

Diversification Also Works for Forecasting Aggregate Stock Returns

David E. Rapach Jack K. Strauss Guofu Zhou

Department of Economics
Simon Center for Regional Forecasting
Saint Louis University

Department of Finance
Washington University in St. Louis

Slides available at
<http://pages.slu.edu/faculty/rapachde/Simon.html>

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- Forecasting stock returns is of great interest to both academics and practitioners
- Numerous **economic variables** have been proposed as predictors of aggregate stock returns
 - Valuation ratios (dividend-price, earnings-price, book-to-market)
 - Nominal interest rates
 - Inflation rate
 - Term and default spreads
 - Corporate issuing activity
 - Consumption-wealth ratio
 - Stock market volatility
- Most studies focus on **in-sample** tests
 - Conclusion: stock returns have a **significant**—albeit **small**—predictable component

- Goyal and Welch (2008): individual predictors unable to deliver consistently superior **out-of-sample** forecasts
 - Cannot beat simple **historical average** forecast
 - Individual predictors fail to pass important diagnostic test
 - “[T]hese models would not have helped an investor with access to available information to profitably time the market”
- Negative findings of Goyal and Welch (2008) typical of other out-of-sample tests
 - Bossaerts and Hillion (1999)
 - Goyal and Welch (2003)

- We show that **combinations** of individual model forecasts deliver consistent out-of-sample gains relative to the historical average
- Why does forecast combination work?
 - Reduces forecast volatility, much like **diversification** can reduce a portfolio's variance
 - Better connects stock return forecasts to the **real economy**
- Ultimately, data-generating process for aggregate stock returns is highly **complex** and subject to substantial **structural instability**
 - Literature indicates that forecast combination is useful in this environment, rather than reliance on a single model

- Individual predictive regression models
 - $r_{t+1} = \alpha + \beta x_{i,t} + \epsilon_{t+1}$
 - r_{t+1} : aggregate stock return minus risk-free interest rate
 - $x_{i,t}$: economic variable ($i = 1, \dots, N$)
 - ϵ_{t+1} : disturbance term (expected value = 0)
 - Generate out-of-sample forecasts using a **recursive** (expanding) estimation window
- Natural benchmark—historical average
 - $\bar{r}_{t+1} = \sum_{j=1}^t r_j$ (constant expected equity premium)
- Simple combination forecast
 - **Mean** of N individual predictive regression model forecasts

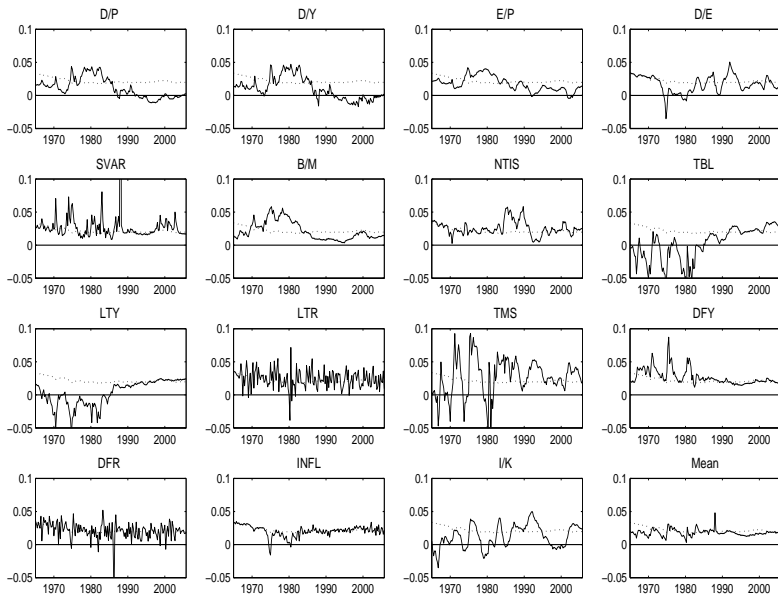
Out-of-Sample Forecasting Results

1-quarter horizon results, 1965:1–2005:4

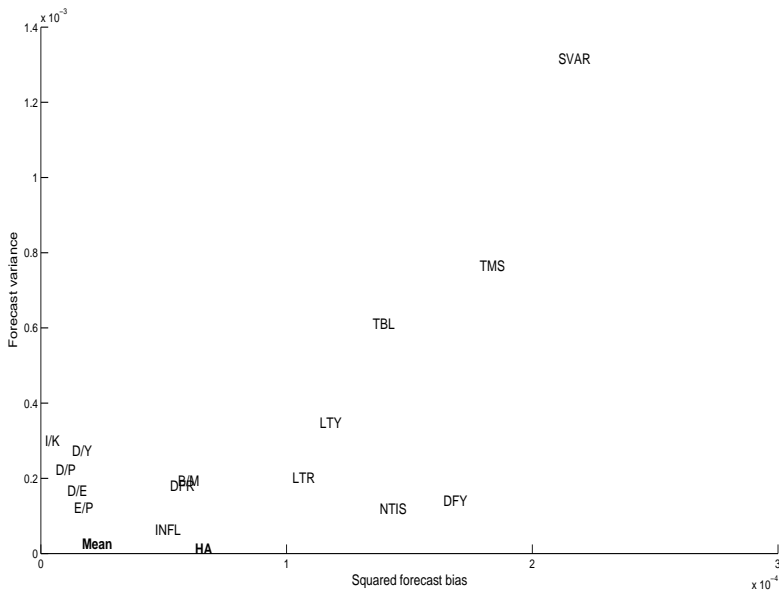
Variable	R_{OS}^2 (%)	Variable	R_{OS}^2 (%)
<i>D/P</i>	0.34 [†]	<i>LTY</i>	-3.09
<i>D/Y</i>	0.25 [†]	<i>LTR</i>	0.33
<i>E/P</i>	0.36	<i>TMS</i>	-2.96
<i>D/E</i>	-1.42	<i>DFY</i>	-2.72
<i>SVAR</i>	-12.97	<i>DFR</i>	-1.10
<i>B/M</i>	-2.60	<i>INFL</i>	-0.84
<i>NTIS</i>	-0.91	<i>I/K</i>	1.44*
<i>TBL</i>	-2.78	Mean	3.58**

4-quarter horizon: **Mean, $R_{OS}^2 = 8.19^{**}$**

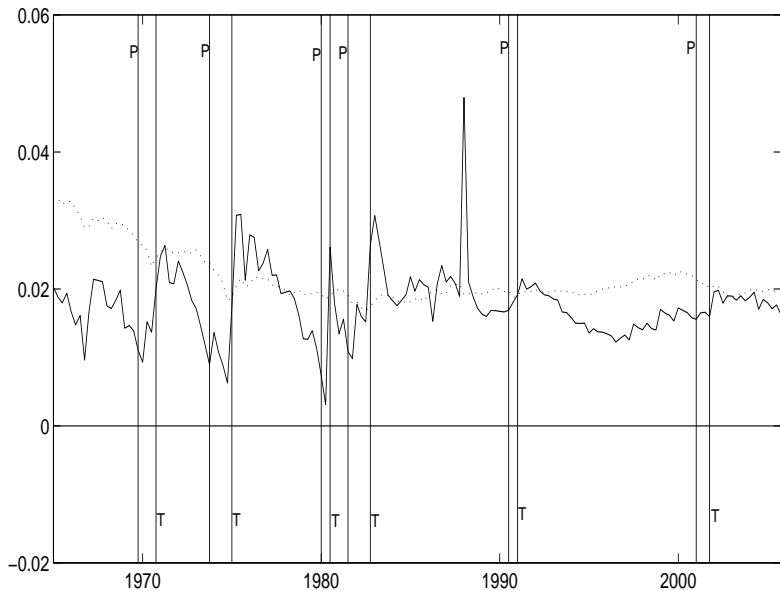
Forecast Stabilization I



Forecast Stabilization II



Links to the Real Economy



Going (Way) Out on a Limb

- Using data through 2008:4
 - Mean combination forecast, 2009 = 8.5%
 - Historical average forecast, 2009 = 7.6%
 - Mean combination forecast, 2009/2010 = 15.7%
 - Historical average forecast, 2009/2010 = 15.4%
- See John Cochrane, “Is Now the Time to Buy Stocks?”
Wall Street Journal, November 12, 2008