

Does Interest Rate Volatility Drive The Equity Premium Puzzle?

Micah White¹

¹ Department of Economics & Finance, College of Business, Louisiana Tech University



Research Question

- The equity premium puzzle is the unexplained difference of return between stocks and bonds.
- Economic models calculate an equity premium of 40 basis points, but the premium in reality averages at 6%, 560 basis points above what models suggest.
- Equity premium is not a fixed number and varies over time.

This research investigates whether interest rate volatility is a driver of the equity premium puzzle.

Method to Calculate Results

To examine if interest rate volatility drives the equity premium puzzle, the following steps can be taken:

1. Calculate Monthly Return of the Standard & Poor's 500 (S&P 500) Index (Fig. 1a).
2. Retrieve the monthly yield of 3-Month U.S. Treasury Bill (Fig. 1b).
3. Calculate the equity premium by finding the difference between the S&P 500's returns and the 3-Month Treasury yield (Fig. 2 [Blue]).
4. Calculate interest rate volatility through the Federal Funds Rate (Fig. 2 [Red]).
5. Model the equity premium gap as a function of interest rate volatility.

Data Visualizations

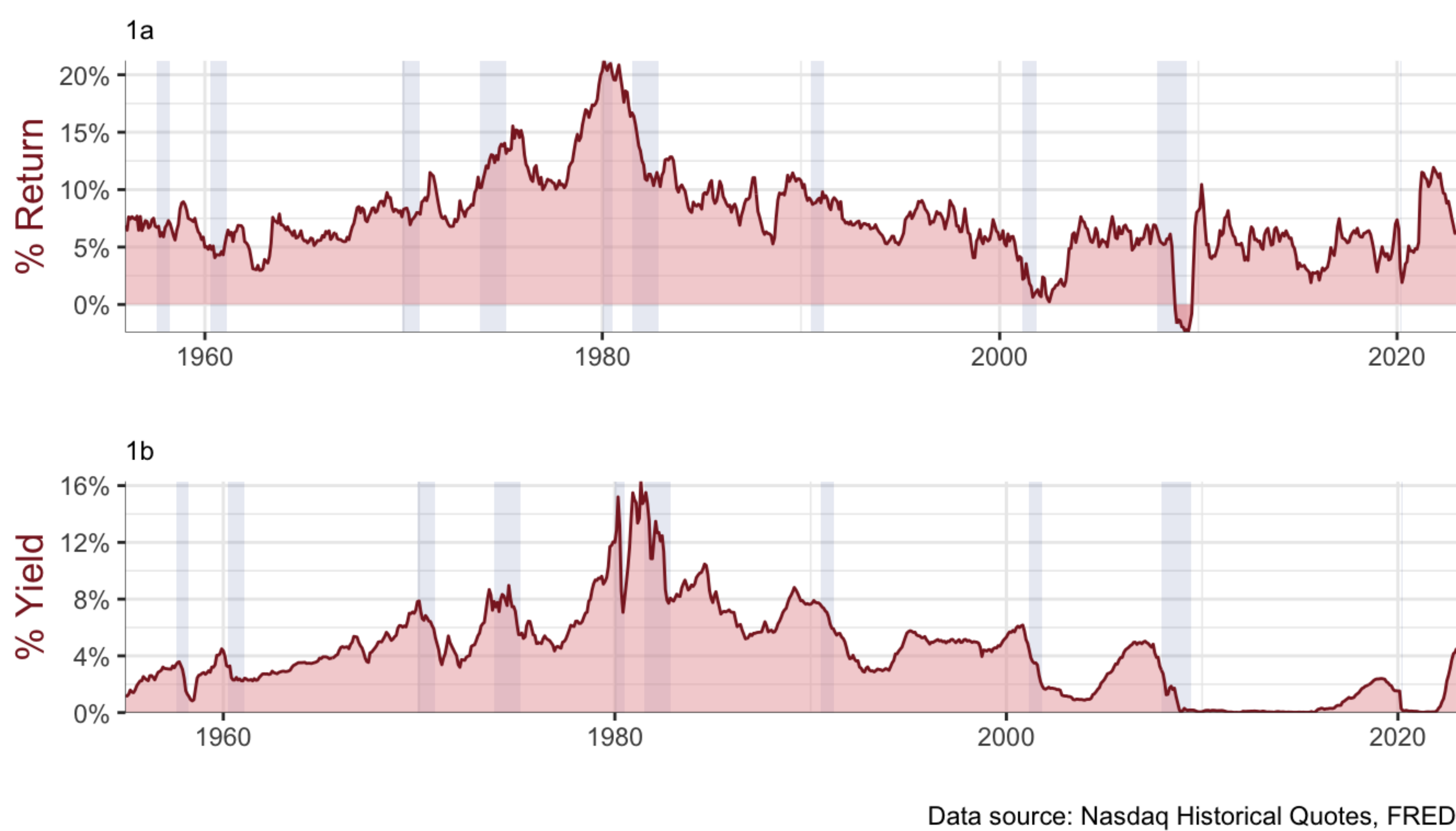


Figure 1: Monthly S&P 500 Return (1a), 3-Month Treasury Yield (1b)

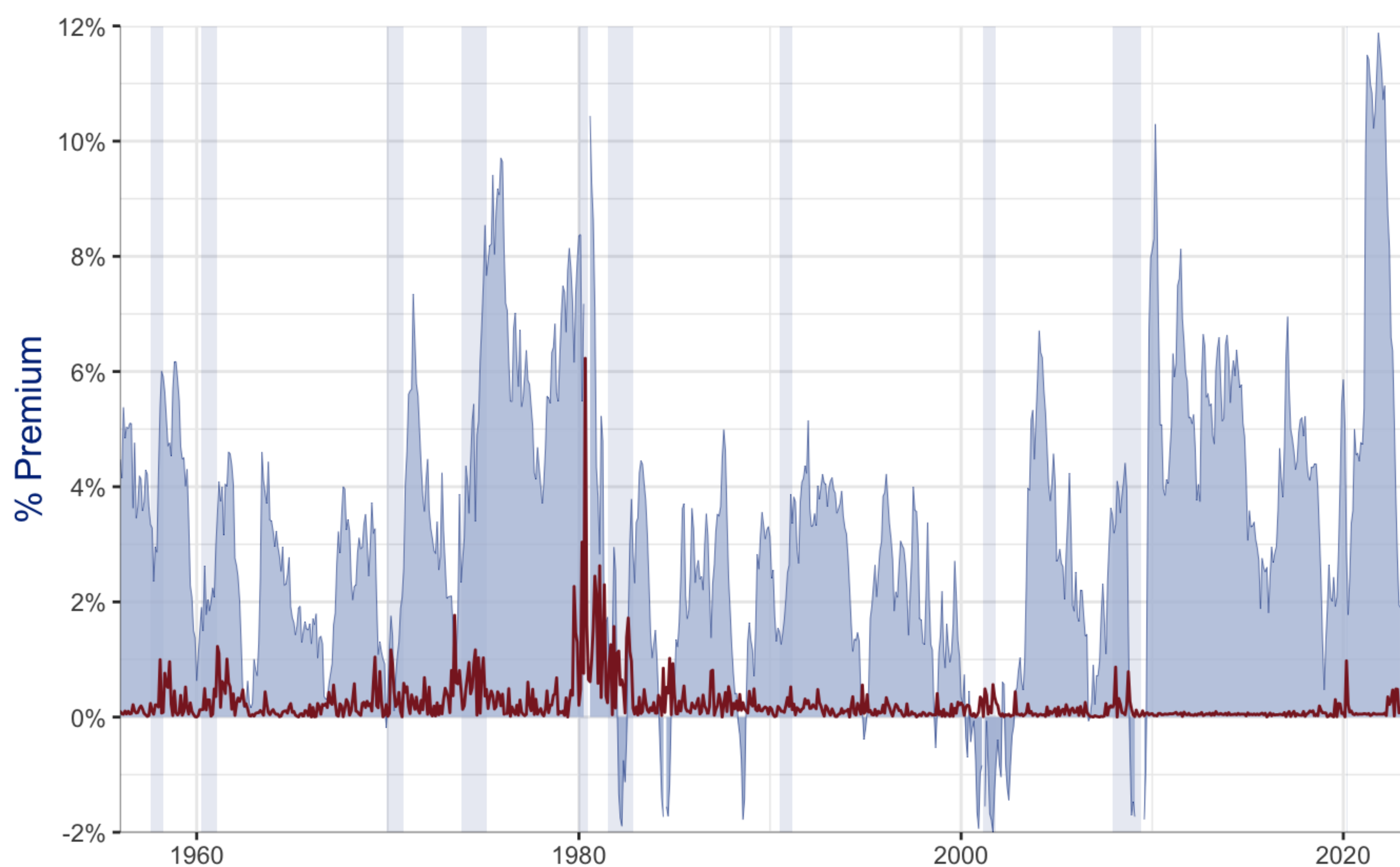


Figure 2: Monthly Equity Premium (Blue), Interest Rate Volatility (Red)

ARIMA Model Results

	Results	
	Dependent variable:	
	(1)	(2)
First Lag	1.2101*** (0.0339)	1.2118*** (0.0339)
Second Lag	-0.2695*** (0.0339)	-0.2711*** (0.0339)
Intercept	3.3205*** (0.4358)	3.3339*** (0.4364)
Interest Rate Volatility		-0.0653 (0.0548)
Observations	805	805
Log Likelihood	-906.5643	-905.8561
sigma ²	0.5550	0.5541
Akaike Inf. Crit.	1,821.1290	1,821.7120
Note:	p<0.1; p<0.05; p<0.01	

- The difference in log likelihood values between the model without an external regressor and the model with interest rate volatility as an external regressor is not statistically significant.
- Inclusion of interest rate volatility does **not** explain changes in the equity premium.

Forecast Results

Regression Model Estimates							
	ME	RMSE	MAE	MPE	MAPE	MASE	ACF1
Training set	-0.002	0.745	0.538	16.312	54.941	0.951	0.022
Regression Model Estimates							
	ME	RMSE	MAE	MPE	MAPE	MASE	ACF1
Training set	-0.002	0.744	0.536	16.432	54.923	0.949	0.023

- Interest rate volatility as an external regressor reduces the errors of the forecasted residuals.
- Inclusion of interest rate volatility as an external regressor improves the *forecastability* of the equity premium.

Conclusion

Although the volatility of interest rate policy as an external regressor has a better predictive ability for the equity premium, it is not a statistically significant explainer on the equity premium itself.

Thus, interest rate volatility does **not** drive the equity premium puzzle.

References

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- Mehra, R., & Prescott, E. C. (1985). The Equity Premium: A Puzzle. *Journal of Monetary Economics*, 15(2), 145-161.