Managing the Market Portfolio

Online Appendix

This Online Appendix contains robustness tests as well as detailed definitions of the variables and factors used in this study. Section A1 provides extensive robustness analyses for different subsamples, extended samples, transaction costs, alternative factor model specifications, longer forecast windows, alternative functional forms, as well as different return periods for the factor-managed market portfolios. In Sections A2 and A3, we provide the detailed definitions of the predictor variables and factor models, respectively.

JEL classification: G12, G11

Key words: Conditioning variables, managed portfolios, market portfolio, market timing

A1. Robustness

A1.1. Subsample Analysis

We present the results for various subsamples in Table A5. First, we split the sample period roughly in half into a pre-1995 and a post-1995 period. The factor alphas are somewhat larger in the first half, but also sizable and statistically significant for every model in the second half. For example, the FF-6* alpha in the first half is 7.09% per annum. That in the second half is 5.02% per annum. Next, we exclude salient periods during which the managed market portfolio performs particularly well. In particular, we exclude the oil crisis period 1973–1975, which has been shown to be a particularly influential period for return forecasts by Goyal and Welch (2008) and during which the managed market portfolio also performs very well (see Figure 2). We also exclude both the oil crisis period and the period 1982–1984, during which the managed market portfolio also performs very well. In all cases, we detect sizable and statistically significant alphas of the managed market portfolio during the remaining periods. Finally, we separately analyze NBER recessions and expansions. We find that the managed market portfolio performs exceptionally well in recessions, with alphas of more than 19%. However, in expansions it also leads to large and significant alphas relative to all factor models.

Next, we analyze the performance of the combination-forecast-managed market portfolio over the various business cycles during our sample period. We report the results for each business cycle from right after the peak of the previous cycle to the peak of the current cycle, using the dates determined by the NBER.[1] We present the results in Table A6. We find that the alphas of the combination-forecast-managed market portfolio are positive throughout the entire sample period. Only in the August 1991–March 2001 business cycle, the alphas for two of the models turn slightly negative. However, even for that period, the three other models yield positive alphas. The FF-6* alphas over the 7 business cycles are 14.9%, 9.0%, 15.2%, 4.8%, –0.4%, 1.9%, and 10.1%, in that order. Naturally, given the reduced power associated with the smaller subsamples, not all alphas are statistically significant. The statistically strongest results occur for the business cycle starting from January 2008.

A1.1.1. Managed Market Portfolio Performance in the 2020 COVID-19 Economic Turmoil

Our main sample period ends in 2019, using all the data that was available when we first submitted the manuscript to this journal. However, given the substantial market turmoil during the COVID-19 crisis in 2020, it is interesting to study the performance of the managed market portfolios using these data, which are outside our original sample. That is, we expand all data on the predictor variables and factors to include the year 2020.

[1] `https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions`.

We present the results for the full expanded sample period as well as those occurring specifically in the year 2020 in Table A7. We find that overall the results are robust to including the COVID-19 turmoil period. However, we also find that the main combination-forecast-managed market portfolio based on the conventional predictor variables does not perform particularly well in 2020. The main reason for the 2020 performance of the main combination-forecast-managed market portfolio is an unprecedented extreme outlier observation in the predictor variable VRP in March 2020. The variable alone drives the $COMB$ variable down from 112% of its full sample average (without the forecast for April 2020) when it is not included to 19% of that value when including it for the $COMB$ calculation. This results in an extreme negative weight for April 2020.[2] Note that for our main analysis, we chose the simplest approach possible to combine the information from a large set of predictor variables: the simple average. These out-of-sample results, along with the insight that there are actors trying to prevent the most extreme market outcomes, indicate that for use in practice a more robust approach, which limits the impact a single predictor can have, might be more advisable. As can also be seen from Table A7, robust approaches such as those based on binary managing as well as the median and trimmed-mean forecast combinations perform substantially better in 2020 and also lead to high and statistically significant alphas for the extended sample period.

The results for the factor-combination-forecast-managed market portfolio are in Panel B of Table A7. We find that the extension of the sample period has a negligible impact on these results.

A1.2. Transaction Costs

For all dynamic trading strategies with time-varying weights transaction costs are an issue. Cross-sectional and time-series management strategies require a frequent turnover of the holdings. The associated trades create both direct and indirect costs. Direct transaction costs occur for every trade. For example, Barroso and Detzel (2021) show that most volatility-managed portfolio strategies require too much turnover to be profitable after costs. In addition to direct transaction costs, investors that perform strategies at scale also have to worry about the price impacts of their orders (Li et al. 2020, DeMiguel et al. 2021). Direct transaction costs and price impacts are a problem in particular for cross-sectional asset pricing factors and management strategies, which involve the trading of small and illiquid stocks.

For the managed market portfolios, however, both direct transaction costs and price impact costs are much less of an issue. The entire market portfolio can simply be traded using Exchange Traded Funds (ETFs) or, in particular, futures on some proxy for the market. These products are very

[2] It might have been right to reduce the weight in equities that much had it not been for the swift reactions of central banks. Goldstein et al. 2021, p. 5136 for example, argue that "the quick recovery of financial markets in the United States can be, at least in part, attributed to the Federal Reserve".

liquid. Thus, direct transaction costs are small. Furthermore, price impacts in these highly liquid markets are likely negligible for most investors. Thus, the managed market portfolios covered in this study are likely more profitable for investors than more costly strategies trading cross-sectional anomalies.

To explicitly examine the effect of transaction costs, we first follow Fleming et al. (2003), who calculate that one-way transaction costs in S&P 500 futures are approximately 1bp. For a conservative alternative, we also follow Frazzini et al. (2015) and Moreira and Muir (2017), who focus on cross-sectional strategies, and consider transaction costs of 10bp. Finally, we also examine a specification that uses transaction costs of 10bp, explicitly takes into account the additional rebalancing that becomes necessary due to the quarterly expiration cycle of S&P 500 futures, and uses the LIBOR instead of the one-month Treasury bill rate to finance the position. This last approach is extremely conservative for a strategy based on futures in that it not only assumes very high transaction costs, but also a fully-collateralized position and zero interest on the posted collateral. The results are in Table A8. Even in the most conservative case, the alphas are still larger than 4.5% per year and statistically significant for all models.

A1.3. Alternative Factor Model Specifications

In this section, we test whether the managed market portfolio returns can be explained by simple dynamic strategies in the cross-sectional factors. First, we follow Moreira and Muir (2017) and examine factor models augmented with volatility-managed factors. The authors show that volatility management boosts the Sharpe ratios of various factors.

To perform the volatility management, we first compute the annualized realized variance of each factor based on daily returns over the past month. We use the past realized variance observation as a random-walk forecast for the next-month variance and manage the factors, so that their variance equals the annualized full-sample variance of the unmanaged factors (which is achieved by suitably choosing the constant c). That is,

$$FAC_t^{vman} = FAC_t \frac{c}{\sigma^2_{FAC,t-1}}, \tag{A1}$$

where $\sigma^2_{FAC,t-1}$ is the annualized realized variance of the factor during month $t-1$ (based on daily return data). We apply Equation (A1) for each factor. The resulting factor models then contain $2k$ factors: all plain and all volatility-managed factors.

For comparison, we also present the weight of the volatility-managing strategy for the market factor of Moreira and Muir (2017) (salmon solid line with dots) in Figure A1. As can be seen from the figure, the weights of the two strategies differ substantially. The weight of the volatility-managed strategy fluctuates much more strongly and implies substantially more leverage. The correlation between the two weight time series is -0.01.

The results when using volatility-managed factor models are presented in Table A8. These are similar to before. The combination-managed market portfolio yields significant alphas relative to all volatility-managed factor models. The managed market portfolio we propose is thus substantially different from volatility-managed factor strategies.

Second, we use the time-series efficient factor models of Ehsani and Linnainmaa (2020). The authors make use of the mildly positive first-order autocorrelations in factor returns to dynamically shift the weight in the factors. This helps to substantially boost the factors' Sharpe ratios. We follow the out-of-sample implementation of Ehsani and Linnainmaa (2020), using a 10-year rolling window and pooling the factors to estimate the moments. The results are also in Table A8. We find that the alphas of the managed market portfolio with respect to all time-series efficient models are significantly positive. Hence, the managed market portfolio strategy is clearly different from the time-series efficient factors.

Third, one might also wonder whether the addition of a conditional risk factor to the cross-sectional factor models might enable them to explain the managed market portfolios. Thus, we augment all factor models by the conditional risk factor of Gormsen and Jensen (2021). The results are again presented in Table A8. We find that the inclusion of the conditional risk factor does not change our previous results. Thus, at a minimum these results suggest that the managed market portfolios capture information about the state of the economy that the combination of the factor models and the Gormsen and Jensen (2021) conditional risk factor appears to miss.

Finally, we also examine the alphas of the combination-forecast-managed market portfolio when the factor models do not include the market factor.[3] That is, we regress the managed market portfolio return only on the extra-market factors of the different models. The results are also in Table A8. We find that the alphas without the market factor are substantially smaller. Only the alpha with respect to the DMNU-7 model is statistically significant. Thus, the managed market portfolio appears to provide value mainly when the market is part of an investor's current portfolio.

However, we believe that the market portfolio should be in the set of factors, for both economic and statistical reasons. First, the combination-forecast-managed market portfolio is negatively exposed to the market portfolio. Part of the reason for this negative exposure is that conditional demeaning and standardization fail to generate an ex-post average weight in the market of zero. If we just add 0.17 (the negative of the average realized weight) times the market factor to the managed market portfolio, its average return increases to 5.06% and the Fama and French (2018) 6-factor alpha is 3.97%. Both are statistically significant at the 5% level. The alphas are still smaller than when including the market in the set of factors because the market exposure is even more negative than indicated by the average portfolio weight.

[3]We thank an anonymous referee for suggesting that we should pursue this analysis.

The second reason why we think the market portfolio should be included in the set of factors is statistical. Omitting the market factor likely biases the remaining regression coefficients (including the alpha) since MKT is significantly correlated with both the managed market portfolio return and close to all other factors. These two reasons aside, we also believe that investors who consider *managing* the market portfolio most likely already include the market as a part of their portfolios.

A1.4. Alternative Forecast Combination Definitions

In this section, we test the robustness of our main results to using alternative ways of aggregating the return forecasts. Following Rapach et al. (2010), we also consider the discount mean squared prediction error (DMSPE) optimization approach of Stock and Watson (2004). Finally, we also use the combination adaptive elastic net of Rapach and Zhou (2020). One problem with this approach is that it cannot easily cope with the heterogeneous starting dates of different variables and their market excess return forecasts. Therefore, we present two variations of it. For the first variant (denoted by "full") we use only those variables that are available for the full sample period. The second variant uses an adaptive elastic net regression for the variable subsets from each unique starting date and uses all variables selected at least for one of the subsets. The DMSPE approach places higher weight on historically better predictors. The combination adaptive elastic net aims to filter out irrelevant predictors before performing the (unweighted) forecast combination.

The results are in Table A8. For the DMSPE forecast combination the results are qualitatively similar to those for the main mean forecast combination. All factor alphas are significantly positive and the time-series metrics confirm significant predictability. For the combination adaptive elastic net, on the other hand, the factor alphas are generally insignificant. Thus, optimizing the return predictability in the time series (which is very good with the approach) can have adverse consequences for the managed portfolios. This result indicates that the variables that are important to manage the market portfolio vary over time.

A1.5. Twelve-Month Forecast Window

Next, we test the robustness of our main results to using a twelve-month instead of a one-month forecast window for the market excess return. That is, when obtaining the out-of-sample market excess return forecasts with Equation (1), we set $h = 12$ instead of $h = 1$, which we use for the main analysis. Other than that, we proceed analogously. We present the results in Table A8. With a twelve-month forecast window, the managed market portfolio performs similarly well. The alphas of the twelve-month-managed portfolio are generally even larger than those in our baseline analysis.

A1.6. Alternative Variable Subsets

We also examine the performance of the managed market portfolio without the VRP variable, which appears to be influential around the financial crisis, causing a strong downward spike in the managed portfolio weight in November 2008. It is thus interesting to examine the importance of this variable. The results without the VRP variable, also presented in Table A8, are qualitatively similar.

A1.7. Further Anomalies

We document that the combination-managed market portfolio return cannot be explained by prominent factor models. However, the cross-sectional asset pricing literature has uncovered several further anomalies. Any of these could potentially be related to the managed market portfolio.

To cast the net wide, we use all 32 anomalies provided by Novy-Marx and Velikov (2016).[4] We use each anomaly long–short return as a potential explanatory variable. That is, we use Equation (3) to regress the return on the combination-managed market portfolio on the market factor augmented with one of the anomaly long–short returns at a time.

We present the results in Table A9. Confirming our previous findings, we detect that the combination-managed market portfolio returns are largely unrelated to all cross-sectional anomalies. They have a significant exposure to only 2 of the 32 anomalies: industry-relative reversals and short-run reversals. Thus, there seems to be some relation of the managed market portfolio with reversals. However, the exposure is significantly negative and the alphas relative to all anomaly-augmented factor models are statistically significant. Thus, the managed market portfolio seems to be truly different from any cross-sectional anomaly, suggesting that it can significantly improve the portfolio performance for investors.

A1.8. Managed Factor Portfolios

In this section, we examine whether managing factor portfolios, not only the market portfolio, also enhances the investment opportunity set. To do so, we proceed exactly as for the managed market portfolio in our main analysis. We use every single one of the conventional predictor variables to perform univariate out-of-sample forecasts for the factor excess returns. Then, we aggregate the forecasts, conditionally demean the weights, and scale such that the conditional volatility of each managed factor portfolio equals that of the corresponding unmanaged factor portfolio. Afterwards, we analyze the managed factor portfolios by regressing their returns on those of the different factor models.

We present the results in Table A10.[5] It seems that factor returns are generally not as predictable by the conventional predictor variables used in this study as is the market excess return and

[4] These data are available from the author's webpage: `http://rnm.simon.rochester.edu/data_lib/index.html`. See Novy-Marx and Velikov (2016) for detailed definitions of the anomaly variables. We use the same anomaly names as the authors.

[5] Note that part of the ΔCERs are exactly equal to 0. This is because in some cases both the historical mean and the forecast combination forecasts constantly hit the Campbell and Thompson (2008) restrictions we impose for the portfolio weights.

managing the factor portfolios based on these variables is less profitable than managing the market portfolio. This is likely related to the fact that the frequent rebalancing in the factor portfolios changes their properties. We observe significantly positive average managed factor portfolio returns for SMB, RMW, HML^M, and $MGMT$. Only the managed HML^M factor yields significant positive alphas with respect to all factor models. It is also one of the factors whose returns and volatilities are predictable in the time series, as evidenced by significant positive out-of-sample R^2s. On the other hand, the returns to the SMB, WML, CMA, INV, and EG factors also seem to be predictable in the time series. However, their managed portfolios do not yield consistent positive alphas. Most other factors seem to neither be predictable by the set of variables used in this study, nor does the forecast appear to generate profitable managed factor portfolios.[6]

A1.9. Alternative Functional Forms

In Tables A11 and A12, we present the results for single-variable and factor-managed market portfolios when simply using a binary managing approach. As for the binary approach with the combination forecast, we set the weight to 1 if the variable or factor return exceeds its conditional mean. Otherwise, we set the weight to zero. These results are qualitatively similar.

A1.10. Longer Sample Periods for Factor-Managed Portfolios

Part of the factors are available for substantially longer sample periods than that we analyze in the main part. Therefore, we conduct additional robustness tests and also examine the performance of factor-managed portfolios over longer time periods. First, we look at the period 1960–2020. With the start in 1960, we make use of the full sample period for all new factors introduced by Fama and French (2015), Stambaugh and Yuan (2017), and Hou et al. (2021). We present the results in Table A13. The results are very similar to those for our main sample period.

For some factors, even longer time periods are available. This is the case for all versions of the Fama and French (1993) and Carhart (1997) factors. Thus, for these we also examine the maximum sample period available: from 1936 to 2020.[7] These results are also in Table A13. We find that the results are broadly similar. The alphas over this full period are somewhat smaller, though. Upon closer inspection, we make out two reasons for these smaller alphas: (i) The high market volatility in the early period before the end of World War II causes even higher volatilities of the factor-managed market portfolios. Since we standardize the weights so that the conditional volatility

[6]Cooper et al. (2004), Avramov et al. (2016), and Hameed et al. (2017), among others, show that the size and momentum factors are predictable with other variables like market states and liquidity. Thus, it is possible that the predictors we use in this study are particularly well suited for predicting the market, while other predictors work better for other factors.

[7]Note that we need the first 10 years of data to perform the conditional demeaning and standardizing, which is why we start in 1936 rather than right away in 1926 when the factor time series begin.

estimated from the past returns equals that of the market, this reduces the weight magnitude over the full sample period, also reducing the return magnitude. This leaves the statistical significance largely untouched and is mainly mechanical. As can be seen from Table A13, the t-statistics of the alphas of the managed market portfolio relative to the multifactor models, which become available in the 1960s are not much different between the 1960–2020 and 1937–2020 periods. However, due to the smaller weights also the alphas are smaller.[8] (ii) We also find that the performance of the factor-managed market portfolios is indeed weaker in the period before 1960.

A1.11. Alternative Factor Return Periods

We also test the robustness of the factor-managing results to the horizon over which the factor returns are measured. In Table A14, we present the results when using three-month returns and in Table A15 those for the past twelve-month factor returns. For the past three-month returns, the results are broadly similar, although somewhat weaker. On the other hand, managing the market portfolio with past-twelve-month factor return is generally not profitable. The primary exception is the momentum factor. Its past three-month and even twelve-month returns can be used for a very profitable managed market portfolio. Interestingly, the past twelve-month momentum return also performs very well based on the time-series evaluation measures. Apart from momentum, however, the relation between past factor returns and the market excess return appears to be strongest in the short term.

We also consider one-month factor returns lagged by three and twelve instead of only one month. We present the results in Tables A16 and A17. The relation is substantially weaker especially with a twelve-month lag.

A2. Predictor Variables

If not specified otherwise, the data are from Amit Goyal's webpage.[9]

- ***BM*** (Kothari and Shanken 1997) is the book-to-market ratio of the Dow Jones Industrial Average index. For March to December, the book value is from the fiscal-year end of the previous year. In January and February, the book value is that of two years before. The market value is as of the end of the current month.

- ***CAY*** (Lettau and Ludvigson 2001) is the log consumption-to-wealth ratio. Technically, it is defined as the cointegrating residual between the natural logarithms of consumption, asset wealth,

[8]Note that, to be consistent throughout this study, we report the results for an expanding-window demeaning and standardization. When using a ten-year rolling window during the 1936–2020 period, the alphas are typically somewhat larger. For example, the FF-6* alpha of the MKT-managed market portfolio is 3.6% (t-stat 3.0). However, they are still not of the same magnitude as those for the period starting later, giving rise to the next point (ii).

[9]`http://www.hec.unil.ch/agoyal/`.

and labor income. As in Equation (5) of Goyal and Welch (2008), we use an out-of-sample approach to estimate the cointegrating regression. The consumption, asset wealth, and labor income data are from Martin Lettau's webpage.[10] To account for the time it takes for the data to release, we do not use the new values until 1 month after the end of the quarter.

- ***CR*** (Gormsen and Jensen 2021) is the conditional risk. It is the expected one-month market excess return, estimated with the Kelly and Pruitt (2013) PLS filter and the 25 size/book-to-market portfolios of Kenneth French, divided by the expected variance, based on an $AR(1)$ forecast. The analysis is cast in an out-of-sample setting based on expanding observation windows with data starting in 1926.

- ***DE*** (Lamont 1998) is the natural logarithm of the dividend payout ratio of the S&P 500 index (the twelve-month trailing sum of dividends divided by the twelve-month trailing sum of earnings).

- ***DFR*** (Goyal and Welch 2008) is the default return spread, computed as the difference between the long-term corporate bond returns and the long-term (10-year) government bond returns.

- ***DFY*** (Fama and French 1989) is the default yield spread, computed as the difference between the BAA- and AAA-rated corporate bond yields.

- ***DP*** (Dow 1920, Campbell and Shiller 1988) is the natural logarithm of the ratio of the twelve-month trailing sum of dividends paid by S&P 500 firms divided by the level of the S&P 500 index.

- ***DY*** (Goyal and Welch 2008) is the natural logarithm of the ratio of the twelve-month trailing sum of dividends divided by the lagged S&P 500 price index level.

- ***EFD*** (Baker et al. 2016) is the economic forecaster disagreement based on data from the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters.[11]

- ***EP*** (Campbell and Shiller 1988) is the natural logarithm of the ratio of the twelve-month trailing sum of earnings divided by the S&P 500 price index level.

- ***EPU*** (Baker et al. 2016) is the U.S. news-based economic policy uncertainty index. It is based on a search for a set of defined uncertainty words in 10 large U.S. newspapers.[11]

- ***IK*** (Cochrane 1991) is the investment-to-capital ratio of aggregate private non-residential fixed investment to aggregate capital. At any point in time, we use the most recent estimate for the ratio derived from data observable in real time. The data come from the Archival Federal Reserve Bank of St. Louis FRED database.[12]

[10] `https://sites.google.com/view/martinlettau/data`.

[11] The data are from `www.policyuncertainty.com`.

[12] `https://alfred.stlouisfed.org/`.

- ***INFL*** (e.g., Chen et al. 1986, Ferson and Harvey 1991) is the growth rate in the Consumer Price Index from the Bureau of Labor Statistics. At any point in time, we use the most recent growth rate derived from data observable in real time. The data come from the Archival Federal Reserve Bank of St. Louis FRED database.[12]

- ***IPRO*** is the monthly growth rate in the seasonally-adjusted U.S. industrial production index. At any point in time, we use the most recent growth rate derived from data observable in real time. The data come from the Archival Federal Reserve Bank of St. Louis FRED database.[12]

- ***LTR*** (Goyal and Welch 2008) is the long-term (ten-year) rate of government bond returns.

- ***LTY*** (Goyal and Welch 2008) is yield on the long-term (ten-year) government bonds.

- $\boldsymbol{MA_{1,12}}$ (Rapach and Zhou 2020) is an indicator variable that is 1 if the S&P 500 index value exceeds (or is equal to) its twelve-month moving average. Otherwise the indicator variable is 0.

- $\boldsymbol{MA_{3,12}}$ (Rapach and Zhou 2020) is an indicator variable that is 1 if the three-month moving average of the S&P 500 index value exceeds (or is equal to) its twelve-month moving average. Otherwise the indicator variable is 0.

- $\boldsymbol{MOM_6}$ (Rapach and Zhou 2020) is an indicator variable that is 1 if the S&P 500 index value exceeds (or is equal to) the S&P 500 index value six months before. Otherwise the indicator variable is 0.

- ***NTIS*** (Boudoukh et al. 2007) is the net equity expansion, computed as the ratio of the twelve-month trailing sum of net issues by NYSE firms divided by the total market capitalization of NYSE stocks.

- ***RD*** (Maio 2016) is the cross-sectional return dispersion, measured as the standard deviation of the returns of the 100 size/book-to-market portfolios of Kenneth French.

- ***RREL*** (Campbell et al. 1997) is the stochastically-detrended risk-free rate. It is calculated as the three-month U.S. Treasury bill rate minus its twelve-month trailing average.

- ***RSI*** (Rapach et al. 2016) captures the aggregate short interest. Data are from Compustat and CRSP. Following the methodology of Rapach et al. (2016), RSI is the detrended equally weighted average relative short interest of all stocks with prices greater than $5 and market capitalizations above the 5th percentile of NYSE firms.

- ***RVOL*** (Rapach and Zhou 2020) is the annualized stock excess return volatility using the estimator of Mele (2007) and twelve months of monthly excess returns of the S&P 500 index.

- ***SENT*** (Baker and Wurgler 2007) is the orthogonalized sentiment index obtained from Jeff Wurgler's webpage.[13] It is computed using the dividend premium, first-day returns of initial public offerings (IPO), IPO volume, the closed-end fund discount, and the equity share in new issues.

- ***SVAR*** (Guo 2004) is the monthly stock market variance, calculated by summing the squares of the daily returns on the S&P 500 during the past month.

- ***TBL*** (Fama and French 1989) is the annualized three-month Treasury bill rate.

- ***TMS*** (Campbell 1987) is the term spread, computed as the difference between the yield on long-term (ten-year) government bonds and the Treasury bill rate.

- ***TR*** (Kelly and Jiang 2014) is a measure of tail risk derived from the cross-section of stock returns. It is computed using all NYSE, AMEX, and NASDAQ stocks with data from CRSP as $TR_t = \frac{1}{K_t}\sum_{i=1}^{K_t} log(r^*_{i,\tau}) - log(u_t)$, where K_t is the total number of daily returns $r^*_{i,\tau}$ of different firms i during month t that fall below the threshold u_t. The threshold is the 5% quantile of the cross-sectional return distribution in month t.

- ***VIX*** is the Chicago Board Options Exchange (CBOE) Volatility Index. It measures the thirty-day option-implied volatility of the S&P 500. The data are from the CBOE.[14] Prior to the start of the VIX in 1990, we supplement the data with the VXO index, which starts in 1986.

- ***VRP*** (Bollerslev et al. 2009) is the variance risk premium (VIX minus random-walk expected realized variance of the S&P 500), obtained from Hao Zhou's webpage.[15]

- ***VS*** (Cohen et al. 2003) is the small stock value spread, measured as the difference between the natural logarithm of the book-to-market ratios of small value and small growth stocks (among the six size/book-to-market portfolios of Kenneth French).

A3. Factor Models

FF-6 Model* The FF-6* model of Fama and French (2018) is based on the Fama and French (2015) 5-factor model. It uses the market factor (MKT) and the size (SMB) and investment (CMA) factors of Fama and French (2015). In addition, it contains a monthly-rebalanced value factor (HML^M), a cash-based operating profitability factor (RMW^{Cash}), and the momentum (WML) factor of Carhart (1997). The model equation is

$$r_{j,t} - r_{f,t} = \alpha_j + b_j MKT_t + s_j SMB_t + h_j HML^M_t + r_j RMW^{Cash}_t + c_j CMA_t + w_j WML_t + \epsilon_{j,t}. \quad (A2)$$

[13] `http://people.stern.nyu.edu/jwurgler/`.

[14] `http://www.cboe.com/products/vix-index-volatility/vix-options-and-futures/vix-index/vix-historical-data`.

[15] `https://sites.google.com/site/haozhoupersonalhomepage/`.

HMXZ-5 Model The HMXZ-5 model of Hou et al. (2021) is the Hou et al. (2015) (HXZ) model, augmented by an expected growth (EG) factor. The EG factor is based on the expected investment estimated from a regression of investment on several variables. The Hou et al. (2015) model contains the MKT factor, a size (SMB^{HXZ}) factor, an investment (INV) factor, and a profitability factor (ROE). The model equation is

$$r_{j,t} - r_{f,t} = \alpha_j + b_j MKT_t + s_j SMB_t^{HXZ} + i_j INV_t + r_j ROE_t + e_j EG_t + \epsilon_{j,t}. \tag{A3}$$

SY-4 Model The SY-4 model of Stambaugh and Yuan (2017) contains the MKT factor, as well as a size (SMB^{M4}) factor, a management ($MGMT$) factor, and a performance ($PERF$) factor. Both the $MGMT$ and $PERF$ factors are defined over the average ranks of stocks for several anomalies. The model equation is

$$r_{j,t} - r_{f,t} = \alpha_j + b_j MKT_t + s_j SMB_t^{SY} + m_j MGMT_t + p_j PERF_t + \epsilon_{j,t}. \tag{A4}$$

DMNU-7 Model The DMNU-7 model of DeMiguel et al. (2020) contains the MKT factor, a standardized unexpected earnings (SUE) factor, a return volatility (VOL) factor, an asset growth (AGR) factor, a short-term reversal (STR) factor, a gross profitability (GMA) factor, and a beta ($BETA$) factor. The model equation is

$$r_{j,t} - r_{f,t} = \alpha_j + b_j MKT_t + u_j SUE_t + r_j VOL_t + a_j AGR_t + t_j STR_t + g_j GMA_t + e_j BETA_t + \epsilon_{j,t}. \tag{A5}$$

Further Factors For part of the analyses, we also consider the ordinary HML and RMW factors of Fama and French (2015) as well as the (traded) liquidity factor (LIQ) of Pástor and Stambaugh (2003).

References

Avramov D, Cheng S, Hameed A (2016) Time-varying liquidity and momentum profits. *Journal of Financial and Quantitative Analysis* 51(6):1897–1923.

Baker M, Wurgler J (2007) Investor sentiment in the stock market. *Journal of Economic Perspectives* 21(2):129–152.

Baker SR, Bloom N, Davis SJ (2016) Measuring economic policy uncertainty. *Quarterly Journal of Economics* 131(4):1593–1636.

Barroso P, Detzel A (2021) Do limits to arbitrage explain the benefits of volatility-managed portfolios? *Journal of Financial Economics* 140(3):744–767.

Bollerslev T, Tauchen G, Zhou H (2009) Expected stock returns and variance risk premia. *Review of Financial Studies* 22(11):4463–4492.

Boudoukh J, Michaely R, Richardson M, Roberts MR (2007) On the importance of measuring payout yield: Implications for empirical asset pricing. *Journal of Finance* 62(2):877–915.

Campbell JY (1987) Stock returns and the term structure. *Journal of Financial Economics* 18(2):373–399.

Campbell JY, Lo AW, MacKinlay AC (1997) *The Econometrics of Financial Markets* (Princeton, NJ: Princeton University Press).

Campbell JY, Shiller RJ (1988) Stock prices, earnings, and expected dividends. *Journal of Finance* 43(3):661–676.

Campbell JY, Thompson SB (2008) Predicting excess stock returns out of sample: Can anything beat the historical average? *Review of Financial Studies* 21(4):1509–1531.

Carhart MM (1997) On persistence in mutual fund performance. *Journal of Finance* 52(1):57–82.

Chen NF, Roll R, Ross SA (1986) Economic forces and the stock market. *Journal of Business* 59(3):383–403.

Clark TE, West KD (2007) Approximately normal tests for equal predictive accuracy in nested models. *Journal of Econometrics* 138(1):291–311.

Cochrane JH (1991) Production-based asset pricing and the link between stock returns and economic fluctuations. *Journal of Finance* 46(1):209–237.

Cohen RB, Polk C, Vuolteenaho T (2003) The value spread. *Journal of Finance* 58(2):609–641.

Cooper MJ, Gutierrez Jr RC, Hameed A (2004) Market states and momentum. *Journal of Finance* 59(3):1345–1365.

DeMiguel V, Martin-Utrera A, Nogales FJ, Uppal R (2020) A transaction-cost perspective on the multitude of firm characteristics. *Review of Financial Studies* 33(5):2180–2222.

DeMiguel V, Martin-Utrera A, Uppal R (2021) What alleviates crowding in factor investing?, London Business School Working Paper.

Dow CH (1920) *Scientific Stock Speculation* (Magazine of Wall Street).

Ehsani S, Linnainmaa JT (2020) Time-series efficient factors, Tuck School of Business Working Paper.

Fama EF, French KR (1989) Business conditions and expected returns on stocks and bonds. *Journal of Financial Economics* 25(1):23–49.

Fama EF, French KR (1993) Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33(1):3–56.

Fama EF, French KR (2015) A five-factor asset pricing model. *Journal of Financial Economics* 116(1):1–22.

Fama EF, French KR (2018) Choosing factors. *Journal of Financial Economics* 128(2):234–252.

Ferson WE, Harvey CR (1991) The variation of economic risk premiums. *Journal of Political Economy* 99(2):385–415.

Fleming J, Kirby C, Ostdiek B (2003) The economic value of volatility timing using "realized" volatility. *Journal of Financial Economics* 67(3):473–509.

Frazzini A, Israel R, Moskowitz TJ (2015) Trading costs of asset pricing anomalies, Chicago Booth Working Paper.

Gormsen NJ, Jensen CS (2021) Conditional risk, Chicago Booth Working Paper.

Goyal A, Welch I (2008) A comprehensive look at the empirical performance of equity premium prediction. *Review of Financial Studies* 21(4):1455–1508.

Guo H (2004) Limited stock market participation and asset prices in a dynamic economy. *Journal of Financial and Quantitative Analysis* 3+(3):495–516.

Hameed A, Lof M, Suominen M (2017) Slow trading and stock return predictability, Aalto University Working Paper.

Hou K, Mo H, Xue C, Zhang L (2021) An augmented q-factor model with expected growth. *Review of Finance* 25(1):1–41.

Hou K, Xue C, Zhang L (2015) Digesting anomalies: An investment approach. *Review of Financial Studies* 28(3):650–705.

Kelly B, Jiang H (2014) Tail risk and asset prices. *Review of Financial Studies* 27(10):2841–2871.

Kelly B, Pruitt S (2013) Market expectations in the cross-section of present values. *Journal of Finance* 68(5):1721–1756.

Kothari SP, Shanken J (1997) Book-to-market, dividend yield, and expected market returns: A time-series analysis. *Journal of Financial Economics* 44(2):169–203.

Lamont O (1998) Earnings and expected returns. *Journal of Finance* 53(5):1563–1587.

Lettau M, Ludvigson S (2001) Resurrecting the (C)CAPM: A cross-sectional test when risk premia are time-varying. *Journal of Political Economy* 109(6):1238–1287.

Li SA, DeMiguel V, Martin-Utrera A (2020) Which factors with price-impact costs?, London Business School Working Paper.

Maio P (2016) Cross-sectional return dispersion and the equity premium. *Journal of Financial Markets* 29:87–109.

Mele A (2007) Asymmetric stock market volatility and the cyclical behavior of expected returns. *Journal of Financial Economics* 86(2):446–478.

Moreira A, Muir T (2017) Volatility-managed portfolios. *Journal of Finance* 72(4):1611–1644.

Newey WK, West KD (1987) A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica* 55(3):703–708.

Novy-Marx R, Velikov M (2016) A taxonomy of anomalies and their trading costs. *Review of Financial Studies* 29(1):104–147.

Pástor L, Stambaugh RF (2003) Liquidity risk and expected stock returns. *Journal of Political Economy* 111(3):642–685.

Rapach DE, Ringgenberg MC, Zhou G (2016) Short interest and aggregate stock returns. *Journal of Financial Economics* 121(1):46–65.

Rapach DE, Strauss JK, Zhou G (2010) Out-of-sample equity premium prediction: Combination forecasts and links to the real economy. *Review of Financial Studies* 23(2):821–862.

Rapach DE, Zhou G (2020) Time-series and cross-sectional stock return forecasting: New machine learning methods. Jurczenko E, ed., *Machine Learning in Asset Management: New Developments and Financial Applications* (Hoboken, NJ: Wiley).

Stambaugh RF, Yuan Y (2017) Mispricing factors. *Review of Financial Studies* 30(4):1270–1315.

Stock JH, Watson MW (2004) Combination forecasts of output growth in a seven-country data set. *Journal of Forecasting* 23(6):405–430.

Figure A1 Time Series of Combination-Forecast-Managed Portfolio Weights – Robustness

This figure plots the time series of the weights of different versions of the one-month combination-forecast-managed portfolio. For each single variable, we estimate Equation (1) to obtain out-of-sample market excess return forecasts. The main $COMB$ variable is the equally weighted average of the one-month market excess return forecasts (dark blue solid line). Alternatively, we also consider a median forecast combination (orange solid line with dots), a trimmed-mean forecast combination (yellow–green dashed line), and a binary (mean dummy) strategy that always uses a weight of one if the combination forecast exceeds its conditional historical average and zero otherwise (light blue dashed line). Each month, the managed portfolio invests an amount proportional to this out-of-sample market excess return forecast. For all strategies except for the mean dummy, the forecasts are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investments of the managed market portfolios (except that for the mean dummy strategy) are approximately zero. For comparison, we also depict the weight of the volatility-managed strategy for the market factor of Moreira and Muir (2017) (salmon solid line with dots), which are determined by Equation (A1). The shaded areas indicate the time periods marked as business cycle contractions by the NBER.

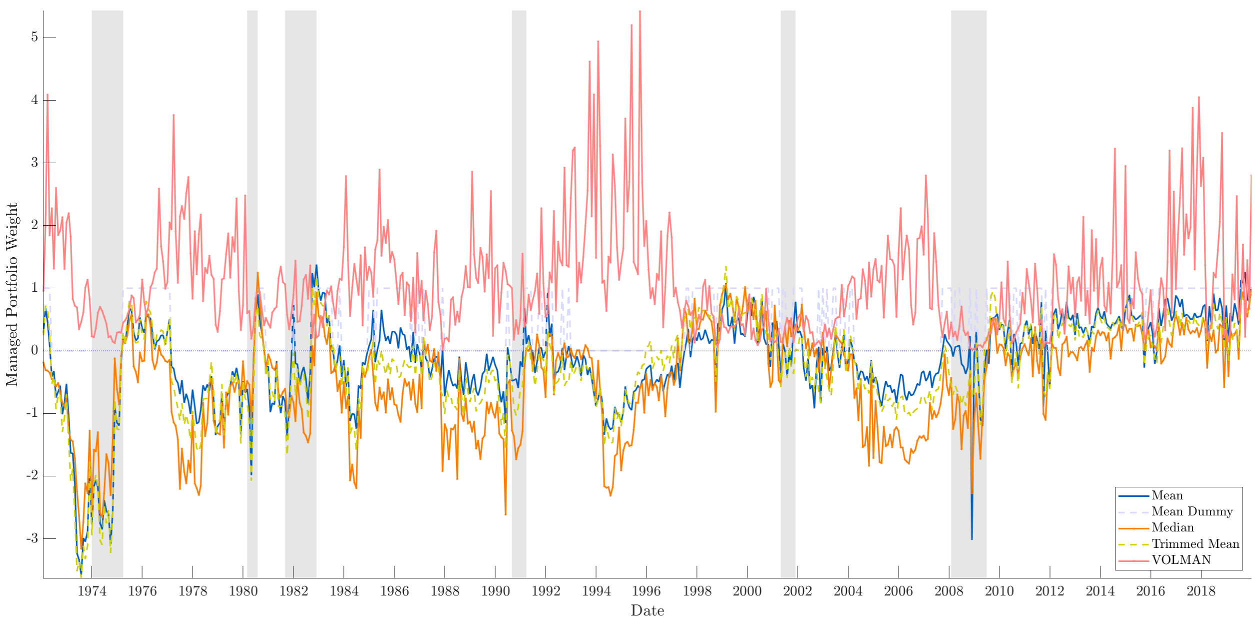

Figure A2 Cumulative SSE Differences over Time

This figure plots the out-of-sample market excess return prediction performance of the $COMB$ approach. It shows the cumulative sum of the squared prediction errors (SSE) of the recursive historical mean minus that of the main mean forecast combination. An increase in the plotted line indicates that the mean forecast combination outperforms the historical mean. A decrease occurs when the combination forecast underperforms the historical mean model. The shaded areas indicate the time periods marked as business cycle contractions by the NBER.

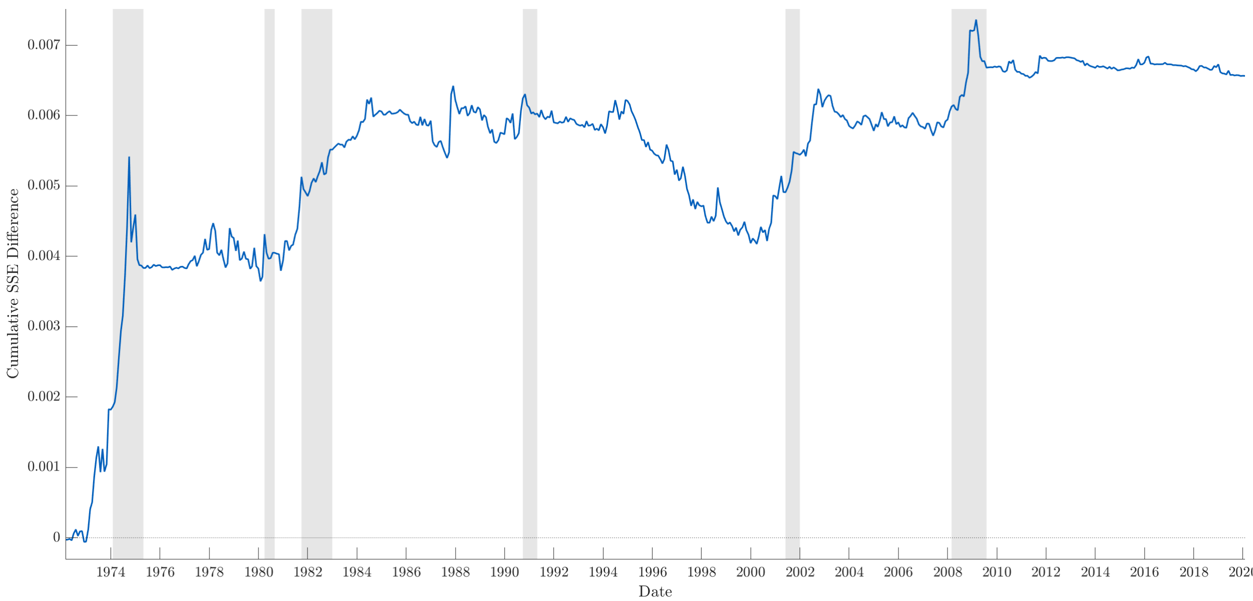

Table A1 Correlations

This table presents pairwise time-series correlations among the conventional predictor variables used to manage the market portfolio. Definitions of the predictor variables are in Section A2.

	CAY	*CR*	*DE*	*DFR*	*DFY*	*DP*	*DY*	*EFD*	*EP*	*EPU*	*IK*	*INFL*	*IPRO*	*LTR*	*LTY*	$MA_{1,12}$	$MA_{3,12}$
BM	0.64	−0.29	0.29	−0.01	0.46	0.84	0.83	0.63	0.71	0.04	0.64	0.36	−0.04	−0.01	0.16	−0.24	−0.23
CAY		−0.17	0.15	0.01	0.26	0.75	0.76	0.61	0.59	−0.18	0.54	0.32	0.01	0.02	0.78	−0.12	−0.10
CR			−0.23	0.11	−0.31	−0.29	−0.27	−0.06	−0.14	−0.26	−0.10	−0.07	0.17	−0.04	0.09	0.31	0.29
DE				0.09	0.53	0.49	0.49	0.37	−0.24	0.15	−0.18	−0.15	−0.04	−0.03	−0.26	−0.21	−0.21
DFR					0.02	−0.01	0.01	−0.02	−0.08	−0.06	−0.08	−0.05	0.04	−0.47	−0.01	0.09	0.02
DFY						0.40	0.40	0.31	0.04	0.31	0.09	0.09	−0.11	0.07	0.06	−0.26	−0.28
DP							0.99	0.65	0.73	0.04	0.53	0.22	−0.05	−0.02	−0.06	−0.24	−0.24
DY								0.66	0.73	0.02	0.52	0.21	−0.04	−0.01	−0.06	−0.20	−0.22
EFD									0.18	0.02	−0.09	0.03	−0.04	0.10	0.45	0.05	0.06
EP										−0.13	0.62	0.32	−0.03	−0.00	0.14	−0.10	−0.10
EPU											−0.28	−0.21	−0.22	0.10	−0.38	−0.35	−0.35
IK												0.40	−0.07	0.01	0.57	−0.16	−0.14
INFL													−0.03	−0.05	0.39	−0.11	−0.07
IPRO														0.01	−0.02	0.09	0.13
LTR															0.05	−0.05	−0.04
LTY																−0.01	0.00
$MA_{1,12}$																	0.80

continued below

	MOM_6	*NTIS*	*RD*	*RREL*	*RSI*	*RVOL*	*SENT*	*SVAR*	*TBL*	*TMS*	*TR*	*VIX*	*VRP*	*VS*	*COMB*	$COMB_{Fac}$
BM	−0.20	0.02	0.21	0.02	−0.41	0.35	−0.31	0.20	0.18	−0.08	−0.04	0.04	−0.06	0.15	−0.24	−0.54
CAY	−0.08	0.09	−0.14	0.04	−0.05	0.13	−0.13	0.00	0.69	−0.08	0.24	0.22	0.17	−0.52	−0.30	−0.42
CR	0.29	0.02	−0.16	0.09	−0.24	−0.27	−0.04	−0.25	0.13	−0.14	0.04	−0.79	−0.12	−0.14	0.23	0.30
DE	−0.15	0.14	0.46	−0.23	0.13	0.56	−0.02	0.39	−0.32	0.20	−0.02	0.34	0.13	0.52	0.01	0.00
DFR	0.07	0.02	0.09	−0.04	−0.06	0.07	−0.03	−0.08	−0.04	0.08	0.06	−0.15	0.07	0.03	0.10	0.30
DFY	−0.23	−0.18	0.53	−0.23	−0.08	0.75	−0.03	0.57	−0.07	0.29	0.25	0.56	−0.03	0.59	0.16	−0.19
DP	−0.19	0.22	0.26	−0.01	−0.33	0.32	−0.24	0.19	−0.00	−0.12	−0.03	0.06	−0.05	0.25	−0.27	−0.52
DY	−0.16	0.22	0.28	−0.01	−0.33	0.32	−0.25	0.16	−0.00	−0.12	0.01	0.00	−0.05	0.25	−0.24	−0.47
EFD	0.09	0.06	−0.13	−0.21	0.05	0.23	0.01	−0.03	0.23	0.35	0.17	0.11	0.13	−0.13	−0.01	−0.19
EP	−0.10	0.14	−0.07	0.17	−0.39	−0.09	−0.21	−0.09	0.25	−0.29	−0.01	−0.31	−0.19	−0.13	−0.26	−0.47
EPU	−0.34	−0.20	0.12	−0.26	−0.27	0.19	−0.13	0.32	−0.41	0.13	−0.14	0.35	−0.05	0.37	0.34	−0.06
IK	−0.15	0.13	0.06	0.20	−0.34	−0.11	0.00	−0.07	0.77	−0.63	−0.09	0.02	−0.01	−0.40	−0.26	−0.38
INFL	−0.08	0.09	−0.04	0.20	−0.15	0.06	−0.14	−0.07	0.46	−0.22	0.06	−0.12	0.07	−0.18	−0.37	−0.32
IPRO	0.13	−0.06	0.04	0.13	−0.01	−0.00	−0.04	−0.08	−0.02	0.01	−0.00	−0.22	0.05	0.05	−0.05	0.02
LTR	−0.04	−0.06	0.00	−0.12	0.01	0.02	0.03	0.08	0.05	−0.01	0.09	0.14	0.04	−0.01	0.21	−0.10
LTY	−0.02	−0.09	−0.24	0.00	−0.10	−0.13	0.12	−0.09	0.90	0.01	0.24	0.12	0.20	−0.41	−0.29	−0.42
$MA_{1,12}$	0.82	−0.11	−0.10	0.07	−0.11	−0.17	−0.03	−0.29	−0.02	0.01	0.08	−0.58	−0.14	−0.12	0.45	0.29
$MA_{3,12}$	0.73	−0.09	−0.13	0.13	−0.12	−0.17	−0.04	−0.22	0.02	−0.03	0.02	−0.49	−0.10	−0.13	0.34	0.19
MOM_6		−0.08	−0.08	0.03	−0.09	−0.13	−0.04	−0.25	−0.03	0.03	0.08	−0.52	−0.11	−0.11	0.41	0.25
NTIS			0.11	0.03	−0.11	−0.01	−0.02	−0.03	0.02	−0.23	−0.12	−0.11	0.24	0.01	−0.22	−0.12
RD				−0.08	0.06	0.64	0.07	0.45	−0.24	0.05	0.13	0.40	0.11	0.57	0.11	0.12
RREL					−0.17	−0.20	−0.07	−0.12	0.21	−0.49	−0.10	−0.34	−0.11	−0.08	−0.52	−0.03
RSI						0.05	0.27	0.18	−0.18	0.23	−0.20	0.27	0.11	−0.13	−0.24	0.12
RVOL							−0.05	0.60	−0.21	0.23	0.10	0.66	0.34	0.59	0.20	−0.03
SENT								−0.00	0.11	−0.02	−0.07	−0.06	0.01	0.18	0.05	0.22
SVAR									−0.15	0.16	−0.02	0.73	−0.35	0.34	−0.11	−0.18
TBL										−0.42	0.14	0.03	0.17	−0.47	−0.37	−0.41
TMS											0.19	0.15	0.00	0.22	0.29	0.13
TR												−0.41	0.07	0.15	0.14	0.17
VIX													0.27	0.04	−0.07	−0.30
VRP														0.02	0.21	−0.01
VS															0.33	0.24
COMB																0.36

Table A2 Leverage Constraints

This table presents the annualized factor alphas of a managed market portfolio that uses a market excess return forecast combination (for a one-month horizon) as a conditioning variable when imposing leverage constraints. Each month, the managed portfolio invests an amount proportional to the out-of-sample market excess return forecast derived from the conditioning variable. This forecast is conditionally demeaned and the resulting managed portfolio is constructed such that its conditional standard deviation is the same as that of the market portfolio. Thus, the time-series-average investment of the managed market portfolio is approximately zero. The leverage constraints provided in the panel headings set all weights outside the presented interval to the boundary of the interval it hits. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factor models are in Section A3.

α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
No Leverage Constraints				
6.179^{**}	5.964^{***}	6.579^{***}	5.065^{**}	7.342^{***}
(2.474)	(2.719)	(3.344)	(2.152)	(2.650)
$[\pm 2]$ *Leverage Constraints*				
5.214^{***}	5.428^{***}	6.107^{***}	4.517^{**}	6.246^{***}
(2.587)	(2.889)	(3.430)	(2.302)	(2.746)
$[\pm 1]$ *Leverage Constraints*				
3.613^{***}	4.270^{***}	4.944^{***}	3.526^{**}	4.356^{***}
(2.711)	(2.870)	(3.459)	(2.375)	(2.888)
$[0,1]$ *Leverage Constraints*				
1.558^{***}	1.677^{**}	1.867^{***}	1.385^{**}	2.011^{***}
(2.694)	(2.434)	(2.700)	(2.162)	(3.303)

Table A3 Factor Exposures of Managed Market Portfolios

This table presents the exposures of the managed market portfolios based on single conventional predictor variables to different model factors. Each month, the managed portfolios invest an amount proportional to the realization of the conditioning variable *[name in row]* during the previous month. All conditioning variables are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment of the managed market portfolio is approximately zero for each conditioning variable. The body of the table presents the factor loadings estimated using Equation (4). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively, based on robust Newey and West (1987) standard errors using six lags. Definitions of the conditioning variables are in Section A2, those of the factor models are in Section A3.

	CAPM	FF-6 Model						HMXZ-5 Model				
	MKT	MKT	SMB	HML^{M}	RMW^{Cash}	CMA	WML	MKT	SMB^{HXZ}	INV	ROE	EG
BM	−0.188	−0.088	0.263*	−0.230	−0.145	0.744***	0.410*	−0.151	0.113	0.320**	0.625***	−0.355
CAY	−0.155	−0.029	0.303**	−0.268*	−0.051	0.794***	0.483**	−0.052	0.270**	0.169	0.615***	0.305
CR	−0.686***	−0.624***	0.046	−0.137	0.107	0.213	0.185	−0.633***	0.088	−0.114	0.106	0.412**
DE	−0.298	−0.218	−0.073	1.106*	0.177	0.056	−0.344	−0.158	−0.078	0.769*	−0.755*	0.556*
DFR	−0.369*	−0.357**	−0.155	−0.454**	−0.127	−0.024	0.278	−0.345**	−0.077	−0.269	0.190	0.166
DFY	0.571***	0.615***	0.205	0.686*	0.118	0.310	−0.263	0.615***	0.076	0.510**	−0.208	0.023
DP	−0.297	−0.120	0.296*	−0.046	−0.075	1.029***	0.481*	−0.183	0.141	0.557***	0.706***	−0.146
DY	−0.336	−0.161	0.338*	−0.035	−0.074	1.058***	0.478	−0.221	0.175	0.566***	0.685***	−0.097
EFD	−0.560***	−0.521***	0.047	0.293**	0.087	0.117	0.007	−0.503***	0.092	0.348**	0.191	−0.111
EP	−0.160	−0.019	0.306*	−0.569*	−0.108	0.938***	0.640**	−0.117	0.193	0.141	1.057***	−0.372
EPU	0.431*	0.306	−0.070	0.312	−0.221	−0.368*	−0.113	0.352	−0.100	0.379*	−0.229	−0.577**
IK	−0.417**	−0.512**	0.220	−0.347**	−0.116	0.338	−0.387	−0.529**	0.111	−0.555***	0.548***	−0.411**
$INFL$	0.021	0.048	0.062	−0.413	−0.167	0.321**	0.271	0.035	−0.024	−0.193	0.236	0.066
$IPRO$	−0.297**	−0.193*	−0.091	−0.542**	0.029	0.096	0.673***	−0.239*	0.015	−0.012	0.433***	0.073
LTR	0.134	0.136	−0.117	0.077	−0.098	−0.063	0.007	0.128	−0.117	0.076	−0.103	−0.144
LTY	0.147	0.238	0.264**	−0.513**	−0.021	0.785***	0.340	0.190	0.167	−0.135	0.872***	−0.046
$MA_{1,12}$	−0.214*	−0.099	0.165**	−0.065	0.363***	0.273**	0.289**	−0.132	0.236***	0.088	0.315**	0.411***
$MA_{3,12}$	−0.177	−0.080	0.117	0.003	0.447***	0.195	0.106	−0.120	0.192**	−0.009	0.358***	0.281**
MOM_{6}	−0.202*	−0.116	0.221***	−0.185	0.193**	0.297**	0.368**	−0.149	0.249***	0.057	0.276**	0.313**
$NTIS$	−0.801***	−0.784***	0.103	−0.304	0.001	0.006	0.344	−0.811***	0.125	0.068	0.181	−0.111
RD	0.170	−0.007	−0.328*	0.186	−0.040	−0.526**	−0.934***	0.062	−0.395**	−0.518**	−0.483***	−0.243
$RREL$	−0.115	−0.057	0.226*	−0.238	0.081	0.265*	0.359*	−0.103	0.255**	0.031	0.363***	0.053
RSI	0.409**	0.368*	−0.182	0.109	0.009	−0.491**	−0.001	0.434**	−0.055	0.009	−0.334**	0.312
$RVOL$	0.409***	0.378***	−0.071	0.401**	0.041	−0.107	−0.386**	0.409***	−0.135**	0.085	−0.345*	0.021
$SENT$	0.143	0.045	−0.169**	−0.272**	−0.097	−0.326**	−0.216*	0.071	−0.130	−0.466***	0.004	−0.140
$SVAR$	0.673***	0.729**	−0.207	0.330	0.070	0.080	−0.158	0.730**	−0.248	0.301	−0.031	−0.146
TBL	−0.113	−0.073	0.302**	−0.520**	−0.021	0.754***	0.105	−0.123	0.189	−0.386**	0.868***	−0.109
TMS	0.438***	0.526***	−0.145	0.189	0.036	−0.186	0.426*	0.545***	−0.061	0.599***	−0.254*	0.203
TR	0.245**	0.286***	−0.023	−0.360*	−0.192**	0.245**	0.345**	0.293***	−0.053	−0.114	0.160	0.217
VIX	0.564***	0.519**	−0.140	0.370	0.016	−0.197	−0.169	0.559**	−0.157	0.307	−0.189	−0.198
VRP	−0.024	0.074	−0.252**	−0.476	−0.264	0.160	0.412	0.025	−0.306*	−0.193	−0.153	0.297*
VS	0.247	0.053	−0.256*	0.205	0.016	−0.782***	−0.795***	0.086	−0.320***	−0.481***	−0.681***	−0.379**
$TRRREL$	0.360**	0.343**	−0.249	−0.122	−0.273*	−0.021	−0.015	0.396**	−0.308**	−0.145	−0.202	0.165

continued on the next page

Table A3: Factor Exposures of Managed Market Portfolios (continued)

	SY-4 Model				DMNU-7 Model						
	MKT	SMB^{SY}	$MGMT$	$PERF$	MKT	SUE	VOL	AGR	STR	GMA	$BETA$
BM	−0.103	0.103	0.134	0.240**	−0.015	0.009	−0.068	−0.102	0.068	0.261	0.321
CAY	−0.037	0.161	0.187	0.343***	0.039	0.124	0.285	−0.035	−0.072	0.373***	−0.074
CR	−0.589***	0.034	0.151	0.227***	−0.535***	0.122	0.516***	−0.223	−0.268***	−0.213***	−0.411**
DE	−0.181	0.013	0.696*	−0.432	−0.230	−0.693	0.144	0.665*	−0.227	0.015	−0.250
DFR	−0.371**	−0.236**	−0.160	0.070	−0.366*	0.384**	0.353	−0.194	−0.331**	−0.131	−0.436
DFY	0.631***	0.183	0.380*	−0.147	0.654***	−0.512	−0.105	0.231	0.064	0.204	0.191
DP	−0.138	0.123	0.351*	0.273**	−0.048	0.012	0.107	0.033	0.035	0.291	0.196
DY	−0.171	0.156	0.375**	0.289**	−0.081	−0.048	0.114	0.030	−0.011	0.325	0.183
EFD	−0.488***	0.098	0.305***	−0.023	−0.491**	−0.156	0.280*	0.197	−0.043	0.092	−0.260**
EP	−0.037	0.108	0.068	0.491***	0.090	0.354	0.131	−0.297	0.136	0.246	0.258
EPU	0.300	−0.034	0.070	−0.440***	0.297	−0.405*	−0.302	0.419*	0.302*	0.068	0.223
IK	−0.539**	0.032	−0.445***	0.099	−0.472*	0.164	−0.433**	−0.656***	0.112	0.098	0.530**
$INFL$	0.044	−0.028	−0.152	0.282***	0.056	0.028	0.048	−0.260	−0.047	0.113	0.021
$IPRO$	−0.217*	−0.060	−0.023	0.334***	−0.299**	0.543***	0.290	0.015	−0.155	−0.022	−0.351
LTR	0.132	−0.076	0.049	−0.119	0.092	−0.299	0.004	0.059	0.179	0.238	−0.006
LTY	0.222	0.010	−0.147	0.517***	0.283	0.274	0.139	−0.437**	−0.120	0.297**	0.058
$MA_{1,12}$	−0.050	0.204**	0.298***	0.410***	−0.053	0.333***	0.184	0.075	−0.268***	0.029	−0.090
$MA_{3,12}$	−0.033	0.164**	0.225**	0.403***	−0.076	0.412***	0.140	−0.005	−0.188**	−0.025	−0.079
MOM_6	−0.090	0.194**	0.202**	0.318***	−0.080	0.245**	0.251*	−0.012	−0.239***	−0.025	−0.186
$NTIS$	−0.796***	0.046	−0.101	0.183*	−0.956***	0.285*	0.031	0.169	−0.062	0.083	−0.257
RD	−0.036	−0.283*	−0.540***	−0.312**	−0.146	0.039	−0.791***	−0.135	0.123	0.134	0.515***
$RREL$	−0.085	0.199*	0.024	0.210**	−0.152	0.336***	−0.099	0.071	−0.120	−0.039	0.016
RSI	0.366*	−0.058	−0.090	−0.097	0.310	0.137	0.037	0.267*	0.015	−0.002	−0.196
$RVOL$	0.386***	−0.063	0.001	−0.135	0.355**	−0.332*	−0.312*	0.179	0.029	0.198*	0.245
$SENT$	0.008	−0.187**	−0.439***	−0.082	0.029	0.138	0.104	−0.353***	0.023	−0.210***	−0.186
$SVAR$	0.716**	−0.212	0.124	−0.103	0.645**	−0.122	−0.630***	0.238	0.259*	0.406	0.678**
TBL	−0.094	0.037	−0.264*	0.452***	−0.028	0.278	−0.022	−0.613***	−0.091	0.210	0.202
TMS	0.543***	−0.015	0.344**	−0.025	0.509***	−0.085	0.348**	0.544***	−0.017	0.092	−0.371**
TR	0.320***	−0.123	0.034	0.203***	0.445***	−0.159	0.383***	−0.302**	−0.275***	0.073	−0.199
VIX	0.549**	−0.106	0.124	−0.180	0.458**	−0.423**	−0.397***	0.389**	0.259**	0.399**	0.334*
VRP	0.134	−0.322**	0.087	0.199	0.015	−0.155	0.120	−0.290	−0.063	−0.037	−0.077
VS	0.023	−0.186	−0.517***	−0.364***	−0.061	−0.223	0.066	−0.407**	−0.021	−0.507***	−0.394**
$TRRREL$	0.406**	−0.322**	0.010	−0.007	0.596***	−0.495***	0.482***	−0.373*	−0.155	0.112	−0.215

Table A4 Factor-Managed Market Portfolios – Volatility-Adjusted

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest an amount proportional to the excess return of the factor *[name in row]* during the previous month divided by its realized volatility during the same period. All forecasts are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment is approximately zero for each factor-managed market portfolio. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
MKT	1.200	3.546*	3.853*	2.103	2.501	4.974**
	(0.651)	(1.913)	(1.891)	(0.936)	(1.165)	(2.277)
SMB	0.695	1.909	3.046	2.591	2.961	1.728
	(0.451)	(1.070)	(1.553)	(1.315)	(1.413)	(0.911)
HML	−3.529*	−3.169*	−2.404	−3.787	−1.863	−5.362**
	(−1.890)	(−1.685)	(−1.112)	(−1.539)	(−0.882)	(−2.109)
WML	−2.628	−2.772	−4.185	−4.529	−4.710*	−4.123*
	(−1.244)	(−1.214)	(−1.513)	(−1.530)	(−1.687)	(−1.696)
RMW	−1.618	−1.766	−0.663	−0.181	0.105	−0.784
	(−0.953)	(−1.035)	(−0.330)	(−0.085)	(0.052)	(−0.380)
CMA	−4.400**	−5.367***	−5.477**	−5.742**	−5.035**	−6.846***
	(−2.260)	(−2.609)	(−2.240)	(−2.082)	(−1.968)	(−2.732)
SMB^{HXZ}	1.298	2.507	3.426*	3.301*	3.166	1.942
	(0.862)	(1.432)	(1.855)	(1.726)	(1.590)	(1.066)
INV	−5.014**	−5.438**	−5.083*	−5.372*	−3.907	−5.945**
	(−2.516)	(−2.547)	(−1.934)	(−1.961)	(−1.453)	(−2.363)
ROE	−2.108	−2.140	−1.903	−0.673	−2.147	−1.044
	(−0.979)	(−1.008)	(−0.763)	(−0.289)	(−0.814)	(−0.545)
EG	−5.568***	−6.561***	−6.829**	−5.315*	−6.721**	−6.392**
	(−2.796)	(−2.929)	(−2.538)	(−1.803)	(−2.377)	(−2.493)
LIQ	1.461	1.897	3.589	1.826	3.119	3.118
	(0.595)	(0.657)	(1.095)	(0.615)	(0.967)	(0.983)
HML^{M}	−1.887	−1.542	0.583	−0.758	1.546	−2.283
	(−1.010)	(−0.811)	(0.259)	(−0.327)	(0.668)	(−1.030)
RMW^{Cash}	−6.137***	−6.772***	−6.286**	−5.913**	−5.873**	−6.187***
	(−2.936)	(−3.361)	(−2.546)	(−2.286)	(−2.334)	(−2.917)
SMB^{SY}	0.349	1.589	2.186	1.641	2.174	0.836
	(0.206)	(0.821)	(1.103)	(0.797)	(1.030)	(0.417)
$MGMT$	−4.442**	−6.006***	−6.125***	−5.920**	−5.314**	−7.853***
	(−2.202)	(−3.077)	(−2.789)	(−2.436)	(−2.449)	(−3.373)
$PERF$	−3.857**	−3.686**	−3.563	−2.335	−3.970	−3.016
	(−2.166)	(−2.089)	(−1.579)	(−0.966)	(−1.631)	(−1.567)

Table A5 Sample Splits

For various sample splits, this table presents the annualized factor alphas of a managed market portfolio that uses a market excess return forecast combination (for a one-month horizon) as a conditioning variable. Each month, the managed portfolio invests an amount proportional to the out-of-sample market excess return forecast derived from the conditioning variable. This forecast is conditionally demeaned and the resulting managed portfolio is constructed such that its conditional standard deviation is the same as that of the market portfolio. Thus, the time-series-average investment of the managed market portfolio is approximately zero. The sample splits are imposed using dummy variables. For the first panel, we consider a split in the middle of the sample period (1995). The following two panels separate observations during the years indicated in the panel headings from the remaining period. The final panel splits into recession and expansion periods, as identified by the NBER. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factor models are in Section A3.

	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
Sample Split					
First Half	7.758^{*}	7.087^{*}	8.519^{**}	6.496^{*}	9.688^{**}
	(1.929)	(1.912)	(2.497)	(1.683)	(2.232)
Second Half	4.713^{**}	5.018^{**}	5.028^{**}	3.775^{*}	5.434^{**}
	(2.294)	(2.472)	(2.525)	(1.876)	(2.397)
Excluding the Oil Crisis (1973–1975)					
Oil Crisis	36.21^{*}	33.44	35.63^{*}	34.47^{*}	41.80^{**}
	(1.753)	(1.605)	(1.714)	(1.664)	(2.103)
Remaining Period	4.081^{**}	4.158^{**}	4.917^{***}	3.006^{*}	5.334^{**}
	(2.528)	(2.509)	(3.010)	(1.861)	(2.423)
Excluding Further Crisis Periods (1973–1975 and 1982–1984)					
Crisis Periods	24.98^{**}	23.40^{**}	25.19^{**}	23.16^{*}	30.03^{**}
	(2.109)	(2.013)	(2.166)	(1.932)	(2.502)
Remaining Period	3.422^{**}	3.669^{**}	4.433^{***}	2.649^{*}	4.680^{**}
	(2.160)	(2.257)	(2.635)	(1.658)	(2.220)
Recessions vs. Expansions					
Recessions	19.47^{*}	20.71^{*}	19.88^{*}	19.01^{*}	22.69^{**}
	(1.659)	(1.877)	(1.784)	(1.655)	(1.988)
Expansions	4.207^{**}	3.707^{**}	4.890^{***}	2.985^{*}	5.315^{**}
	(2.339)	(2.238)	(2.830)	(1.813)	(2.226)

Table A6 Sample Splits – Business Cycles

For the NBER Business Cycles (peak to peak) during our sample period, this table presents the annualized factor alphas of a managed market portfolio that uses a market excess return forecast combination (for a one-month horizon) as a conditioning variable. Each month, the managed portfolio invests an amount proportional to the out-of-sample market excess return forecast derived from the conditioning variable. This forecast is conditionally demeaned and the resulting managed portfolio is constructed such that its conditional standard deviation is the same as that of the market portfolio. Thus, the time-series-average investment of the managed market portfolio is approximately zero. The sample splits are imposed using dummy variables for different business cycles from after the previous peak to the next peak, as reported by the NBER. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factor models are in Section A3.

α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
Until November 1973 Peak				
20.25*	14.86	17.52*	18.32*	22.48**
(1.837)	(1.484)	(1.656)	(1.711)	(1.967)
December 1973–January 1980 Peak				
9.897	9.019	10.87	8.684	11.64
(0.851)	(0.839)	(1.051)	(0.795)	(1.070)
February 1980–July 1981 Peak				
12.86**	15.17**	15.61**	12.96*	13.43**
(2.075)	(2.196)	(2.095)	(1.777)	(1.982)
August 1981–July 1990 Peak				
5.357	4.810	5.652	3.285	7.556
(1.277)	(1.109)	(1.335)	(0.746)	(1.479)
August 1991–March 2001 Peak				
0.696	−0.427	1.145	−1.234	0.895
(0.285)	(−0.180)	(0.434)	(−0.502)	(0.330)
April 2001–December 2007 Peak				
1.540	1.855	2.384	1.047	3.123
(0.864)	(0.780)	(1.152)	(0.539)	(1.146)
From January 2008				
9.193***	10.11***	9.002***	8.386***	9.304***
(3.136)	(3.298)	(3.047)	(2.860)	(3.067)

Table A7 Extended Sample Period

This table summarizes the performance of the managed market portfolios during the COVID-19 crisis in the year 2020. That is, we present the results for an expanded sample period including 2020 (1972–2020) as well as the alpha of the strategies in 2020 only. The managed market portfolios use market excess return forecast combinations (for a one-month horizon) based on economic predictor variables (Panel A) and factor returns (Panel B) as conditioning variables. Each month, the managed portfolios invest an amount proportional to these out-of-sample market excess return forecasts. These forecasts are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investments of the managed market portfolios is approximately zero. The reported alphas are the outcomes of estimating the regression in Equation (3). The 2020 results are based on a separate regression with a 2020 dummy variable (as well as one for the remaining period). The considered models include the CAPM, the Fama and French (2018) 6-factor model (FF-6*), the Hou et al. (2021) 5-factor model (HMXZ-5), the Stambaugh and Yuan (2017) 4-factor model (SY-4), and the DeMiguel et al. (2020) 7-factor model (DMNU-7). In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factor models are in Section A3.

Panel A. The Combination-Forecast-Managed Market Portfolio

	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
Mean Forecast Combination					
1972–2020	5.364*	4.674*	8.010***	4.321*	7.250**
	(1.856)	(1.753)	(3.141)	(1.705)	(2.225)
2020	−20.89	−21.65	−23.07	−18.43	−22.41
	(−0.253)	(−0.254)	(−0.288)	(−0.230)	(−0.287)
Binary Managing with Mean Forecast Combination					
1972–2020	2.565**	2.778**	3.819***	2.188*	3.124***
	(2.355)	(2.282)	(3.155)	(1.854)	(2.613)
2020	0.424	−0.149	−0.205	1.430	−0.248
	(0.024)	(−0.008)	(−0.013)	(0.088)	(−0.015)
Median Forecast Combination					
1972–2020	4.324**	4.399**	8.504***	4.112**	7.289***
	(2.014)	(2.113)	(3.580)	(1.977)	(3.103)
2020	53.88	53.17	51.61*	54.56*	52.17
	(1.595)	(1.584)	(1.701)	(1.691)	(1.636)
Trimmed-Mean Forecast Combination					
1972–2020	5.745**	4.513*	8.048***	4.385*	7.388**
	(2.148)	(1.923)	(3.237)	(1.778)	(2.484)
2020	47.82	47.76	45.48	50.09	45.51
	(1.210)	(1.234)	(1.251)	(1.381)	(1.249)

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Table A7: Extended Sample Period (continued)

Panel B. The Factor-Combination-Forecast-Managed Market Portfolio

	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
Mean Forecast Combination (Factors)					
1972–2020	4.465*	6.610***	6.030***	6.786***	7.726***
	(1.838)	(3.062)	(2.981)	(2.868)	(2.685)
2020	0.447	−1.083	−6.657	1.914	−5.437
	(0.012)	(−0.026)	(−0.179)	(0.051)	(−0.166)
Binary Managing with Mean Forecast Combination (Factors)					
1972–2020	2.673***	3.405***	3.764***	3.204***	3.992***
	(2.773)	(3.177)	(3.017)	(3.014)	(3.455)
2020	12.15	12.43	9.961	13.53	10.58
	(0.834)	(0.850)	(0.738)	(0.968)	(0.817)
Median Forecast Combination (Factors)					
1972–2020	3.734*	5.459***	5.693***	5.592***	6.672**
	(1.665)	(2.707)	(2.949)	(2.648)	(2.517)
2020	5.807	4.574	−0.451	7.630	1.243
	(0.189)	(0.136)	(−0.015)	(0.251)	(0.047)
Trimmed-Mean Forecast Combination (Factors)					
1972–2020	4.458**	6.214***	5.618***	6.294***	7.382***
	(1.972)	(3.052)	(2.994)	(2.857)	(2.719)
2020	−0.246	−1.547	−6.955	1.056	−6.401
	(−0.007)	(−0.041)	(−0.205)	(0.031)	(−0.216)

Table A8 Robustness Checks

For various different robustness analyses, this table presents the annualized factor alphas of a managed market portfolio that uses different types of market excess return forecast combinations as conditioning variables. In addition, for alternatives that structurally deviate from the main $COMB$ approach, the table shows the time-series out-of-sample return and volatility prediction evaluation measures of these market excess return forecast combinations. Each month, the managed portfolios invest an amount proportional to the out-of-sample market excess return forecast derived from the forecast combinations. The forecasts are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series average of the investments of the managed market portfolios is approximately zero. We consider several robustness tests including (i) also accounting for transaction costs. (ii) We analyze several alternative factor model specifications, augmenting the benchmark models with volatility-managed factors as in Moreira and Muir (2017), using time-series efficient factors as in Ehsani and Linnainmaa (2020), augmenting the models with the conditional risk factor of Gormsen and Jensen (2021), and excluding the market factor from the benchmark models. Furthermore, (iii) we consider alternative forecast combinations based on various different methods (details for both are indicated by the respective panel headings), (iv) a forecast combination for an alternative twelve-month instead of the one-month horizon, and (v) an alternative variable subset. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{OOS} and ΔCER denote the out-of-sample R^2 and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the one-month market excess return. $R^2_{OOS,\sigma}$ is the equivalent out-of-sample R^2 statistic for predicting the one-month volatility. The statistical inference for the return prediction out-of-sample R^2s is based on the MSPE-adjusted test statistic of Clark and West (2007), that for volatility prediction uses the bootstrap approach of Goyal and Welch (2008). Below the $R^2_{OOS,\sigma}$, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factor models are in Section A3.

Cross-Sectional Evaluation					Time-Series Evaluation		
α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{OOS}	ΔCER	$R^2_{OOS,\sigma}$
Transaction Costs							
Accounting for Transaction Costs (1bp)							
6.146**	5.931***	6.546***	5.032**	7.309***			
(2.462)	(2.704)	(3.328)	(2.138)	(2.638)			
Accounting for Transaction Costs (10bp)							
5.850**	5.629**	6.246***	4.737**	7.015**			
(2.346)	(2.570)	(3.184)	(2.015)	(2.533)			
Accounting for Transaction Costs (10bp), Futures Rolling, and LIBOR Rates							
5.654**	5.408**	6.049***	4.539*	6.804**			
(2.279)	(2.483)	(3.106)	(1.940)	(2.468)			

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Table A8: Robustness Checks (continued)

	Cross-Sectional Evaluation					Time-Series Evaluation		
	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{OOS}	ΔCER	$R^2_{OOS,\sigma}$
Alternative Factor Model Specifications								
Volatility-Managed Factor Models								
	5.936**	5.850***	6.782***	4.705**	7.237***			
	(2.573)	(2.871)	(3.660)	(2.141)	(2.926)			
Time-Series Efficient Factor Models								
	5.049**	4.046**	3.456*	3.290*	5.626***			
	(2.216)	(2.073)	(1.851)	(1.733)	(2.615)			
CR-Augmented Factor Models								
	5.540**	5.822***	7.212***	5.323**	6.515***			
	(2.416)	(2.656)	(3.592)	(2.193)	(2.822)			
Models Without the Market Factor								
	3.893*	1.836	1.353	0.836	5.604**			
	(1.793)	(0.881)	(0.578)	(0.392)	(2.582)			
Alternative Forecast Combinations								
DMSPE Forecast Combination								
	5.700**	4.952**	5.641***	3.853*	6.680**	0.505**	0.344	0.353*
	(2.499)	(2.378)	(2.957)	(1.785)	(2.534)			*no*
Combination Adaptive Elastic Net (Full)								
	4.424**	2.963	3.710	1.592	5.451*	0.768**	0.651	−0.092
	(2.260)	(1.285)	(1.436)	(0.706)	(1.783)			*no*
Combination Adaptive Elastic Net								
	2.461	−0.257	1.056	−1.335	2.137	0.590**	0.410	−0.167
	(1.533)	(−0.138)	(0.547)	(−0.710)	(0.974)			*no*
Alternative Forecast Horizon								
Twelve-Month Forecast Window								
	4.512*	8.060**	10.71***	8.305**	6.329**	3.498**	−0.062	0.576**
	(1.708)	(2.411)	(3.233)	(2.574)	(2.415)			*no*
Alternative Variable Subsets								
Without VRP Variable								
	4.972*	4.462*	5.384***	3.975	5.693*	0.452**	0.260	1.707**
	(1.880)	(1.889)	(2.662)	(1.596)	(1.888)			*no*

Table A9 The Combination-Forecast-Managed Market Portfolio and Anomalies

This table presents the annualized alphas and factor sensitivities of the managed market portfolio that uses a market excess return forecast combination as a conditioning variable. Each month, the managed portfolio invests an amount proportional to the out-of-sample market excess return forecast derived from the conditioning variable. This forecast is conditionally demeaned and the resulting managed portfolio is constructed such that its conditional standard deviation is the same as that of the market portfolio. Thus, the time-series-average investment of the managed market portfolio is approximately zero. The table presents the results of a time-series regression of the managed market portfolio return on a constant, the return on the market portfolio, as well as that of the anomaly portfolio *[name in row]*. We use all anomalies of Novy-Marx and Velikov (2016) using the exact same anomaly names as the authors. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

	α		MKT		$ANOM$	
Size	6.203**	(2.353)	−0.396***	(−2.681)	−0.031	(−0.438)
Gross Profitability	6.513**	(2.244)	−0.401***	(−2.815)	−0.087	(−0.741)
Value	6.328**	(2.569)	−0.403***	(−2.940)	−0.026	(−0.333)
ValProf	6.725***	(2.653)	−0.408***	(−2.942)	−0.056	(−0.882)
Accruals	5.569**	(2.140)	−0.381***	(−2.787)	0.150	(1.509)
Net Issuance RebalA	7.945**	(2.291)	−0.434***	(−2.722)	−0.173	(−1.402)
Asset Growth	6.159**	(2.523)	−0.400***	(−2.954)	−0.002	(−0.027)
Investment	5.237**	(2.238)	−0.384***	(−2.880)	0.124	(1.467)
Piotroski's F-Score	6.475**	(2.324)	−0.423***	(−2.745)	−0.074	(−1.337)
Asset Turnover	6.604**	(2.378)	−0.389***	(−2.877)	−0.118	(−1.549)
Gross Margins	6.122**	(2.237)	−0.397***	(−2.621)	0.027	(0.215)
Ohlson's O-Score	5.189*	(1.767)	−0.371**	(−2.361)	0.043	(0.647)
Net Issuance RebalM	6.930**	(2.095)	−0.420***	(−2.613)	−0.094	(−0.713)
Return-on-Book Equity	6.664**	(1.988)	−0.426***	(−2.592)	−0.115	(−1.289)
Failure Probability	5.477*	(1.692)	−0.389**	(−2.272)	−0.004	(−0.065)
ValMomProf	4.680*	(1.877)	−0.381***	(−2.802)	0.078	(1.422)
ValMom	5.437**	(2.264)	−0.385***	(−2.926)	0.054	(0.771)
Idiosyncratic Volatility	6.105*	(1.955)	−0.397**	(−2.274)	0.003	(0.048)
Momentum	5.290*	(1.925)	−0.385***	(−2.682)	0.050	(1.251)
PEAD (SUE)	5.280*	(1.651)	−0.386***	(−2.626)	0.016	(0.152)
PEAD (CAR3)	5.387*	(1.675)	−0.387***	(−2.609)	0.003	(0.036)
Long-Run Reversals	6.057**	(2.342)	−0.401***	(−2.768)	0.021	(0.329)
Return on Market Equity	6.050**	(2.070)	−0.402***	(−2.759)	−0.040	(−0.602)
Return on Assets	5.868*	(1.885)	−0.403**	(−2.502)	−0.049	(−0.648)
Beta Arbitrage	6.627**	(2.179)	−0.395***	(−2.898)	−0.068	(−0.742)
Industry Momentum	5.771**	(2.282)	−0.391***	(−2.823)	0.034	(1.061)
Industry Relative Reversals	7.081**	(2.582)	−0.361**	(−2.562)	−0.109**	(−2.092)
Highfrequency Combo	5.649**	(2.157)	−0.402***	(−2.839)	0.030	(0.482)
Short-Run Reversals	6.268**	(2.312)	−0.371**	(−2.559)	−0.072*	(−1.899)
Seasonality	6.279**	(2.140)	−0.398***	(−2.862)	−0.015	(−0.178)
Industry-Relative Reversals (Low Volatility)	7.595***	(2.604)	−0.373***	(−2.757)	−0.127	(−1.536)
Highfrequency Combo wHS	6.421**	(2.091)	−0.397***	(−2.873)	−0.017	(−0.205)

Table A10 Managed Factor Portfolios

This table presents the annualized average returns, and factor alphas of managed factor portfolios (of the respective factors *[names in row]*) that use factor-return forecast combinations (for a one-month horizon) as conditioning variables. Each month, the managed portfolios invest an amount proportional to the out-of-sample factor-return forecast derived from the one-month mean forecast combination for the respective factor. All forecasts are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the corresponding factor portfolio. Thus, the time-series-average investment of each managed factor portfolio is approximately zero. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{OOS} and ΔCER denote the out-of-sample R^2 and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the factor excess return. The statistical inference for the return prediction out-of-sample R^2s is based on the MSPE-adjusted test statistic of Clark and West (2007). $R^2_{IS,\sigma}$ and $R^2_{OOS,\sigma}$ are the equivalent in-sample and out-of-sample R^2 statistics for predicting the future one-month factor volatility with the respective mean return forecasts. The statistical inference for the volatility predictability in-sample and out-of-sample R^2s is based on the bootstrap approach of Goyal and Welch (2008). In parentheses below the in-sample R^2s, we present the in-sample t-statistics. Below the out-of-sample R^2s, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factor models are in Section A3.

	Cross-Sectional Evaluation						Time-Series Evaluation			
	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{OOS}	ΔCER	$R^2_{IS,\sigma}$	$R^2_{OOS,\sigma}$
SMB	2.958*	2.499	−1.261	−0.823	−0.267	−0.519	0.420*	0.800	0.250***	−0.544
	(1.665)	(1.412)	(−0.606)	(−0.401)	(−0.146)	(−0.204)			(0.589)	*no*
HML	1.920	2.687	2.643**	2.272*	2.062	6.185***	−0.027	0.060	0.782**	0.034***
	(1.274)	(1.595)	(2.009)	(1.761)	(1.559)	(2.771)			(1.243)	*yes*
WML	−0.628	−3.062	0.154	1.394	0.957	4.988	0.398*	1.219	0.342	−0.013
	(−0.156)	(−0.971)	(0.034)	(0.376)	(0.155)	(0.801)			(−0.796)	*yes*
RMW	3.024**	3.985***	0.755	0.629	−0.012	3.969**	0.157	0.761	0.631***	0.427***
	(2.206)	(2.908)	(0.676)	(0.568)	(−0.008)	(2.241)			(1.096)	*yes*
CMA	0.967	1.226	0.610	−0.124	0.323	1.295	0.568*	0.098	1.658***	0.059***
	(1.366)	(1.340)	(0.852)	(−0.230)	(0.396)	(1.438)			(3.489)	*yes*
SMB^{HXZ}	0.752	1.154	−0.158	0.331	0.609	−0.495	−0.058	0.434	0.071***	0.774***
	(0.494)	(0.710)	(−0.100)	(0.209)	(0.395)	(−0.233)			(0.459)	*no*
INV	0.153	0.141	1.847*	0.304	1.460	2.595**	0.407*	0.000	0.294***	0.903***
	(0.141)	(0.108)	(1.683)	(0.352)	(1.194)	(2.304)			(−0.783)	*yes*
ROE	0.450	0.919	−0.971	−2.035	−0.859	−0.870	−0.111	0.000	0.663***	1.290***
	(0.385)	(0.913)	(−0.830)	(−1.296)	(−0.595)	(−0.637)			(1.297)	*no*
EG	0.185	0.433	−2.209*	−0.593	−1.233	−1.451	0.604**	0.000	0.891***	−0.454
	(0.154)	(0.318)	(−1.829)	(−0.457)	(−0.905)	(−1.141)			(1.372)	*no*
LIQ	0.981	0.650	−0.126	1.434	0.897	1.974	−0.370	−0.291	2.730***	1.316**
	(0.645)	(0.402)	(−0.081)	(0.972)	(0.583)	(1.050)			(1.969)	*yes*
HML^{M}	3.695*	3.632*	3.770*	4.993**	3.827**	8.542***	0.368*	0.303	0.169	0.346**
	(1.924)	(1.864)	(1.930)	(2.238)	(2.078)	(3.095)			(0.634)	*no*
RMW^{Cash}	1.666	2.391**	0.024	0.056	−0.076	2.122*	−0.234	−0.240	2.331***	0.883***
	(1.620)	(2.331)	(0.034)	(0.073)	(−0.071)	(1.779)			(3.043)	*yes*
SMB^{SY}	−0.580	−0.283	−0.743	−0.820	0.272	−2.159	0.342	0.099	0.017***	1.191***
	(−0.560)	(−0.264)	(−0.705)	(−0.778)	(0.294)	(−1.373)			(0.201)	*no*
$MGMT$	3.126***	4.435***	0.447	0.133	−0.012	2.806**	0.227	−0.021	0.551*	0.015**
	(3.238)	(4.179)	(0.596)	(0.159)	(−0.014)	(2.520)			(1.127)	*yes*
$PERF$	2.026	4.367*	−1.964	−1.986	−3.787*	0.377	−0.097	−0.169	0.183	2.759**
	(0.866)	(1.840)	(−0.698)	(−0.704)	(−1.743)	(0.116)			(0.841)	*yes*

Table A11 Single Variable Binary Managing

This table presents the annualized average returns and factor model alphas of various managed market portfolios. Each month, the managed portfolios invest in the market portfolio either with a weight of one or zero, depending on whether the realization of the conditioning variable *[name in row]* during the previous month exceeds its conditional average or not. In parentheses are the *t*-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the predictor variables are in Section A2, those of the factor models are in Section A3.

	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
BM	0.836	−1.206	−2.444**	−2.578**	−2.548**	−1.926
	(0.629)	(−1.015)	(−2.008)	(−2.003)	(−2.077)	(−1.568)
CAY	1.642	−1.366	−3.371**	−4.735***	−3.580***	−3.048**
	(1.104)	(−1.058)	(−2.499)	(−3.584)	(−2.760)	(−2.279)
CR	2.874***	1.495	0.894	0.007	0.770	1.488
	(2.748)	(1.527)	(0.801)	(0.006)	(0.675)	(1.400)
DE	2.198	−0.387	−0.276	−0.910	−0.478	−0.136
	(1.370)	(−0.283)	(−0.167)	(−0.557)	(−0.291)	(−0.086)
DFR	5.775***	2.925**	2.725*	1.867	2.919*	2.855**
	(3.805)	(2.460)	(1.778)	(1.197)	(1.880)	(2.053)
DFY	3.038	−1.227	−2.147	−2.343	−2.585*	−2.149
	(1.518)	(−0.966)	(−1.427)	(−1.434)	(−1.722)	(−1.623)
DP	1.614	−0.682	−2.045	−2.090	−1.801	−1.110
	(1.170)	(−0.599)	(−1.614)	(−1.613)	(−1.380)	(−0.921)
DY	1.923	−0.329	−1.575	−1.642	−1.507	−0.416
	(1.397)	(−0.284)	(−1.227)	(−1.251)	(−1.151)	(−0.326)
EFD	2.014*	0.307	−0.930	−1.158	−0.635	−0.760
	(1.670)	(0.303)	(−0.780)	(−0.933)	(−0.488)	(−0.633)
EP	2.241	−0.375	−1.922	−2.122	−1.936	−2.079
	(1.497)	(−0.300)	(−1.437)	(−1.564)	(−1.461)	(−1.562)
EPU	6.769***	1.858	2.250	3.027*	2.632	1.517
	(3.450)	(1.336)	(1.406)	(1.779)	(1.564)	(0.989)
IK	0.547	−1.931	−0.369	0.329	−0.193	−1.265
	(0.401)	(−1.570)	(−0.287)	(0.226)	(−0.137)	(−0.987)
INFL	0.550	−2.697**	−3.267**	−3.627**	−3.851***	−2.363
	(0.352)	(−2.109)	(−2.164)	(−2.385)	(−2.597)	(−1.616)

continued on the next page

Table A11: Single Variable Binary Managing (continued)

	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
$IPRO$	2.844**	−0.397	−1.419	−2.297	−1.710	−1.238
	(2.040)	(−0.355)	(−1.101)	(−1.606)	(−1.371)	(−1.003)
LTR	5.585***	1.823	2.387*	3.742**	2.622*	2.023*
	(3.292)	(1.610)	(1.718)	(2.583)	(1.847)	(1.659)
LTY	2.179	−1.101	−2.900**	−4.158***	−3.148**	−2.615*
	(1.329)	(−0.822)	(−2.100)	(−3.055)	(−2.390)	(−1.933)
$MA_{1,12}$	6.855***	3.030**	0.216	−0.737	−0.579	2.050
	(4.207)	(2.294)	(0.153)	(−0.528)	(−0.412)	(1.473)
$MA_{3,12}$	5.766***	1.763	−0.874	−1.076	−1.347	0.851
	(3.369)	(1.266)	(−0.590)	(−0.700)	(−0.903)	(0.577)
MOM_6	5.465***	1.790	−0.297	−1.212	−0.902	1.332
	(3.241)	(1.333)	(−0.209)	(−0.844)	(−0.627)	(0.974)
$NTIS$	1.436	−0.579	−0.748	−1.267	−1.100	−1.423
	(1.269)	(−0.535)	(−0.597)	(−0.979)	(−0.879)	(−1.180)
RD	1.020	−2.125*	−0.486	0.099	0.230	−1.015
	(0.618)	(−1.684)	(−0.336)	(0.061)	(0.153)	(−0.773)
$RREL$	2.258	−0.657	−2.213	−1.889	−2.084	−0.797
	(1.593)	(−0.514)	(−1.559)	(−1.141)	(−1.399)	(−0.592)
RSI	4.321**	−0.501	0.864	0.236	1.248	−1.107
	(2.173)	(−0.405)	(0.623)	(0.163)	(0.893)	(−0.852)
$RVOL$	3.981**	−0.484	0.643	2.007	0.754	0.184
	(2.066)	(−0.399)	(0.455)	(1.255)	(0.527)	(0.141)
$SENT$	3.373**	−0.551	0.463	0.339	0.860	−0.088
	(2.026)	(−0.444)	(0.314)	(0.231)	(0.586)	(−0.062)
$SVAR$	2.997	−1.580	−0.366	1.258	0.199	−0.538
	(1.549)	(−1.448)	(−0.278)	(0.836)	(0.147)	(−0.436)
TBL	1.328	−1.164	−2.229*	−2.919**	−2.302*	−1.961
	(0.898)	(−0.925)	(−1.683)	(−2.129)	(−1.760)	(−1.513)
TMS	6.257***	1.860	1.089	0.589	0.643	0.646
	(3.190)	(1.604)	(0.752)	(0.383)	(0.437)	(0.502)
TR	3.802*	−0.918	−0.959	−2.278	−1.683	−0.252
	(1.908)	(−0.798)	(−0.692)	(−1.547)	(−1.281)	(−0.188)
VIX	2.412	−2.818**	−1.140	0.054	−0.915	−2.063
	(1.145)	(−2.102)	(−0.677)	(0.030)	(−0.543)	(−1.308)
VRP	5.343***	1.586	2.063	1.053	1.651	1.461
	(2.997)	(1.031)	(1.432)	(0.712)	(1.025)	(0.962)
VS	3.476*	−0.327	1.398	2.923**	2.309*	1.471
	(1.912)	(−0.269)	(0.993)	(2.030)	(1.740)	(1.078)
$TRRREL$	9.379***	7.880***	7.853***	7.055***	7.462***	7.190***
	(6.317)	(6.857)	(6.395)	(5.560)	(6.009)	(6.021)

Table A12 Binary Factor-Managed Market Portfolios

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest in the market portfolio either with a weight of one or zero, depending on whether the excess return of the factor *[name in row]* during the previous month exceeds its conditional average or not. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$
MKT	5.502***	2.841**	3.629***	2.666*	3.175**	3.854***
	(3.537)	(2.465)	(2.737)	(1.836)	(2.304)	(2.864)
SMB	4.394***	1.345	2.170	2.220	2.330	1.673
	(2.722)	(1.228)	(1.585)	(1.547)	(1.639)	(1.257)
HML	1.494	−1.579	−0.535	−1.019	−0.313	−1.832
	(1.044)	(−1.413)	(−0.406)	(−0.696)	(−0.223)	(−1.317)
WML	2.750*	−0.952	−0.047	0.169	−0.252	−0.935
	(1.851)	(−0.780)	(−0.030)	(0.103)	(−0.158)	(−0.673)
RMW	2.475	−1.314	−0.556	−1.035	−0.797	−1.720
	(1.455)	(−1.169)	(−0.413)	(−0.669)	(−0.582)	(−1.310)
CMA	−0.312	−4.269***	−4.267***	−3.726**	−3.945***	−4.260***
	(−0.187)	(−3.954)	(−3.287)	(−2.579)	(−2.979)	(−3.303)
SMB^{HXZ}	4.275**	0.906	1.426	1.442	1.352	0.992
	(2.486)	(0.820)	(1.068)	(1.019)	(0.957)	(0.750)
INV	0.572	−3.228***	−2.945**	−2.164	−2.246*	−3.409***
	(0.341)	(−3.153)	(−2.237)	(−1.516)	(−1.718)	(−2.792)
ROE	2.229	−1.641	−0.847	0.052	−1.040	−1.081
	(1.271)	(−1.363)	(−0.570)	(0.034)	(−0.683)	(−0.912)
EG	0.923	−3.360***	−2.969**	−2.173	−3.113**	−3.394**
	(0.530)	(−2.793)	(−2.136)	(−1.462)	(−2.162)	(−2.545)
LIQ	2.603	−1.086	−0.285	−0.739	−0.059	−0.898
	(1.546)	(−0.868)	(−0.193)	(−0.455)	(−0.036)	(−0.722)
HML^{M}	3.367**	0.389	1.913	1.625	2.692**	0.327
	(2.328)	(0.352)	(1.443)	(1.133)	(2.037)	(0.270)
RMW^{Cash}	0.390	−3.432***	−2.846*	−3.299**	−3.455**	−3.868***
	(0.219)	(−2.931)	(−1.958)	(−2.147)	(−2.340)	(−3.046)
SMB^{SY}	4.365***	1.460	1.880	1.204	2.076	1.165
	(2.794)	(1.291)	(1.326)	(0.799)	(1.376)	(0.886)
$MGMT$	1.150	−3.229***	−3.700***	−2.705*	−2.726**	−3.664***
	(0.642)	(−2.932)	(−2.776)	(−1.874)	(−2.039)	(−2.966)
$PERF$	1.638	−2.518**	−2.616**	−2.298*	−2.672**	−2.922***
	(0.986)	(−2.365)	(−2.055)	(−1.722)	(−2.020)	(−2.702)

Table A13 Factor-Managed Market Portfolios (Longer Sample Periods)

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest an amount proportional to the excess return of the factor *[name in row]* during the previous month. These excess returns are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment is approximately zero for each factor-managed market portfolio. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{IS}, R^2_{OOS}, and ΔCER denote the in-sample R^2, the out-of-sample R^2, and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the one-month market excess return. $R^2_{IS,\sigma}$ and $R^2_{OOS,\sigma}$ are the equivalent in-sample and out-of-sample R^2 statistics for predicting the future one-month volatility. The statistical inference for the in-sample and out-of-sample R^2s is based on the bootstrap approach of Goyal and Welch (2008). In parentheses below the in-sample R^2s, we present the in-sample t-statistics. Below the out-of-sample R^2s, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Cross-Sectional Evaluation						Time-Series Evaluation				
	Avg. Ret	α^{CAPM}	$\alpha^{FF\text{-}6^*}$	$\alpha^{HMXZ\text{-}5}$	$\alpha^{SY\text{-}4}$	$\alpha^{DMNU\text{-}7}$	R^2_{IS}	R^2_{OOS}	ΔCER	$R^2_{IS,\sigma}$	$R^2_{OOS,\sigma}$
1960–2020											
MKT	3.495*	6.718***	7.562***	4.454	7.046**	11.17***	0.450**	0.125*	1.448	2.845***	1.747***
	(1.706)	(3.097)	(2.854)	(1.622)	(2.473)	(3.390)	(1.696)	*no*		(−3.911)	*no*
SMB	2.355	3.902	6.421**	6.315**	5.782**	4.882*	0.127	0.001	0.055	0.002	−0.178
	(1.009)	(1.602)	(2.459)	(2.305)	(2.063)	(1.834)	(1.006)	*yes*		(0.132)	*no*
HML	−3.142	−2.913	0.537	−0.855	1.252	−3.890	0.273*	−2.512	−1.971	0.041	−0.074
	(−1.614)	(−1.504)	(0.198)	(−0.301)	(0.498)	(−1.228)	(−1.499)	*no*		(0.428)	*yes*
WML	−0.742	−1.343	−7.121**	−6.475*	−7.084**	−6.727**	0.050	−0.607	0.043	1.864***	1.256***
	(−0.306)	(−0.502)	(−2.235)	(−1.880)	(−2.066)	(−2.211)	(−0.589)	*no*		(3.916)	*no*
RMW	−2.039	−2.593	−0.268	1.222	0.061	0.137	0.411	−0.586	−0.833	0.544*	−0.050
	(−0.903)	(−1.140)	(−0.109)	(0.465)	(0.023)	(0.056)	(−2.000)	*yes*		(1.553)	*yes*
CMA	−3.259*	−4.270**	−3.233	−3.176	−2.397	−5.643**	0.383	−0.346	−0.282	0.380	0.184
	(−1.781)	(−2.151)	(−1.462)	(−1.449)	(−1.077)	(−2.149)	(−1.437)	*yes*		(1.184)	*no*
SMB^{HXZ}	2.293	3.917*	5.381**	4.484**	5.534**	3.020	0.256	−0.410	−0.442	0.019	−0.634
	(1.153)	(1.863)	(2.487)	(2.106)	(2.237)	(1.410)	(1.511)	*no*		(0.360)	*yes*
INV	−3.868**	−4.608**	−3.592	−3.747*	−2.569	−4.908*	0.515*	−0.313	0.097	0.261	−0.231
	(−2.100)	(−2.296)	(−1.561)	(−1.746)	(−1.141)	(−1.949)	(−1.627)	*no*		(0.868)	*no*
ROE	−2.165	−2.522	−4.168	−1.636	−4.013	−2.913	0.206	−0.741	−1.096	0.468	0.178
	(−0.889)	(−1.055)	(−1.600)	(−0.605)	(−1.415)	(−1.244)	(−1.035)	*yes*		(1.903)	*no*
EG	−3.502	−5.692***	−6.483***	−2.798	−5.769**	−7.027***	0.588*	−0.434	0.429	1.403***	1.119
	(−1.630)	(−2.666)	(−2.906)	(−1.032)	(−2.383)	(−2.605)	(−1.584)	*yes*		(2.874)	*no*
LIQ	0.451	0.589	3.758	3.380	3.878	3.260	0.017	−0.900	−1.110	0.044	−0.849
	(0.182)	(0.208)	(1.243)	(1.173)	(1.275)	(1.040)	(0.260)	*yes*		(−0.413)	*yes*
HML^{M}	−1.886	−1.937	4.238	1.467	4.978	0.134	0.076	−2.381	−1.344	0.477**	−0.096
	(−0.819)	(−0.825)	(1.359)	(0.521)	(1.555)	(0.040)	(−0.691)	*no*		(−1.849)	*yes*
RMW^{Cash}	−5.728**	−6.871***	−5.155**	−3.347	−4.478*	−4.918**	0.907**	0.112***	0.354	1.036**	0.414
	(−2.449)	(−3.021)	(−1.970)	(−1.296)	(−1.701)	(−1.976)	(−2.655)	*yes*		(2.076)	*no*
SMB^{SY}	2.014	3.234*	5.289**	4.548**	4.807**	3.906*	0.245	−0.531	−1.053	0.030	−0.292
	(1.139)	(1.704)	(2.515)	(2.072)	(2.112)	(1.710)	(1.381)	*yes*		(0.440)	*yes*
$MGMT$	−4.181**	−5.580***	−3.270	−3.037	−2.086	−6.800***	0.600*	−0.114	−0.015	0.903**	0.421
	(−2.389)	(−2.990)	(−1.482)	(−1.317)	(−1.035)	(−2.639)	(−1.974)	*no*		(2.039)	*no*
$PERF$	−2.288	−3.387*	−5.181**	−3.057	−5.194*	−5.283**	0.245	−0.481	−0.805	1.936***	1.527
	(−1.206)	(−1.799)	(−2.164)	(−1.053)	(−1.935)	(−2.001)	(−1.391)	*yes*		(3.667)	*no*
1936–2020											
MKT	0.706	2.019**	3.200***	1.720	2.726**	4.705***	0.078	−1.837	0.956	2.786***	1.429***
	(0.891)	(2.384)	(2.713)	(1.431)	(2.233)	(3.319)	(0.650)	*no*		(−4.649)	*no*
SMB	−0.109	1.046	3.848**	3.752**	3.548**	2.907*	0.002	−0.553	−0.147	0.083	−1.435
	(−0.094)	(0.859)	(2.429)	(2.145)	(2.082)	(1.771)	(−0.125)	*yes*		(−0.775)	*no*
HML	−0.934*	−0.625	0.358	−0.095	0.575	−0.815	0.267*	−3.818	−1.653	0.037	−0.371
	(−1.913)	(−1.276)	(0.417)	(−0.104)	(0.719)	(−0.833)	(−1.762)	*no*		(−0.441)	*yes*
WML	0.057	−0.240	−2.447**	−2.248**	−2.534**	−2.567**	0.015	−2.182	−0.342	1.861***	0.888***
	(0.090)	(−0.358)	(−2.528)	(−2.219)	(−2.293)	(−2.449)	(0.346)	*no*		(4.290)	*yes*
HML^{M}	−0.712	−0.427	1.611*	0.695	1.867*	0.634	0.137	−3.913	−1.303	0.817***	−0.645
	(−1.357)	(−0.784)	(1.664)	(0.796)	(1.826)	(0.609)	(−1.187)	*no*		(−2.606)	*yes*

Table A14 Factor-Managed Market Portfolios (Three-Month Factor Returns)

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest an amount proportional to the excess return of the factor *[name in row]* during the previous three months. These excess returns are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment is approximately zero for each factor-managed market portfolio. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{IS}, R^2_{OOS}, and ΔCER denote the in-sample R^2, the out-of-sample R^2, and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the one-month market excess return. $R^2_{IS,\sigma}$ and $R^2_{OOS,\sigma}$ are the equivalent in-sample and out-of-sample R^2 statistics for predicting the future one-month volatility. The statistical inference for the in-sample and out-of-sample R^2s is based on the bootstrap approach of Goyal and Welch (2008). In parentheses below the in-sample R^2s, we present the in-sample t-statistics. Below the out-of-sample R^2s, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Cross-Sectional Evaluation						Time-Series Evaluation				
	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{IS}	R^2_{OOS}	ΔCER	$R^2_{IS,\sigma}$	$R^2_{OOS,\sigma}$
MKT	1.918	3.818	0.411	−1.100	−0.468	5.354*	0.084	−0.215	−0.318	0.268	−0.808
	(0.965)	(1.643)	(0.144)	(−0.404)	(−0.174)	(1.751)	(0.632)	*yes*		(−1.269)	*no*
SMB	−3.704*	−2.323	−1.045	−2.178	−0.029	−2.503	0.443**	−0.220	−0.225	0.330	0.299*
	(−1.950)	(−1.033)	(−0.379)	(−0.852)	(−0.010)	(−1.045)	(−1.662)	*yes*		(1.044)	*no*
HML	−3.906**	−3.420	3.280	4.083	4.160	−5.367*	0.419**	−0.406	−0.486	0.033	−0.313
	(−2.069)	(−1.641)	(1.074)	(1.309)	(1.456)	(−1.889)	(−1.891)	*no*		(−0.361)	*no*
WML	−5.692*	−6.766**	−9.795**	−10.13**	−12.04***	−6.968**	0.788***	−0.606	−0.786	1.096**	0.234*
	(−1.907)	(−2.085)	(−2.343)	(−2.264)	(−2.605)	(−2.162)	(−2.234)	*yes*		(2.295)	*yes*
RMW	−1.769	−2.986	1.275	3.117	2.924	−0.060	0.238	−0.726	−1.128	0.188	−0.408
	(−0.764)	(−1.298)	(0.401)	(0.934)	(0.884)	(−0.022)	(−1.190)	*yes*		(0.689)	*yes*
CMA	−4.201**	−5.191***	−1.245	1.141	−0.071	−5.415**	0.937**	0.170**	0.533	0.324	0.166**
	(−2.322)	(−2.692)	(−0.526)	(0.466)	(−0.029)	(−2.186)	(−2.288)	*no*		(1.287)	*no*
SMB^{HXZ}	−3.863**	−2.727	−0.827	−1.468	0.289	−2.710	0.523*	−0.297	−0.550	0.508*	−0.415
	(−2.029)	(−1.219)	(−0.314)	(−0.598)	(0.111)	(−1.117)	(−1.791)	*yes*		(1.231)	*yes*
INV	−4.518***	−4.962***	−1.329	0.400	0.190	−5.334**	0.781**	−0.118	0.488	0.141	−0.199
	(−2.695)	(−2.779)	(−0.605)	(0.183)	(0.091)	(−2.193)	(−2.189)	*no*		(0.812)	*no*
ROE	−3.702	−5.404**	−5.755**	−4.083	−5.525*	−3.908	0.393	−0.605	−0.815	0.210	−0.121
	(−1.635)	(−2.373)	(−2.077)	(−1.405)	(−1.742)	(−1.520)	(−1.627)	*yes*		(1.063)	*yes*
EG	−3.759**	−5.367***	−2.686	−1.966	−2.143	−4.665*	0.456	−0.550	−0.284	0.305	0.186
	(−2.179)	(−2.954)	(−1.238)	(−0.875)	(−1.058)	(−1.799)	(−1.823)	*yes*		(1.507)	*no*
LIQ	0.092	0.596	4.154	3.343	3.920	3.615	0.019	−1.001	−1.591	0.157	−0.385
	(0.030)	(0.160)	(0.968)	(0.944)	(0.944)	(0.913)	(0.236)	*yes*		(−0.751)	*yes*
HML^M	−0.351	0.367	6.992**	6.566*	8.824***	−1.904	0.006	−0.075	−0.101	0.552*	−0.655
	(−0.171)	(0.160)	(2.047)	(1.908)	(2.644)	(−0.747)	(0.198)	*yes*		(−1.661)	*no*
RMW^{Cash}	−4.108	−5.874**	−2.511	−0.888	−0.914	−4.425*	0.555*	−0.581	−0.930	0.139	−0.606
	(−1.616)	(−2.440)	(−0.822)	(−0.290)	(−0.299)	(−1.700)	(−1.826)	*yes*		(0.630)	*yes*
SMB^{SY}	−3.906**	−2.869	−1.046	−2.476	−0.132	−2.549	0.472*	0.048*	−0.399	0.323	−0.247
	(−2.158)	(−1.344)	(−0.421)	(−1.014)	(−0.051)	(−1.129)	(−1.803)	*yes*		(1.192)	*yes*
$MGMT$	−3.248*	−4.675**	0.739	2.893	1.665	−5.517**	0.551**	0.009*	0.243	0.337	−0.152
	(−1.780)	(−2.419)	(0.293)	(1.192)	(0.653)	(−2.092)	(−1.799)	*no*		(1.337)	*no*
$PERF$	−4.394*	−6.580**	−6.455*	−5.336	−7.343**	−3.129	0.557*	−0.080	0.425	1.625***	0.931**
	(−1.765)	(−2.523)	(−1.936)	(−1.380)	(−1.997)	(−1.197)	(−1.988)	*yes*		(2.425)	*yes*

Table A15 Factor-Managed Market Portfolios (Twelve-Month Factor Returns)

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest an amount proportional to the excess return of the factor *[name in row]* during the previous twelve months. These excess returns are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment is approximately zero for each factor-managed market portfolio. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{IS}, R^2_{OOS}, and ΔCER denote the in-sample R^2, the out-of-sample R^2, and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the one-month market excess return. $R^2_{IS,\sigma}$ and $R^2_{OOS,\sigma}$ are the equivalent in-sample and out-of-sample R^2 statistics for predicting the future one-month volatility. The statistical inference for the in-sample and out-of-sample R^2s is based on the bootstrap approach of Goyal and Welch (2008). In parentheses below the in-sample R^2s, we present the in-sample t-statistics. Below the out-of-sample R^2s, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Cross-Sectional Evaluation						Time-Series Evaluation				
	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{IS}	R^2_{OOS}	ΔCER	$R^2_{IS,\sigma}$	$R^2_{OOS,\sigma}$
MKT	2.064	3.517	−2.733	−3.909	−3.909	0.797	0.029	−0.138	0.235	0.636*	0.178**
	(0.867)	(1.265)	(−0.858)	(−1.289)	(−1.274)	(0.238)	(0.291)	*no*		(−2.043)	*no*
SMB	−3.985**	−2.901	−4.118	−2.028	−3.597	−2.648	0.439**	0.110	0.198	0.006	−0.071
	(−2.129)	(−1.495)	(−1.596)	(−0.699)	(−1.392)	(−1.105)	(−1.584)	*yes*		(0.202)	*yes*
HML	−4.796*	−4.589	4.411	5.036	5.201	−3.476	0.325*	−0.717	−0.885	0.100	−0.153
	(−1.913)	(−1.416)	(1.275)	(1.357)	(1.315)	(−1.005)	(−1.382)	*no*		(−0.625)	*yes*
WML	−5.743**	−7.041**	−6.375*	−7.771**	−7.546*	−7.330**	0.761***	0.661***	1.169	1.488***	0.106**
	(−2.023)	(−2.554)	(−1.891)	(−1.981)	(−1.910)	(−2.583)	(−2.307)	*no*		(2.692)	*yes*
RMW	1.113	−1.155	4.178	1.515	5.855	1.330	0.099	−0.941	−0.713	0.666*	−0.053
	(0.376)	(−0.333)	(1.156)	(0.409)	(1.552)	(0.396)	(−0.615)	*yes*		(1.435)	*yes*
CMA	−3.309	−4.735*	1.609	3.196	2.364	−3.230	0.211	−1.330	−1.368	0.377	0.279**
	(−1.547)	(−1.793)	(0.644)	(1.236)	(0.805)	(−1.135)	(−0.896)	*yes*		(1.193)	*no*
SMB^{HXZ}	−4.813**	−4.015**	−3.559	−0.970	−2.803	−2.970	0.708**	−0.047	−0.289	0.026	−0.291
	(−2.554)	(−1.973)	(−1.288)	(−0.310)	(−1.020)	(−1.256)	(−2.043)	*yes*		(0.403)	*yes*
INV	−3.547*	−3.468	1.670	2.092	2.069	−2.737	0.092	−1.604	−1.271	0.078	−0.212
	(−1.897)	(−1.479)	(0.794)	(0.882)	(0.832)	(−1.036)	(−0.607)	*yes*		(0.545)	*no*
ROE	−2.722	−4.538*	−1.799	−3.735	−1.057	−2.054	0.247	−0.956	−1.099	0.324	−0.081
	(−1.055)	(−1.754)	(−0.558)	(−1.103)	(−0.318)	(−0.730)	(−1.218)	*yes*		(1.234)	*yes*
EG	−3.550*	−4.529**	1.804	1.673	3.185	−1.479	0.155	−1.154	−1.036	0.729**	0.672
	(−1.679)	(−2.149)	(0.757)	(0.674)	(1.367)	(−0.559)	(−0.854)	*yes*		(1.867)	*no*
LIQ	−3.392	−3.843	0.408	0.257	−1.528	−2.175	0.627*	−1.192	−0.596	0.748**	−0.225
	(−1.406)	(−1.371)	(0.119)	(0.070)	(−0.408)	(−0.675)	(−1.772)	*yes*		(2.001)	*yes*
HML^{M}	−1.161	−0.382	3.732	4.701	4.375	−1.213	0.028	−0.175	−0.166	0.980**	−0.437
	(−0.427)	(−0.113)	(1.141)	(1.278)	(1.203)	(−0.338)	(0.363)	*no*		(−1.854)	*no*
RMW^{Cash}	−0.533	−3.128	1.559	−1.251	2.775	−0.971	0.139	−0.719	−1.072	0.543*	0.003**
	(−0.178)	(−1.008)	(0.456)	(−0.360)	(0.844)	(−0.327)	(−0.765)	*yes*		(1.268)	*yes*
SMB^{SY}	−3.828**	−2.706	−2.292	−0.530	−1.805	−1.425	0.244	−0.134	−0.480	0.015	−0.135
	(−1.995)	(−1.348)	(−0.915)	(−0.185)	(−0.725)	(−0.591)	(−1.137)	*yes*		(0.363)	*yes*
$MGMT$	−1.324	−2.788	4.869**	4.950*	5.670**	−1.065	0.030	−0.781	−1.080	0.079	−0.106
	(−0.676)	(−1.220)	(2.208)	(1.825)	(2.152)	(−0.402)	(−0.358)	*yes*		(0.567)	*no*
$PERF$	−5.702	−9.733**	−4.834	−5.227	−3.924	−5.042	1.123***	0.235**	0.354	6.690***	5.132**
	(−1.583)	(−2.380)	(−1.011)	(−1.120)	(−0.830)	(−1.080)	(−2.070)	*yes*		(3.548)	*no*

Table A16 Factor-Managed Market Portfolios (Three-Month-Lagged Returns)

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest an amount proportional to the monthly excess return of the factor *[name in row]* three months ago. These excess returns are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment is approximately zero for each factor-managed market portfolio. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{IS}, R^2_{OOS}, and ΔCER denote the in-sample R^2, the out-of-sample R^2, and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the one-month market excess return. $R^2_{IS,\sigma}$ and $R^2_{OOS,\sigma}$ are the equivalent in-sample and out-of-sample R^2 statistics for predicting the future one-month volatility. The statistical inference for the in-sample and out-of-sample R^2s is based on the bootstrap approach of Goyal and Welch (2008). In parentheses below the in-sample R^2s, we present the in-sample t-statistics. Below the out-of-sample R^2s, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Cross-Sectional Evaluation						Time-Series Evaluation				
	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{IS}	R^2_{OOS}	ΔCER	$R^2_{IS,\sigma}$	$R^2_{OOS,\sigma}$
MKT	1.651	2.272	−1.879	−0.743	−0.975	2.320	0.007	−0.188	−0.145	0.128	−0.148
	(0.742)	(0.932)	(−0.589)	(−0.225)	(−0.344)	(0.737)	(−0.169)	*no*		(−0.878)	*no*
SMB	−5.922**	−5.257**	−4.588	−5.227*	−3.500	−5.323**	0.060	−0.312	0.212	0.325	0.135**
	(−2.503)	(−2.102)	(−1.538)	(−1.766)	(−1.245)	(−2.133)	(−0.671)	*no*		(1.628)	*no*
HML	−2.439	−1.783	4.161	3.124	3.467	−3.344	0.206	−0.068	−0.050	0.478*	0.251**
	(−1.030)	(−0.721)	(1.534)	(1.158)	(1.277)	(−1.079)	(−1.185)	*yes*		(−1.514)	*no*
WML	−7.301**	−7.991***	−10.10**	−12.21***	−11.05***	−7.998***	0.041	−0.082	−0.098	1.045**	0.693**
	(−2.301)	(−2.706)	(−2.442)	(−2.643)	(−2.791)	(−2.836)	(−0.439)	*yes*		(2.182)	*no*
RMW	−0.460	−1.204	2.665	2.165	2.872	2.288	0.246	−0.626	−0.938	0.609*	−0.022
	(−0.156)	(−0.379)	(0.698)	(0.781)	(0.784)	(0.804)	(−1.001)	*yes*		(1.468)	*yes*
CMA	−3.493	−4.195*	−0.651	0.311	−0.280	−3.674	0.061	−0.662	−0.954	0.000	−0.203
	(−1.576)	(−1.792)	(−0.251)	(0.125)	(−0.114)	(−1.429)	(0.619)	*no*		(−0.014)	*yes*
SMB^{HXZ}	−6.646***	−5.993**	−4.659	−4.857*	−3.435	−5.615**	0.140	−0.686	−1.043	0.421	0.092
	(−2.739)	(−2.241)	(−1.500)	(−1.723)	(−1.199)	(−2.165)	(−0.973)	*yes*		(1.864)	*yes*
INV	−2.773	−2.878	0.304	0.972	0.971	−2.842	0.113	−0.778	−0.993	0.004	−0.349
	(−1.266)	(−1.240)	(0.129)	(0.358)	(0.420)	(−1.160)	(0.831)	*no*		(−0.127)	*yes*
ROE	−2.587	−3.528	−2.985	−3.345	−2.978	−2.711	0.062	−1.230	−0.887	0.422	0.130
	(−1.031)	(−1.433)	(−1.144)	(−1.122)	(−1.117)	(−1.214)	(−0.583)	*no*		(1.316)	*yes*
EG	−2.652	−3.140	0.186	−1.379	0.716	−1.139	0.002	−1.006	−1.631	0.039	−0.384
	(−1.302)	(−1.473)	(0.065)	(−0.525)	(0.266)	(−0.502)	(0.073)	*yes*		(0.556)	*yes*
LIQ	−0.603	−0.279	0.094	−0.023	1.495	0.969	0.664**	−0.514	−0.557	0.174	−0.227
	(−0.261)	(−0.107)	(0.030)	(−0.009)	(0.482)	(0.339)	(−1.770)	*no*		(0.858)	*no*
HML^{M}	2.603	3.487	8.112***	8.327***	8.406***	1.329	0.003	−0.145	−0.222	1.540***	0.756**
	(1.151)	(1.548)	(2.700)	(2.614)	(3.034)	(0.517)	(0.125)	*no*		(−2.384)	*no*
RMW^{Cash}	−0.833	−1.725	1.889	1.473	2.145	0.119	0.097	−0.701	−1.230	0.418	−0.042
	(−0.273)	(−0.522)	(0.453)	(0.462)	(0.574)	(0.036)	(−0.595)	*yes*		(1.322)	*yes*
SMB^{SY}	−5.419**	−4.995**	−3.590	−4.350	−2.396	−4.682**	0.015	−0.373	−0.979	0.325	0.104*
	(−2.414)	(−2.085)	(−1.306)	(−1.629)	(−0.915)	(−1.998)	(−0.338)	*yes*		(1.820)	*yes*
MGMT	−0.677	−1.251	3.482	4.305*	2.912	−1.278	0.062	−0.585	−1.184	0.206	−0.341
	(−0.295)	(−0.520)	(1.260)	(1.666)	(1.023)	(−0.421)	(0.540)	*yes*		(−0.765)	*yes*
PERF	−4.606*	−5.972**	−4.939	−6.726**	−5.023*	−2.476	0.099	−0.867	−1.061	2.722***	1.915**
	(−1.701)	(−2.247)	(−1.644)	(−2.296)	(−1.704)	(−1.094)	(−0.591)	*yes*		(2.732)	*yes*

Table A17 Factor-Managed Market Portfolios (Twelve-Month-Lagged Returns)

This table presents the annualized average returns and factor model alphas of various factor-managed market portfolios. Each month, the managed portfolios invest an amount proportional to the monthly excess return of the factor *[name in row]* twelve months ago. These excess returns are conditionally demeaned and the resulting managed portfolios are constructed such that their conditional standard deviations are the same as that of the market portfolio. Thus, the time-series-average investment is approximately zero for each factor-managed market portfolio. In parentheses are the t-statistics based on robust Newey and West (1987) standard errors using six lags. R^2_{IS}, R^2_{OOS}, and ΔCER denote the in-sample R^2, the out-of-sample R^2, and the annualized certainty equivalent gain (with mean–variance preferences and $\gamma = 3$) of the variables (all reported in percentage points), respectively, for predicting the one-month market excess return. $R^2_{IS,\sigma}$ and $R^2_{OOS,\sigma}$ are the equivalent in-sample and out-of-sample R^2 statistics for predicting the future one-month volatility. The statistical inference for the in-sample and out-of-sample R^2s is based on the bootstrap approach of Goyal and Welch (2008). In parentheses below the in-sample R^2s, we present the in-sample t-statistics. Below the out-of-sample R^2s, we indicate whether there is a switch of the sign of the predictive slope coefficient during the out-of-sample period ("*yes*" or "*no*"). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively. Definitions of the factors are in Section A3.

	Cross-Sectional Evaluation						Time-Series Evaluation				
	Avg. Ret	α^{CAPM}	$\alpha^{\text{FF-6*}}$	$\alpha^{\text{HMXZ-5}}$	$\alpha^{\text{SY-4}}$	$\alpha^{\text{DMNU-7}}$	R^2_{IS}	R^2_{OOS}	ΔCER	$R^2_{IS,\sigma}$	$R^2_{OOS,\sigma}$
MKT	2.033	1.376	−0.640	−2.518	−1.213	−0.552	0.082	−0.031	−0.060	0.050	−0.142
	(0.834)	(0.555)	(−0.221)	(−0.814)	(−0.423)	(−0.197)	(−0.610)	*no*		(−0.320)	*no*
SMB	−1.388	−2.174	−1.112	2.354	−1.346	0.067	0.140	−0.188	−0.275	0.197	0.131*
	(−0.579)	(−0.863)	(−0.398)	(0.783)	(−0.466)	(0.026)	(−0.767)	*no*		(1.180)	*no*
HML	3.136	3.083	1.474	1.890	1.826	3.840	0.017	−0.262	−0.311	0.104	−0.031
	(1.345)	(1.242)	(0.472)	(0.572)	(0.591)	(1.346)	(0.298)	*no*		(−0.711)	*no*
WML	−1.626	−1.301	2.217	0.350	3.976	−0.236	0.000	−0.141	−0.223	0.017	−0.753
	(−0.618)	(−0.462)	(0.776)	(0.113)	(1.343)	(−0.091)	(−0.033)	*yes*		(−0.195)	*no*
RMW	5.684*	6.635*	0.789	0.190	0.655	4.524	0.404	−0.581	−0.502	0.236	−0.104
	(1.867)	(1.869)	(0.182)	(0.048)	(0.141)	(1.349)	(1.450)	*no*		(−1.284)	*no*
CMA	1.725	1.457	3.288	3.657	3.403	2.227	0.083	−0.605	−1.304	0.069	−0.319
	(0.784)	(0.674)	(1.192)	(1.219)	(1.269)	(0.753)	(0.632)	*yes*		(−0.485)	*yes*
SMB^{HXZ}	−2.148	−2.917	−0.757	2.381	−0.965	0.071	0.103	−1.450	−1.589	0.195	−0.207
	(−0.995)	(−1.226)	(−0.292)	(0.888)	(−0.345)	(0.031)	(−0.617)	*no*		(1.174)	*yes*
INV	3.003	3.766	3.451	2.292	2.934	2.485	0.326	−0.734	−1.105	0.113	−0.389
	(1.336)	(1.593)	(1.390)	(0.845)	(1.163)	(0.906)	(1.267)	*yes*		(−0.555)	*yes*
ROE	1.240	1.970	3.186	1.327	2.838	1.741	1.206***	0.290***	−0.240	0.534*	−0.490
	(0.517)	(0.829)	(1.020)	(0.399)	(0.941)	(0.566)	(2.523)	*no*		(−1.322)	*yes*
EG	0.103	0.605	1.738	1.154	3.278	0.310	0.187	−0.626	−0.787	0.154	−0.201
	(0.044)	(0.275)	(0.604)	(0.406)	(1.192)	(0.106)	(1.061)	*yes*		(−1.070)	*yes*
LIQ	1.180	0.732	0.363	0.313	−0.696	3.210	0.224	−1.354	−1.774	0.127	−0.269
	(0.519)	(0.349)	(0.129)	(0.111)	(−0.230)	(1.090)	(−0.933)	*yes*		(0.863)	*yes*
HML^{M}	3.063	2.916	−2.289	0.068	−2.665	2.589	0.043	−0.143	−0.085	0.000	−0.278
	(1.172)	(1.059)	(−0.805)	(0.022)	(−0.927)	(0.958)	(−0.384)	*no*		(−0.021)	*no*
RMW^{Cash}	5.065*	6.254*	2.741	1.119	2.934	4.027	0.830**	0.111**	0.412	0.322	−0.082
	(1.692)	(1.875)	(0.634)	(0.273)	(0.652)	(1.125)	(2.270)	*no*		(−1.617)	*yes*
SMB^{SY}	−0.740	−1.583	−0.596	2.520	−0.146	−0.088	0.054	−0.720	−1.089	0.159	−0.297
	(−0.295)	(−0.605)	(−0.214)	(0.863)	(−0.051)	(−0.034)	(−0.439)	*no*		(0.915)	*yes*
$MGMT$	3.457	4.108	4.120	3.212	4.001	3.491	0.020	−0.482	−1.126	0.029	−0.195
	(1.273)	(1.430)	(1.199)	(0.934)	(1.159)	(1.115)	(0.370)	*yes*		(−0.317)	*yes*
$PERF$	−1.517	−1.736	2.102	1.134	3.546	−0.220	0.192	−0.461	−1.107	0.076	−0.358
	(−0.560)	(−0.568)	(0.605)	(0.337)	(1.050)	(−0.062)	(0.898)	*yes*		(−0.548)	*yes*