Macro-Factor Sensitivity Analysis for Financial Firms

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Abstract

This study analyzes the macroeconomic factor sensitivities of 316 publicly traded U.S. financial and banking firms using the first stage of the Fama-MacBeth two-step asset pricing model.[1] Quarterly firm-level returns from 2001 to 2025 are regressed on standardized macroeconomic variables—including inflation, credit spreads, and GDP growth. To account for firm-level heterogeneity, controls such as Return on Equity and leverage ratios are incorporated. The estimated factor loadings (betas) were used to construct a custom macro-resilience score which was designed to identify firms better positioned to withstand adverse macroeconomic conditions. This framework is particularly relevant in the context of April 2025, amid elevated inflation, widening credit spreads, and slowing growth. The results reveal substantial cross-firm variation in macro exposures and offer a quantitative tool for macro-driven investment screening. All code used in this project can be found in this GitHub repository.[2]

Introduction and Motivation

The imposition of broad-based tariffs by the U.S. government in early April 2025 has contributed to elevated volatility and risk within financial markets. Major equity indices have experienced significant drawdowns, with financial firms among the most adversely affected. Given the evolving macroeconomic landscape, defined by rising inflation expectations, deteriorating credit conditions, and a weakening growth outlook, this analysis aims to identify which firms exhibit return profiles that are relatively robust or vulnerable to current macroeconomic shocks.

This research contributes to ongoing efforts in asset pricing and macro-finance by offering a granular, firm-level perspective on macroeconomic exposure within the financial sector.

Data and Methodology

Sample Construction

- Universe: 316 U.S. financial and banking firms, identified via SIC codes 6000–6300
- Frequency: Quarterly observations
- Time Horizon: January 2001 to January 2025
- Data Sources:
    - Firm-level returns from WRDS (CRSP and Compustat)
    - Macroeconomic series obtained via the FRED API (Federal Reserve Bank of St. Louis)

Variable	Proxy
Credit Conditions	BBB-AAA Credit Spread
Economic Growth	U.S. Real GDP YoY (%)
Inflation	Consumer Price Index (CPI) YoY (%)
Firm Controls	Leverage, Return on Equity, Market-to-Book

[1] Fama, Eugene F. and MacBeth, James D., *Risk, Return, and Equilibrium: Empirical Tests*. The University of Chicago Press Journals, Volume 81, Number 3, 1973.

[2] https://github.com/erobertson753/macro-sensitivity-financials

To capture firms' exposure to key macroeconomic risks, standardized proxies for credit conditions, economic growth, and inflation were selected. The BBB-AAA credit spread serves as a proxy for credit market conditions, reflecting investors' risk appetite and perceived credit risk across the business cycle; wider spreads signal tightening financial conditions and rising default risk. U.S. Real GDP growth (YoY) is used to represent aggregate economic performance, capturing cyclical sensitivity and broad market demand effects on firm returns. CPI inflation (YoY) measures purchasing power erosion and monetary policy pressures, which can materially affect financial sector profitability. To control for firm-specific characteristics that may confound estimated macro sensitivities, I include Leverage, Return on Equity (ROE), and Market-to-Book ratio. These controls proxy for capital structure risk, profitability, and valuation dynamics.

Estimation Procedure

Each firm's return series was regressed on the full set of explanatory variables using the following specification:

$$R_{it} = \beta_0 + \beta_1 \cdot \text{Leverage}_{it} + \beta_2 \cdot \text{ROE}_{it} + \beta_3 \cdot \text{MTB}_{it} + \beta_4 \cdot \text{CreditSpread}_t + \beta_5 \cdot \text{GDPGrowth}_t + \beta_6 \cdot \text{CPI}_t + \epsilon_{it}$$

- Standardization rendered each coefficient interpretable as a partial correlation.
- Firm-level regressions were estimated independently.
- Missing data were interpolated via polynomial interpolation using *zoo::na.spline* in R.

Construction of Macro-Resilience Score

Model Design

To assess firm-level resilience to the prevailing macroeconomic environment, I developed a weighted scoring model emphasizing penalization for sensitivity to inflation and credit risk, and reward for growth sensitivity:

$$\text{Score}_i = -0.6 \cdot \beta_i^{CPI} - 0.4 \cdot \beta_i^{Credit} + 0.5 \cdot \beta_i^{GDP}$$

Only coefficients statistically significant at the 5% level ($p < 0.05$) were incorporated into the score to ensure robustness.

Economic Rationale

- Positive CPI beta: Interpreted as vulnerability to inflation-driven margin compression.
- Positive Credit beta: Suggests fragility in adverse credit conditions.
- Positive GDP beta: Indicates pro-cyclicality, which may be beneficial in recovery scenarios.

Empirical Results

Highest Resilience Score:

Cadence Bank (CADE): 0.376

CADE possessed an inflation risk of -0.42 and a credit risk of -0.30, indicating that it has the potential to succeed in today's turbulent market. With an average quarterly return of 7.23% since 2001, CADE represents an attractive investment opportunity, or at the very least, one that merits a closer look.

Discussion and Strategic Implications

The current macroeconomic environment—marked by tariff-induced cost pressures, rising risk premia, and slowing real activity—favors firms that exhibit minimal inflation and credit exposure. The scoring model provides a systematic framework for macro-aware screening of equities, particularly within sectors highly sensitive to economic cycles such as finance.

This approach is particularly relevant for portfolio managers seeking to construct defensive sector baskets or implement factor-based rotation strategies.

Technical Architecture

- Languages: Python (macro data extraction), R (data cleaning, analysis, and scoring)
- Key Scripts: fred_data.py, wrds.R, clean_data.R, data_analysis.R, scoring.R
- Missing Data Strategy: Polynomial interpolation using zoo::na.spline

Future Research Directions

This study focused on the first-stage time-series regressions of the Fama-MacBeth (1973) framework, estimating firm-level exposures (betas) to macroeconomic factors. A natural next step will be to implement the second-stage cross-sectional regression, where realized returns are regressed on these betas to estimate time-varying risk premia. Additionally, this model could be extended into a dynamic, quarterly-updated screening tool to inform real-time investment decisions, incorporating evolving macro data and firm fundamentals. Finally, applying this methodology to other sectors, such as technology, industrials, or consumer cyclicals, would enable a comparative analysis of macro-sensitivity across industries and assess the robustness of macro-resilience as a screening criterion beyond financial firms.