
Geopolitical Risk and Profit Margin: A Quantitative Study of IBM

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Abstract:

Purpose: This research paper explores the impact of geopolitical risk (measured via Geopolitical Risk Index) on IBM's profitability, specifically focusing on profit margins from Fiscal Year (FY) 2009 to FY 2023.

Design/Methodology/Approach: Utilizing quantitative methodologies, including correlation and regression analyses, the study identifies a significant negative relationship between the Geopolitical Risk Index (GPRI) and IBM's profit margins.

Findings: The findings reveal that periods of heightened geopolitical tension, such as the Russian invasion of Ukraine and major trade disputes, correspond with substantial declines in profitability. However, variations in the correlation suggest that additional factors, including market strategies and operational efficiencies, also influence profit margins.

Practical Implications: This research underscores the importance of geopolitical risk assessment in multinational corporations which is often overlooked and highlights the need for a multifaceted approach to understanding the drivers of financial performance.

Originality/Value: The results provide valuable insights for policymakers and business leaders navigating the complexities of a geopolitically volatile environment.

Keywords: Geopolitical Risk Index, IBM, profitability.

JEL codes: F52, D81, M16, L25, G32.

Paper type: Research article.

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1. Introduction and Literature Review

In an increasingly interconnected global economy, corporations are continually exposed to various forms of geopolitical risk that can significantly impact their financial performance. IBM, a global leader in information technology and services, operates in a highly volatile environment where geopolitical events can influence market conditions, supply chains, and overall profitability.

This study aims to assess the impact of geopolitical risk on IBM's profit margins, focusing specifically on the Geopolitical Risk Index (GPRI) and several macroeconomic control variables, including inflation, GDP change percentage, the federal funds rate, tax expenses, and the S&P 500 index. Understanding these relationships is crucial for IBM's strategic decision-making and long-term financial stability.

The relationship between geopolitical risk and corporate financial performance has garnered considerable attention in recent years. Geopolitical risk encompasses a broad spectrum of events, including political instability, economic sanctions, and international conflicts, which can disrupt markets and affect corporate operations.

Caldara and Iacoviello (2018) developed the Geopolitical Risk Index, which quantifies geopolitical threats and provides a valuable tool for examining their economic impacts. Previous studies have demonstrated that heightened geopolitical risk correlates with increased market volatility and reduced investor confidence, potentially leading to lower corporate profitability (Caldara and Iacoviello, 2018).

IBM, as a major player in the technology and services sector, is particularly susceptible to geopolitical risks due to its global supply chains and significant international market presence. The IT industry is heavily influenced by geopolitical factors, including trade policies, regulatory changes, and diplomatic relations.

For instance, the U.S.-China trade tensions have had profound effects on technology companies, disrupting supply chains and altering competitive dynamics (Bown, 2020). IBM's operations and financial performance are, therefore, directly linked to these geopolitical developments.

Macroeconomic variables also play a critical role in shaping corporate profitability. Inflation, for example, affects input costs and consumer purchasing power, thereby influencing profit margins (Hubbard and O'Brien, 2019). Similarly, GDP growth rates provide insights into overall economic health, which can impact corporate revenues and profitability (Mankiw, 2018).

The federal funds rate, a key monetary policy tool, affects borrowing costs and investment decisions, while tax expenses directly influence net earnings (Bernanke and Blinder, 1992). The S&P 500 index serves as a proxy for overall market

conditions, reflecting investor sentiment and economic outlook. However, in this analysis, these macroeconomic variables are not the primary focus but are included as control variables to isolate the specific impact of geopolitical risk on IBM's profit margins.

Previous research has primarily focused on broader market impacts or specific sectors. For example, Pastor and Veronesi (2012) explored the impact of political uncertainty on stock market volatility, while Berkman, Jacobsen, and Lee (2011) examined how political risk affects global stock returns. Similarly, studies like Bekaert, Harvey, and Lundblad (2005) analyzed the role of financial openness in emerging markets, often overlooking the nuanced effects on individual companies like IBM. This gap highlights the need for focused research on specific corporations to understand how geopolitical risk uniquely affects their financial metrics.

This study builds on existing literature by specifically analyzing the impact of geopolitical risk on IBM's profit margins, incorporating a comprehensive set of control variables. While the macroeconomic variables—such as inflation, GDP growth rates, the federal funds rate, tax expenses, and the S&P 500 index—are essential for providing context, they are included primarily as control variables.

The core objective of this research is to elucidate the often-overlooked effects of geopolitical risk. By conducting descriptive statistics, correlation analysis, and regression analysis, this study aims to unearth the importance of geopolitical risk against these variables and provide a detailed examination of its impact on IBM's financial performance.

IBM's selection for this study is particularly relevant due to its extensive global footprint and historical significance in the technology sector. As one of the world's largest IT companies, IBM's operations span numerous countries, making it a prime candidate for analyzing the effects of geopolitical risk.

The company's diverse portfolio, which includes cloud computing, artificial intelligence, and consulting services, further amplifies its exposure to geopolitical uncertainties. Moreover, IBM's long-standing presence and adaptability in the face of global challenges provide a rich context for examining how geopolitical risks influence its financial metrics.

In summary, this study contributes to the growing body of literature on geopolitical risk and corporate finance by offering a focused analysis of IBM's profit margins. It highlights the importance of considering geopolitical risk when assessing corporate profitability, as these risks are often overlooked in favor of broader economic indicators. The findings will provide valuable insights for IBM and other multinational corporations navigating an increasingly uncertain global landscape.

Furthermore, this research lays the groundwork for more extensive studies on the broader implications of geopolitical risk and underscores the necessity of integrating this assessment into strategic financial planning.

2. Research Methodology

2.1 Research Objectives

This study aims to quantitatively assess the impact of geopolitical risk on IBM's profit margins by analyzing the Geopolitical Risk Index (GPRI). The objective is to elucidate the specific influence of geopolitical risk on IBM's financial performance, providing insights that can guide strategic decision-making and future research in corporate finance. This analysis seeks to highlight the often-overlooked importance of geopolitical risk relative to other economic factors.

2.2 Research Methodology

This study employs a quantitative research methodology to assess the impact of geopolitical risk on IBM's profit margins. The primary independent variable in this analysis is the Geopolitical Risk Index (GPRI), developed by Caldara and Iacoviello (2018), which quantifies geopolitical threats and their potential economic impacts (Table 1).

Table 1. Research methodology.

Dependent Variable	Profit Margin
Independent Variable	Geopolitical Risk Index (GPRI)
Control variables	GDP % change, Inflation, Federal Funds Rate, Taxes, S&P 500. (All for FY 2009 – FY 2023)

Source: Own study.

These control variables are included to isolate the specific influence of geopolitical risk on IBM's financial performance, ensuring that the analysis accurately captures the nuanced effects of geopolitical events. Data for this study are collected from reliable and publicly accessible sources. The GPRI data are sourced from the Federal Reserve Board, which maintains an extensive database on geopolitical risks.

Macroeconomic data, including inflation rates, GDP change percentages, and federal funds rates, are obtained from the U.S. Bureau of Economic Analysis (BEA) and the Federal Reserve Economic Data (FRED) database. IBM's financial data, including profit margins and tax expenses, are extracted from the company's annual reports and financial statements available on the IBM investor relations website and the U.S. Securities and Exchange Commission (SEC) EDGAR database. The S&P 500 index data are retrieved from financial market databases such as Yahoo Finance and Bloomberg. The methodology involves three key analytical techniques:

Descriptive Statistics provide a summary of the data, highlighting central tendencies and overall trends in IBM's profit margins and the selected variables. Correlation analysis is conducted to examine the relationships between the GPRI and Profit Margin [(Net Income / Revenue)*100].

The core of the analysis is the multivariate regression analysis with IBM's profit margin as the dependent variable and the GPRI along with the control variables as independent variables. This model allows for the isolation of the effect of geopolitical risk, providing a clear understanding of its influence on IBM's profitability.

By combining these methods, the study aims to offer a comprehensive examination of how geopolitical risk affects IBM's financial performance, providing insights that can inform both academic research and corporate strategy. The variables under consideration have been tested for multicollinearity through VIF (Variance Inflation Factor) values and range between low to moderate (1-5). Historical geopolitical events have also been analyzed qualitatively to suggest reasoning.

However, the study also has its limitations - the GPRI, while comprehensive, may not capture all dimensions of geopolitical risk, such as sudden political events or regional conflicts that may disproportionately affect IBM. Furthermore, the study's focus on IBM means that the findings may not be generalizable to other companies or industries. Future research could expand the scope to include other companies or sectors and explore alternative measures of geopolitical risk to address these limitations.

3. Analysis and Interpretation

The Geopolitical Risk Index (GPRI) presents considerable variability, with a mean of 98.52 and a standard deviation of 21.03, suggesting substantial fluctuations in geopolitical risk over the study period. The GDP % Change shows moderate variability with a mean of 2.07 and a standard deviation of 1.88, reflecting relative stability in economic growth. Inflation, with a mean of 2.55 and a standard deviation of 1.97, demonstrates variability consistent with historical economic cycles (Table 2).

Table 2. Descriptive Statistics

	GPRI	GDP% Change	Inflation	Federal Fund Rate	Tax	S&P 500
Mean	98.51608612	2.07	2.55	1.15	2417.214286	2535.661
Standard Error	5.619978122	0.50	0.52	0.45	653.6044455	293.2134
Median	94.74958007	2.25	1.95	0.27	2600	2271.865
S.D	21.02803265	1.87	1.96	1.71	2445.563902	1097.104
Minimu	77.29380417	-3.4	0.1	0.08	-1360	1139.97

m						
Maximu						
m	157.5831935	5.7	8	5.53	5642	4283.73

Source: Own study.

The Federal Funds Rate exhibits notable fluctuations, with a mean of 1.16 and a standard deviation of 1.71, indicative of changes in monetary policy. Income Tax Expense and the S&P 500 index show extensive ranges, with means of 2417.21 and 2535.66, respectively, and high standard deviations, highlighting significant economic and market volatility. The wide range and high standard deviation for these variables underscore the diverse economic conditions affecting the data.

3.1 Correlation Analysis

The correlation analysis helps in understanding the relationships between different variables. The mathematical formula for calculating the Pearson correlation coefficient r_{xy} between two variables XXX and YYY is given by:

$$r_{xy} = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2 \sum(Y_i - \bar{Y})^2}}$$

Table 3. Correlation Matrix.

Variable	Profit Margin (%)	GPRI
Profit Margin (%)	1	-0.657023
GPRI	-0.657023	1

Source: Own study.

The correlation coefficient between PM and GPRI is -0.657, indicating a strong negative correlation. This means that as the geopolitical risk increases, IBM's profit margin tends to decrease. A correlation coefficient of -0.657 suggests that there is a substantial inverse relationship between these two variables, implying that geopolitical risks have a significant adverse effect on IBM's profitability.

3.2 Regression Analysis

The regression analysis of Intel's profit margin demonstrates a robust model fit, evidenced by an R-squared value of 0.8661. This indicates that approximately 87% of the variance in the profit margin can be explained by the set of independent variables, underscoring the model's explanatory power. Within this context, several predictors emerge as statistically significant determinants of profit margin (Table 4).

Table 4. Regression analysis.

Statistic	Value
Multiple R	0.9306
R Square	0.8661

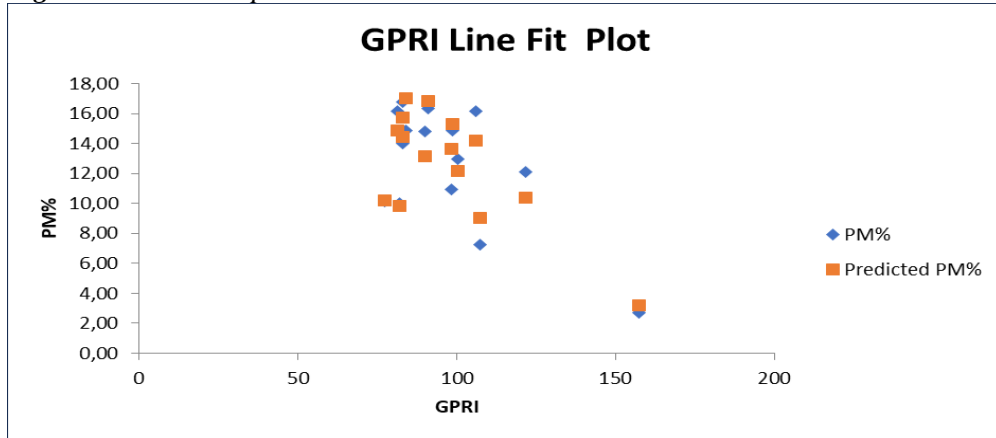
Adjusted R Square	0.7656
Standard Error	1.8993
Observations	25

Variable	Coefficient	Std. Error	t-Statistic	P-value	Lower 95%	Upper 95%
Intercept	35.0185	4.9849	7.0249	0.0001	23.5233	46.5136
GPRI	-0.1229	0.0426	-2.8836	0.0204	-0.2212	-0.0246
GDP % Change	0.9952	0.2962	3.3576	0.0109	0.3107	1.6797
Inflation	-0.7533	0.4334	-1.7378	0.1204	-1.7528	0.2464
Federal Fund Rate	1.8189	0.5843	3.1128	0.0144	0.4714	3.1663
Tax Expense	-0.0009	0.0004	-2.5171	0.0359	-0.0018	-0.0001
S&P 500	-0.0040	0.0011	-3.5215	0.0078	-0.0061	-0.0019

Source: Own study.

The Geopolitical Risk Index (GPRI) exhibits a negative and significant coefficient (p-value = 0.0204). This finding suggests that higher geopolitical risk is associated with lower profit margins, indicating a substantial adverse impact of geopolitical uncertainties on Intel's profitability. This is further supported by the negative correlation coefficient of -0.67 between GPRI and profit margin, reinforcing the detrimental effect of geopolitical risk (Figure 1).

Figure 1. The GPRI plot



Source: Own study.

GDP % Change emerges as a positive and significant predictor (p-value = 0.0109), indicating that economic growth positively influences profit margins. This relationship is consistent with macroeconomic theory, where higher GDP growth typically enhances corporate profitability through increased demand and improved economic conditions.

The Federal Fund Rate also shows a positive and significant relationship with profit margin (p-value = 0.0144), reflecting the influence of monetary policy on corporate performance. Higher interest rates, while generally considered a cost, can also signal a strong economic environment that boosts business confidence and profitability.

Tax Expense and the S&P 500 index present negative and significant coefficients (p-values = 0.0359 and 0.0078, respectively). Higher tax expenses reduce profit margins, which aligns with the intuitive understanding that taxes directly impact net profitability. The negative relationship with the S&P 500 suggests that broader market performance may inversely affect Intel's profit margins, potentially due to competitive pressures or sector-specific dynamics within the technology industry.

Among the independent variables, the Geopolitical Risk Index (GPRI) stands out due to its significant negative impact on profit margins. The coefficient for GPRI is not only statistically significant but also substantial in magnitude compared to other control variables. This highlights the critical importance of geopolitical risk in Intel's profitability, more so than some traditional economic indicators such as inflation or the federal fund rate.

The significance of GPRI suggests that geopolitical stability or instability can have profound implications for corporate strategy and financial performance, necessitating careful monitoring and management of geopolitical factors.

4. Conclusion

In analyzing the impact of geopolitical risk on IBM's profit margins over the years, distinct patterns emerge that underscore the intricate relationship between global political events and corporate financial performance. In Fiscal Year (FY) 2022, the Geopolitical Risk Index (GPRI) soared to 157.5832, a substantial increase from previous years.

This escalation in geopolitical risk corresponds with a notable decline in IBM's profit margin to just 2.71%. The year was marked by significant geopolitical upheaval, notably the Russian invasion of Ukraine, which resulted in heightened sanctions and global economic instability. These factors likely exerted substantial pressure on IBM's international operations and market confidence, leading to a marked reduction in profit margins.

In contrast, FY 2018 experienced a GPRI of 98.55291, reflecting a period of moderate geopolitical tension, including U.S. tariff impositions and retaliatory actions by trading partners. During this year, IBM's profit margin was 10.97%, which, while lower than in some more stable periods, demonstrates a relatively moderate impact of geopolitical risk compared to more turbulent times. The GPRI of 98.55291 aligns with the company's ability to manage geopolitical challenges and maintain a higher profit margin amidst complex trade dynamics.

Similarly, in FY 2017, the GPRI was 107.3773, which also corresponds with a decrease in IBM's profit margin to 7.27%. This period was characterized by significant political developments, such as Brexit negotiations and shifts in U.S. policy under a new administration. These events introduced considerable global economic uncertainties, affecting IBM's profitability during this timeframe.

While these observations suggest a negative correlation between geopolitical risk and profit margins, it is important to recognize that there are periods (when taken in isolation) where the correlation appears less clear or even positive. This implies that factors beyond geopolitical risk, such as market strategies, operational efficiencies, or other economic variables, may also play significant roles in influencing profit margins.

Thus, while geopolitical risk adversely affects IBM's profitability per the analysis, the relationship is multifaceted, and further investigation is required to fully understand the broader context and contributing factors. The research highlights the need for IBM and similar multinational corporations to navigate geopolitical risks with strategic foresight, developing adaptive measures to mitigate adverse impacts on profitability. Furthermore, it emphasizes the importance of considering a multitude of factors when assessing corporate financial performance, advocating for a comprehensive approach that incorporates both geopolitical and non-geopolitical elements.

In conclusion, this study provides valuable insights into how geopolitical risks can influence corporate profitability and underscores the importance of a nuanced understanding of these dynamics. Future research could further explore the interplay between geopolitical risks and other economic factors to offer more granular recommendations for companies operating in a globally interconnected environment.

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