Procyclical Stocks Earn Higher Returns*

William N. Goetzmann[†] Akiko Watanabe[‡] Masahiro Watanabe[§]

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[†]Contact author. Yale School of Management and NBER, Box 208200, New Haven, Connecticut 06520-8200, Phone: (203) 432-5950, Fax: (203) 432-8931, E-mail: william.goetzmann@yale.edu, URL: http://viking.som.yale.edu.

[‡]University of Alberta School of Business, Edmonton, Alberta, Canada T6G 2R6, Phone: (780) 492-0385, Fax: (780) 492-3325, E-mail: akiko.watanabe@ualberta.ca, URL: http://www.business.ualberta.ca/awatanabe.

[§]University of Alberta School of Business, Edmonton, Alberta, Canada T6G 2R6, Phone: (780) 492-7343, Fax: (780) 492-3325, E-mail: masahiro.watanabe@ualberta.ca, URL: http://www.ualberta.ca/˜masa.

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ABSTRACT

We find that procyclical stocks, whose returns comove with business cycles, earn higher average returns than countercyclical stocks. We use a half century of real GDP growth expectations from economists' surveys to determine forecasted economic states. This approach largely avoids the confounding effects of econometric forecasting model error. The loading on the expected real GDP growth rate is a priced risk measure. A fully tradable, ex-ante portfolio formed on this loading generates a procyclicality premium that is statistically significant, economically large, long-lasting over a few years, and independent of the size, book-to-market, and momentum effects.

The link between macroeconomic fundamentals and stock returns is an important yet unresolved issue in finance. There is a long strand of literature that examines the effect of expected business conditions on expected stock returns. The traditional approach has been to proxy expected business conditions by realized macroeconomic variables, financial market instruments, or combination thereof.[1] It has been more challenging to identify a direct measure of macroeconomic expectations for asset pricing tests, because most expectations data is not available in time series for periods long enough to draw inferences about asset return premia.

In addition, there is a more subtle issue. Expectations about macroeconomic factors are not formed mechanically, but instead created through a process of human reasoning that, at the very least relies upon current, observed conditions and past experience in ways that are difficult to simply proxy with a linear model and a handful of quantitative variables. While some economic forecasts are predictable given the model (one thinks of the Fair model, for instance), others may be based upon intuition, shifting inputs, or even on polling of corporate opinion. Equity market participants presumably rely on an extensive institutional network of professional economic forecasters in the public and private sector. Most major financial institutions have a chief economist. These forecasters publish outlooks, talk to the media, convey proprietary information to the firms that employ them, write newsletters and blogs – in short, economists are important agents in the development of a consensus (or lack thereof) about the direction of the economy. In any test of the relation between asset prices and macroeconomic expectations, it would be particularly useful to filter macroeconomic data through the mind of

[1] For the use of macroeconomic variables such as industrial production and the inflation rate, see, for example, Chen, Roll, and Ross (1986) and Chen (1991). Campbell and Shiller (1988), Fama and French (1988, 1989), and Ferson and Harvey (1991, 1999) employ financial market variables, such as the dividend yield, the default and term premia, and the short rate, to predict equity returns. The aggregate consumption-wealth ratio proposed by Lettau and Ludvigson (2001a, 2001b) can be considered a hybrid of macroeconomic and financial variables.

the forecaster, and use this "processed" expectational information to test whether asset returns reflect macroeconomic expectations. That is the objective of this paper.

Specifically, we use a half century of expectational survey data to examine whether stocks whose returns comove with business cycles, or procyclical stocks, earn higher returns. Our motivation comes from the intuition that such stocks protect investors less well against a decline in wealth during economic downturns, and hence should offer higher average returns to be held in equilibrium. In fact, this is a prediction common to many equilibrium models, since procyclical stocks tend to pay more when marginal utility is low, i.e., their payoffs are negatively correlated with the stochastic discounting factor of the economy, whose existence is guaranteed under very weak assumptions.[2] For example, Cochrane (1999, p.39) nicely spells this point out in his summary of Merton's (1973) Intertemporal Capital Asset Pricing Model (ICAPM):

> "In sum, we should expect that *procyclical stocks* that do well in booms and worse in recessions will have to offer higher average returns than *countercyclical stocks* that do well in recessions, even if the stocks have the same market beta. We expect that another dimension of risk covariation with recessions will matter in determining average returns." (our emphasis)

To determine the business cycles, we employ a direct measure of investor expectations about the future prospect of the economy. The Livingston Survey publishes leading economists' forecasts about national output, prices, unemployment, and interest rates semiannually. Initiated by Joseph Livingston in 1946 and currently maintained by the Federal Reserve Bank (FRB) of Philadelphia, the survey provides more than half a century of direct investor expectations. Us-

[2]Specifically, it only requires the law of one price. The existence of a *positive* stochastic discounting factor only additionally requires the absence of arbitrage.

ing this dataset, Campbell and Diebold (2009) find that the growth rate in expected real Gross Domestic Product (GDP) negatively predicts aggregate stock returns controlling for standard predictive variables. This implies that expected returns rise when future business conditions are expected to be poor and vice versa. Importantly to our purpose, this result implies that the expected real GDP growth rate qualifies as a conditioning variable in a cross-sectional asset pricing test. Since the design of the Livingston Survey allows us to only construct a two semiannual-period-ahead forecast for most of the sample period, it is unclear if investors would respond to the survey result immediately. For example, if the survey tells that the real economy will start deteriorating in six months and if investors immediately tilt their holdings toward countercyclical stocks when the economy is still expanding for another six months, they will risk losing their wealth. This makes the growth expectation measure from the Livingston Survey an unlikely candidate for constructing an ICAPM factor, since the state variables in Merton's (1973) ICAPM are continuous-time diffusion processes whose changes affect investors' demand immediately. Therefore, we lag the growth expectation measure for two semiannual periods to match the forecast horizon to the measurement period of returns, and use it as a conditioning variable in a scaled factor model. Campbell and Diebold (2009) also take the second lag of the same expectation measure to examine its return predictability.

We start by examining the ability of the expectation measure to explain the cross-sectional variation in returns. Our minimal model consists of the excess market return and the second semiannual lag of the expected real GDP growth rate, $LEGDP$, which we call the benchmark two-factor model. Using the cross-sectional Fama-MacBeth (1973) regressions with 25 size and book-to-market (BM) sorted portfolios as test assets, we find that the $LEGDP$ premium is positive and significant. This is consistent with the hypothesis that procyclical stocks earn higher average returns. The adjusted R^2 from the cross-sectional regression of the average realized excess returns on estimated betas is 71%. By comparison, the adjusted R^2 for the CAPM and the four-factor model consisting of the market, size, value, and momentum factors are -0.2% and 76%, respectively. Thus, adding the non-traded $LEGDP$ factor to the market model dramatically improves the model's cross-sectional explanatory power from virtually zero to almost the level achieved by a set of four prominent return factors. In addition, when the test assets are replaced by 30 portfolios that combine ten size, ten book-to-market, and ten momentum portfolios based on one-way sorts, the $LEGDP$ premium is significantly positive controlling for the market, size, and value factors and a momentum characteristic, measured by the past six-month return of the test assets.

We next assess the economic significance of the procyclicality premium using a portfolio-sorting approach. We sort individual stocks on their return sensitivity to $LEGDP$ from the benchmark two-factor model. We employ one-way and multi-way sorts controlling for the size, BM, and momentum characteristics and compute procyclicality premium as the return spread between the highest and lowest $LEGDP$ beta portfolios. The procyclicality premium so constructed is a return on a fully tradable long-short portfolio formed on publicly available information at each point in time. The estimated procyclicality premium with and without size-BM controls ranges from 0.24% to 0.43% per month with a three factor alpha between 0.31% and 0.51% and a four factor alpha between 0.29% and 0.46%, depending on the characteristics controlled. These figures are significant both statistically and economically. With a momentum characteristic control, the procyclicality premium and alphas fall in similar ranges for a variety of past return periods and holding periods up to one year. Thus, momentum profits cannot fully explain the procyclicality premium, although we confirm the findings of

Chordia and Shivakumar (2002) and Liu and Zhang (2008) that they are positively correlated. The procyclicality spread is largest among value firms and reaches almost 0.9% per month with three- and four-factor alphas of approximately 1%. In addition, the loading on the momentum factor indicates that countercyclical stocks tend to be losers that experienced low returns in the preceding periods. We further examine the long-run pricing of procyclicality risk. Using a variety of sorting methods, we find that the procyclicality risk premium persists for two to three years after portfolio formation controlling for prominent characteristics and factors. This is consistent with the hypothesis that procyclicality risk arises at the business cycle frequency.

Our paper is related to the recent literature that examines the link between macroeconomic variables and asset returns. Chordia and Shivakumar (2002) show that momentum profits can be explained by lagged macroeconomic variables and disappear once stock returns are adjusted for their predictability based on these macroeconomic variables. Contrarily, applying a battery of asset pricing models to international data, Griffin, Ji, and Martin (2003) conclude that macroeconomic variables cannot explain momentum. This is partly reversed by Liu and Zhang (2008), who find that the growth rate of industrial production is a priced risk factor that explains more than half of momentum profits in the U.S. market. These authors mostly focus on the connection between macroeconomic risk and momentum returns, and do not construct a procyclicality-mimicking portfolio. In contrast, our main objective is to measure the procyclicality premium that is separate from the momentum as well as size and value effects using portfolios formed on fully ex-ante information. Vassalou (2003) proposes that news to future realized GDP growth is priced in the cross section of stock returns. Using Lamont's (2001) economic tracking portfolio, she extracts the component of the realized *future* GDP growth rate that is reflected on basis asset returns as a proxy for investors' expectations about future investment opportunities. Rather, we use a contemporaneously observable measure of investor expectations that is generally recognized by market participants as potentially of value. This is important, because any factor model that relies upon the pervasive perception of risk factors and sensitivities must also address the issue of common observability.

The rest of the paper is organized as follows. The next section explains the data and confirms the return-predictive ability of the expected real GDP growth rate from the Livingston Survey, which is an important qualification for it to serve as a state variable. Section 2 conducts asset-pricing tests using both cross-sectional regressions and portfolio sorting. The final section concludes.

1. GDP Growth Forecast as Predictive Variable

1.1 Data and the Construction of the Expected GDP Growth Measure

Our measure of expected real GDP growth comes from the Livingston Survey, which summarizes the forecasts of approximately 50 economists from industry, government, banking, and academia. Started in 1946 by financial columnist Joseph Livingston and later taken over by the Philadelphia FRB in 1990, it is the oldest continuous survey of economists' expectations. The survey is conducted twice a year in June and December and currently consists of the forecasts of 18 different variables measuring national output, prices, unemployment, and interest rates.[3] The results of the forecasts are released by the Philadelphia FRB during the two survey months and are often reported in major newspapers and Internet newswires.[4]

[3]See Croushore (1997) and the Federal Reserve Bank of Philadelphia (2005) for details of the survey.

[4]Much of the existing research employing the Livingston Survey focuses on inflation forecasts (see, e.g., Ang, Bekaert, and Wei (2006), Fama and Gibbons (1984), and Gultekin (1983)). Our analysis additionally uses GDP forecasts to compute real growth expectations.

Following Campbell and Diebold (2009), we construct a measure of expected real GDP growth ($EGDP$) from the median forecasts of the nominal GDP level ($GDPX$) and the CPI level (CPI). The six- and twelve-month-ahead forecasts of these variables are continuously available from the second half of 1951. This allows us to create a directly observable measure of the two-period-ahead log expected real GDP growth rate at the semiannual frequency,

$$EGDP_t^{t+1,t+2} = \ln \frac{GDPX_t^{t+2}}{CPI_t^{t+2}} - \ln \frac{GDPX_t^{t+1}}{CPI_t^{t+1}},$$

where the subscript represents the current period and the superscripts the forecast period. The Livingston Survey did not request the respondents to provide forecasts on the nominal GDP and CPI levels at the end of each forecast month until June 1992. Hence, we are unable to create a one-period-ahead forecast of real GDP growth for most of our sample period. To have a sample period long enough to draw inferences in asset-pricing tests and ensure accurate timing of investor expectations, we use the two-period-ahead forecast defined above.

The first two rows of Table 1 report the summary statistics of $EGDP$ and the realized real GDP growth rate ($RGDP$), computed from data publicly available from the St. Louis FRB. The mean expected real semi-annual GDP growth rate is 1.27%, which is close to the realized growth rate of 1.44%. Figure 1 plots $RGDP$ and the second lag of $EGDP$, denoted by $LEGDP$, which matches the forecasting period to the measurement period of $RGDP$. We observe that $LEGDP$ is much smoother than $RGDP$, which, according to Campbell and Diebold (2009), is a property of optimal forecasts. The figure also shows the NBER business cycles. Each narrow band represents a recession, starting with a peak and ending with a trough (except for the end of the sample period, December 2008). We see that $LEGDP$ starts declining at the peak and hit the bottom at the trough for early recessions.

1.2 Predictive Regressions

We now test the ability of $EGDP$ to forecast the future excess market return, which is the qualification for a state variable in cross-sectional asset pricing tests. We control for the following variables typically used in the predictability literature: the dividend yield (DY), default spread (DEF), term spread ($TERM$), and the consumption-wealth ratio (CAY).[5] Our full model specifies the following predictive regression for the period during which all predictive variables are available (the first half of 1953 through the second half of 2008),

$$\begin{aligned} MKT_t &= \delta_0 + \delta_1 EGDP_{t-2}^{t-1,t} + \delta_2 DY_{t-1} + \delta_3 DEF_{t-1} \\ &+ \delta_4 TERM_{t-1} + \delta_5 CAY_{t-1} + e_t, \end{aligned} \tag{1}$$

where MKT is the semiannual CRSP value-weighted excess market return compounded from the monthly series.[6] As noted above, we use the second lag of $EGDP$ to match its forecasting horizon to the holding period of the market return. All other instruments are lagged by one semiannual period.

Table 2 shows that $LEGDP$ has a significant return-predictive ability controlling for standard predictive variables. Again, the prefix "L" represents a lagged series. The negative

[5]See, e.g., Fama and French (1988) for the dividend yield, Keim and Stambaugh (1986) for the default spread, Fama and French (1989) for the term spread, and Lettau and Ludvigson (2001a, 2001b) for the consumption-wealth ratio. DY is the sum of dividends accruing to the Center for Research in Securities Prices (CRSP) value-weighted market portfolio over the previous 12 months divided by the level of the market index. DEF is the yield spread between Moody's Baa and Aaa corporate bonds. $TERM$ is the yield spread between the ten-year Treasury bond and the three-month Treasury bill. The data on corporate and Treasury bond/bill rates are from the St. Louis FRB, and CAY is obtained from Martin Lettau's website.

[6]Summary statistics for DY, DEF, $TERM$, CAY, and MKT are provided in Table 1.

coefficient on $LEGDP$ captures the countercyclical pattern in expected excess returns; a large equity premium arises when the economic outlook is poor and hence the perceived risk is high. This confirms Campbell and Diebold's (2009) finding for an extended period.[7]

2. Cross-Sectional Pricing of Procyclicality Risk

2.1 The Asset Pricing Model

Having confirmed the return-predictive ability of the expected real GDP growth rate, we now examine its cross-sectional pricing. Consider a conditional asset pricing model, $E_{t-1}[m_t R_{it}] = 1$, where m_t is the stochastic discounting factor (SDF), R_{it} is the gross return on asset i, both at time t, and the expectation is taken given investors' information set at time $t-1$. Taking the unconditional mean and using the covariance formula, we can write the expected return by the covariance between the SDF and the asset return (also see Cochrane (2005)):

$$E[R_{it}] = \frac{1 - cov(m_t, R_{it})}{E[m_t]}. \tag{2}$$

In most equilibrium models, the SDF is a nonlinear function of factors and the model's deep parameters. Following the standard procedure, we assume that the SDF can be approximated by a linear function of factors,

$$m_t = a_{t-1} + b'_{t-1} f_t,$$

[7] Campbell and Diebold's (2009) sample period is from the first half of 1952 to the second half of 2003.

where f_t is a vector of factors and a_{t-1} and b_{t-1} are potentially time-varying parameters. We assume that a_{t-1} and b_{t-1} are linear functions of a single state variable, $z_{t-1} = EGDP_{t-2}^{t-1,t}$,

$$a_{t-1} = a_0 + a_1 z_{t-1}, \quad b_{t-1} = b_0 + b_1 z_{t-1}.$$

Our minimal set of factors consists of the single market factor, $f_t = R_{Mt}$, hence:

$$m_t = a_0 + a_1 EGDP_{t-2}^{t-1,t} + b_0 R_{Mt} + b_1 EGDP_{t-2}^{t-1,t} R_{Mt}. \tag{3}$$

We expect that $a_1 < 0$, because a better economic condition, proxied by a higher expected real GDP growth rate, increases investors' consumption (or equivalently wealth in a single period model) and decreases marginal utility. If this is the case, substituting Equation (3) into (2) shows that stocks whose returns covary with the lagged expected real GDP growth rate should have higher returns. That is, procyclical stocks should earn higher returns.

Here, procyclicality is defined by the lagged, but forecast-horizon matched, expected real GDP growth rate. This is where our framework differs from ICAPM, in which the return covariance should be measured with respect to the contemporaneous changes in the state variables that describe investors' future investment set. In fact, it is unclear that the change in the expected real GDP growth rate from the Livingston Survey serves as a factor in ICAPM, because the survey design allows one to construct only a two semiannual-period-ahead forecast for most of the sample period. To see this, suppose the economy is in expansion and the survey tells that the real economy will start deteriorating in six months. Do investors tilt their holdings toward countercyclical stocks *now* even when the real economy is expected to continue expanding for another six months? If they do, they will risk losing their wealth until the economy indeed enters a recession. In contrast, in Merton's (1973) ICAPM the state variables are continuous-time diffusion processes that describe the investment opportunity set in the instantaneous future. Thus, changes in the state variables affect investors' demand immediately. In short, the design of the Livingston Survey makes the resulting real GDP growth expectation a more likely candidate for a lagged conditioning variable than for an ICAPM factor. Thus, in what follows we will use the expected real GDP growth rate as a conditioning variable in a scaled factor model as in Equation (3).[8]

2.2 Fama-MacBeth Regressions

As a preliminary investigation, we examine the ability of the GDP growth expectation measure to explain the cross-sectional variation in returns. We use the Fama-MacBeth (1973) procedure with 25 test portfolios formed as the intersection of independently sorted size and book-to-market quintiles. To account for the possible errors-in-variable problem, we employ the Shanken (1992) correction for standard errors.

The first row of Table 3 shows the estimated premia for the benchmark two-factor model comprised of the market factor (MKT) and the second lag of the Livingston-Survey expected real-GDP growth rate ($LEGDP$). The $LEGDP$ premium is positive and significant at 5%, implying that stocks whose returns comove with the business cycle proxy earn higher returns. The average adjusted R^2 of the cross-sectional regressions from the second pass of the Fama-MacBeth procedure is 43%. This is an encouraging figure; for example, the average adjusted R^2 for a two-factor model with MKT and the value factor (HML) is exactly identical at 43%

[8]Ferson and Harvey (1991) and Jagannathan and Wang (1996) employ alternative models in which lagged series help explain the cross section of returns.

(not shown). Thus, the non-traded expectation factor does about as well as the traded value factor in explaining the cross section of 25 size-BM portfolio returns. Adding the interaction term between $LEGDP$ and MKT to the benchmark model makes the scaled CAPM model in Equation (3). However, Row 2 of the table shows that the estimated slope coefficient on the interaction term is insignificant, while that on $LEGDP$ remains significant. This implies that $LEGDP$ captures the level of SDF rather than time variation in the market beta. Since the interaction term is insignificant, we will omit it in the rest of the paper. The procyclicality premium, however, dissipates when confronted with the standard three factors including the size factor (SMB) and HML in Row 3.

Liu and Zhang (2008) observe that macroeconomic risk explains a substantial portion of momentum profits and include momentum-sorted portfolios in test assets.[9] Following them, we now replace the test assets with 30 value-weighted portfolios that combine ten size, ten book-to-market, and ten momentum portfolios based on one-way sorts. The results in Rows 4 to 6 show that the $LEGDP$ premium remains significantly positive after controlling for the three factors and additionally the momentum characteristic, measured as each test portfolio's past six-month return ($PRET$). However, the $LEGDP$ premium becomes insignificant when the momentum factor (MOM) is further included in Row 7.[10]

We consider these seemingly mixed results promising for a non-return factor like $LEGDP$. To confirm this view, we plot fitted returns from three models against average realized returns of the 25 size-BM portfolios in Figure 2. The dashed line represents a 45 degree line, on which fitted returns will fall if the model perfectly explains the cross-sectional variation in average

[9] Aretz, Bartram, and Pope (2010) also find a significant link between momentum and macroeconomic fundamentals.

[10] SMB, HML, and MOM as well as the two sets of the test portfolio returns are downloaded from Kenneth French's website.

returns. The flat relation in Panel A shows the well known fact that the unconditional CAPM cannot explain the cross-sectional variation in the returns of size-BM portfolios. The adjusted R^2 from the cross-sectional regression of the average realized excess returns on estimated betas ("Adj R^2") is virtually zero. Once we add $LEGDP$ in Panel B, however, the plot gets more aligned to the 45 degree line, and the adjusted R^2 jumps up to 71%. For the four-factor model in Panel C, the plot is slightly more concentrated but the gain in the adjusted R^2 is only several percent.

We make two observations from this preliminary analysis. First, there is a sign of procyclicality premium for stocks whose returns comove with business cycles. Second, this premium, like any other, may not be measured appropriately in a cross-sectional asset pricing test unless the test assets are sensibly chosen;[11] for example, MOM, so strongly priced ($t = 3.39$) with the 30 size, BM, and momentum-sorted test portfolios in Row 7 of Table 3, becomes insignificant when the test assets are replaced by the 25 size-BM portfolios (not shown). This is true even if $LEGDP$ and $PRET$ are excluded to make the standard four-factor model. This motivates us to pursue an approach that does not rely on a particular set of test assets. Specifically, we will form portfolios based on individual stocks' return comovement with $LEGDP$. Moreover, forming a tradable portfolio allows us to gauge the economic significance of the procyclicality premium. This is what we now turn to.

2.3 Forming Procyclical Portfolios

We form portfolios by sorting individual stocks on their return sensitivity to the expected real GDP growth rate from the Livingston Survey in the benchmark two-factor model. First,

[11] Lewellen and Nagel (2006) and Lewellen, Nagel, and Shanken (2008) raise a related point that one should examine various sets of test assets in cross-sectional asset-pricing regressions.

in each June and December individual stock returns are regressed on MKT and $LEGDP$ using past ten years of semiannual observations (20 periods). Then, stocks are sorted by their $LEGDP$ betas into decile portfolios, which are held for the next six months. Following much of the existing literature, we start forming portfolios in June 1963 and measure monthly returns from July 1963 through December 2008. We report results based on value-weighted returns, but those for equally weighted returns are qualitatively similar.

Table 4 reports the characteristics of the $LEGDP$ beta-sorted decile portfolios. The top row shows that the distribution of the the average $LEGDP$ beta (β^{LEGDP}) is remarkably symmetric, with an average beta of -31.9 in the lowest decile and 33.4 in the highest decile. Thus, stocks in lowest rankings are countercyclical and those in highest rankings are procyclical. Procyclical firms tend to be smaller in market capitalization ($SIZE$), but the relation is not monotonic. The average book-to-market ratio (BM) barely changes across the deciles. The average past six-month return skipping a month (lagged past five-month return, $PRET$) exhibits a U-shape, with the most procyclical stocks having a higher average past return than the most countercyclical stocks. The number of stocks (N) indicates that each portfolio is well populated.

Importantly, the excess return ($EXRET$) roughly increases with the ranking, and the spread between the highest and lowest $LEGDP$ beta portfolios is 0.43% per month ($t = 2.17$, $p = 0.03$). This return spread remains significant upon standard risk adjustment; the three-factor alpha from the regression of the return spread on the market, size, and value factors is 0.51% per month ($t = 2.52$, $p = 0.01$). The alpha increases with the ranking more monotonically than the excess return does. Since there is some evidence that the procyclicality premium is related to momentum (see Section 2.2), we further include the momentum factor in the regressors and calculate the four-factor alpha. As anticipated, the alpha for the spread portfolio declines to

0.37% per month in the presence of MOM, but is still significant ($t = 1.75$, $p = 0.08$).

The loadings on the market (β_{MKT}) and size (β_{SMB}) factors exhibit a U-shape, despite the tendency of procyclical stocks to be slightly smaller in size. The value factor beta (β_{HML}) does not show a discernible pattern. All this results in insignificant or at best only marginally significant loadings of the spread portfolio on MKT, SMB, and HML in the rightmost column. However, the significantly negative loading of the lowest $LEGDP$ beta portfolio on the momentum factor (β_{MOM}) indicates that countercyclical stocks tend to be losers, leading to a modest but significantly positive beta of the spread portfolio ($\beta_{MOM} = 0.15$, $t = 2.92$). That is, the procyclicality spread tends to comove with the winner minus loser spread, and this comovement mainly comes from the short position. In fact, β_{MKT}, β_{SMB}, and β_{HML} of the spread portfolio in the four-factor regression barely change from those in the three-factor regression (not shown), implying that the relatively low four-factor alpha of the spread portfolio results from the loadings of countercyclical stocks on losers.

The variation in the size characteristic and in β_{SMB}, β_{HML} and β_{MOM} across the deciles motivates us to sort out the size, value, and momentum effects to extract a purer procyclicality premium. The next couple of sections address this issue.

2.4 Procyclicality Premium Robust to Size and Book-to-Market Ratio

To isolate the effect of characteristics known to correlate with average returns, we perform multi-way sorts. We first sort stocks independently by size and expected real GDP growth beta (from the benchmark two-factor model) into quintiles and form 25 portfolios as their intersections. For the size sort, we use the NYSE breakpoints following Fama and French (1993). Table 5 reports the result. Panel A indicates that the average $LEGDP$ beta is distributed quite symmetrically across the β^{LEGDP} rankings within each size quintile. Thus, firms of all size come with a spectrum of procyclicality. In contrast, the market beta in Panel B exhibits a U-shaped pattern with respect to β^{LEGDP} ranking in a given size quintile, suggesting the inability of the market beta to spread across procyclical and countercyclical firms at least in the current unconditional framework. Panel C shows that the two-way sort controls for size fairly well, except possibly within the largest quintile. Interestingly, there continues to be little variation in the average book-to-market ratio across the β^{LEGDP} ranks in Panel D. Within each size quintile, countercyclical stocks tend to have lower past six-month returns than procyclical stocks (Panel E). The disproportionately large number of stocks in the smallest size quintile in Panel F reflects the fact that many NASDAQ firms fall in that quintile.

The excess return in Panel G tends to increase with the β^{LEGDP} ranking within each size quintile, making all the five spread returns significant. All these spreads remain significant upon the standard three and four-factor adjustments in Panels H and I, except for the mid-size quintile in the latter. The columns labeled 'Cont' in Panel G shows the equally weighted average of the five size-quintile excess returns within each β^{LEGDP} quintile. This size-controlled portfolio return monotonically increases from 0.43% to 0.76% per month, and the spread of the top and bottom size-controlled portfolio returns, which we call the size-controlled procyclicality premium, is 0.34% and statistically significant at 1%. Likewise, the size-controlled three-factor alpha in Panel H increases monotonically from -0.22% to 0.14%, leading to a spread alpha of 0.36%. Similarly, the size-controlled four-factor alpha in Panel I is 0.31%. Both of these spread alphas are significant at 1%.

We next replace the control-sorting key with the book-to-market ratio and repeat the analysis. Table 6 reports the characteristics of 25 BM-β^{LEGDP}-sorted portfolios. Again, following

Fama and French (1993), we use NYSE breakpoints in BM sorting. Panel A exhibits a remarkable symmetry of the $LEGDP$ beta across rows within each BM quintile. Thus, value firms and growth firms alike come in procyclical and countercyclical varieties. The market beta in Panel B shows a U-shaped pattern with respect to β^{LEGDP}. Size in Panel C tends to be smaller for value firms, confirming what is known from existing studies. Within each BM quintile, there is little variation in the book-to-market ratio (Panel D) and the past six-month return exhibits a U-shaped pattern (Panel E), with procyclical stocks having slightly higher past returns than countercyclical stocks. The number of stocks in Panel F assures that each portfolio is well populated.

Panels G, H, and I show different patterns from those for size-β^{LEGDP} sorting in the previous table. The return spread between the highest and lowest β^{LEGDP} quintiles increases with BM monotonically from 0.11% for growth firms to 0.86% for value firms. The spread alpha ranges between approximately $0.2\% - 0.3\%$ for growth firms and almost 1% for value firms, and are significant for the mid through highest BM quintiles. The BM-controlled excess return, which is given as the equally weighted average of the five excess BM portfolio returns within a given β^{LEGDP} quintile, generally increases with the $LEGDP$ beta ranking and so do the alphas. The return spread between the two extreme $LEGDP$-beta quintiles of the BM-controlled portfolios, which we call the BM-controlled procyclicality premium, is 0.37% per month and statistically significant at 1%. Likewise, the BM-controlled procyclicality alpha is 0.51% and 0.46% when adjusted for the three and four factors, respectively, both of which are also significant at 1%.

As noted above, the pattern of size in Panel C indicates that value stocks tend to be small stocks. To further control for this, we sort stocks independently into size, BM, and $LEGDP$-beta terciles and form 27 portfolios as their intersections. Table 7 shows the result of the triple sorting. For simplicity, we focus on the highest nine and lowest nine β^{LEGDP} portfolios and their spread positions. Panels A and B show the size and the book-to-market ratio of the low and high β^{LEGDP} portfolios in Subpanels (i) and (ii), respectively. Since we are interested in the long-short portfolio returns, it is not the within-panel variation that matters, but the difference between the corresponding cells of the two subpanels. In this regard, the triple sorting controls for the two characteristics quite well, except possibly for the largest growth portfolio that exhibits some variation in size between Subpanels A(i) and A(ii). The past six-month return in Panel C tends to be lower for countercyclical stocks, especially for value stocks. If any, factor adjustments will ultimately control for this.

Panel D shows that the β^{LEGDP}-spread portfolio returns are significant among value stocks, especially large value stocks; the spread return varies from 0.25% for small value firms to 0.79% for large value firms, all of which are significant. The rightmost column shows the equally weighted average of the nine size-BM portfolio returns within a given β^{LEGDP} rank. The spread of this average return between the high and low β^{LEGDP} terciles is the size-BM-controlled procyclicality spread, which is 0.24% and statistically significant at 1%. Because we have already controlled for the size and BM characteristics, the factor-adjusted alphas in Panels E and F do not differ much from the spread returns in Panel D; the size-BM-controlled alpha in the rightmost column monotonically increases with the β^{LEGDP} ranking in both panels, and the controlled procyclicality alpha is 0.31% with the three-factor adjustment and 0.29% with the four-factor adjustment, both of which are statistically significant at the 1% level.

To summarize our findings thus far, the estimated procyclicality premium ranges from 0.24% to 0.43% per month with a three factor alpha between 0.31% and 0.51% and a four factor alpha between 0.29% and 0.46%, depending on the characteristics controlled. These figures are significant both statistically and economically. The procyclicality spread is largest among value firms and reaches almost 0.9% per month with three- and four-factor alphas of approximately 1% each.

2.5 Procyclicality Premium Robust to Momentum Characteristic

Given the positive relation between procyclicality and past returns (see Section 2.3), we control for the momentum characteristic as well. Following Jegadeesh and Titman (1993), we implement the so-called (J, K) momentum strategies. Every month, stocks are sorted independently into quintiles by their past J month returns skipping a month (lagged $J-1$ month return, $PRET$) and the latest available $LEGDP$ beta. The $LEGDP$ beta is computed from the benchmark two-factor model using past ten years of semi-annual observations as of last June or December, whichever is later, and hence does not change for six months. First, 25 value-weighted sub-portfolios are formed as the intersection of the past return-$LEGDP$ beta quintiles and held for K months. Then for each ranking, the entire portfolio is an equally weighted portfolio of the K sub-portfolios, consisting of those formed in the current and previous $K-1$ months, with overlapping holding periods when $K > 1$. Thus, we effectively rebalance fraction $1/K$ of the stocks monthly by retiring a maturing sub-portfolio and starting a new one.

Table 8 presents the result for the $(6, 6)$ strategy. Again, both procyclical and countercyclical stocks are present within a given characteristic level, this time the past six-month return (Panel A). The market beta continues to exhibit a U-shape with respect to $LEGDP$ beta (Panel B). Size in Panel C shows an inverted-U relation with both $LEGDP$ beta and past return. The book-to-market ratio is flat in Panel D. Panel E demonstrates that the double sort controls for the momentum characteristic fairly well. Panel F indicates that each portfolio is well populated.

The $LEGDP$-beta spread-portfolio return at the bottom of Panel G is significant for the mid through highest $PRET$ quintiles, ranging between 0.29% and 0.52%. It may seem that the procyclicality premium mainly obtains among winner stocks, but the bottom rows of Panels H and I show that the spread alphas are significant for losers as well; the three and four factor alphas are both 0.41% for losers, and are 0.59% and 0.47%, respectively, for winners.

The rightmost column labeled "Cont" in Panel G shows the average of the excess returns on the five $PRET$ portfolios within a given $LEGDP$ quintile. This momentum characteristic-controlled excess return monotonically increases with $LEGDP$ beta, and so do its three and four factor alphas in Panels H and I, respectively. The procyclicality premium, defined as the momentum-controlled spread return between the highest and lowest $LEGDP$ beta quintiles, is 0.29% with three- and four-factor alphas of 0.41% and 0.35%, respectively, all of which are significant.

We next extend the analysis to general (J, K) strategies, where $J = 3, 6, 12$ and $K = 1, 3, 6, 12$. For simplicity, we only report the spread returns controlled for the momentum characteristic and their alphas in Table 9. These correspond to the bottom row of the "Cont" column in Panels G, H, and I of Table 8, and therefore the estimates for the $(6, 6)$ strategy are identical. We make two observations. First, the procyclicality premium is robust across the measurement periods of the past return and the holding periods. All the $LEGDP$-beta spread portfolio returns controlled for the momentum characteristic in Panel A are significant except for the $(6, 1)$ strategy. All the three factor alphas in Panel B are significant, and so are the four factor alphas in Panel C, which range between 0.24% and 0.36%. Second, the significant results with $K = 12$ suggest that the procyclicality premium also obtains at horizons longer than one year. This is plausible if it is indeed the reward for bearing the procyclicality risk over business cycles, the risk that one's wealth tends to decrease during bad times and not to recover until good times. The next section explores this possibility.

2.6 Long-run Pricing of Procyclicality Risk

If procyclicality risk arises over business cycles, we expect its pricing to bear a long-run effect. We examine this point by reverting to semiannual portfolio formation and increasing the holding period, K, from 6 to 12, 24, 36, and 60 months. Specifically, every June and December we form sub-portfolios via the one, two, or three-way sort involving the $LEGDP$ beta, size and/or the book-to-market ratio as in Sections 2.3 and 2.4. Each sub-portfolios is value-weighted and held for K months. For each ranking, the entire portfolio is an equally weighted portfolio of $K/6$ sub-portfolios, consisting of those formed in the current and previous $K/6 - 1$ semi-annual periods, with overlapping holding periods when $K > 6$.

Table 10 shows the result. In each panel, the figures for $K = 6$ match those in the previous tables as there is only a single sub-portfolio for a given rank. The spread portfolio return between the highest and lowest $LEGDP$ beta deciles from the one way sort in Panel A almost monotonically decreases with the holding period, and so do their three- and four-factor alphas. They are significant for holding periods of up to three years, with returns ranging between 0.30% and 0.43% and the three- (four-) factor alphas between 0.42% and 0.52% (0.32% and 0.37%). The four-factor alpha is again lower than the three-factor alpha at all holding periods except for 60 months, suggesting some dependency of the procyclicality premium on the momentum premium, although we would expect that the momentum dependency would be most relevant for holding periods of one year or shorter over which short-run return continuation obtains. Nevertheless, the procyclicality risk premium is not entirely subsumed by the inclusion of the momentum factor.

We further form long-run portfolios via the two and three-way sorts. For brevity, we only report the excess returns and alphas of the size-, BM-, and size-BM-controlled portfolios in Panels B, C, and D, respectively. All these panels say that the procyclicality risk premium persists for a few years controlling for prominent characteristics and factors. The significance of alphas is generally stronger than the one-way sort, likely because the spreads are between average portfolios of raw portfolios, rather than between portfolios of individual stocks in the latter.

In summary, the pricing of procyclicality risk persists in the long run, and the procyclicality risk premium remains significant for up to three years. This differentiates the procyclicality premium from the momentum premium, which is known to be positive for holding periods of up to approximately one year and then reverses its sign over longer horizons.

3. Conclusion

We find that procyclical stocks, whose returns comove with business cycles, earn higher returns than countercyclical stocks. Our proxy for business cycles is the expected real GDP growth rate constructed from the Livingston Survey, a publicly available survey data that spans more than a half century. The expected real GDP growth rate forecasts the future aggregate return controlling for existing predictive variables. Thus, it satisfies the qualification for a state variable in a cross-sectional asset pricing test. A benchmark two-factor model with the excess market return and the expected real GDP growth rate explains a sizable portion of cross-sectional variation in standard test portfolio returns. We further form portfolios by sorting individual stocks on their return sensitivity to the expected real GDP growth rate. We extract the procyclicality premium that is statistically significant and economically large controlling for size, BM, and momentum characteristics. The characteristic-controlled procyclicality premium is robust to adjustment for the standard market, size, value, and momentum factors. The procyclicality spread is largest among value firms, and especially among large value firms. We also find that countercyclical stocks tend to have lower past returns. The pricing of procyclicality risk persists for a few years after portfolio formation, consistent with the hypothesis that it derives from the covariation between the stochastic discounting factor and asset returns at the business cycle frequency.

Our analysis leaves some unresolved issues. While we are guided by the scaled factor model, the evidence is also not inconsistent with the two-beta expression of the conditional CAPM proposed by Jagannathan and Wang (1996). In fact, our previous work contained a thorough discussion on this point and an implementation of time-varying beta along the line of Petkova and Zhang (2005).[12] Also, because of the limited availability of the one-period-ahead expectation, we have dismissed the possibility of the contemporaneous change in the real GDP growth expectation to serve as an ICAPM factor early in our analysis. However, when enough observations are accumulated in future, this will make an interesting agenda to pursue, as Cochrane (2005, p.445) puts in the following remark:

> "Though Merton's (1971, 1973) theory says that variables which predict market returns should show up as factors which explain cross-sectional variation in average returns, surprisingly few papers have actually tried to see whether this is true."

[12] The idea to model betas as a function of business cycle variables also appears in Chan and Chen (1988, footnote 6).

Finally, in an unreported analysis, we do not find the innovation to the *realized* real GDP growth rate to be priced. This underscores the advantage of using processed information from survey data. Asset pricing models based on priced systematic risk factors rely fundamentally on a widespread perception of risks. Although latent variable methods and ex-post variable realizations are useful for identifying a factor structure in asset returns, ultimately researchers must look for priced factors in the public flow of economic information. For surely if people care a lot about a few factors they will seek news about them, and the public demand will be met in a free information marketplace.

References

Ang, Andrew, Geert Bekaert, and Min Wei, 2006, "Do Macro Variables, Asset Markets, or Surveys Forecast Inflation Better?" *Journal of Monetary Economics*, forthcoming.

Aretz, Kevin, Söhnke M. Bartram, and Peter F. Pope, 2010, "Macroeconomic Risks and Characteristic-Based Factor Models," forthcoming, *Journal of Banking and Finance.*

Campbell, John Y., and Robert J. Shiller, 1988, "The Dividend-Price Ratio and Expectations of Future Dividend and Discount Factors," *Review of Financial Studies* 1, 195-227.

Campbell, Sean D., and Francis X. Diebold, 2009, "Stock Returns and Expected Business Conditions: Half a Century of Direct Evidence," *Journal of Business and Economic Statistics* 27 (2), 266-278.

Chan, K. C., and Nai-Fu Chen, 1988, "An Unconditional Asset-Pricing Test and the Role of Firm Size as an Instrumental Variable for Risk," *Journal of Finance* 43 (2), 309-325.

Chen, Nai-Fu, 1991, "Financial Investment Opportunities and the Macroeconomy," *Journal of Finance* 46 (2), 529-554.

Chen, Nai-Fu, Richard Roll, and Stephen A. Ross, 1986, "Economic Forces and the Stock Market," *Journal of Business* 59, 383-403.

Chordia, Tarun, and Lakshmanan Shivakumar, 2002, "Momentum, Business Cycle, and Time-varying Expected Returns," *Journal of Finance* 57 (2), 985-1019.

Cochrane, John H., 1999, "New Facts in Finance," *Economic Perspectives*, Federal Reserve Bank of Chicago 23(3), pp. 36-58.

Cochrane, John H., 2005, *Asset Pricing* (revised ed.), Princeton University Press, Princeton, NJ.

Croushore, Dean, 1997, "The Livingston Survey: Still Useful After All These Years," *Business Review* (March/April), Federal Reserve Bank of Philadelphia.

Fama, Eugene F., and Kenneth R. French, 1988, "Dividend Yields and Expected Stock Returns," *Journal of Financial Economics* 22, 3-25.

Fama, Eugene F., and Kenneth R. French, 1989, "Business Conditions and Expected Returns on Stocks and Bonds," *Journal of Financial Economics* 25, 23-49.

Fama, E. F. and K. R. French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33, 3-56.

Fama, Eugene F., and Michael R. Gibbons, 1984, "A Comparison of Inflation Forecasts," *Journal of Monetary Economics* 13, 327-348.

Fama, E. F. and J. D. MacBeth, 1973, "Risk, Return, and Equilibrium: Empirical Tests," *Journal of Political Economy*, 81, 607-636.

Federal Reserve Bank of Philadelphia, 2005, *Livingston Survey Documentation*, http://www.phil.frb.org/econ/liv/.

Ferson, Wayne E., and Campbell R. Harvey, 1991, "The Variation of Economic Risk Premiums," *Journal of Political Economy* 99 (2), 385-415.

Ferson, Wayne E., and Campbell R. Harvey, 1999, "Conditioning Variables and the Cross Section of Stock Returns," *Journal of Finance* 54, 1325-1360.

Griffin, John M., Xiuqing Ji, and J. Spencer Martin, 2003, "Momentum Investing and Business Cycle Risk: Evidence from Pole to Pole," *Journal of Finance* 58 (6), 2515-2547.

Gultekin, K. Bulent, 1983, "Stock Market Returns and Inflation Forecasts," *Journal of Finance* 38, 663-673.

Jagannathan, Ravi, and Zhenyu Wang, 1996, "The Conditional CAPM and the Cross-Section of Expected Returns, " *The Journal of Finance* 51, 3-53.

Jegadeesh, Narasimhan, and Sheridan Titman, 1993, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance* 48 (1), pp. 65-91.

Keim, Donald B., and Robert F. Stambaugh, 1986, "Predicting Returns in the Stock and Bond Markets," *Journal of Financial Economics* 17, 357-390.

Lamont, Owen A., 2001, "Economic Tracking Portfolios," *Journal of Econometrics*, 105, 161-184.

Lettau, Martin, and Sydney Ludvigson, 2001a, "Consumption, Aggregate Wealth, and Expected Stock Returns," *Journal of Finance* 56, 815-848.

Lettau, Martin, and Sydney Ludvigson, 2001b, "Resurrecting the (C)CAPM: A Cross-Sectional Test When Risk Premia Are Time-Varying," *Journal of Political Economy* 109, 1238-1287.

Lewellen, Jonathan, and Stefan Nagel, 2006, "The Conditional CAPM Does Not Explain Asset-pricing Anomalies," *Journal of Financial Economics* 82, 289-314.

Lewellen, Jonathan, Stefan Nagel, and Jay Shanken, 2008, "A Skeptical Appraisal of Asset-Pricing Tests," working paper, Dartmouth, Stanford and Emory Universities.

Liu, Laura Xiaolei, and Lu Zhang, 2008, "Momentum Profits, Factor Pricing, and Macroeconomic Risk," *Review of Financial Studies* 21 (6), 2417-2448.

Merton, Robert C., 1971, "Optimum Consumption and Portfolio Rules in a Continuous Time Model," *Journal of Economic Theory* 3, 373-413.

Merton, Robert C., 1973, "An Intertemporal Capital Asset Pricing Model," *Econometrica* 41, 867-887.

Petkova, Ralitsa, and Lu Zhang, 2005, "Is Value Riskier than Growth?" *Journal of Financial Economics* 78 (1), 187-202.

Shanken, J., 1992, "On the Estimation of Beta-Pricing Models," *Review of Financial Studies*, 5, 1-33.

Vassalou, Maria, 2003, "News Related to Future GDP Growth as a Risk Factor in Equity Returns," *Journal of Financial Economics* 68, 47-73.

Table 1: **Summary statistics**

	Mean	Stdev	N	Start	End
$EGDP(\%)$	1.27	0.73	115	1951S2	2008S2
$RGDP(\%)$	1.44	1.72	114	1952S1	2008S2
$DY(\%)$	3.18	1.13	115	1951S2	2008S2
$DEF(\%)$	0.082	0.040	115	1951S2	2008S2
$TERM(\%)$	0.11	0.10	112	1953S1	2008S2
$CAY(\%)$	-0.032	1.43	114	1952S1	2008S2
$MKT(\%)$	3.23	11.92	115	1951S2	2008S2

This table shows the mean, the standard deviation (Stdev), the number of observations (N), and the starting and ending semiannual periods of selected variables (S1 denotes the first half of the year, and S2 the second half). $EGDP$ is the expected real GDP growth rate from the Livingston Survey. $RGDP$ is the realized GDP growth rate. DY is the dividend yield. DEF is the default spread. $TERM$ is the term spread. CAY is the consumption-wealth ratio. MKT is the excess return on the CRSP value-weighted portfolio.

Table 2: **Predictive return regressions**

	Const	$LEGDP$	LDY	$LDEF$	$LTERM$	$LCAY$	Adj. R^2
1	0.07***	-3.21**					0.03
	(3.39)	(-2.30)					
2	-0.05		2.58**				0.05
	(-1.32)		(2.34)				
3	0.01			20.45			-0.01
	(0.48)			(0.54)			
4	0.01				15.09		0.01
	(0.92)				(1.56)		
5	0.03***					2.31***	0.07
	(2.90)					(3.17)	
6	-0.03	-2.96**	2.47*	3.33	15.80	1.58*	0.13
	(-0.54)	(-2.08)	(1.97)	(0.09)	(1.42)	(1.90)	

This table shows estimated coefficients of semiannual predictive return regressions with t-statistics in parentheses, based on Newey-West robust standard errors with lag length 2. The excess return on the CRSP value-weighted portfolio (MKT) is regressed on a constant ('Const') and lags (denoted by prefix 'L') of the following predictive variables: the Livingston-Survey expected real GDP growth rate ($EGDP$), dividend yield (DY), default spread (DEF), term spread ($TERM$), and the consumption-wealth ratio (CAY). The lag order is 2 for $EGDP$ and 1 for other predictive variables. Adj.R^2 is the adjusted R-squared of the regression. *, **, and *** represent significance at 10, 5, and 1%, respectively.

Table 3: **Fama-MacBeth regressions**

	#Assets	Const	MKT	$LEGDP$	$LEGDP \cdot MKT$	SMB	HML	$PRET$	MOM	Adj.R^2
1	25	7.60*	-3.83	1.22**						0.43
		(1.67)	(-0.77)	(2.00)						
2	25	7.34*	-3.57	1.21**	0.03					0.46
		(1.90)	(-0.81)	(2.05)	(0.37)					
3	25	8.58***	-5.18*	0.47		1.15	2.67*			0.51
		(3.57)	(-1.78)	(1.48)		(0.95)	(1.98)			
4	30	5.88**	-2.30	0.68*						0.28
		(2.37)	(-0.75)	(1.73)						
5	30	14.80***	-11.14**	0.91**		1.99	0.59			0.45
		(3.58)	(-2.41)	(2.38)		(1.25)	(0.32)			
6	30	11.82***	-9.44**	0.64*		1.38	0.60	14.27**		0.50
		(3.82)	(-2.52)	(1.95)		(1.04)	(0.36)	(2.43)		
7	30	3.73	-1.16	0.18		0.71	1.88	7.71**	4.68***	0.59
		(1.60)	(-0.40)	(0.77)		(0.61)	(1.39)	(2.46)	(3.39)	

This table shows the estimated premia from the Fama-MacBeth (1973) two-pass procedure. In the first pass, each excess test asset return is regressed on factors at the semi-annual frequency to estimate factor loadings using the entire sample. In the second pass, a cross-sectional regression of excess test asset return is run on the factor loadings and characteristics, if any, in each semi-annual period. Reported are the time-series average slope coefficients from the second pass and t-statistics in parentheses, based on the Shanken (1992) correction for standard errors. *, **, and *** represent significance at 10, 5, and 1%, respectively. #Assets is 25 if the test assets are the 25 portfolios formed as the intersection of size and book-to-market quintiles, and 30 if the test assets are comprised of ten size, ten book-to-market-ratio, and ten momentum portfolios based on one-way sorts. 'Const' is the intercept. MKT is the excess return on the CRSP value-weighted portfolio. $LEGDP$ is the second lag of expected real GDP growth rate constructed from the Livingston Survey. $LEGDP \cdot MKT$ is the interaction term between $LEGDP$ and MKT. SMB, HML, and MOM are the size, book-to-market, and momentum factors, respectively. $PRET$ is the lagged six-month return of the test asset, included as a characteristic in the second-pass cross-sectional regressions. 'Adj.R^2' is the average adjusted R-squared of the second-pass cross-sectional regressions.

Table 4: **Decile portfolios sorted on Livingston expected real GDP growth beta**

β^{LEGDP} rank	1	2	3	4	5	6	7	8	9	10	10-1
β^{LEGDP}	-31.9	-13.8	-7.4	-3.2	0.0	3.0	6.1	9.9	15.7	33.4	
$SIZE$	1361	2786	2753	2246	2087	1662	1502	1330	988	480	
BM	1.01	1.02	1.05	1.05	1.03	1.01	1.01	1.00	1.02	1.02	
$PRET(\%)$	7.7	6.3	6.4	5.9	6.0	6.0	6.0	5.9	7.2	9.3	
N	177	178	179	180	180	180	180	179	178	177	
$EXRET(\%)$	0.31	0.35	0.38	0.50	0.43	0.50	0.43	0.52	0.48	0.74	0.43
	(1.15)	(1.60)	(1.86)	(2.60)	(2.23)	(2.69)	(2.21)	(2.58)	(2.12)	(2.79)	(2.17)
	[0.25]	[0.11]	[0.06]	[0.01]	[0.03]	[0.01]	[0.03]	[0.01]	[0.03]	[0.01]	[0.03]
3-fac $\alpha(\%)$	-0.21	-0.13	-0.06	0.08	-0.03	0.06	-0.02	0.14	0.16	0.30	0.51
	(-1.70)	(-1.34)	(-0.80)	(1.00)	(-0.46)	(0.79)	(-0.23)	(1.61)	(1.34)	(2.32)	(2.52)
	[0.09]	[0.18]	[0.43]	[0.32]	[0.64]	[0.43]	[0.82]	[0.11]	[0.18]	[0.02]	[0.01]
4-fac $\alpha(\%)$	-0.08	-0.07	0.00	0.10	-0.01	0.07	0.05	0.21	0.15	0.28	0.37
	(-0.67)	(-0.65)	(-0.05)	(1.24)	(-0.19)	(0.85)	(0.64)	(2.36)	(1.17)	(2.08)	(1.75)
	[0.50]	[0.52]	[0.96]	[0.22]	[0.85]	[0.40]	[0.52]	[0.02]	[0.24]	[0.04]	[0.08]
β_{MKT}	1.19	1.05	1.04	1.00	1.00	0.97	0.98	0.96	0.95	1.11	-0.08
	(39.61)	(43.64)	(55.30)	(54.29)	(56.01)	(52.66)	(52.04)	(45.92)	(31.33)	(34.44)	(-1.66)
β_{SMB}	0.21	0.00	-0.06	-0.12	-0.10	-0.12	-0.11	0.00	0.14	0.30	0.09
	(5.20)	(0.01)	(-2.47)	(-5.08)	(-4.17)	(-4.88)	(-4.36)	(-0.10)	(3.44)	(6.96)	(1.35)
β_{HML}	0.00	0.17	0.14	0.18	0.25	0.25	0.21	0.02	-0.16	-0.12	-0.11
	(-0.07)	(4.57)	(4.75)	(6.49)	(9.01)	(8.70)	(7.13)	(0.60)	(-3.38)	(-2.36)	(-1.49)
β_{MOM}	-0.12	-0.07	-0.06	-0.02	-0.02	-0.01	-0.07	-0.07	0.02	0.02	0.15
	(-4.07)	(-2.71)	(-3.00)	(-1.09)	(-1.06)	(-0.32)	(-3.54)	(-3.21)	(0.53)	(0.72)	(2.92)

Every June and December, each excess individual stock return is regressed on the excess market return (MKT) and the lagged expected real GDP growth rate from the Livingston Survey ($LEGDP$) using past ten years of semi-annual observations. Portfolios are formed by sorting individual stocks on their $LEGDP$ loading. Value-weighted returns are measured monthly for the next six months. β^{LEGDP} is the average $LEGDP$ beta of member stocks. $SIZE$ is the average market capitalization in millions of dollars. BM is the average book-to-market ratio, constructed as in Fama and French (1993). $PRET$ is the past six-month return skipping a month (lagged past five-month return). N is the average number of stocks. $EXRET$ is the monthly excess value-weighted return in percentage. "3-fac α" is the three-factor alpha, the intercept from the time-series regression of the excess portfolio return on the excess market return (MKT) and the size (SMB) and value (HML) factors. "4-fac α" additionally includes the momentum (MOM) factor in the regressors, and the four betas are the respective factor loadings from this four-factor regression. Round and square parentheses beside the estimates carry t-statistics and p-values, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

Table 5: **25 portfolios sorted on size and Livingston expected real GDP growth beta**

Panel A: *LEGDP* beta

		SIZE 1	2	3	4	5
β^{LEGDP}	1	-24.6	-22.9	-22.2	-20.1	-17.7
	2	-5.4	-5.4	-5.2	-5.2	-5.2
	3	1.5	1.6	1.6	1.5	1.4
	4	8.2	8.0	7.9	7.8	7.7
	5	26.6	22.7	21.5	20.1	18.5

Panel B: Market beta

		SIZE 1	2	3	4	5
β^{LEGDP}	1	1.30	1.30	1.24	1.16	1.14
	2	1.17	1.08	1.03	1.00	0.93
	3	1.12	1.01	0.96	0.95	0.88
	4	1.19	1.08	1.02	0.95	0.97
	5	1.60	1.47	1.37	1.29	1.31

Panel C: Size ($ million)

		SIZE 1	2	3	4	5
β^{LEGDP}	1	49	247	571	1454	14243
	2	53	250	586	1446	11611
	3	53	248	585	1434	9077
	4	50	248	581	1459	9031
	5	47	241	570	1415	7901

Panel D: Book-to-market ratio

		SIZE 1	2	3	4	5
β^{LEGDP}	1	1.32	0.92	0.79	0.70	0.58
	2	1.44	1.04	0.90	0.78	0.67
	3	1.39	1.02	0.92	0.84	0.70
	4	1.35	1.01	0.89	0.80	0.71
	5	1.31	0.98	0.81	0.77	0.67

Panel E: Past six-month return (%)

		SIZE 1	2	3	4	5
β^{LEGDP}	1	7.0	7.8	7.5	5.9	6.2
	2	6.3	6.1	6.3	6.4	5.9
	3	6.3	6.5	6.1	5.9	5.6
	4	6.6	6.5	6.5	6.1	5.6
	5	8.7	9.3	8.4	8.3	7.8

Panel F: Number of stocks

		SIZE 1	2	3	4	5
β^{LEGDP}	1	176	56	41	40	42
	2	133	55	51	54	66
	3	123	57	57	60	64
	4	141	56	54	57	52
	5	196	53	40	36	31

Table 5: **25 portfolios sorted on size and Livingston expected real GDP growth beta–continued**

Panel G: Excess return (%)

		SIZE						
		1	2	3	4	5	1-5	Cont
β^{LEGDP}	1	0.61**	0.55*	0.53**	0.32	0.14	0.47**	0.43***
	2	0.69***	0.78***	0.66***	0.53**	0.38*	0.31	0.61***
	3	0.87***	0.89***	0.76***	0.61***	0.43**	0.44**	0.71***
	4	0.90***	0.98***	0.73***	0.61***	0.39**	0.51***	0.72***
	5	0.89***	0.83***	0.82***	0.75***	0.53**	0.35	0.76***
	5-1	0.28**	0.28*	0.29**	0.44***	0.39*		0.34***

Panel H: Three factor alpha (%)

		SIZE						
		1	2	3	4	5	1-5	Cont
β^{LEGDP}	1	-0.22**	-0.23**	-0.15	-0.33***	-0.16	-0.06	-0.22***
	2	-0.14	0.02	-0.05	-0.09	0.02	-0.15	-0.05
	3	0.13	0.19**	0.11	0.00	0.03	0.10	0.09*
	4	0.16*	0.25***	0.09	0.02	0.04	0.12	0.11**
	5	0.07	0.07	0.11	0.17	0.31**	-0.24	0.14**
	5-1	0.28**	0.31**	0.26*	0.50***	0.47**		0.36***

Panel I: Four factor alpha (%)

		SIZE						
		1	2	3	4	5	1-5	Cont
β^{LEGDP}	1	-0.21**	-0.16	-0.15	-0.19*	-0.15	-0.06	-0.17***
	2	-0.15	0.02	-0.04	-0.03	0.05	-0.20*	-0.03
	3	0.13	0.19**	0.13*	0.05	0.04	0.09	0.11**
	4	0.17*	0.25***	0.14*	0.06	0.11	0.06	0.15***
	5	0.10	0.11	0.09	0.18	0.23	-0.13	0.14**
	5-1	0.31***	0.26*	0.24	0.37**	0.38*		0.31***

Every June and December, each excess individual stock return is regressed on the excess market return (MKT) and the lagged expected real GDP growth rate from the Livingston Survey ($LEGDP$) using past ten years of semi-annual observations. 25 portfolios are formed as the intersection of independently sorted size and $LEGDP$-beta quintiles. Value-weighted returns are measured monthly for the next six months. The panels show the following quantities: Panel A, average $LEGDP$ beta of member stocks; Panel B, average market beta; Panel C, size, measured as the average market capitalization in millions of dollars; Panel D, the average book-to-market ratio, constructed as in Fama and French (1993); Panel E, the past six-month return skipping a month (lagged past five-month return); Panel F, the average number of stocks; Panel G, the average monthly excess value-weighted return; Panel H, the three-factor alpha, computed as the intercept from the time-series regression of the excess portfolio return on the excess market return (MKT) and the size (SMB) and value (HML) factors; and Panel I, the four-factor alpha, where the regressors additionally include the momentum (MOM) factor. "Cont" in Panel G represents the size-controlled excess portfolio returns, computed as the average of the excess returns on the five size quintile portfolios within each $LEGDP$ beta quintile, and "Cont" in Panels H and I their respective alphas. *, **, and *** represent significance at 10, 5, and 1%, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

Table 6: **25 portfolios sorted on BM and Livingston expected real GDP growth beta**

Panel A: *LEGDP* beta

		BM				
		1	2	3	4	5
β^{LEGDP}	1	-24.1	-22.3	-21.9	-22.8	-22.3
	2	-5.5	-5.3	-5.2	-5.2	-5.3
	3	1.4	1.5	1.6	1.6	1.5
	4	8.1	8.0	8.0	7.9	8.1
	5	26.5	24.2	22.8	23.0	24.8

Panel B: Market beta

		BM				
		1	2	3	4	5
β^{LEGDP}	1	1.39	1.27	1.21	1.16	1.17
	2	1.17	1.08	1.05	1.02	1.02
	3	1.16	1.07	0.96	0.91	1.00
	4	1.25	1.13	1.00	0.95	1.08
	5	1.65	1.48	1.40	1.40	1.45

Panel C: Size ($ million)

		BM				
		1	2	3	4	5
β^{LEGDP}	1	4744	1719	1210	621	382
	2	5926	2814	1846	1230	739
	3	3835	2842	1729	1204	572
	4	3671	1743	1297	897	490
	5	1627	942	659	444	265

Panel D: Book-to-market ratio

		BM				
		1	2	3	4	5
β^{LEGDP}	1	0.29	0.55	0.78	1.07	2.10
	2	0.30	0.55	0.78	1.06	2.08
	3	0.30	0.56	0.78	1.06	2.00
	4	0.30	0.56	0.78	1.06	2.00
	5	0.29	0.56	0.78	1.06	2.06

Panel E: Past six-month return (%)

		BM				
		1	2	3	4	5
β^{LEGDP}	1	5.4	5.5	6.4	7.2	10.5
	2	5.1	5.5	5.4	6.4	7.5
	3	3.9	5.1	5.7	6.5	8.1
	4	4.3	4.8	5.5	6.4	8.5
	5	5.3	6.0	8.2	8.7	11.8

Panel F: Number of stocks

		BM				
		1	2	3	4	5
β^{LEGDP}	1	89	68	59	61	78
	2	67	68	69	70	85
	3	52	65	76	84	84
	4	50	65	76	83	85
	5	65	63	69	68	91

Table 6: **25 portfolios sorted on BM and Livingston expected real GDP growth beta–continued**

Panel G: Excess return (%)

		BM						
		1	2	3	4	5	5-1	Cont
β^{LEGDP}	1	0.32	0.35	0.24	0.50**	0.38	0.07	0.36***
	2	0.42**	0.48**	0.39*	0.47**	0.61***	0.19	0.48***
	3	0.36*	0.43**	0.65***	0.60***	0.86***	0.50***	0.58***
	4	0.32	0.44**	0.54***	0.57***	0.92***	0.60***	0.56***
	5	0.43	0.45*	0.55**	0.99***	1.24***	0.82***	0.73***
	5-1	0.11	0.10	0.31	0.49**	0.86***		0.37***

Panel H: Three-factor alpha (%)

		BM						
		1	2	3	4	5	5-1	Cont
β^{LEGDP}	1	0.00	-0.15	-0.44***	-0.28**	-0.56***	-0.57***	-0.29***
	2	0.16	0.02	-0.20*	-0.22**	-0.13	-0.28**	-0.08
	3	0.12	-0.04	0.15	-0.05	0.12	0.01	0.06
	4	0.09	0.02	0.07	-0.14	0.15	0.06	0.04
	5	0.30*	0.03	0.04	0.31**	0.43**	0.13	0.22***
	5-1	0.30	0.18	0.49**	0.59***	1.00***		0.51***

Panel I: Four-factor alpha (%)

		BM						
		1	2	3	4	5	5-1	Cont
β^{LEGDP}	1	0.03	-0.17	-0.35**	-0.19	-0.49***	-0.52**	-0.23***
	2	0.19*	0.09	-0.16	-0.24**	-0.06	-0.25*	-0.04
	3	0.17	-0.04	0.19*	-0.02	0.08	-0.08	0.08
	4	0.16	0.10	0.11	-0.05	0.16	-0.01	0.10*
	5	0.22	0.13	0.08	0.22	0.47***	0.25	0.22**
	5-1	0.19	0.30	0.43**	0.41*	0.96***		0.46***

Every June and December, each excess individual stock return is regressed on the excess market return (MKT) and the lagged expected real GDP growth rate from the Livingston Survey ($LEGDP$) using past ten years of semi-annual observations. 25 portfolios are formed as the intersection of independently sorted book-to-market ratio (BM) and $LEGDP$-beta quintiles. Value-weighted returns are measured monthly for the next six months. The panels show the following quantities: Panel A, average $LEGDP$ beta of member stocks; Panel B, average market beta; Panel C, size, measured as the average market capitalization in millions of dollars; Panel D, the average book-to-market ratio, constructed as in Fama and French (1993); Panel E, the past six-month return skipping a month (lagged past five-month return); Panel F, the average number of stocks; Panel G, the average monthly excess value-weighted return; Panel H, the three-factor alpha, computed as the intercept from the time-series regression of the excess portfolio return on MKT and the size (SMB) and value (HML) factors; and Panel I, the four-factor alpha, where the regressors additionally include the momentum (MOM) factor. "Cont" in Panel G represents the size-controlled excess portfolio returns, computed as the average of the excess returns on the five BM quintile portfolios within each $LEGDP$ beta quintile, and "Cont" in Panels H and I their respective alphas. *, **, and *** represent significance at 10, 5, and 1%, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

Table 7: **27 portfolios sorted on size, B/M, and *LEGDP* beta**

Panel A: Size ($ million)

(i) Low *LEGDP* beta portfolios

		SIZE 1	2	3
	1	94	614	10,940
BM	2	97	591	6,832
	3	63	587	4,712

(ii) High *LEGDP* beta portfolios

		SIZE 1	2	3
	1	88	609	6,470
BM	2	89	585	4,395
	3	58	573	4,315

Panel B: Book-to-market ratio

(i) Low *LEGDP* beta portfolios

		SIZE 1	2	3
	1	0.39	0.40	0.37
BM	2	0.79	0.78	0.77
	3	1.87	1.48	1.40

(ii) High *LEGDP* beta portfolios

		SIZE 1	2	3
	1	0.40	0.41	0.38
BM	2	0.80	0.79	0.77
	3	1.79	1.44	1.42

Panel C: Past six-month return (%)

(i) Low *LEGDP* beta portfolios

		SIZE 1	2	3
	1	4.9	5.8	6.0
BM	2	6.0	6.8	6.3
	3	8.5	8.5	7.5

(ii) High *LEGDP* beta portfolios

		SIZE 1	2	3
	1	4.9	6.4	5.6
BM	2	7.0	7.2	7.1
	3	9.8	9.8	8.5

Panel D: Spread return (high - low *LEGDP* beta)

		SIZE 1	2	3
	1	0.32*	0.08	0.01
BM	2	0.16	0.15	0.13
	3	0.25**	0.29**	0.79***

Controlled excess return (%)

	1	0.51**
β^{LEGDP}	2	0.63***
	3	0.75***
	3-1	0.24***

Panel E: 3-factor Alpha (high - low *LEGDP* beta)

		SIZE 1	2	3
	1	0.40**	0.12	0.07
BM	2	0.19	0.19	0.30*
	3	0.30***	0.39***	0.83***

Controlled three-factor alpha (%)

	1	-0.18***
β^{LEGDP}	2	0.02
	3	0.13**
	3-1	0.31***

Panel F: 4-factor Alpha (high - low *LEGDP* beta)

		SIZE 1	2	3
	1	0.26	0.04	0.07
BM	2	0.22	0.22*	0.29*
	3	0.33***	0.33**	0.83***

Controlled four-factor alpha (%)

	1	-0.14**
β^{LEGDP}	2	0.04
	3	0.15***
	3-1	0.29***

Every June and December, each excess individual stock return is regressed on the excess market return (MKT) and the lagged expected real GDP growth rate from the Livingston Survey ($LEGDP$) using past ten years of semi-annual observations. 27 portfolios are formed as the intersection of independently sorted size ($SIZE$), book-to-market ratio (BM), and $LEGDP$-beta terciles. Value-weighted returns are measured monthly for the next six months. The panels show the following quantities: Panel A, size, measured as the average market capitalization in millions of dollars; Panel B, the average book-to-market ratio, constructed as in Fama and French (1993); Panel C, the past six-month return skipping a month (lagged past five-month return); Panel D, the spread portfolio return, computed as the the monthly value-weighted excess return on the high $LEGDP$ beta portfolio less that of the low $LEGDP$ beta portfolio; Panel E, the three-factor alpha, computed as the intercept from the time-series regression of the excess portfolio return on MKT and the size (SMB) and value (HML) factors; and Panel F, the four-factor alpha, where the regressors additionally include the momentum (MOM) factor. The controlled excess returns in Panel D are the size-BM-controlled excess portfolio returns, computed as the average of the excess returns on the nine size-BM portfolios within each $LEGDP$ beta tercile, and the controlled alphas in Panels E and F are their respective alphas. *, **, and *** represent significance at 10, 5, and 1%, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

Table 8: **25 portfolios sorted on past six-month return and Livingston expected real GDP growth beta**

Panel A: ***LEGDP* beta**

		PRET 1	PRET 2	PRET 3	PRET 4	PRET 5
β^{LEGDP}	1	-25.14	-22.10	-20.92	-20.81	-23.09
	2	-5.43	-5.20	-5.13	-5.19	-5.38
	3	1.46	1.51	1.49	1.52	1.50
	4	8.07	7.90	7.84	7.89	8.03
	5	26.55	23.70	22.82	22.71	25.31

Panel B: Market beta

		PRET 1	PRET 2	PRET 3	PRET 4	PRET 5
β^{LEGDP}	1	1.33	1.25	1.20	1.21	1.30
	2	1.26	1.07	1.00	1.02	1.16
	3	1.21	1.02	0.96	0.97	1.12
	4	1.29	1.07	1.00	1.02	1.19
	5	1.66	1.46	1.37	1.38	1.56

Panel C: Size ($ million)

		PRET 1	PRET 2	PRET 3	PRET 4	PRET 5
β^{LEGDP}	1	975	2348	2862	2682	1535
	2	1412	2539	2928	2864	1680
	3	960	1726	2147	2196	1455
	4	925	1399	1581	1590	1189
	5	561	784	842	818	610

Panel D: Book-to-market ratio

		PRET 1	PRET 2	PRET 3	PRET 4	PRET 5
β^{LEGDP}	1	1.01	1.00	0.98	0.99	1.09
	2	1.12	1.03	0.99	1.00	1.15
	3	1.07	0.99	0.98	0.99	1.14
	4	1.04	0.97	0.97	1.00	1.12
	5	1.00	0.97	0.98	1.00	1.14

Panel E: Past six-month return

		PRET 1	PRET 2	PRET 3	PRET 4	PRET 5
β^{LEGDP}	1	-0.27	-0.08	0.03	0.15	0.48
	2	-0.25	-0.08	0.03	0.15	0.43
	3	-0.25	-0.08	0.03	0.15	0.41
	4	-0.25	-0.08	0.03	0.15	0.41
	5	-0.26	-0.08	0.03	0.15	0.47

Panel F: Number of stocks

		PRET 1	PRET 2	PRET 3	PRET 4	PRET 5
β^{LEGDP}	1	69	75	69	68	68
	2	47	77	87	82	58
	3	40	76	92	87	56
	4	42	76	89	86	59
	5	60	71	70	73	75

Table 8: **25 portfolios sorted on past six-month return and Livingston expected real GDP growth beta–continued**

Panel G: Excess return (%)

		PRET						
		1	2	3	4	5	5-1	Cont
β^{LEGDP}	1	0.05	0.28	0.26	0.40*	0.50**	0.45**	0.30***
	2	-0.02	0.30	0.45**	0.47**	0.59**	0.62***	0.36***
	3	0.10	0.45**	0.48**	0.44**	0.65***	0.55**	0.42***
	4	0.18	0.33	0.37*	0.56***	0.67***	0.49**	0.42***
	5	0.21	0.38	0.62***	0.69***	1.03***	0.81***	0.59***
	5-1	0.16	0.10	0.35**	0.29**	0.52***		0.29**

Panel H: Three-factor alpha (%)

		PRET						
		1	2	3	4	5	5-1	Cont
β^{LEGDP}	1	-0.67***	-0.30***	-0.28***	-0.08	0.05	0.72***	-0.26***
	2	-0.65***	-0.19*	-0.01	0.06	0.14	0.79***	-0.13**
	3	-0.49***	-0.05	0.01	-0.01	0.19*	0.69***	-0.07
	4	-0.39**	-0.17*	-0.04	0.13*	0.24**	0.63***	-0.04
	5	-0.26	-0.05	0.19*	0.26***	0.64***	0.90***	0.15*
	5-1	0.41**	0.25*	0.46***	0.34**	0.59***		0.41***

Panel I: Four-factor alpha (%)

		PRET						
		1	2	3	4	5	5-1	Cont
β^{LEGDP}	1	-0.04	0.02	-0.17*	-0.12	-0.30***	-0.26	-0.12
	2	-0.03	0.20**	0.10	-0.04	-0.17	-0.14	0.01
	3	0.07	0.26***	0.11	-0.13*	-0.16*	-0.23	0.03
	4	0.24	0.19**	0.12*	0.01	-0.07	-0.31*	0.10*
	5	0.37**	0.26**	0.24**	0.12	0.17	-0.20	0.23***
	5-1	0.41**	0.24	0.41**	0.24	0.47***		0.35***

Every month, stocks are sorted independently into quintiles by their past J month returns skipping a month (lagged $J-1$ month return, $PRET$) and latest available beta with respect to the lagged expected real GDP growth rate ($LEGDP$) from the Livingston Survey. The $LEGDP$ beta is computed by regressing each excess individual stock return on the excess market return (MKT) and $LEGDP$ using past ten years of semi-annual observations as of last June or December, whichever is later. 25 value-weighted sub-portfolios are formed as the intersection of the past return-$LEGDP$ beta quintiles and held for K months. For each ranking, the entire portfolio is an equally weighted portfolio of K sub-portfolios, consisting of those formed in the current and previous $K-1$ months, with overlapping holding periods when $K > 1$. The panels show the following quantities for the strategy with $(J, K) = (6, 6)$: Panel A, average $LEGDP$ beta of member stocks; Panel B, average market beta; Panel C, size, measured as the average market capitalization in millions of dollars; Panel D, the average book-to-market ratio, constructed as in Fama and French (1993); Panel E, the past six-month return skipping a month (lagged past five-month return); Panel F, the average number of stocks; Panel G, the average monthly excess return; Panel H, the three-factor alpha, computed as the intercept from the time-series regression of the excess portfolio return on MKT and the size (SMB) and value (HML) factors; and Panel I, the four-factor alpha, where the regressors additionally include the momentum (MOM) factor. "Cont" in Panel G represents the past return-controlled excess portfolio returns, computed as the average of the excess returns on the five $PRET$ quintile portfolios within each $LEGDP$ beta quintile, and "Cont" in Panels H and I their respective alphas. *, **, and *** represent significance at 10, 5, and 1%, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

Table 9: **Momentum-controlled *LEGDP* Spread Portfolios**

Panel A: Spread returns (%)

		J = 3	J = 6	J = 12
K	1	0.27*	0.20	0.24*
	3	0.26*	0.23*	0.24*
	6	0.28**	0.29**	0.28**
	12	0.27**	0.24*	0.24*

Panel B: Three factor alpha (%)

		J = 3	J = 6	J = 12
K	1	0.35**	0.32**	0.36***
	3	0.36***	0.35***	0.38***
	6	0.38***	0.41***	0.41***
	12	0.36***	0.38***	0.34***

Panel C: Four factor alpha (%)

		J = 3	J = 6	J = 12
K	1	0.26*	0.24*	0.26*
	3	0.28**	0.30**	0.31**
	6	0.30**	0.35***	0.36***
	12	0.26**	0.29**	0.26**

Every month, stocks are sorted independently into quintiles by their past J month returns skipping a month (lagged $J-1$ month return, $PRET$) and latest available beta with respect to the lagged expected real GDP growth rate ($LEGDP$) from the Livingston Survey. The $LEGDP$ beta is computed by regressing each excess individual stock return on the excess market return (MKT) and $LEGDP$ using past ten years of semi-annual observations as of last June or December, whichever is later. 25 value-weighted sub-portfolios are formed as the intersection of the past return-$LEGDP$ beta quintiles and held for K months. For each ranking, the entire portfolio is an equally weighted portfolio of K sub-portfolios, consisting of those formed in the current and previous $K-1$ months, with overlapping holding periods when $K > 1$. The $PRET$-controlled excess portfolio return is the average of the excess returns on the five $PRET$ quintile portfolios within a given $LEGDP$ beta quintile. The spread portfolio return in Panel A is the excess return on the $PRET$-controlled highest $LEGDP$ beta portfolio less the excess return on the $PRET$-controlled lowest $LEGDP$ beta portfolio for given J and K. The three-factor alpha in Panel B is computed as the intercept from the time-series regression of the spread return on the excess market return (MKT) and the size (SMB) and value (HML) factors, and the four-factor alpha in Panel C additionally includes the momentum (MOM) factor in the regressors. *, **, and *** represent significance at 10, 5, and 1%, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

Table 10: **Long-run pricing of procyclicality risk**

Panel A: Decile β^{LEGDP} portfolio excess returns (%)

	Holding Period (months)				
β^{LEGDP} rank	6	12	24	36	60
1	0.31	0.33	0.37	0.41*	0.46**
2	0.35	0.35	0.39*	0.43**	0.46**
3	0.38*	0.41**	0.43**	0.43**	0.46**
4	0.50***	0.48**	0.44**	0.47**	0.49***
5	0.43**	0.45**	0.44**	0.45**	0.46**
6	0.50***	0.48**	0.49***	0.47***	0.43**
7	0.43**	0.46**	0.45**	0.40**	0.37**
8	0.52**	0.45**	0.44**	0.37*	0.36*
9	0.48**	0.51**	0.51**	0.47**	0.40*
10	0.74***	0.76***	0.73***	0.71***	0.58**
10-1	0.43**	0.43**	0.37**	0.30*	0.12
10-1: 3-fac α	0.51**	0.52***	0.48***	0.42**	0.21
10-1: 4-fac α	0.37*	0.37*	0.34*	0.32*	0.22

Panel B: Size-controlled excess returns (%)

	Holding Period (months)				
β^{LEGDP} rank	6	12	24	36	60
1	0.43*	0.46*	0.49**	0.51**	0.56**
2	0.61***	0.64***	0.63***	0.63***	0.63***
3	0.71***	0.70***	0.70***	0.68***	0.63***
4	0.72***	0.72***	0.68***	0.63***	0.59***
5	0.76***	0.78***	0.76***	0.72***	0.65***
5-1	0.34***	0.32***	0.27***	0.21**	0.09
5-1: 3-fac α	0.36***	0.35***	0.34***	0.28***	0.14*
5-1: 4-fac α	0.31***	0.29***	0.26***	0.23**	0.16*

Table 10: **Long-run pricing of procyclicality risk–continued**

Panel C: BM-controlled excess returns (%)

	Holding Period (months)				
β^{LEGDP} rank	6	12	24	36	60
1	0.36	0.40*	0.43*	0.45**	0.50**
2	0.48**	0.49**	0.50**	0.50***	0.52***
3	0.58***	0.57***	0.55***	0.54***	0.51***
4	0.56***	0.55***	0.53***	0.48**	0.45**
5	0.73***	0.73***	0.73***	0.68***	0.58***
5-1	0.37***	0.33***	0.30**	0.23**	0.08
5-1: 3-fac α	0.51***	0.46***	0.45***	0.38***	0.20*
5-1: 4-fac α	0.46***	0.39***	0.35***	0.31***	0.21**

Panel D: Size-BM-controlled excess returns (%)

	Holding Period (months)				
β^{LEGDP} rank	6	12	24	36	60
1	0.51**	0.54**	0.55**	0.57***	0.59***
2	0.63***	0.64***	0.65***	0.63***	0.60***
3	0.75***	0.74***	0.70***	0.66***	0.59***
3-1	0.24***	0.20***	0.15**	0.09	0.00
3-1: 3-fac α	0.31***	0.27***	0.23***	0.17**	0.06
3-1: 4-fac α	0.29***	0.23***	0.17**	0.14**	0.08

Every June and December, each excess individual stock return is regressed on the excess market return (MKT) and the lagged expected real GDP growth rate from the Livingston Survey ($LEGDP$) using past ten years of semi-annual observations. In Panel A, stocks are sorted into decile sub-portfolios by their $LEGDP$ beta. In Panel B (C), 25 sub-portfolios are first formed as the intersection of independently sorted size (book-to-market ratio, BM) and $LEGDP$-beta quintiles. Then the excess return of a size- (BM-) controlled sub-portfolio is the average of the excess returns on the five size (BM) portfolios within each $LEGDP$ beta quintile. In Panel D, 27 sub-portfolios are first formed as the intersection of independently sorted size, BM, and $LEGDP$-beta terciles. Then the excess return of a size-BM-controlled sub-portfolio is the average of the excess returns on the nine size-BM portfolios within each $LEGDP$ beta tercile. Each sub-portfolio is value-weighted and is held for K months. For each ranking, the entire portfolio is an equally weighted portfolio of K sub-portfolios, consisting of those formed in the current and previous $K-1$ semi-annual periods, with overlapping holding periods when $K > 1$. "3-fac α" is the three-factor alpha, computed as the intercept from the time-series regression of the spread portfolio return on MKT and the size (SMB) and value (HML) factors. "4-fac α" additionally includes the momentum (MOM) factor in the regressors. *, **, and *** represent significance at 10, 5, and 1%, respectively. The sample contains ordinary common shares of firms traded on NYSE, AMEX, and NASDAQ. The monthly sample runs from July 1963 through December 2008.

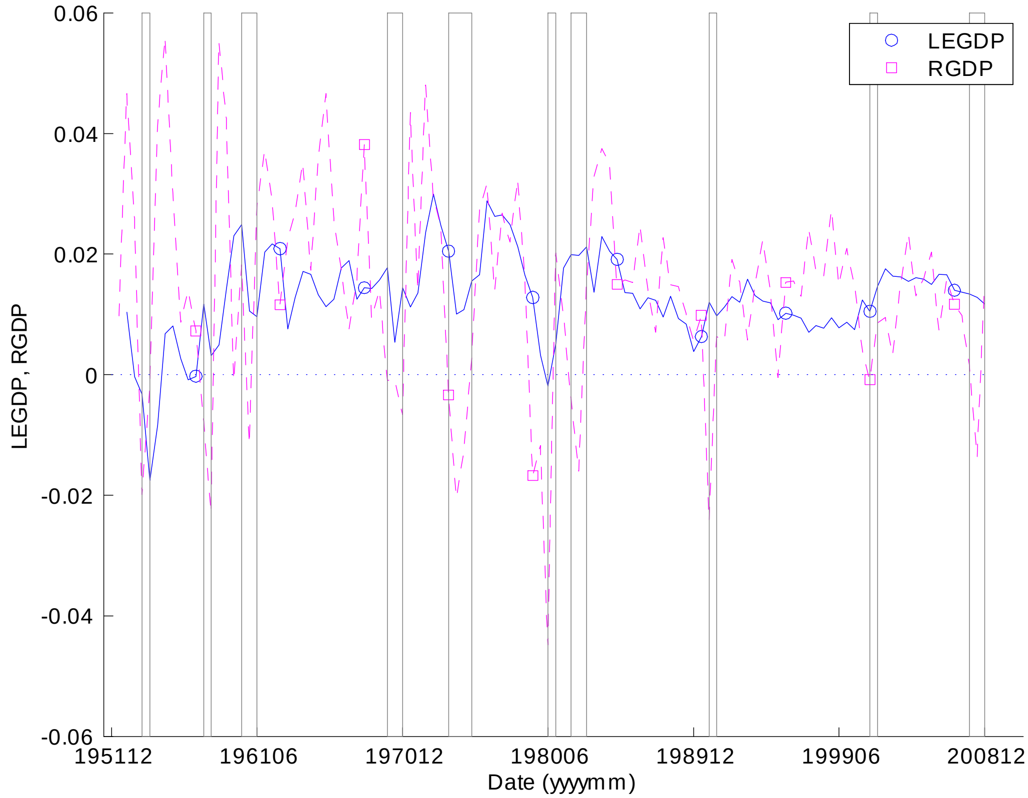

Figure 1: The lagged Livingston-Survey expected real GDP growth rate ($LEGDP$) and the realized GDP growth rate ($RGDP$). Each narrow band represents a recession period as defined by NBER, starting with a peak and ending with a trough (except for the end of the sample period, 200812).

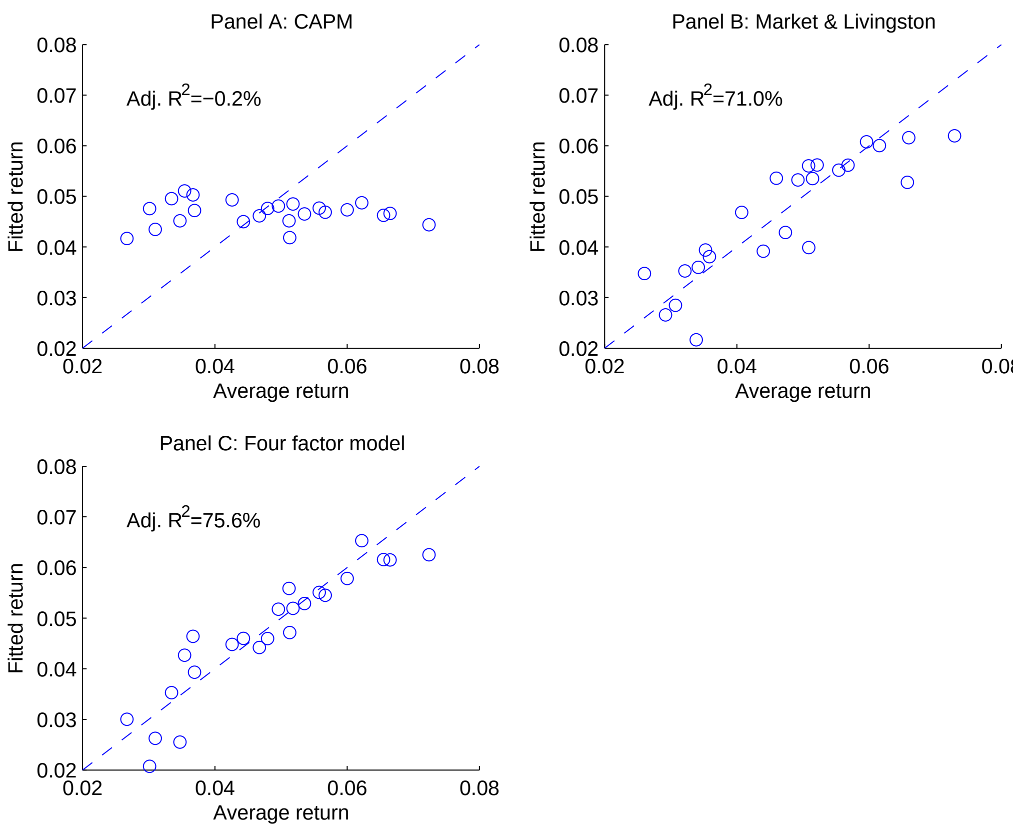

Figure 2: Fitted returns plotted against average realized returns. Fitted returns are the fitted values from the regression of average excess size-B/M 25 portfolio returns on a constant and the estimated loadings on the following factors: the excess market return (MKT) in CAPM (Panel A); MKT and the lagged Livingston-Survey expected real GDP growth rate ($LEGDP$) in Panel B; MKT and the size (SMB), book-to-market (HML) and momentum (MOM) factors in the four-factor model (Panel C). Adj.R^2 is the adjusted R-squared from the cross-sectional regression of the average realized excess returns on estimated betas.