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A COMPREHENSIVE LOOK AT THE EMPIRICAL PERFORMANCE OF EQUITY PREMIUM PREDICTION

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ABSTRACT

Given the historically high equity premium, is it now a good time to invest in the stock market? Economists have suggested a whole range of variables that investors could or should use to predict: dividend price ratios, dividend yields, earnings-price ratios, dividend payout ratios, net issuing ratios, book-market ratios, interest rates (in various guises), and consumption-based macroeconomic ratios (cay). The typical paper reports that the variable predicted well in an *in-sample* regression, implying forecasting ability.

Our paper explores the *out-of-sample* performance of these variables, and finds that not a single one would have helped a real-world investor outpredicting the then-prevailing historical equity premium mean. Most would have outright hurt. Therefore, we find that, for all practical purposes, the equity premium has not been predictable, and any belief about whether the stock market is now too high or too low has to be based on theoretical prior, not on the empirically variables we have explored.

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1 Introduction

Attempts to predict stock market returns or the equity premium have a long tradition in finance. For example, as early as 1920, Dow (1920) explored the role of dividend ratios. Nowadays, a typical specification regresses an independent lagged predictor on the stock market rate of return or, as we shall do, on the equity premium,

$$\text{Rm(t)} - \text{Rf(t)} = \gamma_0 + \gamma_1 \cdot [x(t-1)] + \epsilon(t) \quad . \tag{1}$$

γ_1 is interpreted as a measure of how significant x is in predicting the equity premium. The most prominent x variables explored in the literature are

The dividend-price ratio and the dividend yield: Ball (1978), Rozeff (1984), Shiller (1984), Campbell (1987), Campbell and Shiller (1988), Campbell and Shiller (1989), Fama and French (1988a), Hodrick (1992), Campbell and Viceira (2002), Campbell and Yogo (2003), Lewellen (2004), and Menzly, Santos, and Veronesi (2004). Cochrane (1997) surveys the dividend ratio prediction literature.

The earnings price ratio and dividend-earnings (payout) ratio: Lamont (1998).

The interest and inflation rates: The short term interest rate: Campbell (1987) and Hodrick (1992). The term spread and the default spread: Avramov (2002), Campbell (1987), Fama and French (1989), and Keim and Stambaugh (1986). The inflation rate: Campbell and Vuolteenaho (2003), Fama (1981), Fama and Schwert (1977), and Lintner (1975). Some papers explore multiple interest rate related variables, as well as dividend related variables (e.g., Ang and Bekaert (2003)).

The book-to-market ratio: Kothari and Shanken (1997) and Pontiff and Schall (1998).

The consumption, wealth, and income ratio: Lettau and Ludvigson (2001).

The aggregate net issuing activity: Baker and Wurgler (2000).

In turn, a large theoretical and normative literature has developed that stipulates how investors should allocate their wealth as a function of state variables—and prominently the just-mentioned variables.

Our own paper is intentionally simple: as in Goyal and Welch (2003), we posit that a real-world investor would not have had access to any ex-post information, either to construct variables or to the entire-sample gamma regression coefficients. An investor would have had to estimate the prediction equation only with data available strictly before or at the prediction point, and then make an *out-of-sample* prediction. Therefore, instead of running one single *in-sample* regression and comparing the fitted to the actual value (or, equivalently, compute the R^2 or F-statistic), we must run rolling forecasting regressions and compare the performance of the regression predictions against the equivalent predictions from simply projecting the then-prevailing historical equity premium mean. Unlike Goyal and Welch (2003), our current paper expands the set of variables and horizons to be comprehensive. We are interested in how well any of the popular variables, which were proposed in existing literature as important *in-sample* predictors of the equity premium, hold up *out-of-sample*.[1]

Our paper not only tries out different time horizons and forecasting periods, but also diagnoses when these variables were of help, using a graphical diagnostic first proposed in Goyal and Welch (2003). We are also interested in the contradictory results in the literature: different papers have identified different methods/variables to be important. Our paper shows that many of the differences can be traced back to choices of sample period and data frequency: these are not innocuous, but often the primary driver for the significance of in-sample results.

Altogether, we find our evidence sobering: we could not identify a single variable that would have been of solid and robust use to a real-world investor (who did not have access to ex-post information). Our diagnostic shows that any presumed equity premium forecasting ability was a mirage. Even before the often-considered anomalous 1990s, many of these variables had little if any statistical forecasting power. It is also usually not a matter of arguing over whether we computed correct statistical standard errors. Instead, most variables are just *worse* than the prevailing historical equity premium average as a predictor, and some even economically significantly so.

[1]Goyal and Welch (2003) was not the first paper to explore *out-of-sample* prediction. There are three earlier/contemporaneous attempts we are aware of: First, Fama and French (1988a) interpreted *out-of-sample* performance to be a success, primarily due to a fortunate sample period. Second, Pesaran and Timmerman (1995) explore model selection in great detail, exploring dividend-yield, earnings-price ratios, interest rates, and money in $2^9 = 512$ model variations. Their data series is monthly, from 1954–1992. They conclude that investors could have succeeded, especially in the volatile periods of the 1970s. They do not entertain the historical equity premium mean as a null hypothesis. Third, like Goyal and Welch (2003), Bossaerts and Hillion (1999) interpreted *out-of-sample* performance to be a failure. However, Bossaerts and Hillion (1999) relied more on a large cross-section (14 countries) than on a long out-of-sample time period (1990–1995).

Goyal and Welch (2003) was also not first to critique predictive regressions. In particular, the use of *dividend ratios* has been critiqued in many other papers (see, e.g., Goetzmann and Jorion (1993) and Ang and Bekaert (2003); apologies to everyone whose paper we omit to cite here—the literature is voluminous).

Overall, the performance of these variables is worse than what we would have expected: given the data snooping of many researchers looking for variables that predict stock prices, and given that our *out-of-sample* regressions often rely on the very *same* data points that were used to establish the significance of the *in-sample* regression, so we are not really conducting a true out-of-sample test—we would have expected at least about equal performance. But instead, for example, of 51 predictive regressions on annual frequencies, 46 (!) underperformed the prevailing mean on a the RMSE criterion. As for the rare regression exceptions in which a variable outpredicts the mean, none are robust across time-specifications and/or data periodicity, few reach statistical significance, and none reaches good economic significance, i.e., surpassing even very modest transaction costs. (The average annual outperformance is 12 basis points.)

In sum, despite good *in-sample* predictive ability for many of these variables, most had consistently poor or zero *out-of-sample* forecasting ability. (They were essentially noise.) Thus, our paper concludes that the evidence that the equity premium has *ever* varied predictably with both *prevailing* variables and *prevailing* regression specifications has always been tenuous: a market-timing trader could not have taken advantage of these variables to outperform the prevailing moving average—and could/should have known this. By assuming that the equity premium was "like it always has been," this trader would have performed at least as well.

Before we proceed, we wish to point out what our paper does not do: it has nothing to say about cross-sectional evidence, i.e., whether these variables can predict which stocks do better than other stocks. It has little to say about models which assume that agents know all parameters—if the relations are *assumed* to be known, then out-of-sample estimates are not required. We are more interested in whether Amit Goyal and Ivo Welch—agents without full model parameters—should rely on these variables to time the market.

2 Data

In this section, we describe our data sources and data construction. First, the dependent variable, the equity premium:

- Stock Prices: S&P 500 index monthly prices from 1871 to 1926 are from Robert Shiller's website. These are monthly averages for the month. Prices from 1926 to 2003 are from CRSP's month-end values. Stock Returns are the continuously compunded returns on the S&P 500 index.
- Risk-free Rate: The risk-free rate for the period 1920 to 2003 is the T-bill rate. Because there was no risk-free short-term debt prior to the 1920's, we had to

estimate it. We obtained commercial paper rates for New York City from NBER's Macrohistory data base. These are available for the period 1871 to 1970. We estimated a regression for the period 1920 to 1971, which yielded

$$\text{T-bill Rate} = -0.004 + 0.886 \times \text{Commercial Paper Rate} \quad . \tag{2}$$

with an R^2 of 95.7%. Therefore, we instrumented the risk-free rate for the period 1871 to 1919 with the predicted regression equation. The correlation for the period 1920 to 1971 between the equity premium computed using the T-bill rate and that computed using the predicted commercial paper rate is 99.8%.

Our dependent variable is the equity premium, i.e., the rate of return on the stock market minus the prevailing short-term interest rate. Note that for frequencies less than 1 year, we do not consider the dividend yield (defined below) in the dependent variable. There is little month-to-month variation in the yield, so no harm is done by avoiding complications as to how to apportion low-frequency dividend yields to higher frequency return data. For frequencies of 1 year and longer, we indeed include the dividend yield.

As independent variables, our first set of variables relate primarily to characteristics of stocks:

- <u>Dividends:</u> Dividends are twelve-month moving sums of dividends paid on the S&P 500 index. They are from Robert Shiller's website for the period 1871 to 1970. Dividends from 1971 to 2003 are from S&P Corporation.

  The **Dividend Price Ratio (d/p)** is the difference between the log of dividends and the log of prices. The **Dividend Yield (d/y)** is the difference between the log of dividends and the log of lagged prices.

- <u>Earnings:</u> Earnings are twelve-month moving sums of earnings on the S&P 500 index. These are from Robert Shiller's website for the period 1871 to June 2003. Earnings from June 2003 to December 2003 are our own estimates based on interpolation of quarterly earnings provided by S&P Corporation.

  The **Earnings Price Ratio (e/p)** is the difference between log of earnings and log of prices. **Dividend Payout Ratio (d/e)** is the difference between log of dividends and log of earnings.

- <u>Book Value:</u> Book values from 1920 to 2002 are from Value Line's website, specifically their *Long-Term Perspective Chart* of the Dow Jones Industrial Average.

  The **Book to Market Ratio (b/m)**: is the ratio of book value to market value for the Dow Jones Industrial Average. For the months of March to December, this is computed by dividing book value at the end of previous year by the price at the end of the current month. For the months of January to February, this is computed by dividing book value at the end of 2 years ago by the price at the end of the current month.

- Net Issuing Activity: The dollar amount of net issuing activity (IPOs, SEOs, stock repuchases, less dividends) for NYSE listed stocks is computed from CRSP data via the following equation:

$$\text{Net Issue}_t = \text{Mcap}_t - \text{Mcap}_{t-1} \cdot (1 + \text{vwretx}_t), \tag{3}$$

  where Mcap is the total market capitalization, and vwretx is the value weighted return (excluding dividends) on the NYSE index.[2] These data are available from 1926 to 2003.

  Net Equity Expansion (**ntis**): is the ratio of twelve-month moving sums of net issues by NYSE listed stocks divided by the total market capitalization of NYSE stocks. **Percent Equity Issuing** (**eqis**): is the ratio of equity issuing activity as a fraction of total issuing activity. This is the variable proposed in Baker and Wurgler (2000), which we obtained directly from the authors.[3]

Our next set of independent variables are interest-rate related:

- T-bills (**tbl**): T-bill rates from 1920 to 1933 are the *U.S. Yields On Short-Term United States Securities, Three-Six Month Treasury Notes and Certificates, Three Month Treasury* series from NBER's Macrohistory data base. T-bill rates from 1934 to 2003 are the *3-Month Treasury Bill: Secondary Market Rate* from the economic research database at Federal Reserve Bank at St. Louis (FRED).

- Long Term Yield (**lty**): Long-term government bond yields for the period 1919 to 1925 is the *U.S. Yield On Long-Term United States Bonds* series from NBER's Macrohistory database. Yields from 1926 to 2002 are from Ibbotson's Stocks, Bonds, Bills and Inflation Yearbook. Yields for the year 2003 is the *Treasury Long-Term Average (25 years and above)*.

  Long Term Rate of Return (**ltr**): Long-term government bond returns for the period 1926 to 2003 are from Ibbotson's Stocks, Bonds, Bills and Inflation Yearbook.

  The **Term Spread** (**tms**) is the difference between the long term yield on government bonds and the T-bill.

[2] This calculation implicitly assumes that the delisting return is –100 percent. Using the actual delisting return, where available, or ignoring delistings altogether, has no impact on results.

[3] Baker and Wurgler (2000) are interested in the behavior of firms themselves, not with the prediction that outside investors may follow. Thus, they are appropriately interested in in-sample outperformance, not out-of-sample outperformance.

- Corporate Bond Returns: Long-term corporate bond returns for the period 1926 to 2003 are from Ibbotson's Stocks, Bonds, Bills and Inflation Yearbook.

  Corporate Bond Yields: Yields on AAA- and BAA-rated bonds for the period 1919 to 2003 are from FRED.

  The **Default Yield Spread** (**dfy**): is the difference between BAA- and AAA- rated corporate bond *yields*.

  The **Default Return Spread** (**dfr**): is the difference between the return on long-term corporate bonds and returns on the long-term government bonds.

- Inflation (**infl**): Inflation is the *Consumer Price Index (All Urban Consumers)* for the priod 1919 to 2003 from the Bureau of Labor Statistics. Because inflation information is released only in the following month, in our monthly regressions, we inserted one month of waiting before use.

Our final single variable could be considered a macro-economic variable:

- Consumption, wealth, income ratio (**cay**) is suggested in Lettau and Ludvigson (2001). Data for its construction is available from Martin Lettau's website at quarterly frequency from the second quarter of 1952 to the second quarter of 2003, and for annual frequency from 1948 to 2001. Lettau-Ludvigson estimate the following equation:

$$c_t = \alpha + \beta_w\, w_t + \beta_y\, y_t + \sum_{i=-k}^{k} b_{w,i}\Delta w_{t-i} + \sum_{i=-k}^{k} b_{y,i}\Delta y_{t-i} + \epsilon_t, \quad t = k+1, \ldots, T-k, \quad (4)$$

  where c is the aggregate consumption, w is the aggregate wealth, and y is the aggregate income. The estimates of the above equation provide $\widehat{cay}_t = c_t - \hat{\beta}_a\, a_t - \hat{\beta}_y\, y_t, \quad t = 1, \ldots, T$. Eight leads/lags are used in quarterly estimation ($k = 8$) while two lags are used in annual estimation ($k = 2$). (For further details, see Lettau and Ludvigson (2001).)

  However, the Lettau-Ludvigson measure of cay is constructed using look-ahead (*in-sample* regression coefficients). We thus modified cay to use only prevailing data. In other words, if the current time period is 's', then we estimated equation (4) using only the data up to 's' through

$$c_t = \alpha + \beta_w^s\, w_t + \beta_y^s\, y_t + \sum_{i=-k}^{k} b_{w,i}^s \Delta w_{t-i} + \sum_{i=-k}^{k} b_{y,i}^s \Delta y_{t-i} + \epsilon_t, \quad t = k+1, \ldots, s-k, \quad (5)$$

  where the superscript on betas indicates that these are rolling estimates. This measure is called **caya** ("ante") to distinguish it from the traditional variable **cayp** constructed with look-ahead bias ("post").

Finally, we also entertain two methods that rely on multiple variables:

- A "model selection" approach, named "**ms.**". If there are K variables, we consider 2^K models essentially consisting of all possible combinations of variables. Every time period, we select one of these models that gives the minimum cumulative prediction errors up to that time period t. This method is based on Rissanen (1986) and is recommended by Bossaerts and Hillion (1999). Essentially, this method uses our criterion of mimimum out-of-sample prediction errors to choose amongst competing models *in each time period* t. This is also similar in spirit to the use of more conventional criteria (like R^2) in Pesaran and Timmerman (1995), who however do not entertain our null hypothesis.

  Avramov (2002) and Cremers (2002) also use model selection procedures, but with empirically motivated priors (empirical Bayes procedure) which are formed *after* looking at the whole data. We do not follow their approach because we want to stay in the framework of real-time forecasting. Additionally, the focus of Avramov (2002) is cross-sectional predictability while we study only time-series evidence of predictability of the market returns.

- A "kitchen sink" regression, named "**all.**" (This regression throws **caya** rather than **cayp** into our kitchen sink, because we want no look-ahead bias.) We do not report coefficients, just prediction statistics. (Consequently, variable deletion to prevent perfect multicollinearity does not change anything.)

3 Results

3.1 Format

Our result tables are all in the same format. (Table 1 is a good example.) The panel name describes the timing for the forecasting equation and for the *out-of-sample* prediction. The "sample start" column describes when the forecasting equation is first fed data. The "forecast start" column describes when the first *out-of-sample* forecast is made.

The *in-sample* columns provide the mean absolute error and root mean-square-error of the residuals for observations which are predicted in the *out-of-sample* forecasts. Our goal is to allow comparison of our *in-sample* and *out-of-sample* predictions on the very same observations. We also report the adjusted r-square ($\overline{R}^2$), which is starred to designate the statistical significance of the independent variables in predicting the equity premium (based on the F-statistic). The first four columns in the *out-of-sample* columns describe the statistics of the *out-of-sample* forecast error: the mean, which measures forecast bias; the standard deviation, which measures noise; the mean absolute error (MAE); and the root mean-squared error (RMSE). Naturally, we would expect the *in-sample* MAE/RMSE to outperform the *out-of-sample* MAE/RMSE, but hopefully only modestly so. More important than the per-sé deterioration is the *relative* deterioration of the regression model's predictive power, i.e., relative to the prevailing mean's predictive power. If the prevailing mean's forecasting power deteriorates faster than that of the regression, the regression would perform even better out-of-sample in relative terms.

Consequently, of most interest to us are the final three columns, which measure how much better an investor would have fared if he had used the known observations on the variable relative to the known historical equity mean at that point. The ΔMAE is the MAE of an *out-of-sample* forecast using the prevailing mean minus the MAE of an *out-of-sample* forecast of the linear regression using the variable(s) described in the first column. Equivalently, the ΔRMSE is the *out-of-sample* root mean-square error of the prevailing mean minus *out-of-sample* root mean-square error of the linear regression. For both measures, a positive number means that the variable outperformed the historical prevailing mean; a negative number means that the historical prevailing mean outperformed the variable. It is important to point out that the MAE, the RMSE, and their differences have easily interpretable economic meaning: If the ΔMAE or ΔRMSE is 0.01%, it means that the predictive regression outperforms the prevailing historical mean by 1 basis point. These numbers are no annualized, but simple multiplication/division gives a rough idea of annual importance.

Diebold and Mariano (1995) propose a t-test for checking equal-forecast accuracy from two models. If e_{1t} and e_{2t} denote the two forecast errors, then defining $d_t = e_{1t}^2 - e_{2t}^2$, the Diebold Marianno (DM) statistic for h-step ahead forecast is calculated as

$$\text{DM} = \sqrt{T + 1 - 2h + h(h-1)/T} \cdot \left[\frac{\bar{d}}{\hat{se}\left(\bar{d}\right)} \right], \tag{6}$$

where

$$\bar{d} = \frac{1}{T} \sum_{t=1}^{T} d_t \tag{7}$$

$$\hat{se}\left(\bar{d}\right) = \frac{1}{T} \sum_{\tau=-(h-1)}^{h-1} \sum_{t=|\tau|+1}^{N} \left(d_t - \bar{d}\right) \times \left(d_{t-|\tau|} - \bar{d}\right), \tag{8}$$

and T is the total number of forecast observations. However, although the Diebold and Mariano (1995) statistic is normally distributed when testing non-nested models (as it was in their context), McCracken (1999) shows that the DM statistic is not asymptotically normally distributed when testing nested models—which is the relevant case for our application. Critical values for our tests are, therefore, taken from McCracken's paper. Note that the null hypothesis is that the unconditional forecast is superior to the conditional forecast. The critical values are therefore for a 1-sided test. The statistical significance levels are only valid for the non-overlapping regressions, because the McCracken statistic does not apply to overlapping observations. For overlapping observation regressions, we bootstrapped the significance of the Diebold-Mariano statistic, rather than rely on the McCracken closed form statistical significance levels. In our bootstrap, the x variable follows the historical time-series process of the x variable, thereby adjusting for the Stambaugh (1999) effect.

3.2 Monthly and Quarterly Data

Insert Table 1 here.
Forecasts at Monthly Frequency

Table 1 presents monthly results, i.e., where both the predictive regression and predicted equity premium are based on monthly data. The three panels are variations on the predictive regression window and out-of-sample window. Panel A uses all available data for the regressions and predictions; Panel B uses all available data for the regression, but keeps the prediction window the same for all variables (1964–2003); Panel C uses both the same regression (beginning 1927) and the same prediction window for all variables (1964–2003). There are 15 models, based on 13 variables.

In-sample, our full **all**-variables regression has the best predictive ability ($\overline{R}^2$) in all three panels. In Panels A and B, **all** is followed by the the dividend payout ratio (**d/e**), the book-to-market ratio (**b/m**), the term-spread (**tms**), and the T-bill rate (**tbl**). (Only the first three models are statistically significant at ordinary significance levels. The other variables fall off because of the sample period end. But all afore-mentioned variables have reasonably strong in-sample predictive ability.) In Panel C, the earnings-price ratio (**e/p**) and the book-to-market ratio (**b/m**) come in statistically significant.

Out-of-sample, as expected, the RMSE and MAE deteriorate relative to the same-set-of-observations *in-sample* RMSE and MAE. The drop seems especially stark for the **all** prediction. In Panel C, we also see that the historical mean shows almost no *out-of-sample* deterioration.

Not in the table, we used the CUSUMSQ statistic to test for stability of a regression model based on *out-of-sample* errors.[4] These tests are often critiqued as being too weak.

[4]The CUSUM test provides identical inferences to CUSUMSQ in all cases. Their *out-of-sample* performance tests use all observations/residuals, not just the residuals after our initial estimation period.

(See Greene (2003) for more details.) However, for our monthly data, the test has no difficulty rejecting the NULL hypothesis of stability: CUSUMSQ can reject stability for each and every model (including the historical mean prediction) at the 1% level.

Of most interest to us is consideration for what an individual investor could have profitably used, i.e., the predictive ability of the variables relative to the predictive ability of the historical mean itself. Even if a model is unstable, if it helped an investor predict better, it might have been useful—though caution would of course be well-advised. Alas, it is immediately apparent that, on the ΔRMSE statistic, of our 15 predictive regressions, 13 regressions in Panel A (forecasts begin 20 years after data is available), 12 regressions in Panel B (estimation begins as soon as possible, forecasts begin in 1964), and 11 regressions in Panel C (estimation begins in 1927, forecasts begin in 1964) *underperform* the prevailing historical mean in their equity premium predictions. The picture is similar for the ΔMAE statistic.

The underperformance occasionally reaches economically meaningful proportions: the **all** regressions underperform the prevailing mean by about 2–3% per annum. (Of course, we would like to find variables with *better* performance, not *worse* performance, so this variable is of no use to us; it is merely noise.) The term-spread (**tms**) is really the only variable that potentially qualifies as a candidate for positive predictive power. Its relative performance is statistically significant in all the three panels. How economically significant is this variable? The largest RMSE increase is 0.011% per month in Panel B. This translates into $12 \cdot 0.011\% \approx 0.13\%$ (13 basis points) per annum. Although one should not expect miracles from stock return predictions, this kind of performance gain does appear tiny. Even one trade's transaction costs could wipe out this advantage. To add to our confusion, on a monthly frequency, our large *in-sample* regressions was *not* statistically significant.

In Section 4.1, we further investigate adjustment methods on monthly prediction to correct for stationarity and increasing non-stationarity in the dividend price ratios, as proposed in Stambaugh (1999), and enhanced by Campbell and Yogo (2003), and Lewellen (2004). We also explored an instrumented method in Goyal and Welch (2003) that adjusted for both increasing non-stationarity in the dividend ratios and the dividend growth process.

We are not reporting the same tables for quarterly data. (Results are available on our website.) The results were practically identical. The only novelty is the inclusion of the **cay** variable. *In-sample*, **cayp** performed fabulously, almost as good as the **all** regression, again our best regression. **cayp** is the variable constructed with look-ahead bias, as in Lettau and Ludvigson (2001). Removing the variable construction look-ahead bias (**caya**), i.e., running one *in-sample* regression on **cayp**, drops about half of its *in-sample* forecasting power in Panel A, and all of its *in-sample* forecasting power in Panels B and C.[5] It still remains an excellent variable. However, **cayp**'s *out-of-sample* performance is also worse than the performance of the historical sample mean—which can be also be seen in the annual data (next).

3.3 Annual Data

Annual Data: Tables

Insert Table 2 here.
Forecasts at Annual Frequency

We deem annual data to be most appealing, because it is a good compromise between the need to use moving averages for some ratios and the need to use corrections for overlapping data. Thus, we will pay some extra attention to these regressions, which are detailed in Table 2.

In-sample, only **eqis**, **cay** (both forms) and **all** systematically managed to predict well in all three panels. **cayp** performs almost as well as the **all** regression, which explains the profession's enthusiasm for it: this one variable outperforms everything else by a wide margin. Eliminating the variable's look-ahead bias, however, we see that **caya** loses much of its forecasting power. Nevertheless, **caya** remains the best known *in-sample* predictor, albeit now together with **eqis**. *In-sample*, the **b/m** ratio also has good persistent predictions in Panels A and B, but not Panel C. The dividend and earnings ratios (**d/p**, **d/y**, **e/p**) and the T-bill rate (**tbl**) have good *in-sample* predictive ability in Panel C only.

Out-of-sample,[6] however, of $18 \cdot 3 = 54$ regressions, 49 failed to outpredict the prevailing historical mean on the ΔRMSE metric (and 47 on the ΔMAE metric). This is worse than chance—after all, as before, except for the beginning observations that cannot be used in an *out-of-sample* test, the dependent and independent variables are the very same as those we used in the *in-sample* tests that helped us/researchers identify these variables. Of the four variables that outpredicted out-of-sample, each panel (time periods) believes in different ones: the percent equity issuing (**eqis**), book-to-market (**b/m**), earnings-price ratio (**e/p**), and dividend yield (**d/y**) are our four candidates. The best and only statistically significant variable *out-of-sample* is **eqis** (at the 10% level, not the 5% level!). In Panel A, it is not only statistically but also not entirely economically insignificant with 23.5 basis points per annum superior performance. Unfortunately,

[5]Brennan and Xia (2002) similarly point out that the look-ahead bias for **cay**, and find no superior performance in *out-of-sample* prediction.

[6]The CUSUMSQ statistic now has too few observations to have enough power to reject the NULL of stability for all regressions. We can now do so only for some regressions In Panel A: **tbl**, **ltr**, **tms**, **dfs**, **ntis**, and **b/m** are again unstable at the 1% level.

eqis does not remain significant in the other panels (time periods). It is still positive in Panel B. We were almost ready to declare victory, but **eqis** then turned in negative in Panel C. The other three variables are not statistically significant. In terms of mean economic effects, these have superior performance that amounts to no more than 10 basis points per year, not enough to make a single trade worthwhile.

For the remaining 49 predictive regressions, negative performance means that we can avoid arguing about whether we have used the proper statistical methods to compute standard errors. It is not a matter of argument whether we have the wrong standard errors. It is simply that these variables—when used in simple linear regressions—failed to predict.

Annual Data: Figures

Figure 1 plot the *out-of-sample* performance for annual predictive regressions, specifically the cumulative *squared* prediction errors of the prevailing mean minus the cumulative squared prediction error of the predictive variable from the linear historical regression. (This is also the running statistic on which the Diebold-Marianno standard error is computed.) Whenever a line increases, the regression predicted better; when it decreases, the prevailing mean predicted better. The standard error of the observations, based on translating McCracken statistics into standard error equivalents, are marked in blue: the reader can thus interpret the blue areas as plus or minus two standard deviations. All scales are identical, except for the **ms** and **all** predictions. (They were so bad, we had to change the scale.) The units are in percent and meaningful: The range from –0.2 to 0.2 means 20 basis points underperformance up to outperformance. (This is cumulative, not average![7] It is also easy to mentally shift to any other data starting or data ending period: one would only have to draw a different $y = 0$ line at the first data point.

Although graphing recursive residuals is not novel, the fact that it has been neglected in this literature means that some rather startling facts about predictability are often overlooked (except by Pesaran and Timmerman (1995)). In our sample period, some years stand out: a variable that can predict poor stock market performance in 1929–1932 (the S&P500 dropped from 24.35 to 6.89) and 1973–1974 (118.05 to 48.56) can gain a good predictive advantage. Of course, a variable that can predict the superior stock market performance of the 1990s (and its demise in 2001–2002) can also gain a good advantage.

Although there is a bit of tea-leaf reading to the exercise, it is interesting to see when ratios performed well and when they performed worse. We begin with the stock-related variables:

[7] We could not plot the running ΔRMSE, because this graph would be too noisy at the first few years.

d/p (Dividend price ratio) Panel A shows that if the entire sample is used, the dividend price ratio really had few particularly good years. The exceptions are 1898–1900 and the aforementioned disaster years of 1973–1974 and 2002. (Not reported, even *in-sample*, much of the statistical importance of this ratio hinges on the presence of these two oil-shock years.) **d/p** has poor performance from 1900–1930, zero performance from 1930–1990 performance, then poor performance again. Panel B shows that if we use all available data in the regression estimation, again only 1973 and 1974 do well. Not much is happening before the mid-1990s, the point when the dividend price ratio's predictive ability collapses. However, Panel C shows that *if* regressions are run only post-war and estimation begins in 1962, then we get good dividend price ratio performance up to 1974. Thereafter, the ratio consistently underperformed.

d/y (Dividend yield) The dividend yield looks similar to the dividend price ratio in Panels B and C, but not in Panel A. There, it shows poor performance 1900–1940, good performance 1940–1955, poor performance 1955–1972, again the two good oil-crisis year predictions 1973 and 1974, and then consistently poor performance.

e/p (Earnings-price) The earnings price ratio showed solid performance post-2000. In Panel A, it only showed good performance in the 1950s. In Panel C, it performed well from 1962–1975, and poorly thereafter.

d/e (Net Payout [Dividend Yield+)] The dividend payout ratio performed even less well than the earnings-price ratio. It had poor performance 1890–1940, and essentially zero performance thereafter. In Panel C, it failed to predict the oil-shock year performance.

b/m (Book-To-Market) The book-to-market ratio generally did well from 1940–1975, after which it did rather poorly.

ntis (Net Equity Expansion) Poor performance in 1973–1974, zero performance otherwise.

eqis (Percent Equity Expansion) Displayed good performance, forecasting the 1973–1974 oil shock, bad performance from 1999–2002, mostly indescriptive in other periods. Rapach and Wohar (2002) use a sample from 1927–1999, beginning their out-of-sample forecasts in 1964—and do find superior out-of-sample performance (in their Table 2). This is borne out by our Panel A, where the 95% confidence intervals almost include 0—the single (significance) star **eqis** in our own Table 2 denotes the 90% confidence level. It is perhaps divine justice that the overperformance of **eqis**, which came from only three years (the 1973–75 oil-shock) is pretty much undone by another three years (the 1999-2002 market correction).[8]

[8] We also replicated the Rapach and Wohar (2002) result of statistical significance if the sample ends

The next set are the interest-related variables.

tbl (T-bill) The short-term rate had consistently good performance until around 1973, after which it had consistently bad performance.

lty (Long-Term Yield) The long-term yield shows essentially the same pattern as the short-term rate.

ltr (Long-Term Rate) The long-term rate of return did well from 1950 to 1978, and then performed very poorly.

tms (Term-Spread) The term-spread has mostly zero performance. In Panel A, it had a tiny positive drift until around 2000, in Panel C, it collapsed in the late 1970s.

dfy (Default Yield Spread) The default yield spread had pretty consistently zero or negative performance.

dfr (Default Return Spread) The default return spread had pretty consistently zero or negative performance.

infl (Inflation) The inflation rate showed consistently zero or negative performance. It did particularly poorly in 1973–1974.

The final three plots are

caya (Consumption, Wealth, Income) Consistently zero or poor predictor.

ms (Model-Selection) Please note the scale change. Model selection only worked during the oil-shock years, and performed very poorly in all other time periods.

all (Kitchen-Sink) Please note the scale change. Good predictor from 1968–1973. Remarkably poor predictor thereafter

in 1999. Finally, we can also replicate beta similarity if we split the Baker and Wurgler (2000) ending in 1997 sample into two. But, as the evidence shows, this is not sufficient evidence that **eqis** can predict out of sample.

3.4 5-Year Horizons

Insert Table 3 here.
Forecasts at 5-year Frequency

Table 3 presents the 5-year predictions. (Like quarterly predictions, 3-year predictions are not reported but available on the authors' websites.) The observations are overlapping (i.e., two consecutive observations have 4-years of shared data.) The reported *in-sample* R^2 is therefore upward biased. However, the reported regression significance stars are based on Newey-West overlap corrections in our regressions, and thus valid. Also, we do not have closed-form McCracken critical values for overlapping observations, so we had to bootstrap the significance for the ΔRMSE metric.

In-sample, as in the annual regressions, **all** and **cayp** perform best, and by a wide margin. But many other variables come in significant, too, confirming again the literature's plethora of variables that seem to have explanatory power. The most important variables across the three panels are the percent equity issuing activity **eqis** and **caya**, the term-spread (**tms**), and the T-Bill rate (**tbl**). In Panels A and B, the dividend and earnings-price ratios (**d/p**, **d/y**, **e/p**) and the net issues (**ntis**) also have statistically significant power; in Panel C, the inflation rate matters.[9]

The dividend ratio deserves a detour. We know from Cochrane (1997) that, on long horizons, the dividend ratios should predict either dividend growth rates or the market rate of return. (In Goyal and Welch (2003), we show how the ratios have primarily predicted *themselves* [instead of dividend growth ratios or stock returns] over shorter horizons; over 3–5 year horizons, Cochrane's effect starts kicking in.) We already know from casual observations that the dividend price ratios have not predicted dividend growth rates well. This gives us some hope that they may predict stock returns. We can see the Cochrane effect in the *in-sample* regressions.

Out-of-Sample, "only" 41 out of $3 \cdot 17 = 51$ regressions underperform the prevailing mean on the ΔRMSE metric.[10] Not one of the variables is statistically significant. On the ΔMAE metric, 44 out of 57 regressions underperform the prevailing mean. Remarkably, here we see the first variable (**caya**) which outperforms the historical mean in all three panels, though it is not statistically significant in any of them. Its largest outperformance is about $0.881\%/5 \approx 0.18\%$ per annum. The magnitudes of the positive outperformance is similarly economically small for the other variables.

[9]**caya** comes in significant in Panel B and C only in the 3-year, but not the 5-year horizon.

[10]In the 3-year regressions, **e/p** worked in Panel A. In the 5-year regressions, **e/p** is no longer significant in Panel A—in fact, it cannot even outperform the prevailing mean.

4 Robust Non-Performance

4.1 Process Stationarity of Independent Variables

Insert Table 4 here.

Forecasts at Monthly Frequency with Alternative Procedures

Stambaugh (1999) points out that if the independent variable is itself generated by an autoregressive process, with an autocorrelation close to 1 (which is the case for virtually all of our variables), then the predictive regression should be corrected for the autoregression in the dependent variable. (Stambaugh points out that high estimated autocorrelation in the predictor variable suffers from a downward bias in the autocorrelation. The negative correlation between residuals of the predictive and predictor equation then causes upward bias in the beta.) Table 4 repeats the estimation using the Stambaugh correction. Comparing Panel B to Panel A shows that the Stambaugh correction reduces both the *in-sample* and *out-of-sample* performance in almost all regressions.

Lewellen (2004) and Campbell and Yogo (2003) suggest that the Stambaugh (1999) procedure can be improved, if one is willing to assume that the independent variable cannot be a random walk. This clearly makes sense for most of our independent variables: variables such as dividend-price ratios and interest rates should not wander off to infinity. However, Panel C shows that this correction fails to improve both the *in-sample* and *out-of-sample* performance in almost all regressions, too. Only the term-spread (**tms**) and the inflation rate (**infl**) survive as significant predictors, but with only $12 \cdot 0.006\% \approx 8$ basis points per annum and $12 \cdot 0.002\% \approx 2$ basis points per annum superior performance, there is nothing here that is economically meaningful.

Campbell and Yogo (2003), Goyal and Welch (2003), and Lewellen (2004) further show that the time-series process of the dividend-ratios is not only near-stationary, but has itself changed over the sample. Lewellen (2004) incorporates this into the predictive regression via a sub-sample procedure. Goyal and Welch (2003) incorporate this by instrumenting changes in the time-series process of *both* dividend ratios *and* dividend growth rates into the prediction equation. However, neither of these procedures reliably improves the *out-of-sample* performance of the dividend yield.

4.2 Moving Means as Alternatives?

Insert Table 5 here.

Forecasts Using Moving Average Historical Equity Premia

Fama and French (1988b) point out that stock returns seem to be mean-reverting at 3-year to 5-year intervals. To what extent does our NULL hypothesis pick up this mean-reversion? Can one use the mean-reversion as a momentum-like predictor? Table 5 explores whether the most recent 5-year performance or the most-recent 10-year performance outpredict the prevailing historical mean. The answer is no. The most recent equity premium moving average cannot outpredict the since-inception prevailing equity premium means.

4.3 Price Ratios Revisited

Insert Table 6 here.
Forecasts Using Various **e/p** and **d/p** Ratios

Lamont (1998) explores variations of the E/P ratio and the payout ratio. Table 6 thus explores variations on the computation of earnings and dividend ratios. For example, Earning(10Y) are the moving average 10-year earnings. We explore two different horizons: one in which the forecast begins in 1902, another in which the forecast begins in 1964.

Panel A shows that there is both statistically significant outperformance (both *in-sample* and *out-of-sample*!) the price variables (**e/p** and **d/p**) if we use longer-term moving average price ratios *and* if we begin our forecasts in 1902. The economic significance reached 33 basis points for the Earnings(10Y)/Price ratio, though it is below 10 basis points for all other variations. The payout ratio (**d/e**) does not work. Unfortunately, if we begin our forecasts in 1964, it is not just that our variables are no longer statistically significant, they outright underperform.

Panels B through D explore 3-year, 5-year, and 10-year horizons, respectively. Panel B shows that the 3-year horizon predictions look like the one-year horizons: significant outperformance of long-memory price ratios if we begin in 1902, but underperformance if we begin in 1964. Panel C and D show that the 5-year and 10-year horizon predictions become progressively worse. The 10-year horizon predictions, however, show statistically insignificant overperformance when we begin predictions in 1964, but none if we begin predictions in 1902.

In sum, there is a tiny hint that long-memory earnings-price ratios might have better *in-sample* and *out-of-sample* performance than the prevailing mean; but the empirical evidence is so modest that it is better interpreted as not speaking against **e/p**, instead of speaking in favor for **e/p**. It looks decent primarily because the other predictive variables look so incredibly bad.

4.4 Earlier Robustness Checks

In Goyal and Welch (2003), we also tried numerous variations, trying to find some method with *out-of-sample* power for our two dividend ratios. None of these variations impact our conclusion that their out-of-sample performance has always been poor. Necessarily, many of these variations were dividend-ratio specific.

1. Instead of the equity premium, we predicted stock market returns. Most of the time-series variation is driven by the stock market, so the results do not change much.

2. In addition to our method for instrumenting process changes in dividend ratios and dividend-growth ratios (because the dividend ratio is close to stationary at the sample end; see the preceding section), we tried changes in dividend ratios. These changes in dividend ratios performed worse in forecasting than the dividend ratios themselves.

3. We tried simple returns and yields, instead of log returns and yields. Again, the unconditional model beats the dividend yield models and performs no worse statistically than the dividend-price ratio model.

4. We tried to reconcile our definitions to match exactly the variables in Fama and French (1988a). This included using only NYSE firms, predicting stock returns (rather than premia), and a 30-year estimation window. None of these changes made any difference. The only important differences are the start and end of the prediction window.

5. We tried different "fixed number of years" estimation windows. The unconditional model typically performs better or as well as the dividend ratio models if five or more years are used for parameter estimation.

6. We tried standardized forecasts to see if the regressions/means could identify years ex-ante in which it was likely to perform unreliably. (In other words, we used the regression prediction standard error to normalize forecast errors.) Again, the unconditional model (its forecast also standardized by its standard deviation) beat the conditional models.

7. We tried a convex combination of the dividend yield model prediction and the unconditional prediction. Such a "shrunk dividend yield" model does not produce meaningfully better forecasts than the unconditional model alone.

8. We also explored a more complex measure based on analysts' forecasts (Lee, Myers, and Swaminathan (1999)). It similarly does not appear to predict equity premia well *out-of-sample*.

A VAR specification in Ang and Bekaert (2003)) also rejects the dividend ratios' forecasting power.

In sum, variations on the specification and variables did not produce instances which would lead one to believe that dividend yields or other variables can predict equity premia in a meaningful way. The data do not support the view that dividend ratios were ever an effective forecasting tool, even if we end the sample before the 1990 market boom. It is not likely that there is a simple dividend ratio model which has superior *out-of-sample* performance. More likely, we believe that these two ratios, as well as our other variables, just fail to predict.[11]

5 Conclusion

Our paper has systematically investigated the empirical real-world out-of-sample performance of plain linear regressions to predict the equity premium. We find that none of the popular variables has worked—and not only post-1990. In our monthly tests, we can solidly reject regression model stability for all variables we examined, even though we use the CUSUMSQ test which is known to be fairly weak. For successful out-of-sample prediction, we will either need a different technique or a different variable. If a researcher finds such, we would like to urge her to produce figures similar to those in Figure 1: they are an immediate diagnostic for when a variable has worked and when it has not worked. For example, to the (very small) extent that dividend ratios ever seemed not to have bad out-of-sample performance, the figures make it obvious that this was driven by the two years of the oil-shock, 1973 and 1974, and by the 2002 collapse of the stock market. In most other years, the dividend ratios simply predicted worse than the prevailing historical equity premium mean.

Our paper may be simple, even trivial, but its implications are not. The belief that the state variables which we explored in our paper can predict stock returns and/or equity premia is not only widely held, but the basis for two entire literatures: one literature on how these state variables predict the equity premium, and one literature of how smart investors should use these state variables in better portfolio allocations. This is not to argue that an investor would not update his estimate of the equity premium as more equity premium realizations come in. Updating will necessarily induce time-varying opportunity sets (see Xia (2001) and Lewellen and Shanken (2002)). Instead, our paper

[11] Please recognize that different published papers on dividend ratios may have come to slightly different results not just based on their exact sample periods (which matters!), but also depending on how they lag the price deflator (which also matters!). For example, Bossaerts and Hillion (1999) employ the dividend yield ($D(t)/P(t-1)$) rather than the dividend price ratio ($D(t)/P(t)$). Consequently, our results explain why they find such poor out-of-sample performance in their 5-year *out-of-sample* period. Fama and French (1988a) report both measures, but emphasize the better *out-of-sample* performance of the $D(t)/P(t)$ measure.

suggests only that our profession has yet to find a variable that has had meaningful robust empirical equity premium forecasting power, at least from the perspective of a real-world investor. We hope that the simplicity of our approach has strengthened the credibility of our evidence.

We close by paraphrasing Mark Twain's famous line, admittedly with some tongue-in-cheek:

The rumors of the predictability of the
equity premium are greatly exaggerated.

Definitely not for publication (just a curiosity): The following is an observation that deserves a few words. Based on our own earlier submissions and conversations with other researchers and referees, the publication process in this literature seems unusually idiosyncratic. The not-so-unusual problems are

- Some referees seem to believe that there is predictive ability, and their priors are difficult to move.
- Some referees seem to believe that there is no predictive ability, and their priors are difficult to move.

The more unusual problems are

- Some referees seem to believe that there is no predictive ability, and this is so well-known, that this is no longer publishable news.
- Some referees believe that there is no predictive ability, and this *is* publishable news.

Strange outcomes can result. For example, a paper that does find in-sample predictive ability can be published based on one's referee's recommendation; but a critique of the paper can be rejected by another referee, who does not find it surprising that the variable does not predict.
A rough survey of the literature shows that a reader will find 10 published papers claiming predictive ability for every 1 paper claiming the predictive ability is spurious, for one reason or another. The current running tally among submitted and accepted papers is probably closer to 3:1, but still in favor of papers finding predictive ability. This explains the overwhelming folklore in the profession and the impression of many an external reader, that predictability via these variables is possible. We hope our paper helps dispell it.

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Website Data Sources

Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm. Note that even earlier stock returns are available from www.unifr.ch.

NBER Macrohistory Data Base: http://www.nber.org/databases/macrohistory/contents/chapter13.html.

FRED: http://research.stlouisfed.org/fred2/categories/22.

Value-Line: http://www.valueline.com/pdf/valueline_2002.html.

Bureau of Labor Statistics Webpage: http://www.bls.gov/cpi/

Martin Lettau's Webpage: (**cay**), http://pages.stern.nyu.edu/~mlettau/.

Jeff Wurgler's Webpage: (**eqis**), http://pages.stern.nyu.edu/~jwurgler/

Table 1: Forecasts at Monthly Frequency

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at the monthly frequency (both in the forecasting equation and forecast). Variables are explained in Section 2. Panel A uses the full sample period for each variable and constructs first forecast 20 years after the first data observation. Panel B uses the full sample period for each variable and constructs first forecast in January 1964. Panel C uses only the sample period January 1927 to December 2003 and constructs first forecast in January 1964. All numbers, except $\overline{R}^2$, are in percent per month. A star next to $\overline{R}^2$ *in-sample* denotes significance of the in-sample regression (as measured by F-statistic). Mean and standard deviation are on out-of-sample forecast errors; RMSE is the root mean square error, MAE is the mean absolute error. Most important to us, ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). DM is the Diebold and Mariano (1995) t-statistic for difference in MSE of the unconditional forecast and the conditional forecast. One-sided critical values of DM statistic are from McCracken (1999). Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Full data, Forecasts begin 20 years after the first sample date

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.05	-0.06	-0.19	5.07	3.55	5.07	-0.006	-0.013	-0.89
d/y	Dividend Yield	1871-M02	2003-M12	1891-M02	3.53	5.05	-0.04	-0.26	5.06	3.56	5.07	-0.015	-0.011	-1.23
e/p	Earning Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.05	0.09	-0.26	5.06	3.55	5.06	-0.012	-0.002	-0.26
d/e	Dividend Payout Ratio	1871-M12	2003-M12	1891-M12	3.54	5.06	0.17*	-0.04	5.08	3.55	5.08	-0.000	-0.012	-0.70
b/m	Book to Market	1921-M03	2003-M12	1941-M03	3.26	4.20	0.16	-0.09	4.22	3.28	4.22	-0.037	-0.015	-0.79
ntis	Net Equity Expansion	1927-M01	2003-M12	1947-M01	3.22	4.20	-0.11	-0.06	4.21	3.23	4.21	-0.002	-0.002	-1.46
tbl	T-Bill Rate	1920-M02	2003-M12	1940-M02	3.25	4.29	0.14	-0.34	4.30	3.27	4.31	0.005	0.003	0.16
lty	Long Term Yield	1919-M01	2003-M12	1939-M01	3.31	4.38	-0.00	-0.38	4.39	3.33	4.41	-0.005	-0.014	-0.59
ltr	Long Term Return	1926-M01	2003-M12	1946-M01	3.25	4.21	0.04	0.01	4.26	3.29	4.26	-0.040	-0.029	-2.00
tms	Term Spread	1920-M01	2003-M12	1940-M01	3.25	4.29	0.15	-0.02	4.30	3.27	4.30	0.006	0.007	0.64**
dfy	Default Yield Spread	1926-M01	2003-M12	1946-M01	3.25	4.23	-0.02	-0.05	4.24	3.26	4.24	-0.007	-0.010	-1.63
dfr	Default Return Spread	1919-M01	2003-M12	1939-M01	3.32	4.39	-0.09	-0.08	4.40	3.33	4.40	-0.007	-0.005	-2.11
infl	Inflation	1919-M02	2003-M12	1939-M02	3.30	4.37	-0.02	-0.11	4.39	3.32	4.39	0.001	-0.000	-0.09
all	Kitchen Sink	1927-M01	2003-M12	1947-M01	3.23	4.17	1.36**	-0.15	4.45	3.44	4.45	-0.212	-0.243	-3.92
ms	Model Selection	1927-M01	2003-M12	1947-M01	——	——	——	-0.07	4.22	3.23	4.21	-0.006	-0.009	-0.01

Panel B: Full data, Forecasts begin in 1964-M01

	Variable	Sample Begin	Sample End	Forecast Begin	In-Sample MAE	In-Sample RMSE	In-Sample $\overline{R}^2$	Out-of-Sample Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-M02	2003-M12	1964-M01	3.34	4.39	-0.06	-0.07	4.41	3.35	4.40	-0.006	-0.006	-1.24
d/y	Dividend Yield	1871-M02	2003-M12	1964-M01	3.35	4.39	-0.04	-0.22	4.40	3.37	4.40	-0.025	-0.007	-0.87
e/p	Earning Price Ratio	1871-M02	2003-M12	1964-M01	3.36	4.40	0.09	-0.17	4.41	3.37	4.41	-0.031	-0.009	-0.67
d/e	Dividend Payout Ratio	1871-M12	2003-M12	1964-M01	3.34	4.40	0.17*	0.20	4.41	3.34	4.41	-0.002	-0.016	-1.10
b/m	Book to Market	1921-M03	2003-M12	1964-M01	3.36	4.41	0.16	0.04	4.45	3.40	4.44	-0.072	-0.040	-1.51
ntis	Net Equity Expansion	1927-M01	2003-M12	1964-M01	3.33	4.40	-0.11	0.10	4.41	3.33	4.40	-0.001	-0.002	-1.44
tbl	T-Bill Rate	1920-M02	2003-M12	1964-M01	3.32	4.38	0.14	-0.30	4.39	3.33	4.40	0.006	0.002	0.07
lty	Long Term Yield	1919-M01	2003-M12	1964-M01	3.33	4.39	-0.00	-0.44	4.40	3.34	4.42	-0.006	-0.018	-0.47
ltr	Long Term Return	1926-M01	2003-M12	1964-M01	3.33	4.38	0.04	0.14	4.41	3.36	4.41	-0.026	-0.007	-0.45
tms	Term Spread	1920-M01	2003-M12	1964-M01	3.31	4.38	0.15	0.22	4.39	3.32	4.39	0.010	0.011	0.63*
dfy	Default Yield Spread	1926-M01	2003-M12	1964-M01	3.33	4.39	-0.02	0.09	4.41	3.34	4.40	-0.002	-0.003	-0.40
dfr	Default Return Spread	1919-M01	2003-M12	1964-M01	3.33	4.39	-0.09	0.10	4.40	3.34	4.40	-0.003	-0.002	-1.01
infl	Inflation	1919-M02	2003-M12	1964-M01	3.32	4.39	-0.02	0.06	4.40	3.33	4.40	0.004	0.003	0.49*
all	Kitchen Sink	1927-M01	2003-M12	1964-M01	3.34	4.36	1.36**	-0.41	4.54	3.48	4.56	-0.145	-0.157	-2.47
ms	Model Selection	1927-M01	2003-M12	1964-M01	——	——	——	0.23	4.51	3.48	4.51	-0.144	-0.112	-0.02

Panel C: Data begins in 1927-M01, Forecasts begin in 1964-M01

	Variable	Sample Begin	Sample End	Forecast Begin	In-Sample MAE	In-Sample RMSE	In-Sample $\overline{R}^2$	Out-of-Sample Mean	Out-of-Sample StdDev	Out-of-Sample MAE	Out-of-Sample RMSE	Out-of-Sample ΔMAE	Out-of-Sample ΔRMSE	Out-of-Sample DM
d/p	Dividend Price Ratio	1927-M01	2003-M12	1964-M01	3.34	4.39	0.01	-0.13	4.41	3.37	4.40	-0.035	-0.005	-0.33
d/y	Dividend Yield	1927-M01	2003-M12	1964-M01	3.35	4.39	0.08	-0.23	4.41	3.39	4.41	-0.053	-0.010	-0.49
e/p	Earning Price Ratio	1927-M01	2003-M12	1964-M01	3.36	4.40	0.29*	-0.06	4.43	3.40	4.43	-0.064	-0.028	-1.02
d/e	Dividend Payout Ratio	1927-M01	2003-M12	1964-M01	3.33	4.40	0.04	0.35	4.43	3.36	4.44	-0.023	-0.035	-2.29
b/m	Book to Market	1927-M01	2003-M12	1964-M01	3.37	4.41	0.19*	-0.05	4.45	3.42	4.45	-0.087	-0.049	-1.64
ntis	Net Equity Expansion	1927-M01	2003-M12	1964-M01	3.33	4.40	-0.11	0.10	4.41	3.33	4.40	-0.001	-0.002	-1.44
tbl	T-Bill Rate	1927-M01	2003-M12	1964-M01	3.32	4.38	0.09	-0.28	4.40	3.33	4.40	0.005	0.000	0.00
lty	Long Term Yield	1927-M01	2003-M12	1964-M01	3.33	4.39	-0.03	-0.43	4.40	3.34	4.42	-0.009	-0.019	-0.52
ltr	Long Term Return	1927-M01	2003-M12	1964-M01	3.33	4.38	0.04	0.15	4.41	3.36	4.41	-0.026	-0.007	-0.39
tms	Term Spread	1927-M01	2003-M12	1964-M01	3.31	4.38	0.08	0.21	4.39	3.32	4.39	0.009	0.007	0.47*
dfy	Default Yield Spread	1927-M01	2003-M12	1964-M01	3.33	4.39	-0.02	0.09	4.41	3.33	4.40	-0.002	-0.003	-0.44
dfr	Default Return Spread	1927-M01	2003-M12	1964-M01	3.33	4.39	-0.09	0.10	4.40	3.34	4.40	-0.003	-0.001	-0.36
infl	Inflation	1927-M01	2003-M12	1964-M01	3.32	4.39	0.02	0.03	4.40	3.33	4.40	0.006	0.004	0.44*
all	Kitchen Sink	1927-M01	2003-M12	1964-M01	3.34	4.36	1.36**	-0.41	4.54	3.48	4.56	-0.145	-0.157	-2.47
ms	Model Selection	1927-M01	2003-M12	1964-M01	——	——	——	0.23	4.51	3.48	4.51	-0.144	-0.112	-0.02
	Historical Mean	1927-M01	2003-M12	1964-M01	3.33	4.40	——	0.09	4.40	3.33	4.40	——	——	——

Table 2: Forecasts at Annual Frequency

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at the annual frequency (both in the forecasting equation and forecast). Variables are explained in Section 2. Panel A uses the full sample period for each variable and constructs first forecast 20 years after the first data observation. Panel B uses the full sample period for each variable and constructs first forecast in 1964. Panel C uses only the sample period 1948 to 2001 and constructs first forecast in 1964. All numbers, except $\overline{R}^2$, are in percent per year. A star next to $\overline{R}^2$ *in-sample* denotes significance of the in-sample regression (as measured by F-statistic). Mean and standard deviation are on out-of-sample forecast errors; RMSE is the root mean square error, MAE is the mean absolute error. Most important to us, ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). DM is the Diebold and Mariano (1995) t-statistic for difference in MSE of the unconditional forecast and the conditional forecast. One-sided critical values of DM statistic are from McCracken (1999). Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Full data, Forecasts begin 20 years after the first sample date

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1872	2003	1892	14.60	18.30	0.63	-2.82	18.69	15.16	18.82	-0.147	-0.099	-0.46
d/y	Dividend Yield	1872	2003	1892	14.53	18.26	1.05	-3.35	18.59	15.13	18.81	-0.113	-0.086	-0.23
e/p	Earning Price Ratio	1872	2003	1892	14.42	18.33	1.10	-2.43	18.74	15.21	18.81	-0.196	-0.085	-0.43
d/e	Dividend Payout Ratio	1872	2003	1892	14.76	18.53	-0.76	-1.64	19.06	15.32	19.05	-0.307	-0.323	-2.36
b/m	Book to Market	1921	2003	1941	12.77	15.73	3.21*	0.01	16.26	12.92	16.13	0.235	-0.013	-0.02
ntis	Net Equity Expansion	1927	2003	1947	12.82	15.91	-0.09	0.62	16.30	13.09	16.17	-0.174	-0.085	-0.33
eqis	Pct Equity Issuing	1927	2002	1947	12.41	15.52	8.99***	0.80	15.93	12.64	15.81	0.182	0.235	0.34*
tbl	T-Bill Rate	1920	2003	1940	13.11	15.68	0.53	-1.97	16.25	13.69	16.24	-0.425	-0.096	-0.15
lty	Long Term Yield	1919	2003	1939	13.18	15.75	-0.55	-3.57	16.24	14.18	16.51	-1.036	-0.478	-0.55
ltr	Long Term Return	1926	2003	1946	12.69	15.72	1.03	1.47	16.90	13.76	16.82	-0.835	-0.776	-0.91
tms	Term Spread	1920	2003	1940	13.00	15.78	0.29	1.16	16.27	13.29	16.18	-0.023	-0.033	-0.08
dfy	Default Yield Spread	1926	2003	1946	12.74	15.68	0.46	0.96	16.18	12.86	16.07	0.063	-0.025	-0.07
dfr	Default Return Spread	1920	2003	1940	13.08	15.95	-1.15	0.91	16.36	13.33	16.25	-0.061	-0.105	-0.74
infl	Inflation	1919	2003	1939	13.15	15.86	-1.00	-0.27	16.36	13.42	16.24	-0.274	-0.206	-1.34
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	10.24	12.80	26.36***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	11.50	14.79	8.22**	4.55	16.34	12.68	16.73	0.016	-0.616	-0.32
all	Kitchen Sink	1948	2001	1968	9.85	12.19	24.42**	-4.18	20.24	18.24	20.37	-5.548	-4.254	-1.70
ms	Model Selection	1948	2001	1968	——	——	——	-3.27	18.54	15.99	18.56	-3.292	-2.443	-0.01

Panel B: Full data, Forecasts begin in 1964

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1872	2003	1964	13.01	15.56	0.63	-2.17	15.98	13.53	15.93	-0.537	-0.081	-0.13
d/y	Dividend Yield	1872	2003	1964	12.94	15.57	1.05	-3.13	16.06	13.64	16.17	-0.646	-0.322	-0.33
e/p	Earning Price Ratio	1872	2003	1964	12.91	15.54	1.10	-0.34	15.95	13.14	15.75	-0.150	0.094	0.17
d/e	Dividend Payout Ratio	1872	2003	1964	12.89	15.78	-0.76	0.86	16.21	13.10	16.03	-0.112	-0.182	-1.90
b/m	Book to Market	1921	2003	1964	12.86	16.21	3.21*	2.06	17.16	13.40	17.07	-0.613	-0.806	-0.88
ntis	Net Equity Expansion	1927	2003	1964	12.77	15.94	-0.09	2.31	16.36	13.04	16.32	-0.186	-0.165	-0.56
eqis	Pct Equity Issuing	1927	2002	1964	12.30	15.42	8.99***	3.91	15.66	12.54	15.94	0.179	0.157	0.17
tbl	T-Bill Rate	1920	2003	1964	12.93	15.79	0.53	-1.11	16.58	13.53	16.41	-0.710	-0.257	-0.25
lty	Long Term Yield	1919	2003	1964	13.02	15.93	-0.55	-3.38	16.80	14.39	16.93	-1.585	-0.755	-0.55
ltr	Long Term Return	1926	2003	1964	12.62	15.77	1.03	4.60	16.96	14.08	17.37	-1.229	-1.206	-1.11
tms	Term Spread	1920	2003	1964	12.56	15.64	0.29	3.86	16.01	12.89	16.27	-0.073	-0.116	-0.18
dfy	Default Yield Spread	1926	2003	1964	12.64	15.66	0.46	2.89	16.10	12.76	16.15	0.093	0.006	0.01
dfr	Default Return Spread	1920	2003	1964	12.61	15.89	-1.15	3.11	16.23	12.81	16.33	0.006	-0.172	-1.55
infl	Inflation	1919	2003	1964	12.79	15.85	-1.00	2.18	16.29	13.01	16.23	-0.202	-0.054	-0.34
cayp	Cnsmptn, Wlth, Incme	1948	2001	1964	10.07	12.52	26.36***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1964	11.17	14.53	10.62***	5.68	16.32	12.96	17.08	-0.567	-1.149	-0.65
all	Kitchen Sink	1948	2001	1964	9.67	12.13	26.82***	-3.62	20.24	17.91	20.30	-5.521	-4.368	-1.92
ms	Model Selection	1948	2001	1964	——	——	——	-2.48	18.32	15.46	18.24	-3.073	-2.318	-0.01

Panel C: Data begins in 1948, Forecasts begin in 1964

	Variable	Sample Begin	Sample End	Forecast Begin	In-Sample MAE	In-Sample RMSE	In-Sample $\overline{R}^2$	Out-of-Sample Mean	Out-of-Sample StdDev	Out-of-Sample MAE	Out-of-Sample RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1948	2001	1964	11.95	15.16	6.95**	-0.33	16.42	13.13	16.21	-0.738	-0.279	-0.22
d/y	Dividend Yield	1948	2001	1964	11.85	15.04	5.66**	0.75	16.03	12.43	15.83	-0.046	0.093	0.09
e/p	Earning Price Ratio	1948	2001	1964	12.18	15.21	4.52*	2.02	16.18	12.76	16.10	-0.376	-0.169	-0.20
d/e	Dividend Payout Ratio	1948	2001	1964	12.23	15.20	-0.91	2.31	16.76	13.44	16.70	-1.054	-0.770	-1.23
b/m	Book to Market	1948	2001	1964	12.05	15.32	-0.71	4.04	17.06	13.00	17.31	-0.616	-1.387	-1.06
ntis	Net Equity Expansion	1948	2001	1964	11.98	15.23	-1.78	3.07	16.42	12.85	16.49	-0.458	-0.564	-1.14
eqis	Pct Equity Issuing	1948	2001	1964	11.54	14.49	6.67**	4.90	15.97	13.05	16.50	-0.661	-0.577	-0.45
tbl	T-Bill Rate	1948	2001	1964	12.36	15.15	5.09*	-5.05	16.56	14.35	17.11	-1.958	-1.179	-0.50
lty	Long Term Yield	1948	2001	1964	12.40	15.41	0.71	-5.98	16.58	14.92	17.42	-2.531	-1.490	-0.69
ltr	Long Term Return	1948	2001	1964	11.79	15.15	-0.23	5.91	16.86	14.10	17.66	-1.713	-1.730	-1.47
tms	Term Spread	1948	2001	1964	11.91	14.71	2.66	4.57	16.05	13.49	16.48	-1.101	-0.553	-0.46
dfy	Default Yield Spread	1948	2001	1964	12.01	15.23	-0.51	4.19	16.33	12.53	16.65	-0.145	-0.720	-0.88
dfr	Default Return Spread	1948	2001	1964	11.80	15.14	-1.57	5.16	16.23	12.77	16.83	-0.385	-0.902	-1.18
infl	Inflation	1948	2001	1964	12.28	15.19	0.52	1.34	17.18	13.39	17.01	-1.001	-1.079	-0.58
cayp	Cnsmptn, Wlth, Incme	1948	2001	1964	10.07	12.52	26.36***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1964	11.17	14.53	10.62***	5.68	16.32	12.96	17.08	-0.567	-1.149	-0.65
all	Kitchen Sink	1948	2001	1964	9.67	12.13	26.82***	-3.62	20.24	17.91	20.30	-5.521	-4.368	-1.92
ms	Model Selection	1948	2001	1964	——	——	——	-2.48	18.32	15.46	18.24	-3.073	-2.318	-0.01
	Historical Mean	1948	2001	1964	11.97	15.23	——	3.29	15.79	12.39	15.93	——	——	——

Table 3: Forecasts at 5-year Frequency

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at the 5-year frequency (both in the forecasting equation and forecast). These are overlapping series. Variables are explained in Section 2. Panel A uses the full sample period for each variable and constructs first forecast 20 years after the first data observation. Panel B uses the full sample period for each variable and constructs first forecast in 1968. Panel C uses only the sample period 1948 to 2001 and constructs first forecast in 1968. All numbers, except $\overline{R}^2$, are in percent per 5-year. A star next to $\overline{R}^2$ *in-sample* denotes significance of the in-sample regression (as measured by F-statistic). Mean and standard deviation are on out-of-sample forecast errors; RMSE is the root mean square error, MAE is the mean absolute error. Most important to us, ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). The gray stars on ΔRMSE are based on bootstrapped standard errors. Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Full data, Forecasts begin 20 years after the first sample date

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1876	2003	1896	28.18	35.28	10.99**	-17.67	36.09	33.35	40.03	-1.033	-0.200	-0.01
d/y	Dividend Yield	1876	2003	1896	28.86	36.31	6.00*	-16.63	37.48	32.92	40.85	-0.600	-1.015	-0.06
e/p	Earning Price Ratio	1876	2003	1896	29.76	36.79	5.71*	-10.59	39.32	32.90	40.54	-0.585	-0.711	-0.06
d/e	Dividend Payout Ratio	1876	2003	1896	29.70	37.39	0.33	-11.59	38.63	32.49	40.16	-0.179	-0.333	-0.05
b/m	Book to Market	1921	2002	1941	28.06	34.12	6.52	0.24	40.12	32.76	39.80	-3.777	-3.774	-0.10
ntis	Net Equity Expansion	1927	2002	1947	27.91	34.62	3.04*	-11.76	45.45	36.10	46.55	-6.804	-10.348	-0.18
eqis	Pct Equity Issuing	1927	2002	1947	27.33	33.61	13.09**	-3.24	37.46	30.35	37.26	-1.053	-1.058	-0.06
tbl	T-Bill Rate	1920	2003	1940	25.12	31.03	3.91*	-12.91	37.07	32.91	38.98	-3.697	-2.760	-0.07
lty	Long Term Yield	1919	2003	1939	26.13	32.51	-0.11	-28.06	46.48	45.47	53.98	-16.246	-17.877	-0.31
ltr	Long Term Return	1926	2003	1946	27.52	34.15	-1.37	-6.32	40.78	35.30	40.92	-5.460	-4.261	-0.30
tms	Term Spread	1920	2003	1940	24.95	31.37	7.79**	5.24	40.60	31.65	40.62	-2.441	-4.398	-0.11
dfy	Default Yield Spread	1926	2003	1946	27.12	34.03	-1.23	-7.22	40.18	32.63	40.48	-2.789	-3.820	-0.16
dfr	Default Return Spread	1920	2003	1940	27.49	34.30	3.02*	-7.81	45.22	36.17	45.54	-6.959	-9.318	-0.22
infl	Inflation	1919	2003	1939	26.75	33.43	-1.20	-0.21	38.09	30.50	37.80	-1.282	-1.696	-0.20
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	17.17	22.57	38.17***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	24.43	30.91	6.42*	20.93	35.32	33.42	40.61	-0.310	0.881	0.04
all	Kitchen Sink	1948	2001	1968	17.46	20.53	60.21***	-21.89	65.10	56.17	67.76	-23.067	-26.276	-0.39
ms	Model Selection	1948	2001	1970	——	——	——	-32.85	50.13	46.52	59.28	-14.353	-18.360	-0.02

Panel B: Full data, Forecasts begin in 1968

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1876	2003	1968	26.13	33.88	10.99**	-17.20	34.10	28.28	37.77	-1.596	-4.805	-0.05
d/y	Dividend Yield	1876	2003	1968	26.31	33.15	6.00*	-12.84	33.74	26.21	35.66	0.473	-2.701	-0.03
e/p	Earning Price Ratio	1876	2003	1968	27.39	33.73	5.71*	1.74	34.86	28.06	34.42	-1.379	-1.455	-0.04
d/e	Dividend Payout Ratio	1876	2003	1968	26.57	32.86	0.33	-0.64	33.46	26.85	33.00	-0.173	-0.038	-0.01
b/m	Book to Market	1921	2002	1968	32.04	38.33	6.52	12.17	46.56	40.97	47.47	-11.858	-11.266	-0.16
ntis	Net Equity Expansion	1927	2002	1968	26.26	33.04	3.04*	7.99	34.97	28.55	35.38	0.898	1.220	0.06
eqis	Pct Equity Issuing	1927	2002	1968	25.01	31.12	13.09**	11.35	34.16	29.13	35.53	0.316	1.066	0.03
tbl	T-Bill Rate	1920	2003	1968	27.97	33.85	3.91*	-9.02	42.48	37.08	42.85	-7.653	-6.543	-0.07
lty	Long Term Yield	1919	2003	1968	28.07	34.81	-0.11	-15.34	47.93	43.12	49.69	-13.732	-13.423	-0.11
ltr	Long Term Return	1926	2003	1968	27.25	33.88	-1.37	7.37	38.19	32.10	38.37	-1.837	-1.014	-0.05
tms	Term Spread	1920	2003	1968	24.56	30.86	7.79**	14.51	32.28	28.30	34.99	1.123	1.318	0.04
dfy	Default Yield Spread	1926	2003	1968	26.66	33.64	-1.23	9.40	35.26	29.11	36.02	1.155	1.336	0.09
dfr	Default Return Spread	1920	2003	1968	26.73	34.04	3.02*	11.57	35.13	29.32	36.52	0.100	-0.220	-0.03
infl	Inflation	1919	2003	1968	27.19	34.28	-1.20	14.12	36.24	31.10	38.42	-1.717	-2.158	-0.13
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	17.17	22.57	38.17***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	24.43	30.91	6.42*	20.93	35.32	33.42	40.61	-0.310	0.881	0.04
all	Kitchen Sink	1948	2001	1968	17.46	20.53	60.21***	-21.89	65.10	56.17	67.76	-23.067	-26.276	-0.39
ms	Model Selection	1948	2001	1970	——	——	——	-32.85	50.13	46.52	59.28	-14.353	-18.360	-0.02

Panel C: Data begins in 1948, Forecasts begin in 1968

	Variable	Sample Begin	Sample End	Forecast Begin	In-Sample MAE	In-Sample RMSE	In-Sample $\overline{R}^2$	Out-of-Sample Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1948	2001	1968	28.65	35.00	13.84	1.35	43.97	36.50	43.34	-3.395	-1.851	-0.01
d/y	Dividend Yield	1948	2001	1968	28.69	34.51	14.48	2.37	41.81	34.33	41.26	-1.226	0.230	0.00
e/p	Earning Price Ratio	1948	2001	1968	27.76	34.64	6.32	10.26	44.56	38.15	45.09	-5.046	-3.597	-0.03
d/e	Dividend Payout Ratio	1948	2001	1968	25.00	32.69	-1.49	14.77	41.45	35.57	43.43	-2.464	-1.940	-0.14
b/m	Book to Market	1948	2001	1968	25.06	32.15	-1.66	21.29	51.84	45.77	55.33	-12.660	-13.845	-0.10
ntis	Net Equity Expansion	1948	2001	1968	25.75	32.93	-2.09	11.46	40.32	33.27	41.34	-0.168	0.146	0.01
eqis	Pct Equity Issuing	1948	2001	1968	24.28	29.94	5.42	15.12	43.82	36.67	45.74	-3.564	-4.247	-0.21
tbl	T-Bill Rate	1948	2001	1968	26.64	32.74	10.53*	-32.64	47.03	41.16	56.68	-8.054	-15.187	-0.05
lty	Long Term Yield	1948	2001	1968	26.82	33.78	1.52	-47.86	44.92	51.64	65.19	-18.533	-23.699	-0.09
ltr	Long Term Return	1948	2001	1968	25.11	32.49	-1.37	13.02	40.65	34.08	42.11	-0.976	-0.620	-0.13
tms	Term Spread	1948	2001	1968	22.64	29.42	10.03**	14.69	40.76	33.83	42.75	-0.723	-1.265	-0.03
dfy	Default Yield Spread	1948	2001	1968	25.26	32.27	0.62**	12.18	40.02	32.39	41.27	0.715	0.221	0.02
dfr	Default Return Spread	1948	2001	1968	26.16	32.87	-1.16	8.78	46.98	38.32	47.11	-5.212	-5.622	-0.21
infl	Inflation	1948	2001	1968	24.20	31.35	4.71**	7.21	44.77	36.64	44.69	-3.533	-3.200	-0.17
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	17.17	22.57	38.17***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	24.43	30.91	6.42*	20.93	35.32	33.42	40.61	-0.310	0.881	0.04
all	Kitchen Sink	1948	2001	1968	17.46	20.53	60.21***	-21.89	65.10	56.17	67.76	-23.067	-26.276	-0.39
ms	Model Selection	1948	2001	1970	——	——	——	-32.85	50.13	46.52	59.28	-14.353	-18.360	-0.02
	Historical Mean	1948	2001	1968	25.55	32.81	——	15.21	39.18	33.11	41.49	——	——	——

Table 4: Forecasts at Monthly Frequency with Alternative Procedures

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at the monthly frequency. Variables are explained in Section 2. Panel A uses the unadjusted betas (and is the same as Panel A of Table 1), Panel B corrects betas following Stambaugh (1999), and Panel C corrects betas following Lewellen (2004).

All numbers, except $\overline{R}^2$, are in percent per month. A star next to $\overline{R}^2$ *in-sample* denoted the significance of the regression (as measured by F-statistic). RMSE is the root mean square error, MAE is the mean absolute error, and ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). DM is the Diebold and Mariano (1995) t-statistic for difference in MSE of the unconditional forecast and the conditional forecast. One-sided critical values of DM statistic are from McCracken (1999). Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Unadjusted betas

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.05	−0.06	−0.19	5.07	3.55	5.07	−0.006	−0.013	−0.89
d/y	Dividend Yield	1871-M02	2003-M12	1891-M02	3.53	5.05	−0.04	−0.26	5.06	3.56	5.07	−0.015	−0.011	−1.23
e/p	Earning Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.05	0.09	−0.26	5.06	3.55	5.06	−0.012	−0.002	−0.26
d/e	Dividend Payout Ratio	1871-M12	2003-M12	1891-M12	3.54	5.06	0.17*	−0.04	5.08	3.55	5.08	−0.000	−0.012	−0.70
b/m	Book to Market	1921-M03	2003-M02	1941-M03	3.26	4.21	0.23*	−0.06	4.23	3.28	4.23	−0.033	−0.012	−0.61
ntis	Net Equity Expansion	1927-M01	2002-M12	1947-M01	3.23	4.21	−0.11	−0.03	4.22	3.24	4.22	−0.002	−0.002	−1.42
tbl	T-Bill Rate	1920-M02	2003-M12	1940-M02	3.25	4.29	0.14	−0.34	4.30	3.27	4.31	0.005	0.003	0.16
lty	Long Term Yield	1919-M01	2003-M12	1939-M01	3.31	4.38	−0.00	−0.38	4.39	3.33	4.41	−0.005	−0.014	−0.59
ltr	Long Term Return	1926-M01	2003-M12	1946-M01	3.25	4.21	0.04	0.01	4.26	3.29	4.26	−0.040	−0.029	−2.00
tms	Term Spread	1920-M01	2003-M12	1940-M01	3.25	4.29	0.15	−0.02	4.30	3.27	4.30	0.006	0.007	0.64**
dfy	Default Yield Spread	1926-M01	2003-M12	1946-M01	3.25	4.23	−0.02	−0.05	4.24	3.26	4.24	−0.007	−0.010	−1.63
dfr	Default Return Spread	1919-M01	2003-M12	1939-M01	3.32	4.39	−0.09	−0.08	4.40	3.33	4.40	−0.007	−0.005	−2.11
infl	Inflation	1919-M02	2003-M12	1939-M02	3.30	4.37	−0.02	−0.11	4.39	3.32	4.39	0.001	−0.000	−0.09

Panel B: Betas adjusted for Stambaugh correction

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.05	-0.10	-0.13	5.08	3.55	5.08	-0.009	-0.022	-1.14
d/y	Dividend Yield	1871-M02	2003-M12	1891-M02	3.53	5.05	-0.04	-0.25	5.07	3.56	5.07	-0.015	-0.013	-1.28
e/p	Earning Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.05	0.06	-0.24	5.06	3.55	5.06	-0.009	-0.003	-0.74
d/e	Dividend Payout Ratio	1871-M12	2003-M12	1891-M12	3.54	5.06	0.17*	-0.03	5.09	3.55	5.09	-0.003	-0.015	-0.79
b/m	Book to Market	1921-M03	2003-M02	1941-M03	3.26	4.21	0.20*	-0.05	4.22	3.27	4.22	-0.023	-0.007	-0.49
ntis	Net Equity Expansion	1927-M01	2002-M12	1947-M01	3.23	4.21	-0.11	-0.03	4.22	3.24	4.22	-0.001	-0.002	-0.98
tbl	T-Bill Rate	1920-M02	2003-M12	1940-M02	3.25	4.29	0.14	-0.35	4.30	3.27	4.31	0.004	0.001	0.07
lty	Long Term Yield	1919-M01	2003-M12	1939-M01	3.31	4.38	-0.01	-0.40	4.40	3.33	4.41	-0.009	-0.022	-0.79
ltr	Long Term Return	1926-M01	2003-M12	1946-M01	3.25	4.21	0.04	0.01	4.26	3.29	4.26	-0.040	-0.028	-1.99
tms	Term Spread	1920-M01	2003-M12	1940-M01	3.25	4.29	0.15	-0.01	4.30	3.27	4.30	0.005	0.007	0.59**
dfy	Default Yield Spread	1926-M01	2003-M12	1946-M01	3.25	4.23	-0.02	-0.05	4.24	3.26	4.24	-0.007	-0.010	-1.63
dfr	Default Return Spread	1919-M01	2003-M12	1939-M01	3.32	4.39	-0.09	-0.03	4.40	3.33	4.39	-0.002	-0.003	-1.06
infl	Inflation	1919-M02	2003-M12	1939-M02	3.30	4.37	-0.02	-0.11	4.39	3.32	4.39	0.001	-0.000	-0.08

Panel C: Betas adjusted for Lewellen correction

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.06	-0.28	0.02	5.10	3.56	5.10	-0.014	-0.044	-1.82
d/y	Dividend Yield	1871-M02	2003-M12	1891-M02	3.53	5.05	-0.04	-0.23	5.07	3.55	5.07	-0.011	-0.011	-1.13
e/p	Earning Price Ratio	1871-M02	2003-M12	1891-M02	3.53	5.06	-0.30	-0.21	5.07	3.55	5.07	-0.007	-0.015	-2.61
d/e	Dividend Payout Ratio	1871-M12	2003-M12	1891-M12	3.54	5.06	0.17*	-0.03	5.08	3.55	5.08	0.001	-0.012	-0.67
b/m	Book to Market	1921-M03	2003-M02	1941-M03	3.25	4.21	-0.32	0.01	4.22	3.25	4.22	0.001	-0.007	-1.17
ntis	Net Equity Expansion	1927-M01	2002-M12	1947-M01	3.42	4.48	-18.82	0.42	4.45	3.41	4.46	-0.178	-0.247	-3.62
tbl	T-Bill Rate	1920-M02	2003-M12	1940-M02	3.25	4.29	0.14	-0.35	4.30	3.27	4.31	0.004	0.001	0.07
lty	Long Term Yield	1919-M01	2003-M12	1939-M01	3.31	4.38	-0.01	-0.35	4.39	3.33	4.40	-0.007	-0.013	-0.58
ltr	Long Term Return	1926-M01	2003-M12	1946-M01	3.31	4.26	-1.62	0.06	4.31	3.36	4.31	-0.112	-0.083	-1.62
tms	Term Spread	1920-M01	2003-M12	1940-M01	3.25	4.29	0.15	-0.01	4.31	3.27	4.30	0.004	0.006	0.54**
dfy	Default Yield Spread	1926-M01	2003-M12	1946-M01	3.29	4.28	-1.18	-0.07	4.31	3.31	4.31	-0.059	-0.078	-2.48
dfr	Default Return Spread	1919-M01	2003-M12	1939-M01	3.32	4.39	-0.17	0.07	4.40	3.32	4.39	0.004	-0.003	-0.38
infl	Inflation	1919-M02	2003-M12	1939-M02	3.30	4.37	-0.07	-0.13	4.39	3.32	4.38	0.003	0.002	0.36*

Table 5: Forecasts Using Moving Average Historical Equity Premia

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at 1-year frequency. All numbers, except $\overline{R}^2$, are in percent corresponding to the annual frequency. A star next to $\overline{R}^2$ *in-sample* denoted the significance of the regression (as measured by F-statistic). RMSE is the root mean square error, MAE is the mean absolute error, and ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast).

Panel A: 5-year Moving Average vs. Prevailing Mean

Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
	Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
	1872	2003	1902	——	——	——	0.00	0.23	0.18	0.22	-0.018	-0.025	-0.03
	1872	2003	1964	——	——	——	0.01	0.18	0.14	0.18	-0.008	-0.014	-0.01

Panel C: 10-year Moving Average Prediction vs. Prevailing Mean

Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
	Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
	1872	2003	1902	——	——	——	0.00	0.21	0.16	0.20	-0.001	-0.004	-0.01
	1872	2003	1964	——	——	——	0.01	0.17	0.14	0.17	-0.001	-0.006	-0.01

Table 6: Forecasts Using Various e/p and d/p Ratios

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at various frequencies. Variables are explained in Section 2. All numbers, except $\overline{R}^2$, are in percent corresponding to the panel frequency. A star next to $\overline{R}^2$ *in-sample* denoted the significance of the regression (as measured by F-statistic). RMSE is the root mean square error, MAE is the mean absolute error, and ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). The gray stars are based on bootstrapped standard errors.

Panel A: Forecasting 1 year return

	Variable	Forecast Begins 1902								Forecast Begins 1964							
		In-Sample			Out-of-Sample					In-Sample			Out-of-Sample				
		MAE	RMSE	$\overline{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM	MAE	RMSE	$\overline{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM
e/p	Earning(1Y) Price Ratio	14.96	18.87	1.26	15.86	19.52	-0.242	-0.221	-0.82	12.88	15.54	1.26	13.11	15.77	-0.134	0.098	0.17
e/p	Earning(3Y) Price Ratio	14.77	18.70	2.79**	15.34	19.28	0.278	0.026	0.07*	12.99	15.65	2.79**	13.37	15.93	-0.387	-0.062	-0.08
e/p	Earning(5Y) Price Ratio	14.92	18.66	3.06**	15.53	19.24	0.083	0.068	0.17*	13.08	15.73	3.06**	13.56	16.10	-0.584	-0.231	-0.28
e/p	Earning(10Y) Price Ratio	14.71	18.40	5.17***	15.42	18.97	0.196	0.332	0.60***	13.11	15.84	5.17***	14.00	16.61	-1.026	-0.749	-0.63
d/p	Dividend(1Y) Price Ratio	15.02	18.79	1.57*	15.62	19.34	-0.007	-0.039	-0.11	12.96	15.57	1.57*	13.65	16.07	-0.676	-0.203	-0.24
d/p	Dividend(3Y) Price Ratio	15.02	18.71	2.16*	15.65	19.32	-0.038	-0.014	-0.03*	13.01	15.61	2.16*	13.76	16.18	-0.785	-0.315	-0.33
d/p	Dividend(5Y) Price Ratio	15.02	18.63	2.83**	15.76	19.22	-0.143	0.085	0.17*	13.10	15.67	2.83**	14.00	16.37	-1.020	-0.501	-0.47
d/p	Dividend(10Y) Price Ratio	15.08	18.65	2.39**	15.92	19.28	-0.307	0.026	0.05**	13.19	15.68	2.39**	14.11	16.35	-1.126	-0.484	-0.50
d/e	Dividend(1Y) Earning(1Y) Ratio	15.40	19.06	-0.78	15.95	19.55	-0.333	-0.246	-1.02	12.97	15.76	-0.78	13.22	16.00	-0.240	-0.137	-0.91
d/e	Dividend(1Y) Earning(3Y) Ratio	15.30	19.08	-0.77	15.67	19.66	-0.053	-0.356	-1.84	12.83	15.84	-0.77	12.96	16.45	0.022	-0.583	-1.50
d/e	Dividend(1Y) Earning(5Y) Ratio	15.32	19.08	-0.68	15.96	19.77	-0.340	-0.465	-1.56	12.84	15.92	-0.68	12.98	16.71	-0.005	-0.847	-1.66
d/e	Dividend(1Y) Earning(10Y) Ratio	15.09	18.84	1.45*	15.51	19.36	0.106	-0.059	-0.10	12.69	16.26	1.45*	12.66	16.91	0.321	-1.045	-1.31
d/e	Dividend(3Y) Earning(3Y) Ratio	15.40	19.06	-0.81	15.99	19.63	-0.374	-0.330	-3.08	12.94	15.75	-0.81	13.14	16.05	-0.157	-0.187	-2.31
d/e	Dividend(5Y) Earning(5Y) Ratio	15.42	19.02	-0.54	16.06	19.60	-0.440	-0.301	-1.22	13.02	15.70	-0.54	13.25	15.96	-0.273	-0.095	-0.49
d/e	Dividend(10Y) Earning(10Y) Ratio	15.28	19.08	-0.68	15.85	19.78	-0.239	-0.476	-1.94	12.76	15.85	-0.68	12.95	16.44	0.029	-0.575	-1.61
	Historical Mean	15.32	19.01	——	15.62	19.30	——	——	——	12.89	15.70	——	12.98	15.86	——	——	——

Panel B: Forecasting 3 year return

	Variable	Forecast Begins 1902								Forecast Begins 1964							
		In-Sample			Out-of-Sample					In-Sample			Out-of-Sample				
		MAE	RMSE	$\bar{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM	MAE	RMSE	$\bar{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM
e/p	Earning(1Y) Price Ratio	22.52	29.76	7.16**	23.88	31.31	-0.225	0.577	0.87**	19.02	25.01	7.16**	20.46	25.86	-1.082	-0.022	-0.01
e/p	Earning(3Y) Price Ratio	22.42	29.57	7.76**	23.72	31.16	-0.069	0.725	0.87**	18.92	25.33	7.76**	20.90	26.70	-1.532	-0.858	-0.42
e/p	Earning(5Y) Price Ratio	22.07	29.15	9.95**	23.56	30.91	0.096	0.982	0.91**	18.97	25.76	9.95**	21.55	27.82	-2.177	-1.979	-0.76
e/p	Earning(10Y) Price Ratio	21.51	28.42	13.37**	23.95	31.03	-0.299	0.857	0.55**	18.36	25.63	13.37**	22.06	28.92	-2.684	-3.081	-0.89
d/p	Dividend(1Y) Price Ratio	21.99	29.48	7.28**	24.38	31.54	-0.731	0.351	0.31**	18.11	24.72	7.28**	21.02	27.50	-1.645	-1.663	-0.56
d/p	Dividend(3Y) Price Ratio	22.00	29.26	8.32**	24.48	31.49	-0.826	0.402	0.31**	18.30	24.93	8.32**	21.43	27.88	-2.057	-2.039	-0.67
d/p	Dividend(5Y) Price Ratio	21.84	29.05	9.33**	24.34	31.57	-0.683	0.318	0.22**	18.36	25.02	9.33**	21.68	28.19	-2.304	-2.354	-0.76
d/p	Dividend(10Y) Price Ratio	22.28	29.33	7.25**	25.55	32.48	-1.899	-0.590	-0.40	18.64	25.12	7.25**	21.93	27.99	-2.553	-2.152	-0.80
d/e	Dividend(1Y) Earning(1Y) Ratio	23.36	31.04	-0.79	24.39	32.78	-0.739	-0.887	-2.30	19.34	25.82	-0.79	19.88	26.57	-0.510	-0.737	-2.38
d/e	Dividend(1Y) Earning(3Y) Ratio	23.35	31.03	-0.74	24.56	33.58	-0.903	-1.686	-1.43	19.28	25.68	-0.74	20.37	27.16	-0.999	-1.321	-2.61
d/e	Dividend(1Y) Earning(5Y) Ratio	23.40	31.11	-0.77	24.32	32.71	-0.670	-0.820	-1.42	19.46	26.25	-0.77	21.50	29.12	-2.124	-3.281	-2.55
d/e	Dividend(1Y) Earning(10Y) Ratio	23.16	30.77	1.36	24.21	32.56	-0.561	-0.673	-0.57	19.53	27.02	1.36	20.39	28.33	-1.019	-2.495	-1.90
d/e	Dividend(3Y) Earning(3Y) Ratio	23.26	30.89	-0.27	24.88	33.31	-1.222	-1.419	-1.89	19.26	25.56	-0.27	19.65	26.10	-0.272	-0.261	-1.54
d/e	Dividend(5Y) Earning(5Y) Ratio	23.36	30.87	-0.23	24.66	32.75	-1.004	-0.863	-2.11	19.28	25.41	-0.23	19.75	26.15	-0.377	-0.314	-2.18
d/e	Dividend(10Y) Earning(10Y) Ratio	23.35	31.11	-0.58	24.17	32.67	-0.515	-0.778	-1.92	19.39	26.21	-0.58	21.17	28.03	-1.799	-2.197	-2.56
	Historical Mean	23.29	30.82	——	23.65	31.89	——	——	——	18.81	25.20	——	19.37	25.84	——	——	——

Panel C: Forecasting 5 year return

	Variable	Forecast Begins 1902								Forecast Begins 1964							
		In-Sample			Out-of-Sample					In-Sample			Out-of-Sample				
		MAE	RMSE	$\overline{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM	MAE	RMSE	$\overline{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM
e/p	Earning(1Y) Price Ratio	30.22	37.25	5.64*	32.70	39.91	-0.680	-0.072	-0.08	26.27	32.42	5.64*	27.16	33.34	-1.627	-1.520	-0.76
e/p	Earning(3Y) Price Ratio	29.29	36.34	9.23**	32.73	39.71	-0.710	0.121	0.09*	26.14	33.12	9.23**	28.21	35.22	-2.672	-3.402	-1.13
e/p	Earning(5Y) Price Ratio	27.82	35.20	14.01***	32.41	39.48	-0.398	0.354	0.21**	25.79	33.50	14.01***	28.57	36.65	-3.033	-4.824	-1.34
e/p	Earning(10Y) Price Ratio	27.66	34.80	14.45***	33.35	40.97	-1.333	-1.140	-0.59	24.44	32.84	14.45***	28.43	37.37	-2.892	-5.546	-1.32
d/p	Dividend(1Y) Price Ratio	28.59	35.77	10.41**	33.83	40.50	-1.813	-0.663	-0.35	24.66	32.18	10.41**	29.54	38.18	-4.006	-6.358	-1.50
d/p	Dividend(3Y) Price Ratio	28.21	35.41	11.27**	33.59	40.77	-1.570	-0.935	-0.50	24.65	32.15	11.27**	29.38	37.93	-3.845	-6.112	-1.50
d/p	Dividend(5Y) Price Ratio	27.81	35.18	11.96***	33.40	41.13	-1.389	-1.291	-0.64	24.71	32.30	11.96***	29.77	38.29	-4.236	-6.462	-1.60
d/p	Dividend(10Y) Price Ratio	28.90	36.11	7.47**	35.41	43.60	-3.400	-3.764	-1.72	25.25	32.22	7.47**	29.24	37.09	-3.709	-5.271	-1.44
d/e	Dividend(1Y) Earning(1Y) Ratio	30.38	38.17	0.00	33.82	41.88	-1.807	-2.046	-2.04	25.66	31.92	0.00	25.77	31.82	-0.233	-0.001	-0.00
d/e	Dividend(1Y) Earning(3Y) Ratio	30.60	38.42	-0.63	35.80	44.27	-3.780	-4.438	-2.29	25.75	31.92	-0.63	26.45	32.75	-0.913	-0.923	-3.03
d/e	Dividend(1Y) Earning(5Y) Ratio	30.59	38.55	-0.32	33.12	41.36	-1.102	-1.529	-1.94	26.41	33.10	-0.32	28.11	35.38	-2.578	-3.556	-2.96
d/e	Dividend(1Y) Earning(10Y) Ratio	30.36	38.38	-0.15	33.15	41.96	-1.134	-2.129	-1.98	25.96	32.69	-0.15	25.88	32.81	-0.347	-0.985	-1.76
d/e	Dividend(3Y) Earning(3Y) Ratio	30.46	38.20	-0.12	34.47	42.71	-2.452	-2.879	-2.69	25.70	31.75	-0.12	26.04	31.94	-0.499	-0.120	-0.29
d/e	Dividend(5Y) Earning(5Y) Ratio	30.63	38.45	-0.76	34.46	42.46	-2.443	-2.623	-3.60	25.81	32.12	-0.76	26.50	32.81	-0.967	-0.986	-3.61
d/e	Dividend(10Y) Earning(10Y) Ratio	30.62	38.59	-0.35	34.96	43.17	-2.943	-3.339	-3.92	26.07	32.61	-0.35	27.65	34.55	-2.116	-2.731	-3.13
	Historical Mean	30.14	37.98	——	32.01	39.83	——	——	——	24.30	30.66	——	25.54	31.82	——	——	——

Panel D: Forecasting 10 year return

	Variable	Forecast Begins 1902								Forecast Begins 1964							
		In-Sample			Out-of-Sample					In-Sample			Out-of-Sample				
		MAE	RMSE	$\overline{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM	MAE	RMSE	$\overline{R}^2$	MAE	RMSE	ΔMAE	ΔRMSE	DM
e/p	Earning(1Y) Price Ratio	38.34	44.27	17.55***	48.50	59.36	-4.961	-5.059	-1.51	40.47	45.04	17.55***	37.94	44.12	-0.476	1.627	0.57
e/p	Earning(3Y) Price Ratio	37.23	43.92	17.92***	47.37	58.40	-3.835	-4.095	-1.45	38.66	43.52	17.92***	36.48	42.90	0.985	2.847	0.96
e/p	Earning(5Y) Price Ratio	37.15	44.15	16.73***	46.03	56.96	-2.496	-2.656	-1.15	36.58	42.62	16.73***	35.10	42.36	2.364	3.380	1.10
e/p	Earning(10Y) Price Ratio	36.86	44.60	14.44***	45.40	55.75	-1.868	-1.452	-0.88	35.39	41.68	14.44***	35.17	42.95	2.300	2.792	0.82
d/p	Dividend(1Y) Price Ratio	37.38	44.55	13.36**	45.30	55.29	-1.768	-0.990	-0.51	35.92	43.04	13.36**	36.47	45.00	0.997	0.748	0.18
d/p	Dividend(3Y) Price Ratio	37.64	45.19	10.75**	45.32	55.75	-1.782	-1.448	-0.82	36.33	43.79	10.75**	37.21	46.01	0.258	-0.265	-0.07
d/p	Dividend(5Y) Price Ratio	38.02	45.58	9.43**	45.57	55.76	-2.032	-1.463	-0.89	37.01	44.39	9.43**	38.49	47.02	-1.023	-1.273	-0.33
d/p	Dividend(10Y) Price Ratio	38.22	45.94	8.08*	47.29	57.97	-3.752	-3.667	-1.78	38.33	45.31	8.08*	42.72	50.67	-5.248	-4.924	-1.14
d/e	Dividend(1Y) Earning(1Y) Ratio	41.49	49.47	0.64	47.41	58.11	-3.874	-3.808	-3.68	40.16	48.25	0.64	41.15	50.20	-3.686	-4.453	-2.70
d/e	Dividend(1Y) Earning(3Y) Ratio	40.97	49.42	1.18	50.03	59.99	-6.492	-5.691	-4.29	39.98	48.20	1.18	43.07	52.35	-5.607	-6.605	-3.01
d/e	Dividend(1Y) Earning(5Y) Ratio	40.71	49.57	0.30	47.33	58.50	-3.800	-4.199	-2.99	39.45	47.76	0.30	41.12	49.87	-3.656	-4.123	-2.62
d/e	Dividend(1Y) Earning(10Y) Ratio	41.00	49.60	-0.84	44.95	56.74	-1.420	-2.443	-2.40	39.42	47.50	-0.84	38.42	46.99	-0.949	-1.243	-2.47
d/e	Dividend(3Y) Earning(3Y) Ratio	41.40	49.49	0.88	48.66	58.95	-5.125	-4.649	-4.67	39.79	47.88	0.88	41.71	50.74	-4.242	-4.995	-2.88
d/e	Dividend(5Y) Earning(5Y) Ratio	41.30	49.64	0.38	49.28	60.11	-5.750	-5.811	-5.56	39.33	47.56	0.38	42.11	50.90	-4.639	-5.160	-3.38
d/e	Dividend(10Y) Earning(10Y) Ratio	41.18	49.70	-0.67	62.50	74.08	-18.970	-19.780	-4.21	38.97	47.30	-0.67	45.32	53.37	-7.856	-7.623	-8.00
	Historical Mean	38.62	47.71	——	43.53	54.30	——	——	——	35.70	43.87	——	37.47	45.74	——	——	——

Table 7: Forecasts at Quarterly Frequency

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at the quarterly frequency (both in the forecasting equation and forecast). Variables are explained in Section 2. Panel A uses the full sample period for each variable and constructs first forecast 20 years after the first data observation. Panel B uses the full sample period for each variable and constructs first forecast in January 1964. Panel C uses only the sample period October 1951 to June 2003 and constructs first forecast in January 1964. All numbers, except $\overline{R}^2$, are in percent per quarter. A star next to $\overline{R}^2$ *in-sample* denotes significance of the in-sample regression (as measured by F-statistic). Mean and standard deviation are on out-of-sample forecast errors; RMSE is the root mean square error, MAE is the mean absolute error. Most important to us, ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). DM is the Diebold and Mariano (1995) t-statistic for difference in MSE of the unconditional forecast and the conditional forecast. One-sided critical values of DM statistic are from McCracken (1999). Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Full data, Forecasts begin 20 years after the first sample date

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-Q2	2003-Q4	1891-Q1	6.84	9.78	−0.12	−0.81	9.89	6.97	9.91	−0.077	−0.085	-1.02
d/y	Dividend Yield	1871-Q2	2003-Q4	1891-Q2	6.84	9.79	−0.13	−0.77	9.87	6.97	9.89	−0.076	−0.053	-1.60
e/p	Earning Price Ratio	1871-Q2	2003-Q4	1891-Q2	6.85	9.77	0.40*	−0.82	9.82	6.96	9.84	−0.063	−0.004	-0.11
d/e	Dividend Payout Ratio	1871-Q4	2003-Q4	1891-Q4	6.83	9.82	0.22	−0.18	9.93	6.91	9.92	−0.001	−0.077	-0.82
b/m	Book to Market	1921-Q1	2003-Q4	1941-Q1	6.01	7.85	1.12**	−0.31	8.02	6.18	8.01	−0.214	−0.169	-1.21
ntis	Net Equity Expansion	1927-Q1	2003-Q4	1947-Q1	5.99	7.82	3.55***	−0.74	7.91	6.09	7.92	−0.135	−0.114	-1.44
tbl	T-Bill Rate	1921-Q1	2003-Q4	1941-Q1	5.89	7.75	0.11	−0.84	7.82	6.02	7.85	−0.050	−0.016	-0.17
lty	Long Term Yield	1919-Q1	2003-Q4	1939-Q1	6.06	7.97	−0.13	−1.07	8.05	6.19	8.10	−0.104	−0.092	-0.71
ltr	Long Term Return	1926-Q1	2003-Q4	1946-Q1	5.86	7.77	0.36	0.02	7.87	5.91	7.85	0.062	0.019	0.29*
tms	Term Spread	1921-Q1	2003-Q4	1941-Q1	5.89	7.75	0.11	0.07	7.85	5.93	7.84	0.038	0.003	0.05
dfy	Default Yield Spread	1926-Q1	2003-Q4	1946-Q1	5.95	7.88	−0.21	−0.03	8.12	6.12	8.10	−0.144	−0.228	-2.65
dfr	Default Return Spread	1919-Q1	2003-Q4	1939-Q1	6.10	7.99	−0.20	−0.51	8.08	6.17	8.08	−0.087	−0.067	-2.32
infl	Inflation	1919-Q2	2003-Q4	1939-Q2	6.02	7.89	−0.17	−0.43	7.95	6.06	7.95	−0.019	−0.003	-0.19
cayp	Cnsmptn, Wlth, Incme	1951-Q4	2003-Q2	1971-Q4	6.13	8.14	8.48***							
caya	Cnsmptn, Wlth, Incme	1951-Q4	2003-Q2	1971-Q4	6.34	8.42	3.41***	0.89	8.67	6.41	8.68	0.062	−0.109	-0.36
all	Kitchen Sink	1951-Q4	2003-Q2	1971-Q4	6.01	7.95	8.62***	−0.35	8.78	6.63	8.75	−0.158	−0.176	-0.62
ms	Model Selection	1951-Q4	2003-Q2	1971-Q4	——	——	——	−0.73	8.87	6.70	8.86	−0.221	−0.287	-0.01

Panel B: Full data, Forecasts begin in 1964-Q1

	Variable	Sample Begin	Sample End	Forecast Begin	In-Sample MAE	In-Sample RMSE	In-Sample $\overline{R}^2$	Out-of-Sample Mean	Out-of-Sample StdDev	Out-of-Sample MAE	Out-of-Sample RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1871-Q2	2003-Q4	1964-Q1	6.30	8.23	-0.12	-0.64	8.28	6.38	8.28	-0.103	-0.032	-0.80
d/y	Dividend Yield	1871-Q2	2003-Q4	1964-Q1	6.30	8.23	-0.13	-0.63	8.28	6.39	8.28	-0.113	-0.032	-0.76
e/p	Earning Price Ratio	1871-Q2	2003-Q4	1964-Q1	6.34	8.25	0.40*	-0.62	8.31	6.42	8.30	-0.137	-0.061	-0.65
d/e	Dividend Payout Ratio	1871-Q4	2003-Q4	1964-Q1	6.21	8.26	0.22	0.47	8.32	6.26	8.31	0.023	-0.066	-0.97
b/m	Book to Market	1921-Q1	2003-Q4	1964-Q1	6.37	8.37	1.12**	-0.03	8.63	6.63	8.60	-0.404	-0.334	-1.79
ntis	Net Equity Expansion	1927-Q1	2003-Q4	1964-Q1	6.13	8.15	3.55***	0.04	8.20	6.16	8.17	0.075	0.092	1.14**
tbl	T-Bill Rate	1921-Q1	2003-Q4	1964-Q1	6.19	8.19	0.11	-0.59	8.28	6.28	8.28	-0.058	-0.010	-0.07
lty	Long Term Yield	1919-Q1	2003-Q4	1964-Q1	6.24	8.23	-0.13	-1.23	8.31	6.37	8.38	-0.144	-0.119	-0.61
ltr	Long Term Return	1926-Q1	2003-Q4	1964-Q1	6.08	8.14	0.36	0.50	8.24	6.16	8.23	0.074	0.034	0.37
tms	Term Spread	1921-Q1	2003-Q4	1964-Q1	6.10	8.16	0.11	0.75	8.24	6.16	8.25	0.067	0.023	0.27
dfy	Default Yield Spread	1926-Q1	2003-Q4	1964-Q1	6.20	8.28	-0.21	0.37	8.46	6.32	8.44	-0.081	-0.179	-1.81
dfr	Default Return Spread	1919-Q1	2003-Q4	1964-Q1	6.22	8.22	-0.20	0.22	8.28	6.25	8.25	-0.021	0.007	0.37
infl	Inflation	1919-Q2	2003-Q4	1964-Q1	6.20	8.21	-0.17	0.16	8.27	6.24	8.25	-0.008	0.012	0.49*
cayp	Cnsmptn, Wlth, Incme	1951-Q4	2003-Q2	1964-Q1	5.89	7.92	8.48***							
caya	Cnsmptn, Wlth, Incme	1951-Q4	2003-Q2	1964-Q1	6.18	8.22	0.38	0.79	8.43	6.17	8.44	0.094	-0.127	-0.49
all	Kitchen Sink	1951-Q4	2003-Q2	1964-Q1	5.73	7.69	7.90***	-0.28	8.66	6.47	8.63	-0.207	-0.316	-1.23
ms	Model Selection	1951-Q4	2003-Q2	1964-Q1	——	——	——	-0.72	8.70	6.50	8.70	-0.233	-0.384	-0.01

Panel C: Data begins in 1951-Q4, Forecasts begin in 1964-Q1

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1951-Q4	2003-Q2	1964-Q1	6.23	8.23	0.65	0.18	8.38	6.37	8.35	-0.101	-0.037	-0.34
d/y	Dividend Yield	1951-Q4	2003-Q2	1964-Q1	6.23	8.22	0.94*	0.07	8.39	6.43	8.36	-0.162	-0.044	-0.31
e/p	Earning Price Ratio	1951-Q4	2003-Q2	1964-Q1	6.23	8.24	0.15	0.46	8.40	6.34	8.39	-0.072	-0.070	-0.95
d/e	Dividend Payout Ratio	1951-Q4	2003-Q2	1964-Q1	6.23	8.25	-0.15	-0.27	8.43	6.44	8.41	-0.176	-0.094	-0.41
b/m	Book to Market	1951-Q4	2003-Q2	1964-Q1	6.22	8.25	-0.44	0.71	8.49	6.38	8.49	-0.111	-0.176	-1.75
ntis	Net Equity Expansion	1951-Q4	2003-Q2	1964-Q1	6.11	8.17	0.44	0.56	8.36	6.31	8.35	-0.042	-0.031	-0.42
tbl	T-Bill Rate	1951-Q4	2003-Q2	1964-Q1	6.17	8.22	1.44**	-1.57	8.39	6.41	8.51	-0.150	-0.188	-0.61
lty	Long Term Yield	1951-Q4	2003-Q2	1964-Q1	6.23	8.25	0.06	-1.31	8.40	6.39	8.48	-0.125	-0.161	-0.61
ltr	Long Term Return	1951-Q4	2003-Q2	1964-Q1	6.08	8.13	1.72**	0.73	8.29	6.20	8.30	0.060	0.018	0.15
tms	Term Spread	1951-Q4	2003-Q2	1964-Q1	6.10	8.18	1.45**	1.03	8.42	6.24	8.46	0.028	-0.143	-0.57
dfy	Default Yield Spread	1951-Q4	2003-Q2	1964-Q1	6.23	8.23	0.11	0.44	8.39	6.32	8.37	-0.054	-0.053	-0.50
dfr	Default Return Spread	1951-Q4	2003-Q2	1964-Q1	6.21	8.23	-0.34	0.98	8.40	6.33	8.43	-0.062	-0.109	-0.94
infl	Inflation	1951-Q4	2003-Q2	1964-Q1	6.18	8.20	1.51**	-0.40	8.37	6.28	8.35	-0.013	-0.033	-0.13
cayp	Cnsmptn, Wlth, Incme	1951-Q4	2003-Q2	1964-Q1	5.89	7.92	8.48***							
caya	Cnsmptn, Wlth, Incme	1951-Q4	2003-Q2	1964-Q1	6.18	8.22	0.38	0.79	8.43	6.17	8.44	0.094	-0.127	-0.49
all	Kitchen Sink	1951-Q4	2003-Q2	1964-Q1	5.73	7.69	7.90***	-0.28	8.66	6.47	8.63	-0.207	-0.316	-1.23
ms	Model Selection	1951-Q4	2003-Q2	1964-Q1	——	——	——	-0.72	8.70	6.50	8.70	-0.233	-0.384	-0.01
	Historical Mean	1951-Q4	2003-Q2	1964-Q1	6.21	8.25	——	0.54	8.33	6.27	8.32	——	——	——

Table 8: Forecasts at 3-year Frequency

This table presents statistics on forecast errors (*in-sample* and *out-of-sample*) for stock return forecasts at the 3-year frequency (both in the forecasting equation and forecast). These are overlapping series. Variables are explained in Section 2. Panel A uses the full sample period for each variable and constructs first forecast 20 years after the first data observation. Panel B uses the full sample period for each variable and constructs first forecast in 1968. Panel C uses only the sample period 1948 to 2001 and constructs first forecast in 1968. All numbers, except $\overline{R}^2$, are in percent per 3-year. A star next to $\overline{R}^2$ *in-sample* denotes significance of the in-sample regression (as measured by F-statistic). Mean and standard deviation are on out-of-sample forecast errors; RMSE is the root mean square error, MAE is the mean absolute error. Most important to us, ΔRMSE is the RMSE difference between the unconditional forecast and the conditional forecast for the same sample/forecast period (positive numbers signify superior *out-of-sample* conditional forecast). The gray stars on ΔRMSE are based on bootstrapped standard errors. Significance levels at 90%, 95%, and 99% are denoted by one, two, and three stars, respectively.

Panel A: Full data, Forecasts begin 20 years after the first sample date

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1874	2003	1894	21.89	28.96	5.78**	-9.16	30.01	24.35	31.25	-0.619	0.198	0.03*
d/y	Dividend Yield	1874	2003	1894	22.22	29.15	4.68*	-9.16	30.34	24.69	31.56	-0.962	-0.109	-0.02
e/p	Earning Price Ratio	1874	2003	1894	22.33	29.19	6.44**	-5.46	30.72	24.11	31.06	-0.383	0.389	0.09**
d/e	Dividend Payout Ratio	1874	2003	1894	22.90	30.29	-0.78	-4.38	31.83	24.29	31.99	-0.565	-0.540	-0.51
b/m	Book to Market	1921	2003	1941	20.60	26.48	8.09*	1.38	30.09	23.65	29.88	-2.197	-2.076	-0.14
ntis	Net Equity Expansion	1927	2003	1947	19.93	26.53	1.33*	-4.75	29.19	22.17	29.32	-1.727	-2.393	-0.27
eqis	Pct Equity Issuing	1927	2002	1947	21.02	26.96	15.65*	-1.71	28.98	22.30	28.77	-2.185	-2.096	-0.23
tbl	T-Bill Rate	1920	2003	1940	19.37	25.41	2.15*	-4.97	28.11	22.66	28.33	-1.496	-0.744	-0.11
lty	Long Term Yield	1919	2003	1939	20.40	26.34	-0.12	-9.79	29.10	24.41	30.49	-3.068	-2.809	-0.27
ltr	Long Term Return	1926	2003	1946	19.89	26.27	-1.14	-2.24	29.07	22.52	28.90	-2.058	-2.046	-0.42
tms	Term Spread	1920	2003	1940	19.22	26.20	2.85*	2.32	29.23	21.55	29.09	-0.385	-1.508	-0.21
dfy	Default Yield Spread	1926	2003	1946	19.94	26.25	-1.35	-1.61	27.91	21.31	27.72	-0.847	-0.863	-0.25
dfr	Default Return Spread	1920	2003	1940	20.53	26.81	0.18	-2.23	30.70	23.60	30.54	-2.438	-2.953	-0.49
infl	Inflation	1919	2003	1939	20.64	26.85	-1.22	2.05	28.55	21.68	28.40	-0.331	-0.725	-0.31
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	12.50	16.23	44.46***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	17.68	23.07	10.24***	12.50	26.34	23.70	28.80	-2.698	-1.454	-0.18
all	Kitchen Sink	1948	2001	1968	13.05	16.74	43.12***	-11.45	30.71	25.56	32.35	-4.556	-4.997	-0.17
ms	Model Selection	1948	2001	1968	——	——	——	-3.74	29.93	21.59	29.72	-0.590	-2.373	-0.01

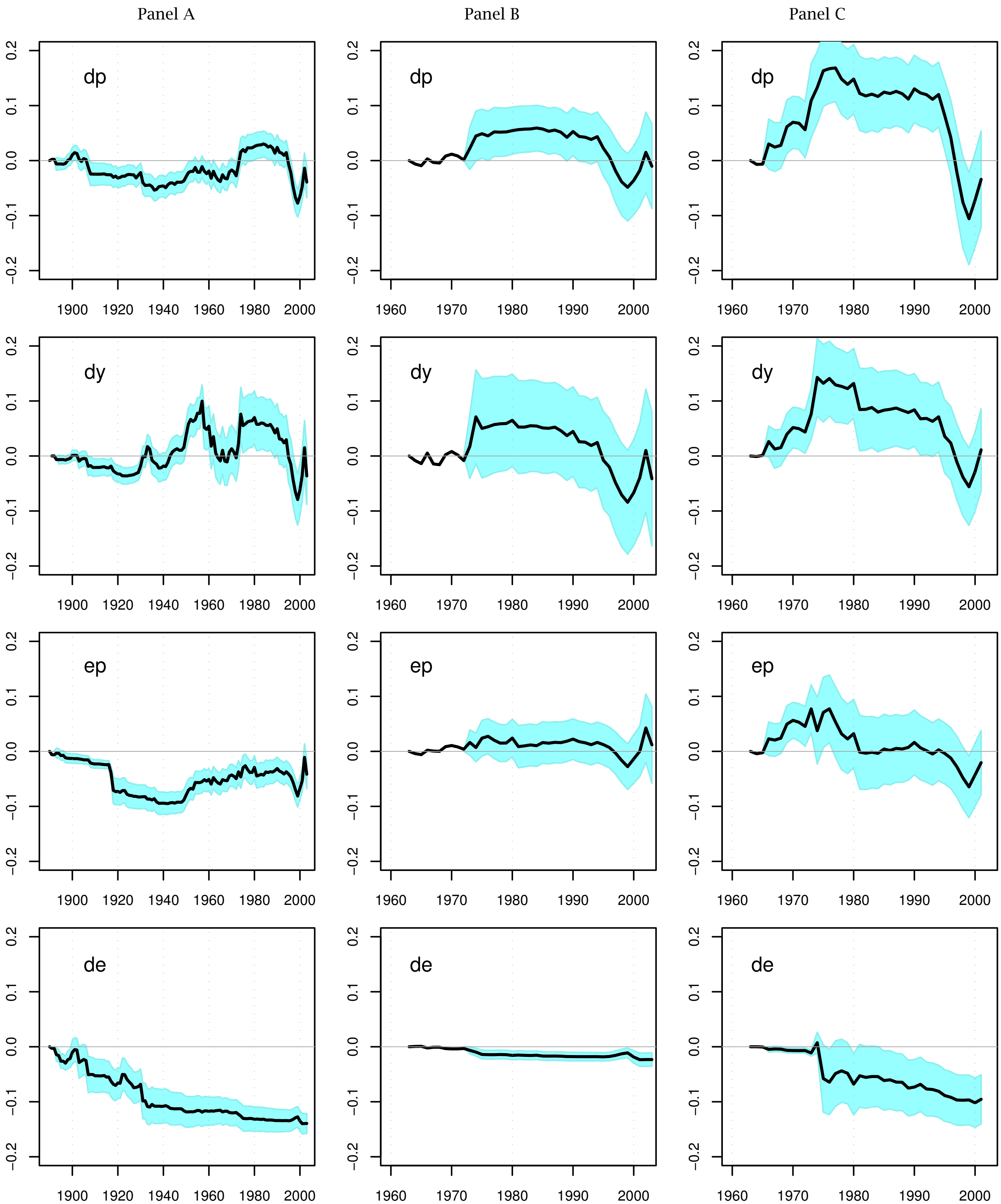
Panel B: Full data, Forecasts begin in 1968

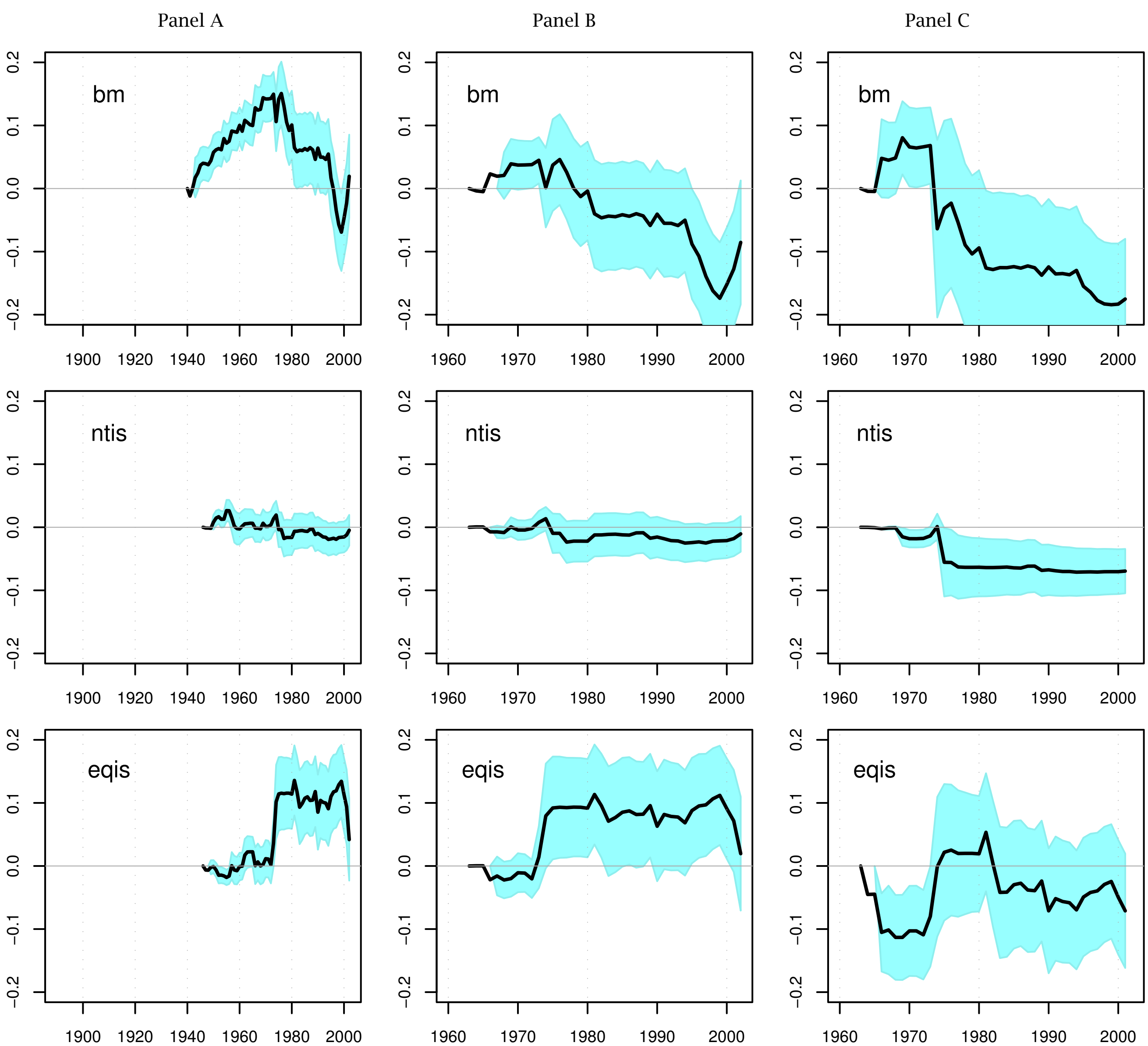
	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1874	2003	1968	20.02	26.08	5.78**	-7.03	27.15	21.06	27.67	-0.676	-0.833	-0.04
d/y	Dividend Yield	1874	2003	1968	20.20	26.27	4.68*	-6.13	27.43	21.75	27.73	-1.366	-0.893	-0.05
e/p	Earning Price Ratio	1874	2003	1968	20.80	26.35	6.44**	1.50	26.95	21.23	26.62	-0.849	0.223	0.02
d/e	Dividend Payout Ratio	1874	2003	1968	20.67	27.17	-0.78	3.95	27.80	20.91	27.70	-0.532	-0.857	-0.34
b/m	Book to Market	1921	2003	1968	24.24	30.46	8.09*	8.59	35.36	30.06	35.91	-8.471	-7.182	-0.37
ntis	Net Equity Expansion	1927	2003	1968	19.63	27.00	1.33*	4.94	27.38	20.09	27.44	1.429	1.153	0.26
eqis	Pct Equity Issuing	1927	2002	1968	20.69	27.59	15.65*	6.80	28.77	22.20	29.16	-1.167	-0.899	-0.07
tbl	T-Bill Rate	1920	2003	1968	21.16	27.93	2.15*	-3.68	29.58	23.93	29.40	-2.422	-0.776	-0.08
lty	Long Term Yield	1919	2003	1968	21.46	28.14	-0.12	-6.05	30.95	25.87	31.11	-4.474	-2.614	-0.19
ltr	Long Term Return	1926	2003	1968	20.31	27.36	-1.14	6.25	28.55	21.99	28.83	-0.328	-0.056	-0.02
tms	Term Spread	1920	2003	1968	19.30	27.47	2.85*	9.64	27.38	20.19	28.67	1.312	-0.044	-0.01
dfy	Default Yield Spread	1926	2003	1968	20.55	27.51	-1.35	6.60	27.91	21.37	28.31	0.292	0.474	0.20
dfr	Default Return Spread	1920	2003	1968	20.84	27.90	0.18	8.49	27.97	21.70	28.86	-0.199	-0.233	-0.13
infl	Inflation	1919	2003	1968	20.62	27.95	-1.22	9.62	28.05	22.11	29.28	-0.716	-0.785	-0.42
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	12.50	16.23	44.46***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	17.68	23.07	10.24***	12.50	26.34	23.70	28.80	-2.698	-1.454	-0.18
all	Kitchen Sink	1948	2001	1968	13.05	16.74	43.12***	-11.45	30.71	25.56	32.35	-4.556	-4.997	-0.17
ms	Model Selection	1948	2001	1968	——	——	——	-3.74	29.93	21.59	29.72	-0.590	-2.373	-0.01

Panel C: Data begins in 1948, Forecasts begin in 1968

	Variable	Sample	Sample	Forecast	In-Sample			Out-of-Sample						
		Begin	End	Begin	MAE	RMSE	$\overline{R}^2$	Mean	StdDev	MAE	RMSE	ΔMAE	ΔRMSE	DM
d/p	Dividend Price Ratio	1948	2001	1968	19.35	25.74	8.72	0.14	31.24	24.63	30.78	-3.629	-3.432	-0.13
d/y	Dividend Yield	1948	2001	1968	19.61	25.65	5.12	2.21	29.16	22.58	28.82	-1.577	-1.466	-0.09
e/p	Earning Price Ratio	1948	2001	1968	19.50	25.39	7.24	6.40	29.53	25.25	29.79	-4.249	-2.441	-0.15
d/e	Dividend Payout Ratio	1948	2001	1968	18.75	24.90	-1.99	7.77	27.95	21.64	28.62	-0.631	-1.266	-0.48
b/m	Book to Market	1948	2001	1968	18.50	24.62	-1.77	12.72	33.48	28.51	35.35	-7.503	-7.998	-0.36
ntis	Net Equity Expansion	1948	2001	1968	17.76	24.59	-0.60	8.03	27.01	20.91	27.79	0.095	-0.442	-0.28
eqis	Pct Equity Issuing	1948	2001	1968	18.48	24.11	1.30	8.93	29.59	23.70	30.49	-2.696	-3.140	-0.42
tbl	T-Bill Rate	1948	2001	1968	18.69	25.24	6.51**	-13.59	28.88	24.87	31.53	-3.861	-4.180	-0.17
lty	Long Term Yield	1948	2001	1968	19.56	25.52	2.65	-22.10	27.30	29.28	34.81	-8.278	-7.457	-0.26
ltr	Long Term Return	1948	2001	1968	18.70	24.94	-2.04	6.76	29.90	23.11	30.22	-2.103	-2.875	-0.33
tms	Term Spread	1948	2001	1968	17.36	24.37	0.70*	8.27	29.09	21.86	29.83	-0.857	-2.481	-0.22
dfy	Default Yield Spread	1948	2001	1968	18.43	24.67	-1.03	7.41	27.19	21.30	27.79	-0.298	-0.443	-0.25
dfr	Default Return Spread	1948	2001	1968	19.04	24.66	1.43	3.38	30.82	24.27	30.55	-3.269	-3.201	-0.45
infl	Inflation	1948	2001	1968	17.57	24.49	3.82**	3.36	27.48	20.18	27.28	0.821	0.074	0.03
cayp	Cnsmptn, Wlth, Incme	1948	2001	1968	12.50	16.23	44.46***							
caya	Cnsmptn, Wlth, Incme	1948	2001	1968	17.68	23.07	10.24***	12.50	26.34	23.70	28.80	-2.698	-1.454	-0.18
all	Kitchen Sink	1948	2001	1968	13.05	16.74	43.12***	-11.45	30.71	25.56	32.35	-4.556	-4.997	-0.17
ms	Model Selection	1948	2001	1968	——	——	——	-3.74	29.93	21.59	29.72	-0.590	-2.373	-0.01
	Historical Mean	1948	2001	1968	18.28	24.20	——	7.19	26.78	21.00	27.35	——	——	——

(Stock Related Variables I)




Panel A
Panel B
Panel C
bm
ntis
eqis
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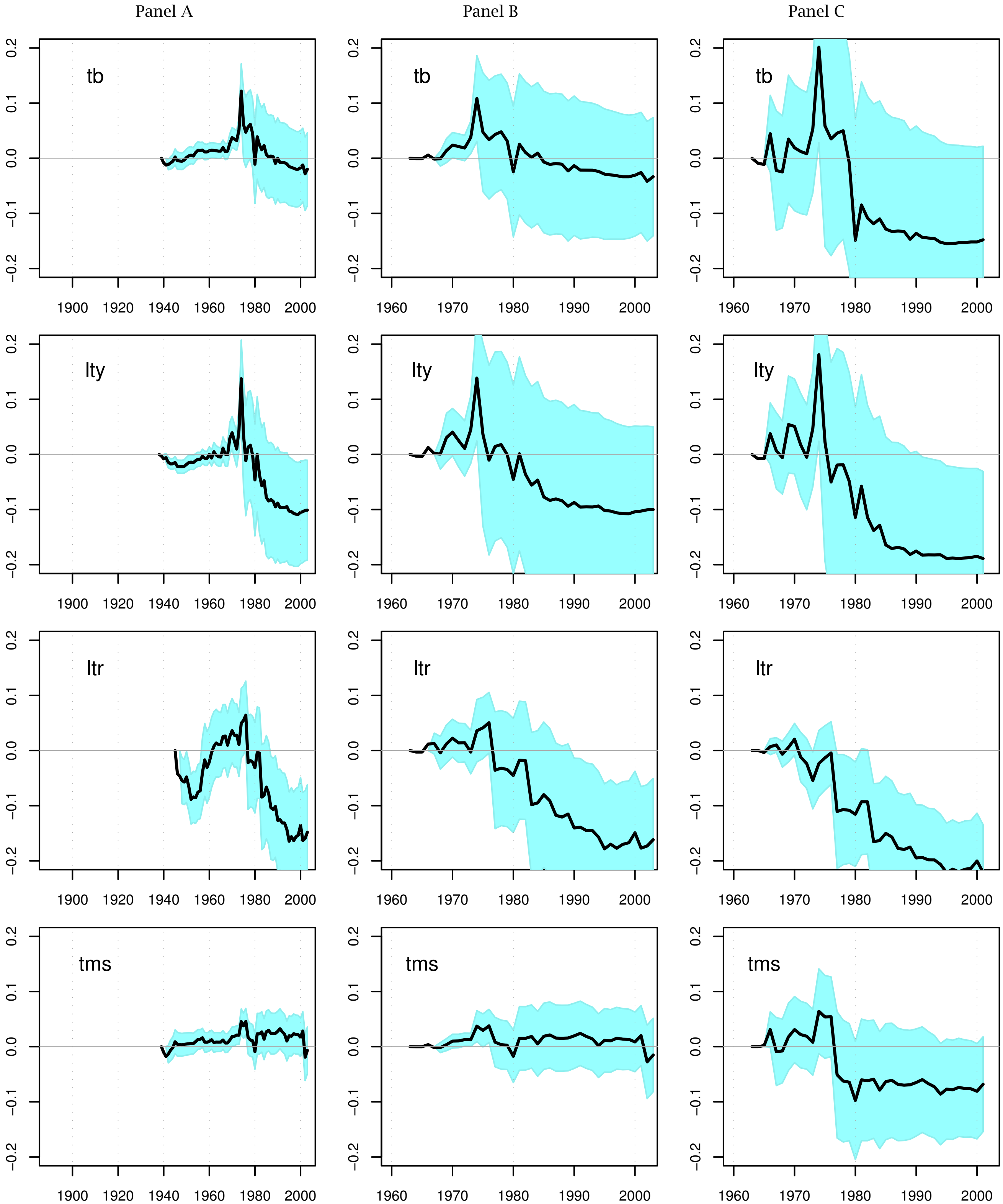
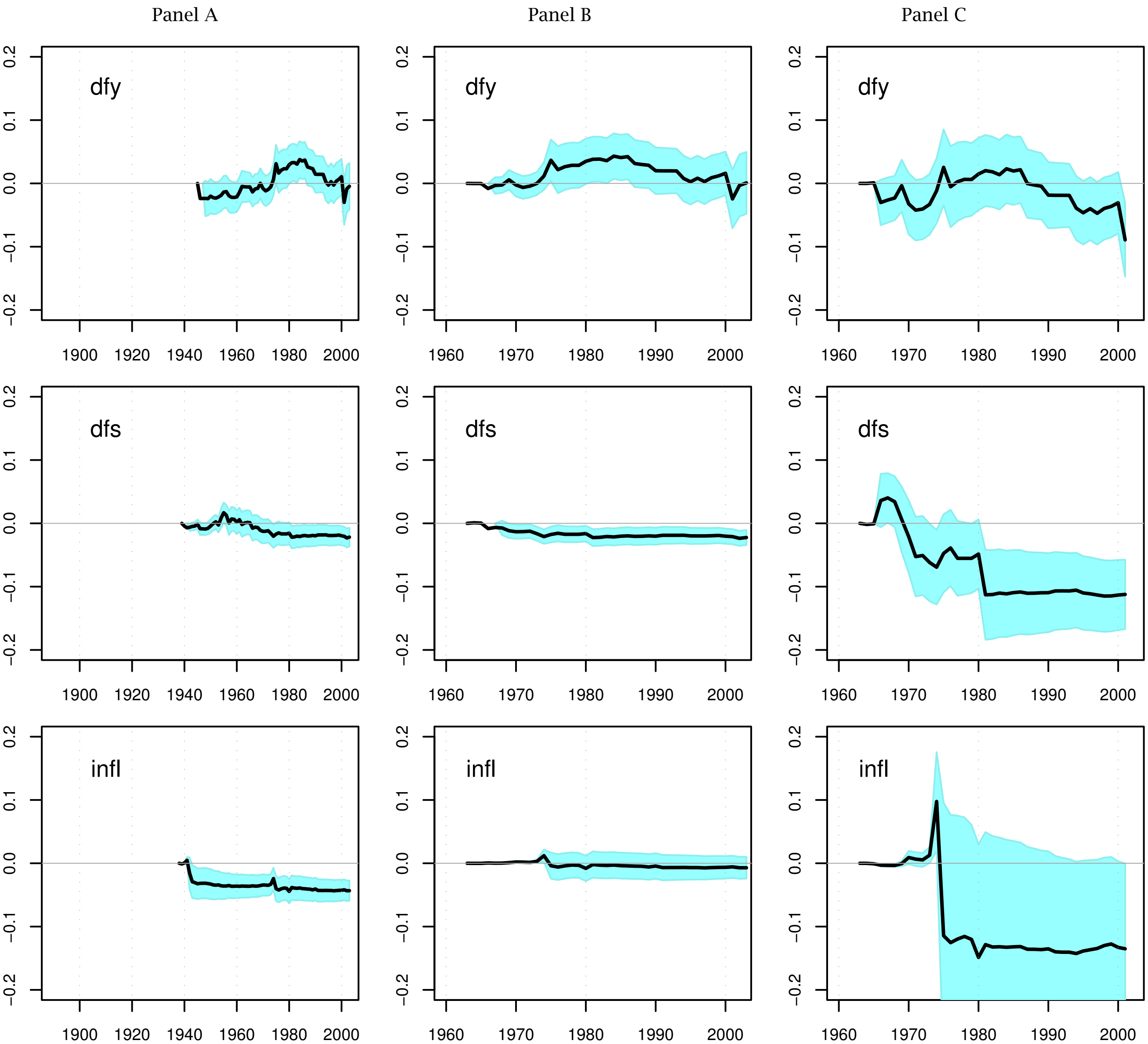
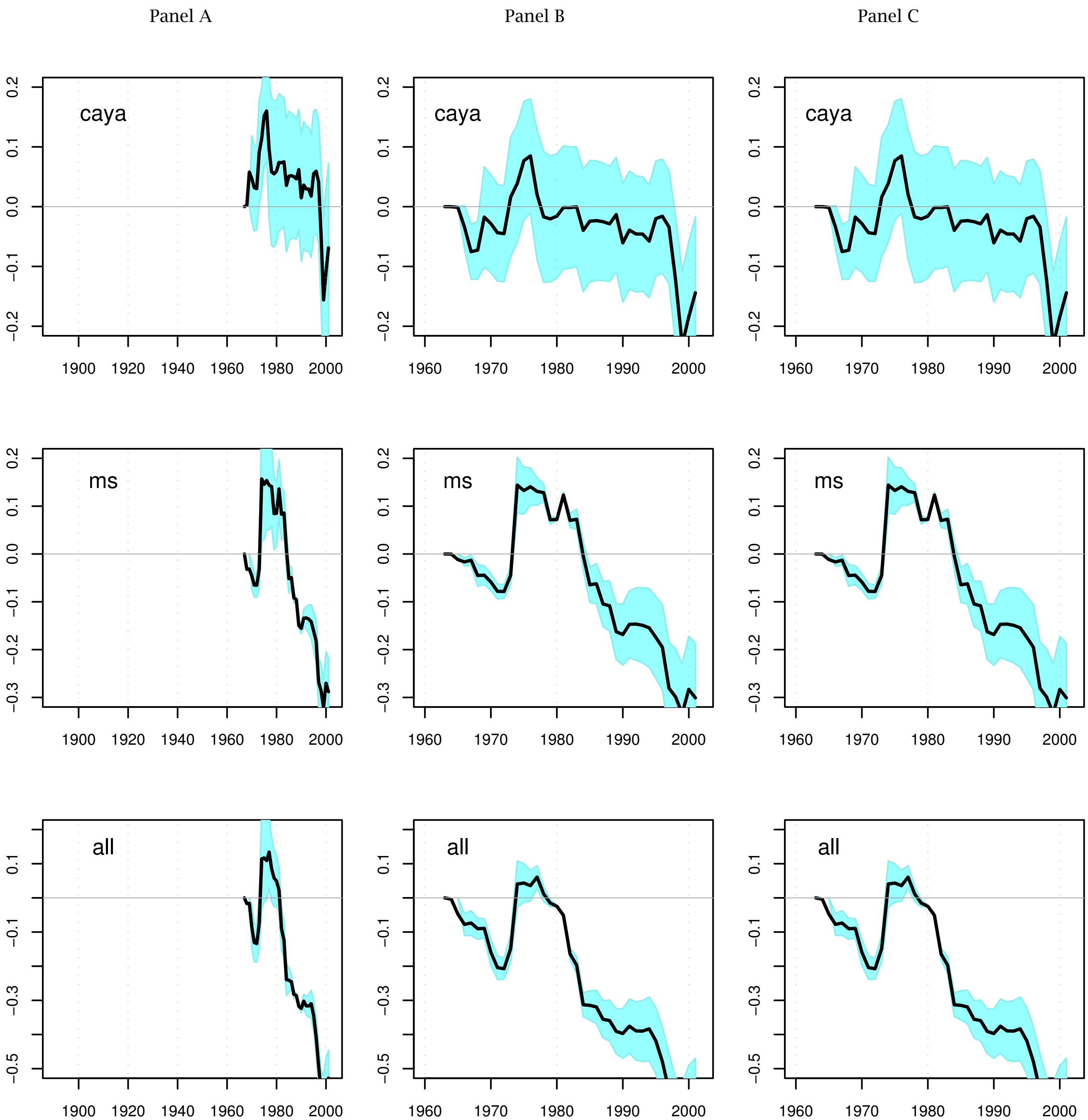
0.1
0.0
−0.1
−0.2
1900
1920
1940
1960
1980
2000
1970
1990


Panel A
Panel B
Panel C
tb
lty
ltr
tms
0.2
0.1
0.0
−0.1
−0.2
1900
1920
1940
1960
1980
2000
1970
1990

(Interest Related Variables II)



(Macroeconomic and All Variables)



Explanation: These figures plot the *out-of-sample* performance for annual predictive regressions. It is the cumulative prediction errors of the prevailing mean minus the cumulative prediction error of the predictive variable from a linear historical regression. An increase in a line indicates better performance of the named variable; a decrease in a line indicates better performance of the prevailing mean.

The blue band are the equivalent 95% two-sided levels, based on correct DM statistics, that can be used to reject the hypothesis that the observed error is different from the value on the y-axis. (Conveniently, start-values in time can be mentally shifted to another beginning period simply by resetting the 0 value on the y-axies.)

All scales are identical, except for the **ms**and **all** predictions, which were so bad, we had to change the scale. The units are in percent and meaningful: “0.2” means 20 basis points outperformance per year.

6 Section for the Referee Only

The following sections need not be published. If not desired, they can appear on the website only.

6.1 Quarterly Data

Insert Table 7 here.
Forecasts at Quarterly Frequency

Table 7 presents quarterly results. In contrast to the monthly tables, we can now add **cay**, which relies on macroeconomic quarterly data, so we can entertain 16 models.

In-sample, the table also helps point out why there are so many variables entertained in the literature. First, data frequency has changed the variables that seem meaningful. Second, depending on the specification of period, different variables come in significant. Only **all** and **cayp** work in all three panels. In Panels A and B, **ntis**, **b/m**, and **e/p** matter. In Panel A, **caya** matters. In Panel C, **d/y**, **tbl**, and **infl** matter, but not **ntis**, **b/m**, **e/p**, or **caya**. Again, this is consistent with the published evidence, in which different papers find different variables to have statistically significant explanatory power.

Out-of-sample, the *out-of-sample* RMSE's and MAE's seem to indicate more deterioration relative to their *in-sample* equivalents than we saw on monthly frequency. This deterioaration now also applies to the prevailing mean. The CUSUMSQ statistic suggests that all regression models in Panel A are unstable, except for **caya** and **all**. The primary reason is that we only have data beginning in 1951 for these predictions. (When graphed, one sees that for all other series, the 1930's were especially problematic.)

Again, of most interest to us is the relative out-of-sample performance. On the ΔMAE metric, 13 out of 16 regressions underperform the prevailing mean in Panel A; 11 out of 16 underperform in Panel B; and 13 out of 16 underperform in Panel C. On the ΔRMSE metric, the performance is even worse: 15 out of 16 regressions underperform the prevailing mean in Panel C; 14 out of 16 underperform in Panel A; and 11 out of 16 underperform in Panel B.

In Panel A, the term-spread (**tms**) has statistical significance, but minimal economic significance ($0.028\% \cdot 4 \approx 0.1\%$ per annum). It has no significance in Panel B, and underperformance in Panel C. Ironically, *in-sample*, **tms** only has statistical significance in Panel C, but not Panels A and B.

In Panel B, only the net issuing activity (**ntis**) does succeed statistically *out-of-sample*, and with an economic significance of only $4 \cdot 0.11 \approx 0.45\%$ per annum. But it *underperforms* in the other two panels. In Panel C, nothing works on the ΔRMSE metric; nothing works statistically significantly on the ΔMAE metric.

6.2 3-Year Regressions

Insert Table 8 here.
Forecasts at 3-year Frequency

Table 8 presents the 3-year predictions. *Out-of-Sample*, in the 3-year horizon regressions, 38 out of 42 regressions underperform the prevailing mean on the ΔRMSE metric; 39 out of 42 on the ΔMAE metric. The only statistically significant out-of-sample performance comes from the earnings-price ratio **e/p** in Panel A ($0.389\%/3 \approx 0.13\%$ per annum), but **e/p** underperforms in Panels B and C. (Incidentally, **e/p** is only the second case where we had both statistically significant *in-sample* regression performance and statistically significant *out-of-sample* performance on the same line! Nothing else matters, except that the kitchen sink regression seems to statistically significantly underperform in its ability to predict.