Update to "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction"

Amit Goyal
Emory

Ivo Welch
Brown

July 23, 2009

Abstract

This file contains updates, one correction, and links to data for our published paper "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction." Even after including the rate of return for the extraordinary year of 2008, most of our original results still hold.

Correction: The printed journal had the author order mixed up. It should have been—and has always been—Goyal and Welch, not Welch and Goyal.

Data: The published version of our paper had data only up to 2005. We now have updated this data to 2008. The data sources have remained the same as in the original paper, except that in some cases, we had to update the data ourselves instead of relying on the original authors. Both the original and the more up-to-date versions of our data are available at the RFS website, `http://www.rfs.org/`.

Analysis of Data up to 2008: 2008 was obviously a rather dramatic year. We are presenting the results using the updated data below. Our empirical procedure has remained the same, except that we rely on asymptotics instead of bootstrapped standard errors in this note.

All in all, the most important change seems to be that the inference for **d/y** is more favorable (but still not unambiguous) in 2009 than it was after 2006.

Some Detailed Observation of Data Analysis up to 2008: Here is a short description of changes in statistical (not economic magnitude) inference:

- Annual Forecasts:

  e/p now gains IS significance in the longest 1872-2008 sample, too. (Previously, this was only the case for the 1927-2008 sample.) **e/p** has OOS significance if we begin forecasts in 1965, but not if we begin in 1892.

  d/y now gains IS significance in the longest 1872-2008 sample, too. (Previously, this was only the case for the 1927-2008 sample.) **d/y** does not have OOS significance either in the post-1965 or the full-sample period.

  d/p gains IS significance in the 1927-2008 sample and has OOS significance in the post-1965 sample. However, it does not have either IS or OOS significance in the full-sample period.

  Thus, the statistical inference on annual forecasts has changed (at least somewhat) for **e/p** and **d/p**. However, please note that **e/p** does not perform well in 5-year or monthly regressions, and **d/p** does not perform well in 5-yearly regressions.

- 5-Year Forecasts:

  A large number of variables now become statistically significant in the full sample: **tbl**, **dfy**, **tms**, **d/y**, **e/p**, **eqis**, **b/m**. None of these new variables has OOS significance if we start forecasts 20 years after we have data. Only **dfy** and **tms** have OOS significance in the 1965-2008 sample (and **dfy** is not IS significant in the 1927-2008 sample).

  Thus, the statistical inference has reliably changed only for **tms**. However, please note that **tms** does not perform well in the annual regressions.

- Monthly Forecasts (Campbell-Thompson method):

  tbl loses IS significance. **d/y** gains OOS statistical significance. **eqis** loses its OOS statistical significance.

  Thus, the statistical inference has reliably and favorably changed only for **d/y**. Unfortunately, the ΔCEV for **d/y** is still negative. **d/y** does reasonably well in annual and 5-year forecast regressions.

Note: blue color in some of the tables below indicates a favorable change in statistical inference when compared with the published paper's original tables.

List of Tables

Table 1: Forecasts at Annual Frequency

This table presents statistics on forecast errors in-sample (IS) and out-of-sample (OOS) for log equity premium forecasts at annual frequency (both in the forecasting equation and forecast). Variables are explained in Goyal and Welch (2008). Stock returns are price changes, including dividends, of the S&P500. All numbers are in percent per year, except except $\overline{R}^2$, which are simple percentages. A star next to IS-$\overline{R}^2$ denotes significance of the in-sample regression. The column 'IS for OOS' gives the IS-$\overline{R}^2$ for the OOS period. ΔRMSE is the RMSE (root mean square error) difference between the unconditional forecast and the conditional forecast for the same sample/forecast period. Positive numbers signify superior out-of-sample conditional forecast. A star next to OOS-$\overline{R}^2$ is based on significance of MSE-F statistic by McCracken (2004), which tests for equal MSE of the unconditional forecast and the conditional forecast. One-sided critical values of MSE statistics are obtained from McCracken (2004). Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Variable		Data	Full Sample: IS $\overline{R}^2$	Forecasts begin after 20 years: IS for OOS $\overline{R}^2$	Forecasts begin after 20 years: OOS $\overline{R}^2$	Forecasts begin after 20 years: OOS ΔRMSE	Forecasts begin 1965: IS for OOS $\overline{R}^2$	Forecasts begin 1965: OOS $\overline{R}^2$	Forecasts begin 1965: OOS ΔRMSE	1927–2008 Sample: IS $\overline{R}^2$
Full Sample, Not Significant IS										
dfy	Default Yield Spread	1919–2008	–1.13	–1.50	–2.95	-0.12	–2.15	–3.61	-0.10	–1.25
dfr	Default Return Spread	1926–2008	–1.02	–1.72	–5.63	-0.33	–2.66	–7.48	-0.43	–1.06
infl	Inflation	1919–2008	–0.91	–1.52	–3.53	-0.17	–2.48	–3.01	-0.05	–1.04
lty	Long Term Yield	1919–2008	–0.74	–0.74	–6.95	-0.44	–4.89	–10.52	-0.68	–1.03
d/e	Dividend Payout Ratio	1872–2008	–0.74	–0.77	–4.16	-0.31	–2.37	–4.54	-0.18	–1.26
svar	Stock Variance	1885–2008	–0.73	–0.97	–25.28	-2.22	–2.18	–2.24	+0.01	–1.26
tms	Term Spread	1920–2008	0.06	0.14	–2.27	-0.06	1.02	–2.75	-0.03	0.73
tbl	T-Bill Rate	1920–2008	0.07	0.56	–3.35	-0.15	–4.40	–4.68	-0.19	–0.11
ltr	Long Term Return	1926–2008	0.47	–0.60	–10.78	-0.74	–0.43	–15.72	-1.10	0.41
d/p	Dividend Price Ratio	1872–2008	1.27	2.38	–1.21	-0.03	1.59	–0.75	+0.14	**2.95***
Full Sample, Significant IS										
e/p	Earning Price Ratio	1872–2008	**1.74***	1.92	–0.95	-0.01	1.87	**1.28****	+0.31	**4.36****
d/y	Dividend Yield	1872–2008	**1.83***	2.89	–0.93	-0.01	2.05	–2.57	-0.02	**4.19****
ntis	Net Equity Expansion	1927–2008	**2.57***	–8.22	–14.82	-1.06	–7.04	–19.70	-1.40	same
b/m	Book to Market	1921–2008	**4.55****	3.32	**1.02****	+0.21	–4.44	–6.50	-0.35	**5.56****
eqis	Pct Equity Issuing	1927–2008	**5.66****	–1.70	–3.44	-0.15	–1.65	–7.86	-0.46	same
i/k	Invstmnt Capital Ratio	1947–2008	**5.73****	–1.28	–1.23	+0.11	–1.28	–1.23	+0.11	same
all	Kitchen Sink	1927–2008	**13.13****	2.45	–119.88	-5.54	–19.63	–142.95	-5.58	same
Full Sample, No IS Equivalent (caya) or Ex-Post Information (cayp)										
cayp	Cnsmptn, Wlth, Incme	1945–2008	**9.68*****	10.89	**8.49*****	+0.96		same		same
caya	Cnsmptn, Wlth, Incme	1945–2008	–	–	–7.93	-0.47		same		same
1927-2008 Sample, Significant IS										Full Sample
d/p	Dividend Price Ratio	1927–2008	**2.95***				1.76	**1.46****	+0.33	1.27
d/y	Dividend Yield	1927–2008	**4.19****				1.70	–1.65	+0.06	**1.83***
e/p	Earning Price Ratio	1927–2008	**4.36****				1.08	**0.56***	+0.25	**1.74***
b/m	Book to Market	1927–2008	**5.56****				–5.38	–11.53	-0.75	**4.55****

Table 2: Forecasts at 5-year Frequency

This table is identical to Table 1, except that we predict overlapping 5-yearly equity premia, rather than annual equity premia.

Variable		Data	Full Sample: IS $\overline{R}^2$	Forecasts begin after 20 years: IS for OOS $\overline{R}^2$	OOS $\overline{R}^2$	OOS ΔRMSE	Forecasts begin 1965: IS for OOS $\overline{R}^2$	OOS $\overline{R}^2$	OOS ΔRMSE	1927–2008 Sample: IS $\overline{R}^2$
Full Sample, Not Significant IS										
ltr	Long Term Return	1926–2008	–1.31	–1.71	–7.16	-1.06	–2.22	–17.75	-2.56	–1.32
infl	Inflation	1919–2008	–1.18	–1.71	–10.81	-1.63	–2.72	–6.90	-0.80	–1.10
dfr	Default Return Spread	1926–2008	–1.14	–1.22	–5.06	-0.66	–2.14	–2.98	-0.10	–1.10
lty	Long Term Yield	1919–2008	–0.11	3.25	–116.85	-16.78	–12.83	–67.54	-10.30	–0.27
svar	Stock Variance	1885–2008	0.40	–0.34	–77.72	-13.01	–2.49	–2.01	+0.06	–0.73
d/e	Dividend Payout Ratio	1872–2008	1.07	2.99	–4.47	-0.69	1.46	**0.59***	+0.48	**2.53***
Full Sample, Significant IS										
tbl	T-Bill Rate	1920–2008	**2.90***	9.91	–18.19	-2.89	–12.07	–30.18	-4.73	3.85
dfy	Default Yield Spread	1919–2008	**3.70***	–3.90	–56.42	-8.78	2.56	**5.22****	+1.40	1.07
tms	Term Spread	1920–2008	**4.46***	4.99	–31.28	-5.01	14.40	**0.72***	+0.56	**7.92****
d/y	Dividend Yield	1872–2008	**5.17****	7.88	–5.02	-0.79	5.02	–18.23	-2.43	**12.89*****
ntis	Net Equity Expansion	1927–2008	**5.62****	–8.42	–4.50	-0.53	–0.17	–14.79	-2.12	same
e/p	Earning Price Ratio	1872–2008	**5.65****	5.84	–1.24	-0.07	–0.09	–3.69	-0.21	**13.33*****
eqis	Pct Equity Issuing	1927–2008	**7.41***	–6.04	–5.50	-0.72	–0.81	–10.61	-1.42	same
d/p	Dividend Price Ratio	1872–2008	**9.78*****	13.78	–1.50	-0.12	7.64	–25.64	-3.51	**20.38*****
b/m	Book to Market	1921–2008	**11.45****	3.54	–10.68	-1.63	–20.64	–40.41	-6.29	**14.36****
i/k	Invstmnt Capital Ratio	1947–2008	**29.89*****	20.93	**10.38*****	+2.73	20.93	**10.38*****	+2.73	same
all	Kitchen Sink	1927–2008	**40.22*****	41.70	–474.19	-43.98	18.97	–402.67	-32.51	same
Full Sample, No IS Equivalent (caya) or Ex-Post Information (cayp)										
cayp	Cnsmptn, Wlth, Incme	1945–2008	**35.35*****	62.59	**29.92*****	+7.29		same		same
caya	Cnsmptn, Wlth, Incme	1945–2008	–	–	**11.48*****	+2.96		same		same
1927-2008 Sample, Significant IS										Full Sample
d/e	Dividend Payout Ratio	1927–2008	**2.53***				2.91	–0.07*	+0.41	1.07
tms	Term Spread	1927–2008	**7.92****				14.49	**1.00***	+0.60	**4.46***
d/y	Dividend Yield	1927–2008	**12.89*****				1.81	–13.27	-1.86	**5.17****
e/p	Earning Price Ratio	1927–2008	**13.33*****				–6.81	–15.50	-2.24	**5.65****
b/m	Book to Market	1927–2008	**14.36****				–22.70	–53.51	-8.08	**11.45****
d/p	Dividend Price Ratio	1927–2008	**20.38*****				3.58	–13.16	-1.85	**9.78*****

Table 3: Forecasts at Monthly Frequency using Campbell and Thompson (2008) procedure

Refer to Table 1 for basic explanations. This table presents statistics on forecast errors in-sample (IS) and out-of-sample (OOS) for equity premium forecasts at the monthly frequency (both in the forecasting equation and forecast). The data period is December 1927 to December 2008, except for csp (May 1937 to December 2002) and cay3 (March 1952 to December 2008). Critical values of all statistics are obtained from McCracken (2004). The resulting significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively. They are two-sided for IS model significance, and one-sided for OOS superior model performance. The first data column is the IS-$\overline{R}^2$ when returns are logged, as they are in our other tables. The remaining columns are based on predicting simple returns for correspondence with Campbell and Thompson (2008). Certainty Equivalence (CEV) gains are based on the utility of an optimizer with a risk-aversion coefficient of $\gamma = 3$ who trades based on unconditional forecast and conditional forecast. Equity positions are winsorized at 150% ($w = w_{\max}$). "T" means "truncated" to avoid a negative equity premium prediction. "U" means unconditional, that is, to avoid a forecast that is based on a coefficient that is inverse to what the theory predicts. A superscript h denotes high trading turnover of about 10%/month more than the trading strategy based on unconditional forecasts.

		Log Returns	Simple Returns								
			IS		OOS	Campbell and Thompson (2008) OOS					
	Variable	IS $\overline{R}^2$	$\overline{R}^2$	$\overline{R}^2$ T	$\overline{R}^2$	Frcst= T	Frcst= U	$\overline{R}^2$ TU	ΔRMSE TU	$w = w_{\max}$	ΔCEV
svar	Stock Variance	0.04	–0.10	–0.10	–0.91	0.0	0.1	–0.91	-0.0161	37.0	–0.03
d/e	Dividend Payout Ratio	0.03	–0.10	–0.10	–0.66	0.0	7.5	–0.65	-0.0107	58.4	–0.01
lty	Long Term Yield	–0.04	0.01	0.01	–0.80	32.6	0.0	**0.20*****	+0.0071	22.2	0.06
tms	Term Spread	0.02	0.07	0.07	–0.06***	3.5	0.0	–0.07***	+0.0014	58.3	0.12
ltr	Long Term Return	0.07	0.10	0.12	–0.54	3.0	36.2	**0.16*****	+0.0063	52.0^{h}	0.08
infl	Inflation	–0.01	0.13	–0.06	–0.03***	1.2	0.0	**0.02*****	+0.0033	44.3^{h}	0.04
tbl	T-Bill Rate	0.04	0.13	0.09	–0.25	22.1	0.0	**0.06*****	+0.0041	18.1	0.09
dfr	Default Return Spread	**0.25***	0.14	–0.16	–0.01***	0.3	19.9	–0.06***	+0.0017	45.6	0.06
dfy	Default Yield Spread	–0.08	**0.20***	0.20	–0.72	4.0	0.0	–0.65	-0.0107	28.1	–0.07
ntis	Net Equity Expansion	**0.29***	**0.34****	0.22	–1.65	0.4	0.0	–1.64	-0.0312	59.2	0.02
d/p	Dividend Price Ratio	**0.20***	**0.43****	0.42	–0.03***	30.7	0.0	**0.42*****	+0.0116	15.3	–0.06
eqis	Pct Equity Issuing	**0.57****	**0.54****	0.35	–0.45	6.4	0.0	–0.29	-0.0033	58.0	0.13
d/y	Dividend Yield	**0.33****	**0.60*****	0.63	–0.73	54.8	0.0	**0.30*****	+0.0092	15.4	–0.06
e/p	Earning Price Ratio	**0.72*****	**0.74*****	0.62	–0.47	18.3	0.0	–0.51	-0.0078	32.7	0.07
e^{10}/p	Earning(10Y) Price Ratio	**0.52****	**0.94*****	1.07	–1.88	53.3	0.0	–0.23	-0.0019	14.7	–0.09
b/m	Book to Market	**0.59*****	**0.99*****	1.09	–2.66	45.4	0.0	–1.70	-0.0326	29.7	–0.11
csp	Cross-Sectional Prem	**0.92*****	**0.99*****	0.93	–0.95	44.7	0.0	**0.15*****	+0.0071	13.5	0.06
cay3	Cnsmptn, Wlth, Incme	**2.01*****	**2.03*****	2.05	–1.93	42.2	0.0	–0.36*	+0.0071	19.3	0.12

Table 4: Significant Forecasts Using Various d/p, e/p, and d/e Ratios

Refer to Table 1 for basic explanations. The table reports only those combinations of **d/p** **e/p** and **d/e** that were found to predict equity premia significantly in-sample. This table presents statistics on forecast errors in-sample (IS) and out-of-sample (OOS) for excess stock return forecasts at various frequencies. All ΔRMSE numbers are in percent per frequency corresponding to the column entitled 'Freq'. The 'Freq' column also gives the first year of forecast. A star next to OOS-$\overline{R}^2$ is based on the MSE-F-statistic by McCracken (2004), which tests for equal MSE of the unconditional forecast and the conditional forecast. Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

	Variable	Data	Freq	IS $\overline{R}^2$	OOS $\overline{R}^2$	OOS ΔRMSE
e/p	Earning(1Y) Price Ratio	1927–2008	M 1965–	**0.75*****	–0.46	-0.01
e^3/p	Earning(3Y) Price Ratio	1927–2008	M 1965–	**0.24***	–0.34	-0.00
e^5/p	Earning(5Y) Price Ratio	1927–2008	M 1965–	**0.35****	–0.47	-0.01
e^{10}/p	Earning(10Y) Price Ratio	1927–2008	M 1965–	**0.56****	–0.55	-0.01
d/p	Dividend(1Y) Price Ratio	1927–2008	M 1965–	**0.23***	**0.11*****	+0.01
d^3/p	Dividend(3Y) Price Ratio	1927–2008	M 1965–	**0.32****	**0.19*****	+0.01
d^5/p	Dividend(5Y) Price Ratio	1927–2008	M 1965–	**0.42****	**0.15*****	+0.01
d^{10}/p	Dividend(10Y) Price Ratio	1927–2008	M 1965–	**0.37****	**0.21*****	+0.01
e/p	Earning(1Y) Price Ratio	1882–2008	A 1902–	**1.94***	–2.40	-0.14
e^3/p	Earning(3Y) Price Ratio	1882–2008	A 1902–	**3.04****	–0.32***	+0.06
e^5/p	Earning(5Y) Price Ratio	1882–2008	A 1902–	**3.46****	**0.25*****	+0.12
e^{10}/p	Earning(10Y) Price Ratio	1882–2008	A 1902–	**5.91*****	**3.27*****	+0.41
d/p	Dividend(1Y) Price Ratio	1882–2008	A 1902–	**2.27***	–0.67***	+0.03
d^3/p	Dividend(3Y) Price Ratio	1882–2008	A 1902–	**2.89****	–0.38***	+0.06
d^5/p	Dividend(5Y) Price Ratio	1882–2008	A 1902–	**3.64****	**0.70*****	+0.16
d^{10}/p	Dividend(10Y) Price Ratio	1882–2008	A 1902–	**3.32****	**0.23*****	+0.11
e/p	Earning(1Y) Price Ratio	1882–2008	A 1965–	**1.94***	**1.42*****	+0.32
e^3/p	Earning(3Y) Price Ratio	1882–2008	A 1965–	**3.04****	–0.78***	+0.13
e^5/p	Earning(5Y) Price Ratio	1882–2008	A 1965–	**3.46****	–1.78***	+0.05
e^{10}/p	Earning(10Y) Price Ratio	1882–2008	A 1965–	**5.91*****	–5.03	-0.22
d/p	Dividend(1Y) Price Ratio	1882–2008	A 1965–	**2.27***	–1.25***	+0.09
d^3/p	Dividend(3Y) Price Ratio	1882–2008	A 1965–	**2.89****	–2.00***	+0.03
d^5/p	Dividend(5Y) Price Ratio	1882–2008	A 1965–	**3.64****	–3.26	-0.07
d^{10}/p	Dividend(10Y) Price Ratio	1882–2008	A 1965–	**3.32****	–2.80	-0.04
e/p	Earning(1Y) Price Ratio	1882–2008	5Y 1902–	**6.75****	**1.76*****	+0.54
e^3/p	Earning(3Y) Price Ratio	1882–2008	5Y 1902–	**11.54*****	**3.94*****	+0.98
e^5/p	Earning(5Y) Price Ratio	1882–2008	5Y 1902–	**16.16*****	**5.06*****	+1.21
e^{10}/p	Earning(10Y) Price Ratio	1882–2008	5Y 1902–	**16.38*****	–2.56	-0.32
d/p	Dividend(1Y) Price Ratio	1882–2008	5Y 1902–	**11.69*****	–1.19	-0.05
d^3/p	Dividend(3Y) Price Ratio	1882–2008	5Y 1902–	**12.66*****	–2.30	-0.26
d^5/p	Dividend(5Y) Price Ratio	1882–2008	5Y 1902–	**13.39*****	–3.97	-0.59
d^{10}/p	Dividend(10Y) Price Ratio	1882–2008	5Y 1902–	**9.34*****	–16.04	-2.88
e/p	Earning(1Y) Price Ratio	1882–2008	5Y 1965–	**6.75****	–3.99	-0.26
e^3/p	Earning(3Y) Price Ratio	1882–2008	5Y 1965–	**11.54*****	–9.74	-1.16
e^5/p	Earning(5Y) Price Ratio	1882–2008	5Y 1965–	**16.16*****	–18.34	-2.46
e^{10}/p	Earning(10Y) Price Ratio	1882–2008	5Y 1965–	**16.38*****	–23.07	-3.16
d/p	Dividend(1Y) Price Ratio	1882–2008	5Y 1965–	**11.69*****	–29.33	-4.06
d^3/p	Dividend(3Y) Price Ratio	1882–2008	5Y 1965–	**12.66*****	–27.38	-3.78
d^5/p	Dividend(5Y) Price Ratio	1882–2008	5Y 1965–	**13.39*****	–29.35	-4.07
d^{10}/p	Dividend(10Y) Price Ratio	1882–2008	5Y 1965–	**9.34*****	–20.44	-2.77

Table 5: Forecasts at Monthly Frequency with Alternative Procedures

Refer to Table 1 for basic explanations. Columns under the heading 'OLS' are unadjusted betas, columns under the heading 'Stambaugh' correct for betas following Stambaugh (1999), and columns under the heading 'Lewellen' correct for betas following Lewellen (2004). ρ under the column OLS gives the autoregressive coefficient of the variable over the entire sample period (the variables are sorted in descending order of ρ).

				OLS		Stambaugh		Lewellen	
				IS	OOS	IS	OOS	IS	OOS
	Variable	Data	ρ	$\overline{R}^2$					
d/e	Dividend Payout Ratio	192701–200812	0.9989	0.02	–1.84	0.02	–1.92	0.02	–1.86
lty	Long Term Yield	192701–200812	0.9963	–0.02	–1.11	–0.03	–1.64	–0.02	–1.03
d/y	Dividend Yield	192701–200812	0.9929	**0.36****	–0.03***	**0.36****	–0.00***	**0.36****	**0.08*****
d/p	Dividend Price Ratio	192701–200812	0.9927	**0.23***	**0.11*****	0.13	–0.17***	–0.17	–0.98
tbl	T-Bill Rate	192701–200812	0.9922	0.05	–0.35	0.05	–0.50	0.05	–0.46
e/p	Earning Price Ratio	192701–200812	0.9879	**0.75*****	–0.47	**0.70*****	–0.02***	**0.63*****	**0.14*****
b/m	Book to Market	192701–200812	0.9843	**0.54****	–1.83	**0.51****	–1.16	0.03	–0.26
csp	Cross-Sectional Prem	193705–200212	0.9788	**0.92*****	**0.70*****	**0.92*****	**0.70*****	**0.91*****	**0.71*****
dfy	Default Yield Spread	192701–200812	0.9763	–0.09	–0.21	–0.09	–0.35	–0.15	–0.61
ntis	Net Equity Expansion	192701–200812	0.9680	**0.19***	–1.77	**0.19***	–1.79	**0.19***	–1.92
tms	Term Spread	192701–200812	0.9566	–0.01	–0.18***	–0.01	–0.20	–0.01	–0.20
svar	Stock Variance	192701–200812	0.6008	0.04	–0.03***	0.04	–0.01***	–1.69	**0.65*****
infl	Inflation	192701–200812	0.5513	–0.01	–0.10***	–0.01	–0.10***	–0.03	–0.18***
ltr	Long Term Return	192701–200812	0.0532	0.07	–0.38	0.07	–0.37	–1.12	–5.98
dfr	Default Return Spread	192701–200812	-0.1996	**0.25***	**0.34*****	**0.25***	**0.34*****	–1.93	–0.05***

Table 6: Encompassing Tests

This table presents statistics on encompassing tests for excess stock return forecasts at various frequencies. Variables are explained in Goyal and Welch (2008). All numbers are in percent per frequency corresponding to the panel. λ gives the ex-post weight on the conditional forecast for the optimal forecast that minimizes the MSE. ENC is the test statistic proposed by Clark and McCracken (2001) for a test of forecast encompassing. One-sided critical values of ENC statistic are obtained from Clark and McCracken (2001). **cayp** uses ex-post information. ΔRMSE* is the RMSE difference between the unconditional forecast and the optimal forecast for the same sample/forecast period. ΔRMSE^{*r} is the RMSE difference between the unconditional forecast and the optimal forecast for the same sample/forecast period using rolling estimates of λ. Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Annual Data

		Estimation:	All Data					All Data				After 1927				
		OOS Forecast:	After 20 years					After 1965				After 1965				
		Data	$\overline{R}^2$	λ	ENC	ΔRMSE*	ΔRMSE^{*r}	λ	ENC	ΔRMSE*	ΔRMSE^{*r}	$\overline{R}^2$	λ	ENC	ΔRMSE*	ΔRMSE^{*r}
d/p	Dividend Price Ratio	1872–2008	1.27	0.41	0.96	+0.0325	-0.2357	0.67	**1.38****	+0.1779	-0.3445	**2.95***	0.73	**2.73****	+0.3796	-0.1481
d/y	Dividend Yield	1872–2008	**1.83***	0.49	**2.50***	+0.1000	-0.5138	0.49	**1.85****	+0.1764	-0.3900	**4.19****	0.52	**3.85*****	+0.3955	-0.1082
e/p	Earning Price Ratio	1872–2008	**1.74***	0.47	0.84	+0.0322	-0.1994	1.01	**1.62****	+0.3062	-0.2706	**4.36****	0.64	**2.97****	+0.3666	-0.1956
d/e	Dividend Payout Ratio	1872–2008	–0.74	-1.77	–1.44	+0.2149	+0.1023	-8.70	–0.43	+0.7524	+0.3296	–1.26	-4.62	–1.14	+1.1307	+0.7376
svar	Stock Variance	1885–2008	–0.73	-0.42	–4.60	+0.2264	-0.6167	2.57	0.04	+0.0182	-0.5050	–1.26	-16.81	–0.15	+0.5089	+0.3871
b/m	Book to Market	1921–2008	**4.55****	0.61	**4.82****	+0.3586	+0.0714	0.35	**2.03****	+0.1478	-0.5819	**5.56****	0.29	**2.44****	+0.1509	-0.3251
ntis	Net Equity Expansion	1927–2008	**2.57***	-0.25	–1.18	+0.0448	-0.4657	-0.30	–1.19	+0.0822	-1.0522	**2.57***	-0.30	–1.19	+0.0822	-1.0522
eqis	Pct Equity Issuing	1927–2008	**5.66****	0.41	**2.54****	+0.1460	-0.2851	0.28	**1.38***	+0.0788	-0.8307	**5.66****	0.28	**1.38***	+0.0788	-0.8307
tbl	T-Bill Rate	1920–2008	0.07	0.37	**1.80***	+0.0830	-1.1368	0.39	**1.72****	+0.1370	-1.1413	–0.11	0.31	**2.23****	+0.1468	-0.4948
lty	Long Term Yield	1919–2008	–0.74	0.28	**2.33***	+0.0829	-0.6403	0.28	**1.98****	+0.1165	-0.8122	–1.03	0.24	**2.01****	+0.1070	-0.4938
ltr	Long Term Return	1926–2008	0.47	0.30	**3.86****	+0.1683	-0.1407	0.22	**1.94****	+0.0936	-7.5134	0.41	0.23	**1.92****	+0.0968	-7.7897
tms	Term Spread	1920–2008	0.06	0.38	0.82	+0.0383	-0.9338	0.46	0.89	+0.0819	-0.7540	0.73	0.49	**1.66***	+0.1615	-0.4608
dfy	Default Yield Spread	1919–2008	–1.13	-2.59	–0.42	+0.1330	-0.8847	-10.46	–0.25	+0.5260	+0.4137	–1.25	-11.81	–0.20	+0.4763	+0.3782
dfr	Default Return Spread	1926–2008	–1.02	-0.15	–0.27	+0.0057	-0.4044	-0.22	–0.32	+0.0142	-0.5116	–1.06	-0.24	–0.33	+0.0161	-0.5197
infl	Inflation	1919–2008	–0.91	-2.31	–0.57	+0.1619	-0.4283	-1.09	–0.09	+0.0200	-13.7035	–1.04	-3.27	–0.77	+0.5210	-0.3605
i/k	Invstmnt Capital Ratio	1947–2008	**5.73****	0.55	**2.65****	+0.3088	-0.1450	0.55	**2.65****	+0.3088	-0.1450	**5.73****	0.55	**2.65****	+0.3088	-0.1450
caya	Cnsmptn, Wlth, Incme	1945–2008	–	0.32	**2.03***	+0.1375	-0.4190	0.32	**2.03***	+0.1375	-0.4190	–	0.32	**2.03***	+0.1375	-0.4190
cayp	Cnsmptn, Wlth, Incme	1945–2008	**9.68*****	1.09	**4.82*****	+0.9665	-0.2792	1.09	**4.82*****	+0.9665	-0.2792	**9.68*****	1.09	**4.82*****	+0.9665	-0.2792
all	Kitchen Sink	1927–2008	**13.13****	0.12	4.39	+0.1304	+0.0002	-0.09	–1.38	+0.0404	-0.3933	**13.13****	-0.09	–1.38	+0.0404	-0.3933

Panel B: Monthly Data

		OOS Forecast:	After 194701					After 196501			
		Data	$\overline{R}^2$	λ	ENC	ΔRMSE*	ΔRMSE^{*r}	λ	ENC	ΔRMSE*	ΔRMSE^{*r}
d/p	Dividend Price Ratio	192701–200812	**0.23***	0.62	**5.00*****	+0.0087	-0.0102	0.65	**3.47*****	+0.0093	-0.0067
d/y	Dividend Yield	192701–200812	**0.36****	0.50	**7.71*****	+0.0108	-0.0080	0.55	**5.00*****	+0.0114	-0.0038
e/p	Earning Price Ratio	192701–200812	**0.75*****	0.43	**11.28*****	+0.0136	-0.0085	0.44	**4.95*****	+0.0090	-0.0109
d/e	Dividend Payout Ratio	192701–200812	0.02	-0.00	–0.04	+0.0000	-0.0139	-0.99	–2.82	+0.0118	-0.0021
svar	Stock Variance	192701–200812	0.04	1.77	0.48	+0.0024	-0.0417	2.31	0.54	+0.0052	-0.0433
csp	Cross-Sectional Prem	193705–200212	**0.92*****	0.37	**6.21*****	+0.0092	-0.0138	0.82	**5.50*****	+0.0219	-0.0007
b/m	Book to Market	192701–200812	**0.54****	0.26	**4.52****	+0.0033	-0.0376	0.17	**2.24****	+0.0016	-0.0229
ntis	Net Equity Expansion	192701–200812	**0.19***	0.05	0.42	+0.0001	-0.0134	-0.09	–0.61	+0.0002	-0.0236
tbl	T-Bill Rate	192701–200812	0.05	0.45	**4.89*****	+0.0062	-0.0222	0.46	**4.34*****	+0.0083	-0.0220
lty	Long Term Yield	192701–200812	–0.02	0.35	**7.34*****	+0.0072	-0.0082	0.34	**5.29*****	+0.0076	-0.0153
ltr	Long Term Return	192701–200812	0.07	-0.08	–0.44	+0.0001	-0.0125	0.37	**1.31***	+0.0020	-0.0210
tms	Term Spread	192701–200812	–0.01	0.47	**1.78***	+0.0024	-0.0323	0.51	**1.70****	+0.0036	-0.0548
dfy	Default Yield Spread	192701–200812	–0.09	-1.76	–0.47	+0.0023	-0.0054	0.24	0.02	+0.0000	-0.0206
dfr	Default Return Spread	192701–200812	**0.25***	1.11	1.21	+0.0038	-0.0183	2.71	**1.74****	+0.0196	-0.0147
infl	Inflation	192701–200812	–0.01	0.84	0.62	+0.0014	-0.0115	0.96	0.51	+0.0020	-0.0515
all	Kitchen Sink	192701–200812	**2.47*****	0.10	**8.97****	+0.0029	-0.0125	0.23	**10.27*****	+0.0104	-0.0312