Predicting Future Stock Market Performance using Style-Based Portfolio Returns

Yingying Shao*
University of Arkansas

Craig G. Rennie
University of Arkansas

This draft: Nov 14, 2007

Abstract

This paper investigates whether returns from style-based portfolios (where style is defined in terms of firm size and growth opportunities) predict subsequent stock market returns, and whether their predictive power is contingent on the phase of the business cycle. We find that returns from large firm portfolios and value portfolios tend to predict stock market movements one month into the future, even after including popular macroeconomic variables and lagged market returns as controls. During early expansionary phases in business cycles, returns on small firm portfolios tend to predict stock market returns. The ability of returns on style portfolios to predict future market returns is also related to the ability of these returns to predict macroeconomic activity. We conclude that returns from style-based portfolios can be used to predict future stock market performance.

JEL Classification: G11; G14

Keywords: Investment decisions; Information and market efficiency

*Corresponding author: Sam M. Walton College of Business, Department of Finance, WCOB 302, 1 University of Arkansas, Fayetteville, AR 72701; Phone: (479)575-6137;
Email: yshao@walton.uark.edu

We acknowledge helpful comments from participants at Finance workshops at the University of Arkansas.

Predicting Future Stock Market Performance using Style-Based Portfolio Returns

1. Introduction

Portfolio managers typically employ a variety of multifactor models when analyzing the relation between risk and return for stocks or portfolios of stocks. These models are based on macroeconomic risk factors, microeconomic risk factors, and occasionally on both. Macroeconomic multifactor models usually seek to explain observed variation in security returns in terms of unexpected changes in underlying macroeconomic conditions, such as GDP, the business cycle, inflation, default spreads, or the term structure of interest rates (e.g., Chen, Roll, and Ross, 1986; Burmeister, Roll, and Ross, 1994). Microeconomic multifactor models normally seek to explain variation in security returns using stock characteristics, like the sensitivity of stock returns to market risk premia, firm size, and growth opportunities, and possibly price momentum (see Fama and French, 1973; Carhart, 1997). Recent literature links macroeconomic and microeconomic risk factors by demonstrating that lagged macroeconomic variables help explain profits associated with momentum, and suggest abnormal returns from price momentum trading may be explained by time-varying expected returns (Chordia and Shivakumar, 2002).

In this study, we investigate whether the returns from style-based portfolios (based on firm size and growth opportunities) predict future stock market movements. Using U.S. stock market returns between 1931-2006, we find that returns on large market capitalization and value portfolios can predict market movements by one month, even after controlling for popular macroeconomic variables and lagged market returns.

Our investigation is also motivated by recent studies on investor information assessing behavior. Many believe that investors have limited information processing capacity for asset prices (Shiller, 2000; and Sims, 2001). Merton (1987) shows investors have information on and tend to trade only a limited number of stocks.

We form our hypothesis of predictability based on Hong and Stein (1999)'s gradual information diffusion theory. Hong and Stein suggest that information travels slowly across asset markets, and that investors are unable to extract information from prices rationally. It is possible that certain investors, such as those who don't specialize in style rotation or timing, receive information originating from a particular style with a lag. As a result, the returns of style portfolios that are informative about macroeconomic fundamentals will tend to lead the aggregate market. This hypothesis assumes that the ability of the returns of a portfolio to predict future market performance comes from the information content of the portfolio. In other words, a style portfolio will lead the market if it has information about future market fundamentals or economic conditions.

We find evidence that the returns on style-based investing contain significant information about future economic activities. Specifically, they can lead business cycles in predicting future market returns. Large market capitalization and value portfolios are best able to lead the broad stock market. Within the early expansionary phase of business cycles, small firm portfolios tend to lead future stock market returns.

Our paper contributes to the literature in two ways. First, to our knowledge, this paper represents some of the first empirical work on the lead-lag relationship between returns on style-based investing and aggregate stock market returns. Secondly, it shows that the strength of the relation between returns on style-based investing and subsequent stock market returns varies with the phase of the business cycle. To our knowledge, our paper is also the first to differentiate between early and late phases of the business cycle. Third, the paper examines links between the ability of returns on style-based portfolios to predict future stock market returns and their ability to predict future macroeconomic indicators.

The rest of this paper proceeds as follows. Section 2 summarizes the literature on style investing, the lead-lag relationship between style investing and the economy, and develops testable hypotheses. Section 3 describes the sample. Section 4 presents the methodology and empirical results. Section 5 discusses results, and concludes.

2. Hypothesis development

2.1. Related Literature

A variety of financial and macroeconomic variables have been shown to have some forecasting ability for future stock market returns. Basu (1977), Banz (1981), Jegadeesh (1990), Fama and French (1992), and Jegadeesh and Titman (1993) find evidence of a predictive relation between firm size, book-to-market, prior return, and subsequent market returns. Keim and Stambaugh (1986) and Fama and French (1989) identify links between macroeconomic variables, such as aggregate dividend yield, the term spread of interest rates, and the default spread, and future variations in market returns.

Style investing has recently attracted interest among those seeking to outperform the market, probably as a result of large divergences in performance between different styles since the late 1990's. A large body of both academic and industry research supports the efficacy of value strategies for choosing individual stocks. Fama and French (1992, 1993), Lakonishok, Shleifer, and Vishny (1994), and Capaul, Rowley, and Sharpe (1993), present U.S. and international evidence that value stocks tend to outperform growth stocks over the long term. Researchers have also tried to forecast differences in returns between value and growth strategies, with mixed success. Arnott (1992), Fan (1995), Sorensen and Lazzara (1995), and Kao and Shumaker (1999) investigate models that forecast differences between returns on value and growth strategies based on various measures of aggregate economic and financial condition. These studies focus on variables like the earnings yield on the S&P 500, the slope of the yield curve, corporate credit spreads, corporate profits, and other macroeconomic measures. Some of these variables appear to have power to forecast value versus growth returns. Others do not.

Another strand of research investigates style investing from behavioral perspective, providing potential insight into some of the forces that underly price movements in equities markets. The behavioral finance literature generally uses non risk-based models to associate returns on style-based investing with market frictions or investor irrationality. Some behavioral studies of style-based investing state that macroeconomic conditions are irrelevant to style investor decisions. For instance, Lakonishok, Shleifer and Vishny (1994) suggest relatively high returns from value investing are associated with erroneous extrapolation of the past performance of value stocks. Barberis and Shleifer (2003) examine investors' style switching behavior at the style level. They show that with positive feedback trading at the style level, money chases relative style returns. In their model, styling investing generates common factors that are unrelated to cash flow factors and risk. Kumer (2002) provides empirical evidence that the style-switching behavior of individual investors incorporates elements of both returns and earnings driven positive-feedback trading. Demand shifts in styles can be predicted using past style return differentials, not innovations in macro-economic variables or shifts in investor expectations.

The literature on lead-lag relations among stocks has found some evidence of a lead-lag relation between stocks with different characteristics. Lo and Mackinlay (1990) find that large stocks tend to lead small stocks. A number of other papers find that stocks that are in some sense more liquid tend to lead less liquid stocks. Some recent studies find returns on industry portfolios tend to lead broad market returns. Eleswarapu and Tiwari (1996) find that stock returns of five industry-based portfolios, out of twelve industries, lead broad market returns. Hong, Torous, and Valkanov (2007) find similar results, i.e., that a number of industry returns forecast stock market returns, by up to two months.

2.2. Hypotheses Development

We form our hypotheses based on the information content of size and book-to-market factors about future macro-economic conditions, and on Hong and Stein (1999)'s information gradual diffusion theory.

Fama and French (1993, 1995, 1996, 1998) state that size and book-to-market factors are state variables that predict future changes in the investment opportunity set in the context of Merton's inter-temporal capital asset pricing model. Liew and Vassalou (2000) find supportive evidence that returns on zero-investment size and book-to-market portfolios contain significant information about future macroeconomic conditions, as measured by future GDP growth, even in the presence of popular business cycle controls.

Given the potential information content of size and book-to-market factors about future economic conditions, and following Shiller (2000), Sims (2001) and Hong and Stein's (1999) studies on investor behavior concerning the utilization of information, we hypothesize that returns from style-based portfolios can lead the stock market.

According to standard asset pricing, stock prices should reflect investor expectations of future economic activities, if the expectations are on average correct. However, not all investors explore the information content of risk factors at the same speed or to the same extent. According to Shiller (2000) and Sims(2001), investors possess limited information processing capacity. Certain investors, such as investors active in style rotation or timing strategies, may extract information contained in size and book-to-market ratios and incorporate this information in their investment decisions quicker than others. Other investors only receive information originating from informative size and book to market portfolios with a lag, consistent with Hong and Stein's (1999) information gradually diffusion assumption. As a result, the returns of certain size and book-to-market portfolios that are informative about macroeconomic conditions have potential to lead the aggregate market.

In this study, we seek answers to answer several questions. First, we investigate whether returns on style portfolios predict future stock market returns. Second, if the market reacts with a delay to information already contained in style portfolio returns, does style investing also lead business cycle variables in predicting future returns? Third, if such leadership exits, how does this relation change across phases of business cycles?

3. Sample

The data on style portfolios consist of monthly returns for Fama-French 5x5 portfolios from January 1926 to December 2006, obtained from Kenneth R. French's website[1]. The portfolios are the intersections of five portfolios formed on size (market value of equity, ME) and five portfolios formed on the ratio of the book value of equity to the market value of equity (BE/ME). In this study, we use each portfolio as a representative of an investment style based both on size and book-to-market ratio.

Other control variables are obtained from the Center for Research in Securities Prices (CRSP). Returns on the stock market are estimated using the returns of the CRSP equal-weighted index. Following the literature, we use market dividend yield, short-term interest rate, term

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

spread, and default spread as macroeconomic variables[2]. The market dividend yield is the one-year dividend from the CRSP equal-weighted market portfolio divided by the current price. The short-term interest rate is the three-month Treasury bill rate. The term spread is the difference between ten-year Treasury bond yield and one-year Treasury bond yield. The default spread is the yield spread between BAA-rated and AAA-rated corporate bonds.

Table 1 presents summary statistics for 25 style portfolios, where s1b1 refers to small growth and s5b5 denotes large value. Means and standard deviations are reported in this Table in monthly percentage points. Returns on these portfolios tend to be highly correlated with one another, with Pearson Correlation Coefficients ranging from 0.43 to 0.96, most at the 0.8 level or above. For simplicity, we report the correlation matrix using four extreme portfolios and other forecasting variables in Table 2.

[Insert Table 1 here]

[Insert Table 2 here]

4. Empirical methods and results

4.1. Predicting the broad stock market

We first examine whether the returns on style portfolio can lead the business cycle variables in forecasting stock market return. We run the following regression separately for each of the 25 style portfolios.

$$RM_t = \alpha_0 + \alpha_1 RS_{i,t-1} + \alpha_2 RM_{t-1} + \alpha_3 Div_{t-1} + \alpha_4 Default_{t-1} + \alpha_5 TB_{t-1} + \alpha_6 Term_{t-1} + e_t \quad (1)$$

[2] Keim and Stambaugh (1986) and Fama and French (1989) discover the predictability of macroeconomic variables such as default spreads, term spreads, industrial production and dividend yields.

where $RS_{i,t-1}$ is the returns on style portfolios *i* lagged in one-month, $RM_{i,t-1}$ is the market returns lagged in one-month, Div_{t-1} is the lagged market dividend yield, $Default_{t-1}$ is the lagged default spread between BAA-rated and AAA-rated bonds, TB_{t-1} is the lagged three-month T-bill rate and $Term_{t-1}$ is the lagged term spread, and e_t is the residual of the regression.

As shown in Equation (1), in the presence of business cycle variables, if the returns on a certain style can still forecast future market returns, the regression coefficient for the returns on such a style should be significantly positive. We also include the lagged market return to control for high auto-correlation and high contemporaneous correlation among portfolios.

Table 3 reports the results of regressions based on Equation (1). Instead of reporting the coefficient of each of the independent variable for each of the 25 regressions, we report just the coefficient of the particular lagged one-month style portfolio return along with the R^2 of the regression. We also plot the significant portfolios in a 5x5 matrix form in Figure 1.

The dependent variable in the first column of Table 3 is next month's market return. The style portfolios that have significant coefficients in this column are denoted by asterisks. Out of 25 style portfolios, 16 have significant predictability of future market return at above 10% significance level. It is interesting to see that, four small portfolios actually are negatively related to next period's market return. And the portfolios that significantly lead the market tend to be large and value portfolios, as shown in Figure 1.

We are also interested in whether the style portfolios lead the stock market by more than one month. In the second column of Table 3, we report the results using a two month lag. The dependent variable is the market return in month t+1. The coefficient of lagged style portfolio returns is only significant for two portfolios. This seems to imply that the information takes about one month to be completely incorporated from certain portfolios into the broad market.

Figure 1. Predictability of style portfolios

	BM1 (lowest quintile)	BM2 (2nd quintile)	BM3 (3rd quintile)	BM4 (4th quintile)	BM5 (highest quintile)
S1 (lowest quintile)	(-)**	(-)*	(-)***	(-)*	
s2 (2nd quintile)	(-)**			**	**
S3 (3rd quintile)			***	***	*
S4 (4th quintile)		**		***	
S5 (highest quintile)		*	***	***	**

[Insert Table 3 about here]

Alternatively, rather than investigating whether different style portfolios lead the market separately, we can augment model (1) by simultaneously including all 25 portfolio returns. The cost of doing this is that we lose some degree of freedom and we cannot estimate the effect of each portfolio on future market returns very precisely. The benefit of doing this is that it allows us to directly compare the difference in predictability of portfolios. Since the portfolio returns are highly contemporaneously correlated with the market return, we orthogonalized the portfolio returns to remove the correlation before we run the regression with 25 portfolio returns included simultaneously.

The results of regression using 25 portfolio returns simultaneously are reported in Table 4. It turns out that our results are not significantly affected by whether we run the forecasting regression separately or by pooling all the lagged portfolio returns. For the sake of simplicity, in our future analysis, we focus on four extreme portfolios: S1B1(small growth), S1B5(small value), S5B1(large growth), and S5B5(large value) and use these portfolio in our regression analysis. We report the results from regression using four extreme portfolios simultaneously in Table 5.

[Insert Table 4 about here]

[Insert Table 5 about here]

To further examine whether the predictability of style portfolios varies across business cycles, we break our sample down into expansionary periods and contraction periods, based on NBER's definition of business cycle. We then compare the predictability of four extreme portfolios in these two economic environments by running the following regression:

$$\begin{aligned} RM_t &= \alpha_0 + \alpha_2 BDUM + \alpha_2 RS_{S1B1,t-1} + \alpha_3 RS_{S1B5,t-1} + \alpha_4 RS_{S5B1,t-1} + \alpha_5 RS_{S5B5,t-1} \\ &+ \alpha_6 RM_{t-1} + \alpha_7 Div_{t-1} + \alpha_8 Default_{t-1} + \alpha_9 TB_{t-1} + \alpha_{10} Term_{t-1} \\ &\alpha_{11} RS_{S1B1,t-1} \times BDUM + \alpha_{12} RS_{S1B5,t-1} \times BDUM + \alpha_{13} RS_{S5B1,t-1} \times BDUM \\ &+ \alpha_{14} RS_{S5B5,t-1} \times BDUM + e_t \end{aligned} \quad (2)$$

where $RS_{S1B1,t-1}$, $RS_{S1B5,t-1}$, $RS_{S5B1,t-1}$, $RS_{S5B5,t-1}$ represent the returns from four extreme portfolios, S1B1(small growth), S1B5(small value), S5B1(large growth), and S5B5(large value), respectively. $BDUM$ is the dummy variable that has value one for months in expansions and zero for months in recessions. $RS_{S1B1,t-1} \times BDUM$, $RS_{S1B5,t-1} \times BDUM$, $RS_{S5B1,t-1} \times BDUM$, and $RS_{S5B5,t-1} \times BDUM$ are the interactions between the portfolio return variables and business cycle dummy variables.

The interaction variables in model (2) allow us the compare the difference in slope coefficients of portfolio returns, i.e., the predictability conditional to the stage of business cycle. The regression coefficients α_2, α_3, α_4, and α_5 measure the predictability of the four extreme portfolios in recessions, and $\alpha_2 + \alpha_{11}$, α_3, + α_{12}, $\alpha_4 + \alpha_{13}$, $\alpha_5 + \alpha_{14}$ measure the predictability of the portfolios in expansions. The results are reported in Table 6.

In Table 6, column (1) reports the result of regression without business cycle dummy variable and column (2) reports the regression results with interactions between return variables and business cycle dummy. From column (1), it is clear that returns from large value portfolio (S5B5) significantly lead the broad market return, after controlling for macroeconomic variables and lagged market returns. However, the returns from the small growth portfolio (S1B1) tend to be followed by lower market returns after controls. From column (2), we observe that the small growth portfolio (S1B1) significantly leads the broad market return during recessions and the small value portfolio (S1B5) significantly leads the broad market return during expansions.

To further explore the feature of the predictive ability of style-based portfolios, we break down each expansion into two sub-periods, the early expansionary period and the late expansionary period. We replace the *BDUM* variable in model (2) with two new dummy variables: *EXP_E* and *EXP_L*. *EXP_E* equals to one if it is in the first half period of expansion and zero otherwise. Similarly, *EXP_L* equals to one if it is in the second half period of expansion and zero otherwise. Again we use interactions to examine the difference in predictability of style portfolios among recessions and different phases of expansion. As shown in column (3) of Table 6, small value portfolio (S1B5) significantly leads the broad market return during early expansions, but no portfolios significantly lead the broad market return during the late expansionary periods.

We are also interested whether the predictability is more significant in January than non-January. We replace the business cycle dummy in model (2) with a January dummy, which takes value of one if it is in January and zero otherwise. We examine the interactions between portfolio return variables and January dummy and report the results in column (4) of Table 6. The results show that during non-January months, the large value (S5B5) portfolio significantly leads the broad market. However, in January, no portfolio is able to significantly predict market return. The regression coefficients for large portfolios show positive signs, but are statistically not significantly different than zero.

4.2. Predicting future economic indicators

To test whether the portfolio's ability to predict the market is related to its ability to forecast future economic conditions, we specify the following regression for forecasting economic activity.

$$ECON_t = \alpha_0 + \alpha_1 RS_{i,t-1} + \sum_{j=1}^{2} \alpha_{2,j} ECON_{t-j} + \alpha_3 Div_{t-1} + \alpha_4 Default_{t-1} + \alpha_5 TB_{t-1} + \alpha_6 Term_{t-1} + e_t \quad (3)$$

where $ECON_t$ is an indicator of economic activity in month t, and other variables as defined in model (2). We also include two monthly lags of the indicators of economic activity. We use Chicago Fed National Activity Index(CFNAI)[3] as a proxy for economic activity. The monthly CFNAI is available over the period of March 1967 to December 2006.

[Insert Table 6 about here]

In Table 7, we determine which of the four extreme portfolios can forecast future economic activities at different horizons. Again, we only report the coefficient of lagged portfolio returns. The results are interesting that all four portfolios have significant coefficients with 3 month lags. In other words, the returns on style portfolios can forecast the future economic activity by three months ahead. Indeed, although not reported in this paper, we find that all 25 portfolios can forecast the future economic activity by three months. This finding that style portfolios contain valuable information about future economic fundamentals is consistent

[3] We obtain the time series of Chicago Fed National Activity Index from Federal Reserve Bank of Chicago's website.

with Liew and Vassalou (2000), who find that portfolios formed based on size and book-to-market ratio can predict future GDP growth.

6. Conclusion

We find that the returns of portfolios based on size and book-to-market ratio are able to predict the movements of stock markets. And a portfolio's predictive ability is strongly correlated with its propensity to forecast indicators of economic activity. These findings indicate that markets incorporate information contained in style portfolios about their fundamentals with a lag because information travels unevenly across stock markets.

References

Akaike, H., 1973, Information theory and the extension of the Maximum likelihood principle, in B. Petrov and F. Csaki, eds., *2nd International Sumposium on Inforamtion Theory*. Budapest.

Arnott, R. 1992, Style management: the missing element in equity portfolios. Journal of investing.

Banz, R. 1979, The relationship between return and market value of common stocks, *Journal of Financial Economics* 9, 3-18.

Barberis, N., and A. Shleifer, 2003, Style investing, 68, *Journal of Financial Economics*, 161-199.

Capaul, C. R., and W. Sharpe, 1993, International value and growth stock returns 50, 27-36.

Eleswarapu, R., V. and A. Tiwari, 1996, Business cycles and stock market returns: evidence using industry-based portfolios, *Journal of Financial Research* 1, 121-134.

Fama, F. E., 1998, Market efficiency, long-term returns, and behavioral finance, *Journal of Financial Economics* 49, 283-306.

___, and K. R. French, 1988, Dividend yields and expected stock returns, *Journal of Financial Economics* 22, 3-25.

___, 1989, Business conditions and expected returns on stocks and bonds, *Journal of Financial Economics* 23, 23-49.

___, 1992, The cross section of expected stock returns, *Journal of Finance* 47, 427-465.

___, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3 -56.

___, 1995, Size and Book-to-Market factors in earnings and returns, *Journal of Finance* 1, 131-155.

Fan, S., 1995, Equity style timing and allocation, in R.Klein and J. Lederman eds., *Equity Style Management*. Chicago: Irwin.

French, K., W. G. Schwert, and R. Stambaugh, 1987, Expected stock returns and volatility, *Journal of Financial Economics* 19, 3-29.

Hong, Harrison, Walter Torous, and Rossen Valkanov, 2007, Do industries lead stock markets? *Journal of Financial Economics* 83, 367-396.

___, T. Lim, and J. Stein, 1999, A unified theory of underreaction, momentum trading and overreaction in asset markets, *Journal of Finance* 54, 2143-2184.

Jegadeesh, N., and S. Titman, 1993, Returns on buying winners and selling losers: implications for stock market efficiency, *Journal of Finance* 48, 65-91.

Kao, Duen-Lin, and R. D. Shumaker, 1999, Equity style timing, *Financial Analyst Journal* 55, 37-48.

Keim, D. and R. Stambaugh, 1986, Predicting returns in the stock and the bond markets, *Journal of Financial Economics* 17, 357 -390.

Kumar, Alok, 2002, Style switching and stock returns, working paper, Cornell Univeristy.

Lakonishok, J., A. Shleifer, and R. Vishny, 1994, Contrarian investment, extrapolation, and risk, *Journal of Finance* 49, 1541-1578.

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

Lewellen, J., 1999, The time-series relations among expected return, risk and book-to-market, *Journal of financial Economics* 54, 5-43.

Liew, J., and M. Vassalou, 2000, Can book-to-market, size, and momentum be risk factors that predict economic growth? *Journal of Financial Economics* 57, 221-245.

Lo, A., and C. MacKinlay, 1990, When are contrarian profits due to stock market overreaction? *Review of Financial Studies* 3, 176-206.

Merton, R., 1987, A simple model of capital market equilibrium with incomplete information, *Journal of Finance* 42, 483 -510.

Mullainathan, S., 2001, Thinking through categories, Working paper, MIT.

Pastor, L., and R. F. Stambaugh, 2003, Liquidity risk and expected stock returns, *Journal of Political Economy* 3, 642-685.

Peng, L., and W. Xiong, 2002, Capacity constrained learning and asset price comovements, Working paper, Princeton University.

Shiller, R. 2000, Irrational exuberance. Broadway Books, New York.

Sims, C., 2001, Rational inattention, Working paper, Princeton University

Sorensen, E., and C. Lazzara, 1995, Equity style management: the case of growth and value, in R.Klein and J. Lederman eds., *Equity Style Management*. Chicago: Irwin.

Appendix

US business cycle expansions and contractions - NBER

Peak		Trough		Contraction Peak to Trough	Expansion Previous Trough to this peak	Cycle Trough from prev trough	Peak from prev Peak from
Month	Year	Month	Year	months	months	months	months
.		12	1854	.	.	.	.
6	1857	12	1858	18	30	48	.
10	1860	6	1861	8	22	30	40
4	1865	12	1867	32	46	78	54
6	1869	12	1870	18	18	36	50
10	1873	3	1879	65	34	99	52
3	1882	5	1885	38	36	74	101
3	1887	4	1888	13	22	35	60
7	1890	5	1891	10	27	37	40
1	1893	6	1894	17	20	37	30
12	1895	6	1897	18	18	36	35
6	1899	12	1900	18	24	42	42
9	1902	8	1904	23	21	44	39
5	1907	6	1908	13	33	46	56
1	1910	1	1912	24	19	43	32
1	1913	12	1914	23	12	35	36
8	1918	3	1919	7	44	51	67
1	1920	7	1921	18	10	28	17
5	1923	7	1924	14	22	36	40
10	1926	11	1927	13	27	40	41
8	1929	3	1933	43	21	64	34
5	1937	6	1938	13	50	63	93
2	1945	10	1945	8	80	88	93
11	1948	10	1949	11	37	48	45
7	1953	5	1954	10	45	55	56
8	1957	4	1958	8	39	47	49
4	1960	2	1961	10	24	34	32
12	1969	11	1970	11	106	117	116
11	1973	3	1975	16	36	52	47
1	1980	7	1980	6	58	64	74
7	1981	11	1982	16	12	28	18
7	1990	3	1991	8	92	100	108
3	2001	11	2001	8	120	128	128

Table 1 Summary Statistics

This table presents summary statistics of the returns of Fama-French 5X5 size and book-to-market porfolios and CRSP equally-weighted index return. All returns are from January 1926 to December 2006. The data are at monthly frequency and in monthly percentage points. The porfolios are named in the following way: S indicatea size and B indicates book-to-market ratio, 1 indicatesthe lowest quintile, and 5 represents the highest the quintile. For example, S1B1 represents the portfolio with the smallest size and the lowest book-to-market ratio(growth). The other forecasting variables are: DEFAULT(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), Term (the spread between 10-year and 1-year Treasury bond yields), and TB(the 3-month Treasury bill rate).

Panel A Full sample period

Name	Maximum	Upper quartile	Median	Lower quartile	Minimum	Mean	Std	N
s1b1	99.28	1.84	-3.22	-8.74	-39.96	1.08	10.96	912
s1b2	63.10	2.19	-3.00	-7.39	-35.64	1.53	9.10	912
s1b3	69.65	1.86	-2.81	-6.89	-35.67	1.75	8.49	912
s1b4	50.97	1.70	-2.54	-6.37	-33.51	1.89	7.82	912
s1b5	104.13	1.90	-2.42	-6.59	-33.47	2.32	9.31	912
s2b1	56.63	1.98	-2.76	-7.50	-39.04	1.02	8.52	912
s2b2	41.77	1.49	-2.28	-6.59	-37.83	1.38	7.42	912
s2b3	37.39	1.39	-2.27	-6.21	-33.78	1.55	6.94	912
s2b4	37.45	1.28	-2.33	-6.22	-31.82	1.58	7.01	912
s2b5	56.42	1.64	-2.17	-6.95	-34.72	1.71	7.93	912
s3b1	36.66	1.61	-2.30	-6.98	-35.80	1.07	7.65	912
s3b2	31.42	1.38	-2.40	-6.33	-35.99	1.28	6.74	912
s3b3	33.72	1.08	-2.33	-6.13	-30.91	1.35	6.57	912
s3b4	29.75	1.04	-2.36	-6.15	-28.38	1.44	6.44	912
s3b5	50.13	1.24	-2.64	-6.40	-37.14	1.64	7.61	912
s4b1	27.56	1.40	-2.40	-6.54	-31.20	1.01	6.72	912
s4b2	34.72	1.01	-2.42	-6.22	-35.12	1.11	6.40	912
s4b3	28.82	1.22	-2.28	-5.98	-31.87	1.29	6.24	912
s4b4	31.66	1.13	-2.38	-6.42	-30.41	1.37	6.52	912
s4b5	58.10	1.12	-2.47	-6.80	-34.66	1.55	7.76	912
s5b1	28.33	0.94	-2.49	-6.36	-28.35	0.90	6.03	912
s5b2	28.46	0.77	-2.54	-6.01	-30.85	1.06	5.78	912
s5b3	22.90	0.80	-2.51	-5.78	-28.46	1.11	5.78	912
s5b4	32.54	0.82	-2.52	-6.30	-27.50	1.21	6.13	912
s5b5	49.29	0.93	-2.67	-6.81	-39.78	0.67	7.34	912
RM	39.05	1.49	-2.38	-6.52	-33.35	1.40	7.03	912
Div	1.40	0.31	0.20	0.14	0.07	0.26	0.18	912
Term	4.40	2.33	1.53	0.73	-3.60	1.47	1.24	915
Default	5.64	1.37	0.86	0.67	0.32	1.13	0.73	915
TB	16.30	5.57	3.44	1.06	0.01	3.81	3.15	915

Table 1 Summary Statistics(Cont'd)

Panel B Expansionary period

Name	Maximum	Upper quartile	Median	Lower quartile	Minimum	Mean	Std	N
s1b1	100.00	5.15	0.92	-4.04	-39.90	1.31	10.88	760
s1b2	159.72	5.67	1.19	-2.80	-30.93	1.72	10.05	760
s1b3	77.12	5.15	1.40	-2.10	-28.24	1.92	8.23	760
s1b4	117.05	4.64	1.52	-1.68	-28.64	2.08	8.17	760
s1b5	108.08	5.31	1.70	-1.44	-31.80	2.51	9.62	760
s2b1	72.51	4.93	1.10	-2.98	-32.91	1.20	7.83	760
s2b2	88.50	4.81	1.58	-1.93	-31.70	1.57	7.14	760
s2b3	93.75	4.52	1.60	-1.40	-27.65	1.74	6.89	760
s2b4	79.10	4.54	1.58	-1.50	-27.87	1.72	6.85	760
s2b5	78.88	4.95	1.77	-1.69	-32.75	1.85	7.68	760
s3b1	67.77	4.64	1.33	-2.45	-29.67	1.18	6.92	760
s3b2	46.21	4.49	1.55	-1.57	-29.86	1.46	5.85	760
s3b3	64.21	4.37	1.63	-1.33	-27.50	1.55	5.96	760
s3b4	59.88	4.42	1.55	-1.35	-26.44	1.59	5.92	760
s3b5	71.54	4.83	1.49	-1.38	-29.38	1.79	7.24	760
s4b1	32.26	4.42	1.28	-1.95	-25.07	1.09	5.59	760
s4b2	51.30	4.00	1.33	-1.63	-28.99	1.25	5.44	760
s4b3	46.45	4.23	1.61	-1.42	-27.34	1.43	5.43	760
s4b4	54.32	4.08	1.58	-1.52	-25.69	1.50	5.83	760
s4b5	76.14	4.61	1.54	-1.79	-32.72	1.73	7.62	760
s5b1	35.20	3.67	1.14	-1.67	-22.81	1.00	4.79	760
s5b2	45.34	3.59	1.23	-1.45	-24.72	1.17	4.80	760
s5b3	48.71	4.00	1.19	-1.40	-23.43	1.27	4.98	760
s5b4	71.33	4.05	1.29	-1.23	-21.07	1.38	5.67	760
s5b5	49.43	4.46	1.50	-1.80	-31.66	1.50	6.76	760
RM	60.60	4.36	1.54	-1.62	-27.22	1.58	6.39	760
Div	1.40	0.30	0.18	0.14	0.07	0.25	0.18	760
Term	4.40	2.35	1.53	0.73	-3.60	1.49	1.23	760
Default	4.34	1.25	0.83	0.66	0.32	1.01	0.53	760
TB	16.30	5.40	3.54	1.12	0.01	3.75	2.95	760

Table 1 Summary Statistics(Cont'd)

Panel C Contraction period

Name	Maximum	Upper quartile	Median	Lower quartile	Minimum	Mean	Std	N
s1b1	114.88	7.14	-2.10	-9.04	-53.17	-0.07	18.37	152
s1b2	140.95	6.47	-0.70	-6.74	-43.14	0.59	16.89	152
s1b3	97.37	6.07	0.42	-6.19	-35.59	0.91	14.22	152
s1b4	101.08	6.25	0.19	-6.18	-34.98	0.91	13.60	152
s1b5	108.44	5.74	0.50	-6.03	-33.39	1.41	14.52	152
s2b1	44.06	7.14	0.59	-7.29	-32.60	0.14	11.44	152
s2b2	78.87	6.71	0.70	-6.22	-34.67	0.46	12.51	152
s2b3	66.21	6.15	0.26	-5.22	-30.76	0.63	10.87	152
s2b4	65.71	6.89	0.50	-5.59	-31.73	0.90	11.69	152
s2b5	91.85	6.39	0.82	-6.28	-34.33	0.99	13.90	152
s3b1	62.98	6.50	1.01	-6.32	-28.68	0.51	11.72	152
s3b2	39.05	6.40	0.46	-5.54	-28.86	0.41	10.02	152
s3b3	46.40	6.45	1.44	-5.25	-31.50	0.36	10.46	152
s3b4	55.46	5.59	1.09	-4.89	-31.11	0.70	10.48	152
s3b5	90.05	6.13	0.98	-6.06	-37.06	0.88	15.02	152
s4b1	27.61	5.70	0.86	-4.92	-28.94	0.62	9.11	152
s4b2	42.76	5.22	1.31	-4.30	-27.52	0.41	9.80	152
s4b3	57.86	5.23	1.13	-4.33	-31.39	0.59	10.18	152
s4b4	67.87	5.40	0.75	-5.09	-32.51	0.74	12.22	152
s4b5	100.74	6.49	1.02	-6.95	-39.90	0.64	15.92	152
s5b1	28.38	5.21	0.64	-4.38	-27.68	0.40	8.74	152
s5b2	44.35	4.60	0.99	-4.38	-29.63	0.49	9.26	152
s5b3	51.50	4.58	1.20	-4.00	-33.72	0.33	10.23	152
s5b4	68.92	4.80	0.46	-5.13	-39.14	0.35	12.59	152
s5b5	72.77	5.16	0.43	-5.54	-99.99	-3.51	22.88	152
RM	66.59	6.13	0.85	-5.69	-31.28	0.54	11.29	152
Div	1.20	0.39	0.27	0.19	0.10	0.32	0.18	152
Term	3.56	2.11	1.54	0.68	-3.33	1.34	1.27	152
Default	5.64	2.32	1.22	0.78	0.58	1.70	1.19	152
TB	15.51	7.13	2.40	0.97	0.05	4.11	4.02	152

Table 2 Correlation Matrix

This table reports the corrlation matrix between four extreme style portoflios:S1B1(small growth), S1B5(small value), S5B1(large growth), S5B5(large value), and RM(the market return), and other forecasting variables. The forecasting variables are: DEFAULT(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), Term (the spread between 10-year and 1-year Treasury bond yields), and TB(the 3-month Treasury bill rate). Panel A report the correlation matrix estimated using full sample period. Panel B reports the correlation matrix estimated using expansion period and panel C reports the correlation matrix using recession periods.

Panel A Correlation matrix using extreme portfolios during full sample period

	s1b1	s1b5	s5b1	s5b5	RM	Div	Term	Default	TB
MEAN	1.08	2.32	0.90	0.67	1.40	0.26	1.47	1.13	3.81
STD	12.44	10.60	5.64	11.33	7.44	0.18	1.24	0.73	3.15
N	912	912	912	912	912	912	915	915	915
s1b1	1	0.83	0.66	0.52	0.85	-0.07	0.06	0.07	-0.05
s1b5	0.83	1	0.64	0.50	0.92	-0.07	0.10	0.11	-0.08
s5b1	0.66	0.64	1	0.51	0.83	0.01	0.06	0.01	-0.03
s5b5	0.52	0.50	0.51	1	0.56	-0.06	0.01	-0.05	0.03
RM	0.85	0.92	0.83	0.56	1	-0.04	0.09	0.07	-0.06
Div	-0.07	-0.07	0.01	-0.06	-0.04	1	-0.08	0.01	-0.32
Term	0.06	0.10	0.06	0.01	0.09	-0.08	1	0.29	-0.50
Default	0.07	0.11	0.01	-0.05	0.07	0.01	0.29	1	-0.06
TB	-0.05	-0.08	-0.03	0.03	-0.06	-0.32	-0.50	-0.06	1

Panel b Correlation matrix using extreme portfolios during expansionary period

	s1b1	s1b5	s5b1	s5b5	RM	Div	Term	Default	TB
MEAN	1.31	2.51	1.00	1.50	1.58	0.25	1.49	1.01	3.75
STD	10.88	9.62	4.79	6.76	6.39	0.18	1.23	0.53	2.95
N	760	760	760	760	760	760	763	763	763
s1b1	1	0.83	0.59	0.60	0.84	-0.05	0.03	0.10	-0.04
s1b5	0.83	1	0.58	0.75	0.91	-0.04	0.09	0.18	-0.09
s5b1	0.59	0.58	1	0.70	0.80	0.04	0.04	0.12	-0.01
s5b5	0.60	0.75	0.70	1	0.80	0.01	0.05	0.12	-0.04
RM	0.84	0.91	0.80	0.80	1	0.00	0.07	0.18	-0.06
Div	-0.05	-0.04	0.04	0.01	0.00	1	-0.09	-0.06	-0.35
Term	0.03	0.09	0.04	0.05	0.07	-0.09	1	0.32	-0.46
Default	0.10	0.18	0.12	0.12	0.18	-0.06	0.32	1	-0.06
TB	-0.04	-0.09	-0.01	-0.04	-0.06	-0.35	-0.46	-0.06	1

Panel C Correlation matrix using extreme portfolios during contraction periods

	s1b1	s1b5	s5b1	s5b5	RM	Div	Term	Default	TB
MEAN	-0.07	1.41	0.40	-3.51	0.54	0.32	1.34	1.70	4.11
STD	18.37	14.52	8.74	22.88	11.29	0.18	1.27	1.19	4.02
N	152	152	152	152	152	152	152	152	152
s1b1	1	0.82	0.77	0.51	0.87	-0.12	0.14	0.07	-0.07
s1b5	0.82	1	0.75	0.34	0.95	-0.17	0.13	0.07	-0.05
s5b1	0.77	0.75	1	0.39	0.89	-0.04	0.14	-0.07	-0.06
s5b5	0.51	0.34	0.39	1	0.41	-0.11	-0.05	-0.06	0.12
RM	0.87	0.95	0.89	0.41	1	-0.13	0.14	-0.01	-0.06
Div	-0.12	-0.17	-0.04	-0.11	-0.13	1	0.03	-0.01	-0.29
Term	0.14	0.13	0.14	-0.05	0.14	0.03	1	0.43	-0.65
Default	0.07	0.07	-0.07	-0.06	-0.01	-0.01	0.43	1	-0.13
TB	-0.07	-0.05	-0.06	0.12	-0.06	-0.29	-0.65	-0.13	1

Table 3 Predictive regressions involving various style portfolios and market protfolios

This table presents forecast of the marekt return using various style(size and Book-to-market) portoflio returns RS (seperately) at month t and month t+1. The other forecasting variables are lagged RM(the market return), DEFAULT(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), Term (the spread between 10-year and 1-year Treasury bond yields), and TB(the 3-month Treasury bill rate). We only report the coefficients of the lagged style portoflio returns. The sample period is January 1931 -Dec 2006.

	Forecast of RM using style portfolio returns at various horizons			
	Month t		Month t+1	
Style porfolio		Adj. R2		Adj. R2
s1b1	-0.08 **	0.08	-0.02	0.07
	(-2.26)		(-0.95)	
s1b2	-0.07 *	0.07	-0.05 **	0.07
	(-1.68)		(-2.30)	
s1b3	-0.26 ***	0.08	-0.01	0.07
	(-3.63)		(-0.53)	
s1b4	-0.14 *	0.07	-0.04	0.07
	(-1.65)		(-1.57)	
s1b5	-0.02	0.07	-0.03	0.07
	(-0.29)		(-1.28)	
s2b1	-0.15 **	0.08	-0.02	0.07
	(-2.22)		(-0.66)	
s2b2	0.03	0.07	-0.04	0.07
	(0.31)		(-1.21)	
s2b3	0.07	0.07	-0.03	0.07
	(0.62)		(-0.79)	
s2b4	0.25 **	0.08	-0.01	0.07
	(2.42)		(-0.19)	
s2b5	0.17 **	0.07	-0.04	0.07
	(2.08)		(-1.60)	
s3b1	-0.05	0.07	-0.02	0.07
	(-0.62)		(-0.74)	
s3b2	0.10	0.07	0.02	0.07
	(0.97)		(0.44)	
s3b3	0.34 ***	0.08	-0.02	0.07
	(3.43)		(-0.55)	
s3b4	0.31 ***	0.08	-0.01	0.07
	(3.12)		(-0.34)	
s3b5	0.12 *	0.07	-0.01	0.07
	(1.71)		(-0.35)	
s4b1	0.05	0.07	0.00	0.07
	(0.69)		(0.02)	
s4b2	0.21 **	0.08	0.00	0.07
	(2.24)		(-0.01)	
s4b3	0.08	0.07	-0.01	0.07
	(0.89)		(-0.17)	
s4b4	0.28 ***	0.08	0.01	0.07
	(3.61)		(0.27)	
s4b5	0.08	0.07	-0.02	0.07
	(1.31)		(-0.62)	
s5b1	0.06	0.07	-0.02	0.07
	(0.76)		(-0.51)	
s5b2	0.14 *	0.07	-0.02	0.07
	(1.71)		(-0.56)	
s5b3	0.30 ***	0.09	-0.02	0.07
	(3.83)		(-0.60)	
s5b4	0.34 ***	0.10	0.00	0.07
	(5.39)		(-0.11)	
s5b5	0.05 **	0.07	0.05 **	0.07
	(2.08)		(2.21)	

t statistics in parentheses

*,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4 Predictive regressions involving various style portfolios and market protfolios

This table presents forecast of the marekt return using various style(size and Book-to-market) portoflio returns at month t simulteneously. Other forecasting variables are lagged RM(the market return), DEFAULT(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), Term (the spread between 10-year and 1-year Treasury bond yields), and TB(the 3-month Treasury bill rate). We only report the coefficients of the lagged style portoflio returns. The sample period is January 1931 -Dec 2006.

	Forecast of RM using style portfolio returns under different conditions		
	(1)	(2)	(3)
Intercept	1.39 ***	-1.38	-1.70 *
	(5.84)	(-1.50)	(-1.88)
s1b1	-0.09 **	-0.08 **	-0.08 **
	(-2.41)	(-2.32)	(-2.35)
s1b2	-0.10 **	-0.09 **	-0.09 **
	(-2.35)	(-1.98)	(-2.04)
s1b3	-0.23 ***	-0.24 ***	-0.24 ***
	(-3.27)	(-3.43)	(-3.44)
s1b4	0.03	0.02	0.03
	(0.31)	(0.17)	(0.27)
s1b5	0.21 ***	0.17 **	0.17 **
	(2.70)	(2.19)	(2.32)
s2b1	-0.11	-0.12 *	-0.12 *
	(-1.53)	(-1.65)	(-1.70)
s2b2	0.20 *	0.14	0.15
	(1.71)	(1.22)	(1.29)
s2b3	0.13	0.12	0.11
	(0.97)	(0.87)	(0.88)
s2b4	0.21	0.21	0.21
	(1.60)	(1.60)	(1.63)
s2b5	0.02	0.07	0.06
	(0.18)	(0.64)	(0.55)
s3b1	0.02	-0.02	-0.02
	(0.14)	(-0.22)	(-0.18)
s3b2	-0.06	-0.05	-0.05
	(-0.40)	(-0.33)	(-0.34)
s3b3	0.21	0.28 *	0.28 *
	(1.35)	(1.81)	(1.82)
s3b4	0.08	0.10	0.10
	(0.52)	(0.70)	(0.68)
s3b5	-0.16	-0.15	-0.15
	(-1.61)	(-1.531)	(-1.60)
s4b1	0.15	0.13	0.13
	(1.01)	(0.85)	(0.89)
s4b2	-0.04	-0.03	-0.03
	(-0.27)	(-0.21)	(-0.20)
s4b3	-0.52 ***	-0.46 ***	-0.47 ***
	(-3.19)	(-2.88)	(-2.99)
s4b4	0.26 *	0.22	0.22 *
	(1.94)	(1.59)	(1.66)
s4b5	-0.18 *	-0.18 *	-0.18 **
	(-1.93)	(-1.95)	(-2.03)
s5b1	-0.18	-0.12	-0.13 ***
	(-1.19)	(-0.80)	(-0.86)
s5b2	-0.02	-0.08	-0.07 ***
	(-0.11)	(-0.39)	(-0.37)
s5b3	0.28 *	0.41 **	0.40 **
	(1.74)	(2.50)	(2.49)
s5b4	0.61 ***	0.64 ***	0.64 ***
	(4.55)	(4.78)	(4.87)
s5b5	0.02	0.04	0.04
	(0.74)	(1.39)	(1.37)
Div		3.10 **	3.60 **
		(2.08)	(2.47)
Term		0.16	0.12
		(0.66)	(0.49)
DEFAULT		1.52 ***	1.38 ***
		(4.24)	(3.94)
TB		0.00	0.03
		(0.02)	(0.34)
RM			0.20 ***
			(6.46)
Adj. R square	0.06	0.09	0.13
F value	3.52	4.08	5.52
N	915.00	915.00	915

t statistics in parentheses

*,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 Predictive regressions involving four extreme style portfolios

This table presents forecast of the marekt return using four extreme style(size and Book-to-market) portoflio returns RS (seperately) at month t. The other forecasting variables are lagged RM(the market return), DEFAULT(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), Term (the spread between 10-year and 1-year Treasury bond yields), and TB(the 3-month Treasury bill rate). We only report the coefficients of the lagged style portoflio returns. The sample period is January 1931 -Dec 2006.

	Forecast of RM using style portfolio returns		
	(1)	(2)	(3)
Intercept	1.39 ***	-1.39	-1.71 *
	(5.66)	(-1.49)	(-1.87)
s1b1	-0.09 **	-0.08 **	-0.08 **
	(-2.34)	(-2.25)	(-2.27)
s1b5	0.03	0.00	0.01
	(0.42)	(0.03)	(0.14)
s5b1	0.07	0.06	0.06
	(0.68)	(0.65)	(0.64)
s5b5	0.05 *	0.06 **	0.06 **
	(1.73)	(2.33)	(2.32)
DIV		3.34 **	3.83 ***
		(2.21)	(2.58)
TERM		0.16	0.12
		(0.65)	(0.49)
DEFAULT		1.52 ***	1.39 ***
		(4.28)	(4.01)
TB		-0.01	0.02
		(-0.12)	(0.18)
RM			0.20 ***
			(6.25)
Adj. R2	0.01	0.03	0.07
F value	2.27	4.89	8.88
N	915	915	915

t statistics in parentheses

*,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6 Predictive regressions involving four extreme style portfolios and market protfolios under different conditions

This table presents forecast of the marekt return using four extreme style(size and Book-to-market) portoflio returns at month t under different economic conditions. Other forecasting variables are lagged RM(the market return), DEFAULT(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), Term (the spread between 10-year and 1-year Treasury bond yields), and TB(the 3-month Treasury bill rate). The sample period is January 1931 -Dec 2006. Column (1) reports results of regression without business dummies. Column (2) reports results of regression with interactions between portfolio returns and business dummies. Column (3) reports results of regression including interactions between portfolios returns and two dummy variables: EXP_E and EXP_L, where EXP_E indicates early expansionary period and EXP_L represents late expansionary period. Column (4) contains results of regression with interactions between portfolio returns and January dummy.

Forecast of RM using style portfolio returns under different conditions

	(1)		Expansion Vs. Contraction (2)		Early Expansion Vs. Late Expansion (3)		January Vs. Non-January (4)
Intercept	-1.71 *		-3.17 ***		-3.14		-1.00
	(-1.87)		(-2.74)		(-2.7)		(-1.1)
s1b1	-0.08 **		0.24 ***		0.25 ***		-0.05
	(-2.27)		(3.43)		(3.44)		(-1.27)
s1b5	0.01		-0.06		-0.06		0.03
	(0.14)		(-0.39)		(-0.40)		(0.42)
s5b1	0.06		-0.07		-0.07		0.04
	(0.64)		(-0.33)		(-0.34)		(0.44)
s5b5	0.06 **		0.02		0.02		0.04 *
	(2.32)		(0.62)		(0.61)		(1.75)
RM	0.20 ***		0.19 ***		0.18 ***		0.20 ***
	(6.25)		(5.89)		(5.46)		(6.32)
DIV	3.83 ***		4.14 ***		4.22 **		1.62
	(2.58)		(2.85)		(2.89)		(0.86)
TERM	0.12		0.03		0.04		0.02
	(0.49)		(0.12)		(0.14)		(0.08)
DEFAULT	1.39 ***		1.34 ***		1.31 **		1.32 ***
	(4.01)		(3.58)		(3.47)		(3.81)
TB	0.02		0.04		0.04		-0.03
	(0.18)		(0.45)		(0.43)		(-0.32)
		BSDUM	1.92 ***	EXP_E	1.99	JAN	3.62 ***
			(2.79)		(2.66)		(3.3)
		s1b1xBSDUM	-0.53 ***	EXP_L	1.79 ***	s1b1xJAN	-0.40 **
			(-6.19)		(2.42)		(-2.37)
		s1b5xBSDUM	0.22	s1b1xEXP_E	-0.60	s1b5xJAN	-0.11
			(1.4)		(-6.51)		(-0.31)
		s5b1xBSDUM	0.17	s1b5xEXP_E	0.30	s5b1xJAN	0.06
			(0.76)		(1.75)		(0.19)
		s5b5xBSDUM	-0.18 **	s5b1xEXP_E	0.25	s5b5xJAN	0.08
			(-2.46)		(1.00)		(0.38)
				s5b5xEXP_E	-0.20 **		
					(-2.10)		
				s1b1xEXP_L	-0.39 ***		
					(-3.57)		
				s1b5xEXP_L	0.09		
					(0.51)		
				s5b1xEXP_L	0.12		
					(0.50)		
				s5b5xEXP_L	-0.08		
					(-0.72)		
Adj. R2	0.07		0.12		0.15		0.10
F value	8.88		10.00		7.69		8.20
N	915		915		915		915

F test for slope coefficients	Effect in Expansion	Effect in Early expansion	Effect in late expansion	Effect in Janaury
s1b1	-0.29 ***	-0.36 ***	-0.14 *	-0.43 ***
	(37.73)	(38.59)	(3.05)	(7.35)
s1b5	0.17 ***	0.24 ***	0.03	-0.075
	(5.87)	(7.09)	(0.09)	(0.06)
s5b1	0.11	0.19	0.06	0.1
	(0.96)	(1.42)	(0.15)	(0.10)
s5b5	-0.16 **	-0.19 **	-0.06	0.12
	(5.80)	(4.03)	(0.34)	(0.34)

t/F statistics in parentheses

*,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7 Predictive regressions involving various style portfolios and economic indicatior

This table presents forecast of the economic indicator using various style(size and Book-to-market) and portoflio returns (seperately) at month t, month t+1, and month t+2. the other forecasting variables are lagged RM(the market return), DFSP(the default spread between BAA-rated and AAA-rated bonds), DIV(the market dividend yield), and TB(the 3-month Treasury bill rate). We only report the coefficients of the lagged style portoflio returns. The sample period is March 1967 - Dec 2006.

	Forecast of economic indicator using style portfolio returns at various horizons					
	Month t		Month t+1		Month t+2	
Style porfolio		Adj. R2		Adj. R2		Adj.R2
s1b1	0.01	0.42	0.01 *	0.47	0.01 *	0.48
	(1.27)		(1.85)		(1.78)	
s1b5	0.01	0.42	0.01	0.47	0.01 *	0.48
	(1.48)		(1.61)		(1.93)	
s5b1	0.01	0.42	0.01	0.47	0.02 ***	0.48
	(1.11)		(0.80)		(2.72)	
s5b5	0.01	0.42	0.00	0.46	0.02 **	0.48
	(1.33)		(-0.17)		(2.15)	

t statistics in parentheses

*,**, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.