returns. Under stable conditions, the value of a CSR option might remain latent, appearing to impose costs without delivering immediate payoffs. However, when a geopolitical crisis intensifies — such as a military invasion that provokes moral outrage and global condemnation—this intangible option becomes highly valuable. Exercising it (e.g., by fully exiting the adversary market) signals strong ethical commitments, ensures alignment with global norms, and preempts negative consequences like customer boycotts, social media backlash, and operational disruptions tied to reputational harm.

Viewed this way, Grade A withdrawals represent the timely exercise of the CSR option. By leveraging previously accumulated reputational capital, the firm secures an immediate hedge against stakeholder-driven risk. It effectively redeems the option to avoid severe stakeholder penalties and moral hazards that would emerge if it hesitated or only partially curtailed operations. Such decisive action sends a clear, costly, and credible signal that the firm prioritizes ethical conduct and risk mitigation over uncertain future market opportunities—precisely the kind of difficult-to-reverse commitment that enhances credibility under signaling theory. (Spence, 1978)

Meanwhile, less decisive responses—such as suspensions (Grade B) or partial scaling back (Grade C)—are scenarios where the firm hesitates to exercise its CSR option fully. In these cases, the company maintains some operational exposure, akin to continuing to hold "call options" on a potentially improving geopolitical scenario, yet also sustains ongoing reputational and stakeholder-related downside risk. The market's negative reaction to such half-measures suggests that investors recognize both the latent costs of prolonged uncertainty and the erosion of reputational goodwill when firms appear unwilling to commit fully to responsible conduct. Following Pfister and

Schwaiger (2016), reputation capital represents an intangible asset that yields economic returns through enhanced stakeholder relationships, reduced transaction costs and reduced cost of debt. If global stakeholder expectations have converged—reducing regional differences in how corporate actions are perceived—then the firm gains no reprieve by deferring full CSR engagement. Instead, it pays a higher "option premium" in the form of forgone reputational security and heightened vulnerability to future deterioriation in its stakeholder capital (Cots, 2024) and potentially subject to sanctions.

Corporate Decision-making

Firms that failed to exercise their "CSR option" decisively, maintaining or only partially curtailing their Russian operations despite mounting evidence of adverse conditions, might initially appear to have made suboptimal choices. However, this assessment overlooks the inherent difficulties in predicting and interpreting geopolitical shocks. Business confidence in Russia was high before the invasion, as evidenced by an EY survey showing that 53% of multinational enterprises planned to increase their market presence (EY, 2021). This suggests a systematic underestimation of the potential for geopolitical upheaval. When confronted with the sudden outbreak of conflict and its associated reputational, operational, and financial risks, these companies found themselves ill-prepared to react swiftly and decisively. The rapid escalation of the conflict, coupled with the unprecedented scale of international condemnation and sanctions, created a fundamentally different operating environment—one that many firms were not adequately prepared for. Rather than immediately exercising their abandonment option (i.e., implementing a Grade A withdrawal), many defaulted to intermediate steps like suspensions (Grade B) or partial retrenchments (Grade C). These half-measures, while potentially intended to preserve optionality in the face of newfound uncertainty, often reflected a failure to fully recognize the magnitude of the regime shift and the permanence of the reputational damage associated with continued presence in Russia. This initial misreading of geopolitical risk, exacerbated by cognitive biases and information processing limitations, contributed to the observed variation in corporate responses.

The observed delays and partial responses can be partially attributed to biased information processing, particularly failures in Bayesian updating. (Barberis and Thaler, 2003) Optimal decision-making under uncertainty theoretically requires continuously revising beliefs and probabilities in response to new information. Managers faced with the Russian invasion could have rapidly updated their probabilistic assessments of long-term political and economic instability, the likelihood and severity of sanctions, and the potential for stakeholder backlash. However, several factors likely hindered this process.

A key factor is anchoring bias, a cognitive heuristic where individuals rely too heavily on an initial piece of information when making decisions. (Tversky and Kahneman, 1974) In this context, many MNEs were likely anchored on their prior experiences of successful operations and relative political stability in Russia before the invasion. This "anchor" of past success likely led managers to form overly optimistic or conservative Bayesian priors regarding the likelihood of a full-scale conflict and its consequences. This is consistent with research on CEO overconfidence (Malmendier and Tate, 2008), where past performance can lead to biased assessments of future prospects Even as negative signals began to emerge—troop build-up, diplomatic failures, and early reports of military action—managers may have downplayed their significance, clinging to the anchor of past stability. This resulted in a slow and hesitant incorporation of new information, leading to a lagged response. Instead of swiftly exercising the abandonment option (Grade A withdrawal), companies lingered in a geopolitical "limbo," incurring an option premium in the form of continued operational costs and reputational damage without receiving the strategic hedge that a timely exercise of the CSR option would have provided. This delay exacerbated the negative market reaction as investors perceived the company's inability to adapt to the new reality.

Beyond biased information processing, organizational structures and internal dynamics further contributed to delayed or incomplete withdrawals. Sunk costs, both financial (investments in infrastructure, operations, and local partnerships) and reputational (established brand presence, local stakeholder relationships), created inertia. Immediate withdrawal required acknowledging that past strategic decisions regarding the Russian market had become value-destroying, a difficult

admission for management teams and boards of directors. This reluctance to recognize losses, otherwise known as disposition effect, (Shefrin and Statman, 1985) can lead to a bias towards maintaining the status quo, even in the face of compelling evidence for change.

Furthermore, internal governance structures often created friction. Large MNEs typically operate with complex organizational structures involving multiple layers of management, boards of directors, and local subsidiaries. These different entities may have misaligned incentives. For example, local managers in Russia might have been incentivized to maintain operations EXAMPLE to meet short-term performance targets, even if a withdrawal was in the best long-term interest of the parent company. Asymmetric information between headquarters and local subsidiaries could also have hindered decision-making. Local managers might have been reluctant to fully disclose the extent of operational risks or the severity of stakeholder backlash, fearing negative repercussions from headquarters. (Smith and Abdullaev, 2024) These internal conflicts and information asymmetries resulted in protracted deliberations and delays, preventing swift and decisive action.

Maintaining a presence in Russia, even a reduced one, could be interpreted as a strategic bet on long-term market access. These companies may have anticipated a future normalization of geopolitical relations and sought to preserve their established market positions, customer relationships, and distribution networks. The potential for future profits, once the crisis subsided, might have outweighed the short-term costs of maintaining operations or implementing only partial curtailments. Furthermore, for some industries, particularly those with significant sunk costs in localized infrastructure or specialized production facilities, a complete withdrawal could have represented an irreversible and excessively costly decision. In such cases, maintaining a scaled-back presence could be seen as a way to preserve some optionality for future operations while minimizing current losses. This strategic calculus is further complicated by the potential for first-mover advantage upon eventual market recovery. However, market prices are inherently forward-looking, reflecting investors' collective assessment of a company's future prospects and discounted free cash flows. The empirical findings of this study suggest that the market, in aggregate, did not validate this strategic calculus. The negative market reaction to partial curtailments and the pos-

itive reaction to complete withdrawals indicate that investors placed a higher value on mitigating reputational and geopolitical risks than on preserving uncertain future market access in Russia. This suggests that the market perceived the risks associated with continued presence in Russia as outweighing the potential benefits of maintaining optionality or securing a first-mover advantage.

Competitive Advantage Signalling

While the exercise of CSR options and timely withdrawal decisions serve as a hedge against stakeholder risks, investors may also be rewarding firms for the competitive signals these actions emit. In other words, beyond simply mitigating downside reputational and geopolitical risks, decisive exits convey to the market a range of strategic and governance-related strengths.

From a dynamic capabilities perspective, (Teece et al., 1997; Teece, 2007; Eisenhardt and Martin, 2000) firms that swiftly respond to environmental shocks demonstrate the ability to sense emerging threats, seize opportunities, and reconfigure their resources accordingly. Initially, companies may have displayed weak sensing capabilities, failing to adequately perceive the magnitude of geopolitical instability. Firms that swiftly respond to environmental shocks demonstrate the ability to sense emerging threats, seize opportunities, and reconfigure their resources accordingly. Once the gravity of the situation became apparent, organizations that acted promptly to fully withdraw from Russia effectively communicated their dynamic capabilities. This decisive action functioned as a positive signal to investors (Spence, 1973; Ross, 1977): it indicated managerial foresight, strategic agility, and a capacity for rapid adjustment. The corporate governance perspective offers a complementary explanation. Slow or inadequate responses to geopolitical crises can be interpreted as elevated agency costs (Jensen and Meckling, 1976b; Fama and Jensen, 1998). By contrast, a decisive withdrawal signals robust governance structures that minimize agency conflicts.

Decisive withdrawal signals robust governance structures that effectively minimize agency conflicts. It suggests that boards and executives are well-aligned with investor interests, capable of overcoming internal resistance and organizational inertia, and prepared to make difficult but necessary decisions to protect firm value. This is consistent with the argument that strong corporate

governance mechanisms enhance firm value by reducing information asymmetry and agency costs (Shleifer and Vishny, 1997). Such governance strength is a desirable attribute for investors, as it reduces uncertainty about how the firm will respond to future challenges and enhances their confidence in management's ability to navigate complex and uncertain environments. This signal of strong governance is particularly valuable in times of crisis, when uncertainty is high and investors are seeking reassurance that their investments are being managed prudently.

Geographical convergence

The finding that European and U.S. firms exhibited no statistically significant differences in market reactions to withdrawal decisions, after controlling for relevant firm-specific factors, offers insights into the dynamics of global financial markets and the landscape of corporate social responsibility. This convergence suggests a diminishing role for traditional explanations based on distinct national or regional market cultures. While prior research has often highlighted differences in investor preferences and corporate governance practices between the U.S. and Europe, particularly concerning the relative emphasis on shareholder versus stakeholder value (Habisch et al., 2011; Bottenberg et al., 2017), the present findings suggest that in the face of a major geopolitical crisis with clear ethical implications, these differences become less pronounced. This convergence can be interpreted through several interconnected lenses. First, the increasing globalization of financial markets has led to a harmonization of investor expectations and risk assessment criteria. As institutional investors diversify their portfolios internationally, they apply more standardized evaluation frameworks, prioritizing consistent metrics for assessing risk and return across different geographical regions. This process of global regulatory arbitrage and harmonization, as discussed in international political economy literature (**?**), implies that firms operating in globally integrated markets are increasingly subject to similar market pressures, regardless of their home country.

This convergence in market reactions can be explained by several interconnected factors. First, the increasing globalization of financial markets has led to a harmonization of investor expectations and risk assessment criteria (Karolyi and Stulz, 2002; Bris et al., 2007; Aggarwal et al.,

2011). As institutional investors diversify their portfolios internationally, they apply more standardized evaluation frameworks, prioritizing consistent metrics for assessing risk and return across different geographical regions. Furthermore, the emergence of increasingly globalized norms of corporate social responsibility (Matten and Moon, 2008; Ioannou and Serafeim, 2012), amplified by global media coverage and social media discourse, creates a powerful incentive for companies to adopt consistent global CSR strategies, further contributing to the harmonization of market reactions. These converging pressures, driven by global market integration and increasingly homogenous stakeholder expectations, are further reinforced by institutional isomorphism (Dimaggio and Powell, 1983), where firms are pressured to adopt similar practices to maintain legitimacy in the global marketplace.

Robustness

This paper focuses specifically on corporate withdrawal decisions announced in the immediate aftermath of Russia's invasion of Ukraine (February-August 2022), a choice that enhances the internal validity of the findings in several important ways. First, this period was characterized by a high concentration of withdrawal announcements, allowing for cleaner identification of market responses with reduced confounding effects. Early sanctions packages primarily targeted individuals and specific sectors rather than imposing broad restrictions on corporate operations, meaning that withdrawal decisions during this period were largely voluntary rather than regulatory-driven. However, the reduction in risk for withdrawal companies was associated with inter alia the anticipation of regulatory pressures on companies.

The early period setting provides a unique window for studying market reactions when risks were still largely unrealized. Companies operating in Russia faced known unknowns - including the possibility of future sanctions, potential asset seizures, and reputational damage - but the actual materialization of these risks was still uncertain. This uncertainty was particularly salient given the credible threat of consumer boycotts and stakeholder pressure, but before the Russian government's implementation of strict exit controls and asset seizures that would later materialize. Following **?**'s

framework of policy uncertainty pricing, this environment allows for observation of how markets valued different risk mitigation strategies when outcomes were still highly uncertain.

A potential limitation of the focus on early-period announcements is that it may not capture the full evolution of market responses as the conflict and sanctions regime developed. However, this limitation is balanced against the advantages of studying a period where corporate decisions were more clearly voluntary and market reactions were less likely to be contaminated by the confounding effects of mandatory sanctions or realized adverse events. The regression results' robustness to various controls for firm characteristics and industry effects suggests that the findings capture genuine market responses to withdrawal decisions rather than reactions to broader geopolitical or regulatory developments.

The unprecedented nature of the Russian invasion means that factor models estimated using historical data may not fully capture changing risk dynamics during the crisis period. The clustering of withdrawal announcements creates potential cross-sectional correlation in abnormal returns affecting statistical inference. While Fama-French factors control for various systematic risks, they may not fully account for exposures specific to Russian operations or geopolitical risk. The model assumes stability in factor loadings between estimation and event windows, which may be questionable given the structural break represented by the invasion. Additionally, the approach cannot fully control for potential selection effects - firms choosing to withdraw might have systematically different characteristics that also affect their returns through channels beyond the Fama-French factors. Despite these limitations, the event study methodology using Fama-French factors as controls represents the most practical approach for isolating the market's valuation of withdrawal decisions. The alternative of not controlling for systematic risk factors would likely introduce even greater bias into the analysis.

The concentrated nature of withdrawal announcements during the study period also helps address potential selection concerns. While companies that withdrew early may have had systematically different characteristics from those that withdrew later or remained in Russia, the difference-in-differences approach and extensive controls for firm characteristics help isolate the market re-

sponse to withdrawal decisions from these potential selection effects. Moreover, the early period setting, before the full implementation of Western sanctions, provides insight into how markets value corporate social responsibility decisions when they are more clearly voluntary rather than regulatory-driven.

This study acknowledges potential endogeneity concerns in analyzing market responses to corporate withdrawal decisions from Russia. Companies choosing early withdrawal may have possessed observed but hopefully controlled for characteristics via proxies—such as superior risk management capabilities, stronger governance structures, or more forward-looking management teams—that could have influenced both their withdrawal decisions and subsequent market performance. Such selection effects could potentially confound the causal interpretation of the results. However, several features of the empirical strategy help mitigate these concerns. The difference-in-differences approach with extensive firm-level controls and industry fixed effects helps account for observable and time-invariant unobservable characteristics that might drive both withdrawal decisions and stock returns. By focusing on the immediate post-invasion period before the full implementation of sanctions, this study observes voluntary corporate decisions rather than responses to regulatory mandates, providing cleaner identification of market reactions to strategic choices. While endogeneity concerns cannot be completely eliminated, the empirical approach and the quasi-experimental setting of the early invasion period provide a robust framework for analyzing how markets valued corporate responses to emerging geopolitical risks.

CONCLUSION

This study examines how financial markets valued corporate decisions to withdraw from Russia following its invasion of Ukraine in 2022, providing insights into how investors evaluate corporate responses to geopolitical crises. The analysis yields three main findings that contribute to our understanding of corporate social responsibility, market valuation, and geopolitical risk management.

First, the empirical results demonstrate that markets rewarded companies for complete withdrawals from Russia while penalizing those that chose partial measures. Companies announcing Grade A withdrawals experienced significantly better cumulative abnormal returns compared to firms that merely suspended or scaled back operations, suggesting that investors placed a premium on decisive action that clearly signaled a company's commitment to risk mitigation and ethical conduct. This finding challenges the traditional view that markets primarily value short-term financial metrics, indicating instead that investors recognize the long-term value of reputation capital and strategic risk management.

Second, despite the clear market preference for complete withdrawal, many companies opted for partial measures that were ultimately penalized by investors. This apparent misalignment between corporate decisions and market expectations can be understood through a real options framework. Companies that maintained partial exposure to Russia effectively continued to pay an "option premium" in the form of ongoing reputational risk and operational uncertainty, while failing to capture the risk-mitigation benefits of a clean break. The prevalence of such suboptimal decisions highlights how cognitive biases, organizational inertia, and misaligned incentives can impede efficient corporate responses to geopolitical crises.

Third, the analysis reveals a surprising convergence in how U.S. and European markets valued corporate withdrawal decisions. After controlling for firm characteristics and industry factors, no significant differences emerged between these markets' reactions to withdrawal announcements. This finding suggests that globalization and the increasing standardization of ESG expectations may be leading to more unified investor perspectives on corporate social responsibility, particu-

larly in response to major geopolitical events with clear ethical implications.

These findings have important implications for corporate strategy and governance. They suggest that in times of geopolitical crisis, markets value decisive action that clearly signals a company's ethical stance and risk management capabilities. The positive market response to complete withdrawals indicates that investors recognize the long-term value of reputation capital and appreciate management teams capable of making difficult strategic decisions in uncertain environments. This supports the stakeholder theory view that maintaining strong relationships with diverse stakeholders can enhance firm value, particularly during periods of heightened uncertainty.

The study also contributes to our understanding of how cognitive biases and organizational factors influence corporate decision-making during crises. The prevalence of partial withdrawals, despite their negative market reception, highlights how anchoring bias, sunk cost fallacies, and complex organizational structures can impede optimal strategic responses. This suggests that companies might benefit from developing more robust crisis response frameworks and decision-making processes that can overcome these behavioral and organizational barriers.

Looking forward, this research has broader implications for how we understand the relationship between corporate social responsibility and firm value in an increasingly interconnected global economy. The convergence in market responses between U.S. and European investors suggests that geographical differences in corporate governance traditions may be less relevant when companies face clear ethical challenges in crisis situations. This points to the emergence of more unified global standards for corporate conduct in response to geopolitical events.

Future research could extend these findings by examining longer-term performance implications of different withdrawal strategies, investigating how various stakeholder groups influenced corporate decisions, and exploring how companies might better prepare for similar geopolitical challenges in the future. As geopolitical tensions continue to reshape the global business environment, understanding how markets value corporate responses to such crises becomes increasingly crucial for both academic research and practical management.

APPENDIX

THE FAMA-FRENCH FIVE-FACTOR MODEL

Background and Intuition

The Fama-French model (Fama and French, 2015) addresses a fundamental question in finance: how do we determine the expected return of a stock? While early financial theory suggested that a stock's risk relative to the overall market (known as market beta) was sufficient to explain expected returns, empirical evidence revealed systematic patterns in stock returns that couldn't be explained by market risk alone. For instance, small companies and companies with high book-to-market ratios historically earned higher average returns than would be predicted by their market risk alone.

Eugene Fama and Kenneth French developed their model to capture these patterns by identifying additional dimensions of risk beyond market exposure. Their approach is based on the idea that stocks with similar characteristics tend to move together and respond to similar economic factors. The model proposes that a stock's expected return can be explained by its sensitivity to five fundamental risk factors:

- **Market Risk:** The tendency of a stock to move with the overall market, capturing broad economic risks affecting all stocks.
- **Size Risk:** Smaller companies are generally considered riskier investments than larger ones, as they may be more vulnerable to economic shocks and have less stable cash flows.
- **Value Risk:** Companies with high book-to-market ratios (value stocks) might be experiencing financial distress or face fundamental business challenges, potentially making them riskier investments than growth stocks.
- **Profitability Risk:** More profitable companies tend to deliver higher returns than less prof-

itable ones, possibly reflecting their greater ability to weather economic downturns and maintain stable cash flows.

- **Investment Risk:** Companies that invest conservatively tend to outperform those that invest aggressively, possibly because aggressive investment can signal overconfidence or indicate limited profitable investment opportunities.

The model posits that differences in average stock returns can be explained by differences in their exposure to these risk factors. For example, if small companies tend to earn higher returns than large companies over time, the model suggests this is compensation for bearing additional risk associated with small size. Similarly, if value stocks outperform growth stocks on average, this premium is viewed as compensation for taking on the additional risks associated with financially distressed or troubled companies.

This framework has become fundamental to modern investment management and academic research, providing a more nuanced way to understand stock returns and evaluate investment performance. When we say an investment manager has "skill," we want to ensure their performance isn't simply loading up on these well-known risk factors but truly reflects superior investment decisions.

The Fama-French five-factor model expands upon the traditional Capital Asset Pricing Model (CAPM) by incorporating additional risk factors that help explain patterns in average stock returns. The model is specified as:

$$R_{it} - R_{ft} = \alpha_i + \beta_{i,MKT}(R_{mt} - R_{ft}) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \beta_{i,RMW}RMW_t + \beta_{i,CMA}CMA_t + \epsilon_{it} \tag{9}$$

where:

- R_{it} is the return on security or portfolio i for period t
- R_{ft} is the risk-free rate
- R_{mt} is the market return

- The coefficients $\beta_{i,j}$ represent factor loadings

Factor Definitions and Construction

Market Factor (MKT)

The market factor ($R_{mt} - R_{ft}$) represents the excess return of the market portfolio over the risk-free rate. It is calculated as the value-weighted return of all NYSE, AMEX, and NASDAQ stocks minus the one-month Treasury bill rate.

Size Factor (SMB)

The Small Minus Big (SMB) factor captures the historical excess returns of small-cap companies over large-cap companies. It is constructed as:

$$SMB = \frac{1}{3}(SMB_{B/M} + SMB_{OP} + SMB_{INV}) \tag{10}$$

where each component represents the difference between the average returns of small and big stocks controlled for book-to-market, operating profitability, and investment patterns respectively.

Value Factor (HML)

The High Minus Low (HML) factor represents the historical excess returns of value stocks (high book-to-market ratio) over growth stocks (low book-to-market ratio). It is calculated as:

$$HML = \frac{1}{2}(Small\ Value + Big\ Value) - \frac{1}{2}(Small\ Growth + Big\ Growth) \tag{11}$$

Profitability Factor (RMW)

The Robust Minus Weak (RMW) factor captures the excess returns of firms with robust operating profitability over those with weak profitability. It is defined as:

$$RMW = \frac{1}{2}(Small\ Robust + Big\ Robust) - \frac{1}{2}(Small\ Weak + Big\ Weak) \tag{12}$$

Investment Factor (CMA)

The Conservative Minus Aggressive (CMA) factor represents the excess returns of firms that invest conservatively over those that invest aggressively. It is calculated as:

$$CMA = \frac{1}{2}(Small\ Conservative + Big\ Conservative) - \frac{1}{2}(Small\ Aggressive + Big\ Aggressive) \tag{13}$$

Portfolio Formation

The factors are constructed using 2×3 sorts on size and the other variables (book-to-market, operating profitability, and investment). The size breakpoint is the NYSE median market cap. For the other variables, the breakpoints are the 30th and 70th NYSE percentiles. The European factors and portfolios include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Factor Calculation Frequency

The portfolios are reformed annually at the end of June. Monthly returns are then calculated for the following 12 months. The market factor is updated monthly, while the size, value, profitability, and investment factors maintain their composition for 12 months, though portfolio returns are calculated monthly.

Data Requirements

To be included in the factor calculations, firms must have:

- Market equity data for December of t-1 and June of t
- Positive book equity data for t-1
- Valid revenue data and at least one of: cost of goods sold, SGA expenses, or interest expense for t-1
- Total assets data for t-2 and t-1

This factor model has become a standard tool in empirical asset pricing, portfolio performance evaluation, and risk analysis. Its main advantage is the ability to capture well-documented patterns in stock returns that the CAPM fails to explain, though it does not completely eliminate all known asset pricing anomalies.

Relevance for This Study

In analyzing market reactions to corporate withdrawals from Russia, we employ the Fama-French five-factor model as our primary control framework. This model is particularly suitable for the analysis as it allows us to isolate the effect of withdrawal announcements by controlling for well-documented patterns in stock returns related to firm size, value, profitability, and investment strategies. This is especially important given our sample includes firms from both US and European markets, which might exhibit systematic differences in these characteristics. By accounting for these factors, we can better identify the incremental impact of withdrawal decisions on firm value, separate from other firm characteristics that might influence returns.

OLS SUMMARY STATISTICS

	Value
Observations	303
Parameters	16
Degrees of Freedom (Model)	15
Degrees of Freedom (Residual)	287
Log-Likelihood (null)	-388.3945
Log-Likelihood (model)	-378.3195
McFadden R^2	0.0259
Cox-Snell R^2	0.0643
Nagelkerke R^2	0.0697
AIC	788.6390
BIC	848.0588
LR χ^2	20.1500
LR p-value	0.1663
Classification Accuracy	0.4686

Note: This table presents summary statistics for the ordered logistic regression model.
AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion.

Table 11: Model Summary Statistics for Ordered Logistic Regression

DIFFERENCE-IN-DIFFERENCES SUMMARY STATISTICS

	Value
Observations	6128
Number of Clusters	214
Parameters	21
Degrees of Freedom (Model)	19
Degrees of Freedom (Residual)	6108
R^2	0.0799
Adjusted R^2	0.0771
F-statistic	3.4898
F p-value	0.0000
Root MSE	0.0658

Note: This table presents model fit statistics for the difference-in-differences regression.

Table 12: Model Summary Statistics for the Difference-in-Differences analysis

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