



Do Some Stocks Always Beat Others?

Exploring Global Stock Factors with R · useR! 2026



Rituraj Singh | 24519, BTech CSE(DS), SoC, Indian Institute of Information Technology Una, Himachal Pradesh, India

Dr. Prince Sharma | Faculty, SoC, Indian Institute of Information Technology Una, Himachal Pradesh, India

KEY FINDINGS: ✓ Market factor remains significant. ✗ Small-cap premium REVERSED. ✓ Momentum strongly predicts returns.
✓ VIX is the dominant macroeconomic factor. ✓ Model explains 51% of return variation.

Introduction

Research Question

Do classical asset pricing factors hold across extreme market cycles? This study tests six factors — Market (β), Size (SMB), Momentum, VIX, GDP Growth, and Oil Price — against 2,000 quarterly return observations from 100 global stocks spanning the COVID crash, stimulus boom, and inflation shock of 2019–2023. All analysis is built entirely in R; visualisations use ggplot2.

Factors Tested:

- Market (β)
- Size (SMB)
- Momentum
- VIX
- GDP Growth
- Oil Prices

Why 2019–2023?

- 2019** Calm bull market — baseline
- 2020** COVID crash + fastest-ever recovery
- 2021** Stimulus boom — tech soared
- 2022** Inflation spike + aggressive rate hikes
- 2023** Stabilisation — moderate returns

2,000 obs · 100 stocks · 9 countries · 21 variables · zero missing

Materials & Methods

R packages: ggplot2 · dplyr · base R · cor.test · lm()

- 1 Data**
Raw Data (100 Global Stocks, 2019–2023)
- 2 EDA**
Time-series, country/sector bar charts, distribution histogram
- 3 Factor I**
Market: group by β quintile; compute mean return per group
- 4 Factor II**
Size (SMB): quartile by market cap; Small — Large premium
- 5 Momentum**
Lag return within each stock using `ave()`; Pearson correlation
- 6 Macro**
VIX, GDP growth, oil price correlations vs. quarterly return
- 7 OLS Model**
`lm()` with 10 predictors; log-transform skewed variables
- 8 Visuals**
ggplot2 with CB-friendly palette; residual diagnostics checked

Conclusions

- ✓ **Market risk remains rewarded.**
 β premium = 8.9%/yr — most robust finding, survives COVID and rate hikes.
- ✗ **Small-cap advantage disappeared.**
SMB = $-0.54\%/yr$; large-cap tech dominated 2019–2023. Factor premiums may vary across market environments.
- ✓ **Momentum survived market shocks.**
 $r = 0.322$, $p < 0.001$ — 9.3%/yr. Persistent macro regimes amplified it.
- ! **Investor fear strongly affects returns.**
VIX alone explains 28% of variance; GDP $r = 0.662$ is the single strongest driver.
- ★ **Combined factors explain half of return variability.**
 $R^2 = 0.509$ — Explains 51% of return variation; 10-variable OLS model · 2,000 observations · Strongest predictor: VIX

References

- [1] Fama, E.F. & French, K.R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3–56.
- [2] Jegadeesh, N. & Titman, S. (1993). Returns to buying winners and selling losers. *Journal of Finance*, 48(1), 65–91.
- [3] Sharpe, W.F. (1964). Capital asset pricing model. *Journal of Finance*, 19(3), 425–442.

Acknowledgements

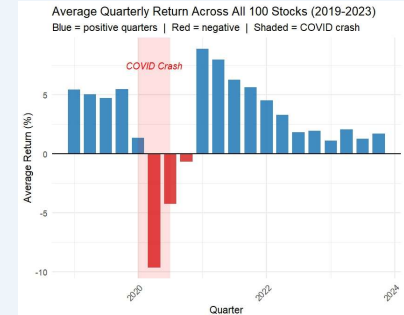
We thank the R and useR! communities for continued support of open-source data analysis. Tools: R, ggplot2, dplyr.

Market Environment — COVID Crash & Recovery (2019–2023)

2020 was the only negative year (avg $-3.29\%/quarter$). The COVID crash (2020 Q1–Q2) was the fastest market drop since 1987 — and the fastest recovery. 2021 delivered the strongest returns ($+7.17\%/quarter$ avg) on stimulus-fuelled growth.

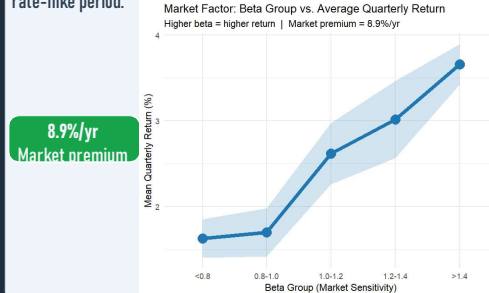
2020: -3.3%
Only negative year

2021: $+7.2\%$
Best year in sample



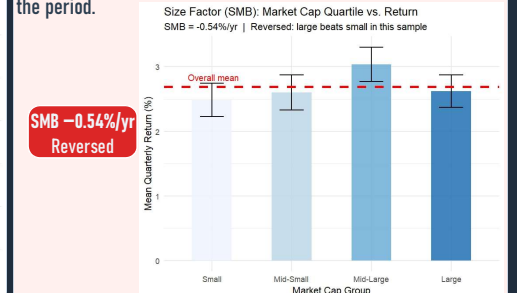
01 Market Factor (β) · CONSISTENT ✓

$\beta > 1.4$ earns 3.6%/quarter vs. 1.75% for $\beta < 0.8$ — nearly a 2x premium. Results were consistent with CAPM across the COVID crash and 2022 rate-hike period.



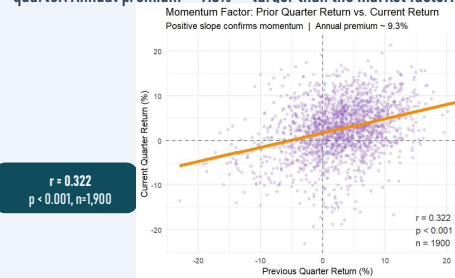
02 Size Factor (SMB) · REVERSED ✗

SMB = $-0.54\%/yr$. Large-cap outperformed small-cap during the study period. Mid-large earns most; mega-cap tech dominated the period.



03 Momentum Factor · STRONG ✓

$r = 0.322$, $p < 0.001$, $n = 1,900$. Every +1% last quarter $\rightarrow$ +0.32% this quarter. Annual premium $\approx 9.3\%$ — larger than the market factor.



04 VIX — The Fear Gauge

$r = -0.529$. VIX alone explains 28% of return variance. Above VIX = 40, returns are almost universally negative. -0.25% per VIX point.



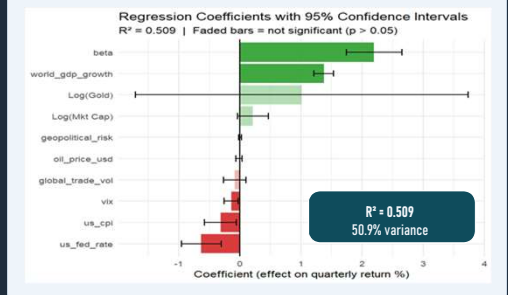
05 GDP Growth & Oil Prices

GDP $r = 0.662$: returns show a strong positive association with GDP growth. Oil $r = 0.313$: 'Very Low' bin = COVID collapse quarters.



06 Regression Model · $R^2 = 0.509$

Beta (+2.18) and GDP (+1.33) were among the strongest positive predictors. Fed rate (-0.52) and CPI (-0.44) the main drags. Faded bars = not significant ($p > 0.05$).



07 Factor Scorecard — Summary of All Findings

Market (β) ✓ CONSISTENT $\sim 8.9\%/yr$	Size (SMB) ✗ Reversed $-0.54\%/yr$	Momentum ✓ Strong $+9.3\%/yr$	VIX (Fear) ✓ Dominant $r = -0.53$	GDP Growth ✓ Strong + $r = +0.66$	OLS Model $R^2 = 0.509$ $n = 2,000$
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Dataset Note: A synthetic global stock panel was constructed for this study using market-inspired financial and macroeconomic variables. The dataset was designed for educational and methodological exploration of asset-pricing factors.

Code & Dataset: github.com/riturajsinghbisen/Global-Stocks-Factors