



Is value riskier than growth? ☆

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Abstract

We study the relative risk of value and growth stocks. We find that time-varying risk goes in the right direction in explaining the value premium. Value betas tend to covary positively, and growth betas tend to covary negatively with the expected market risk premium. Our inference differs from that of previous studies because we sort betas on the expected market risk premium, instead of on the realized market excess return. However, we also find that this beta-premium covariance is too small to explain the observed magnitude of the value premium within the conditional capital asset pricing model.

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1. Introduction

Value stocks earn higher average returns than growth stocks (see, e.g., Rosenberg et al., 1985; Fama and French, 1992, 1993). One potential explanation is time-varying risk, i.e., the risk of value-minus-growth strategies is high in bad times when the expected premium for risk is high and is low in good times when the expected premium for risk is low.

However, several studies suggest that risk cannot be a source of the value premium. Lakonishok et al. (1994) (LSV) report that value betas are higher than growth betas in good times but are lower in bad times, a result that directly contradicts the risk hypothesis. DeBondt and Thaler (1987) and Chopra et al. (1992) find similar evidence for the reversal effect, an earlier manifestation of the value premium. These studies all conclude that value does not expose investors to a greater downside risk and that overreaction-related mispricing must be the primary source of the value premium.

We revisit the relative risk of value and growth stocks. Two main results emerge. First, time-varying risk goes in the right direction in explaining the value premium. Value betas tend to covary positively, and growth betas tend to covary negatively with the expected market risk premium. As a result, value-minus-growth betas tend to covary positively with the expected market risk premium. This result holds for most sample periods and for various value and growth strategies.

Previous studies fail to find similar evidence because they measure aggregate economic conditions using the realized market excess return. However, the realized market return is a noisy measure of economic conditions (see, e.g., Fama, 1981; Stock and Watson, 1999). More precise measures are the default spread, the term spread, and the short-term interest rate, variables that are also common instruments used to model the expected market risk premium. Further, because the ex post and the ex ante market returns are positively correlated, albeit weakly, what previous studies classify as good states ex post tend to be bad states ex ante, and vice versa, in terms of business cycles.

Second, although time-varying risk goes in the right direction, the estimated covariation between the value-minus-growth betas and the expected market risk premium is too small to explain the observed magnitude of the value premium in the context of the conditional capital asset pricing model (CAPM). Specifically, the estimated alphas of value-minus-growth strategies from conditional market regressions are mostly positive and significant.

This evidence lends support to Lewellen and Nagel (2004), who find that the conditional CAPM performs poorly in short-window market regressions. But more important, while Lewellen and Nagel find little evidence that value-minus-growth betas covary positively with the expected market risk premium, we find significant evidence in this regard.

Lettau and Ludvigson (2001) show that value portfolio returns are more highly correlated with consumption growth than growth portfolio returns in bad times. We differ because we use different conditioning variables and focus on the market beta

instead of the consumption beta. We also go further in studying why our results differ from those of previous studies.

The rest of the paper is organized as follows. Section 2 discusses our research design. Section 3 presents the evidence on time-varying risk. Section 4 illustrates why previous studies fail to find similar evidence. And Section 5 summarizes and interprets the results.

2. Research design

We use two methods to study the time-varying risk of value and growth: a simple sorting procedure and a more formal testing procedure motivated by the conditional CAPM.

2.1. Sorting

The sorting procedure compares the average conditional value and growth betas in four different states of the world. State “peak” represents the lowest 10% observations of the expected market risk premium; state “expansion” represents the remaining months with the premium below its average; state “recession” represents the months with the premium above its average but other than the 10% highest; and state “trough” represents the months with the 10% highest observations of the expected market risk premium.

Our classification based on the expected market risk premium is consistent with modern asset pricing theories, which predict that this premium is countercyclical (see, e.g., Campbell and Cochrane, 1999; Constantinides and Duffie, 1996). This classification is also consistent with the stock market predictability literature (see, e.g., Fama and French, 1988, 1989).

Because both the expected market risk premium and the conditional betas are unobservable, we need to estimate them to implement the sorting procedure. We regress the realized market excess return from time t to $t + 1$ on conditioning variables known at time t :

$$r_{mt+1} = \delta_0 + \delta_1 \text{DIV}_t + \delta_2 \text{DEF}_t + \delta_3 \text{TERM}_t + \delta_4 \text{TB}_t + e_{mt+1} \quad (1)$$

and

$$\hat{\gamma}_t = \hat{\delta}_0 + \hat{\delta}_1 \text{DIV}_t + \hat{\delta}_2 \text{DEF}_t + \hat{\delta}_3 \text{TERM}_t + \hat{\delta}_4 \text{TB}_t, \quad (2)$$

where the estimated expected market risk premium $\hat{\gamma}_t$ in Eq. (2) is the fitted component from Eq. (1). The conditioning variables are the dividend yield (DIV), the default spread (DEF), the term spread (TERM), and the short-term Treasury bill rate (TB). Our choice of these variables is standard from the time-series predictability literature.¹

¹An incomplete list of papers motivating our variables includes Fama and French (1988) for the dividend yield, Keim and Stambaugh (1986) for the default premium, Campbell (1987) and Fama and French (1989) for the term premium, and Fama and Schwert (1977) and Fama (1981) for the short-term Treasury bill rate.

We use two approaches to estimate conditional betas. First, we regress value and growth portfolio excess returns on the market excess return using a 60-month rolling window. Using 24-, 36-, or 48-month rolling windows yields similar results (not reported). We call the resulting beta the rolling beta. Second, we use conditional market regressions:

$$r_{it+1} = \alpha_i + (b_{i0} + b_{i1} \text{DIV}_t + b_{i2} \text{DEF}_t + b_{i3} \text{TERM}_t + b_{i4} \text{TB}_t) r_{mt+1} + \varepsilon_{it+1} \quad (3)$$

and

$$\hat{\beta}_{ii} = \hat{b}_{i0} + \hat{b}_{i1} \text{DIV}_t + \hat{b}_{i2} \text{DEF}_t + \hat{b}_{i3} \text{TERM}_t + \hat{b}_{i4} \text{TB}_t, \quad (4)$$

where r_{it+1} is portfolio i 's excess return. We call $\hat{\beta}_{ii}$ from Eq. (4) the fitted beta.

2.2. Beta-premium regressions

Albeit informal, the sorting procedure is perhaps the simplest way to study time-varying risk. We supplement this informal procedure with a more formal test motivated by the conditional CAPM. In a world with time-varying risk, the conditional CAPM serves as a natural benchmark model for asset pricing tests.

2.2.1. Econometric framework

Define conditional beta as $\beta_{it} \equiv \text{Cov}_t[r_{it+1}, r_{mt+1}] / \text{Var}_t[r_{mt+1}]$ and let γ_t denote the expected market risk premium. Both β_{it} and γ_t are conditional on the information set at time t . The conditional CAPM states that $E_t[r_{it+1}] = \gamma_t \beta_{it}$. To measure the effects of time-varying risk on average returns, we follow Jagannathan and Wang (1996) and take unconditional expectations on both sides of the conditional CAPM to obtain

$$E[r_{it+1}] = \bar{\gamma} \bar{\beta}_i + \text{Cov}[\gamma_t, \beta_{it}] = \bar{\gamma} \bar{\beta}_i + \text{Var}[\gamma_t] \varphi_i, \quad (5)$$

where $\bar{\gamma} \equiv E[\gamma_t]$ is the average market excess return, $\bar{\beta}_i \equiv E[\beta_{it}]$ is the average beta, and φ_i is the beta-premium sensitivity, defined as $\varphi_i \equiv \text{Cov}[\beta_{it}, \gamma_t] / \text{Var}[\gamma_t]$.

From Eq. (5), the average value-minus-growth return depends on the dispersion in average beta and on the dispersion in beta-premium sensitivity between value and growth. The beta-premium sensitivity in Eq. (5) is unique to the conditional CAPM. As pointed out by Jagannathan and Wang (1996), this sensitivity measures the instability of an asset's beta over the business cycle. Intuitively, stocks with positive beta-premium sensitivities have high risk precisely during recessionary periods when investors dislike risk or when the price of risk is high. Therefore, these stocks earn higher average returns than stocks with low or even negative beta-premium sensitivities.

In the conditional CAPM, the effect of time-varying beta on average returns is captured entirely by the beta-premium sensitivity. And the part of the conditional beta correlated with the unexpected market excess return, apart from its impact on the average beta, has no direct effect on average returns. However, this result is specific to the conditional CAPM and is not a general property of efficient markets.

The reason is that the assumptions under which the conditional CAPM can be derived are restrictive. Examples include investors with quadratic utility but no labor income and exponential utility with normally distributed returns (see, e.g., [Cochrane, 2001](#), Chapter 9).

If value stocks expose investors to a greater downside risk, then the beta-premium sensitivities of these stocks will be positive. To test this hypothesis, we regress the conditional betas of value portfolios on the expected market risk premium to estimate φ_i :

$$\hat{\beta}_{it} = c_i + \varphi_i \hat{\gamma}_t + \eta_{it}. \tag{6}$$

And the one-sided null hypothesis then is $\varphi_i > 0$. We also test whether growth portfolios have negative beta-premium sensitivities and whether value-minus-growth strategies have positive beta-premium sensitivities.

2.2.2. Estimation

Several sources of measurement errors in regression Eq. (6) can affect our inferences. The estimated expected market risk premium, $\hat{\gamma}_t$, is a generated regressor that is only a proxy for the true premium. Similarly, $\hat{\beta}_{it}$ is only a proxy for the true conditional beta. With fitted betas, the inferences on φ_i based on the sequential regression Eqs. (1), (3), and (6) are likely to be biased. The reason is that both $\hat{\beta}_{it}$ and $\hat{\gamma}_t$ are estimated using the same instrumental variables, and their measurement errors are likely to be correlated.

To account for these measurement errors, we estimate $\hat{\beta}_{it}$, $\hat{\gamma}_t$, and $\hat{\varphi}_i$ simultaneously by the generalized method of moments (GMM). Define $\mathbf{Z}_t \equiv [{}_t\text{DIV}_t \text{DEF}_t \text{TERM}_t \text{TB}_t]$ to be the vector of instrumental variables including a constant term, where ι is a vector of ones. And define $\mathbf{b}_i \equiv [b_{i0} \ b_{i1} \ b_{i2} \ b_{i3} \ b_{i4}]'$ and $\delta \equiv [\delta_0 \ \delta_1 \ \delta_2 \ \delta_3 \ \delta_4]'$ to be vectors of regression coefficients. The set of moment conditions is naturally the set of orthogonality conditions associated with Eqs. (1), (3), and (6):

$$E[(r_{mt+1} - \mathbf{Z}_t \delta) \mathbf{Z}_t'] = 0, \tag{7}$$

$$E[[r_{it+1} - \alpha_i - (\mathbf{Z}_t r_{mt+1}) \mathbf{b}_i] (\iota \mathbf{Z}_t r_{mt+1})'] = 0, \tag{8}$$

and

$$E[(\mathbf{Z}_t \mathbf{b}_i - c_i - \varphi_i \mathbf{Z}_t \delta) (\iota \mathbf{Z}_t \delta)'] = 0. \tag{9}$$

For each portfolio i , there are in total 13 moment conditions and 13 parameters, so the system is exactly identified.

Because the rolling betas are not estimated using instruments, their measurement errors are less likely to correlate with those in the expected market risk premium. And because the errors in beta only enter the left-hand side of Eq. (6), their effect can be absorbed by the disturbance term, η_{it} (see, e.g., [Green, 1997](#), p. 436). In this case, we adjust only for the sampling variation in $\hat{\gamma}_t$ via GMM by using the moment conditions

$$E[(r_{mt+1} - \mathbf{Z}_t \delta) \mathbf{Z}_t'] = 0 \tag{10}$$

and

$$E[(\hat{\beta}_{it} - c_i - \varphi_i \mathbf{Z}_t \boldsymbol{\delta})(t \mathbf{Z}_t \boldsymbol{\delta})'] = 0. \quad (11)$$

2.2.3. Discussion

Our tests so far focus only on the null hypothesis that value-minus-growth strategies have positive beta-premium sensitivities. This is a weak restriction implied by the conditional CAPM. Failing to reject this hypothesis, while suggesting that value exposes investors to a greater downside risk than growth, does not imply that the conditional CAPM can explain the value anomaly. To test this stronger restriction, we test whether the intercepts of value-minus-growth portfolios equal zero in conditional market regressions.

3. Empirical results

Section 3.1 describes our data. The heart of this paper is Section 3.2, which studies the time-varying risk of value and growth. Section 3.3 tests the conditional CAPM.

3.1. Data

Our conditioning variables are defined and obtained as follows. The dividend yield 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. The default premium is the yield spread between Moody's Baa and Aaa corporate bonds, and the term premium is the yield spread between the ten-year and the one-year Treasury bond. The default yields are from the monthly database of the Federal Reserve Bank of St. Louis, and the government bond yields are from the Ibbotson database. Finally, the short-term interest rate is the one-month Treasury bill rate from CRSP.

We use two value-minus-growth strategies. HML is the value portfolio (H) minus the growth portfolio (L) in a two-by-three sort on size and book-to-market.² And the small-stock value premium, denoted HMLs, is the small-value (Hs) minus the small-growth (Ls) portfolio in a five-by-five sort on size and book-to-market. HML has been a standard measure of the value premium since Fama and French (1993). HMLs is economically interesting because the value anomaly is strongest in the smallest quintile. All the monthly portfolio data from January 1927 to December 2001 are from Kenneth R. French's website.³

²Compared with the results from using HML, using the difference between decile ten and decile one in a one-way sort on book-to-market yields quantitatively similar but somewhat weaker results (not reported).

³http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Table 1

Descriptive statistics for two value-minus-growth strategies across different samples: the full sample from 1927 to 2001; the post-depression sample from 1935 to 2001; the postwar sample from 1946 to 2001; the post-compustat sample after 1963; and the pre-compustat sample before 1963

We report average returns, m , unconditional alphas, and unconditional market betas, as well as their standard errors adjusted for heteroskedasticity and autocorrelations of up to six lags. Average returns, alphas, and their standard errors are in monthly percent. HMLs is defined as the small-value minus the small-growth portfolio in the Fama and French 25 size and book-to-market portfolios. The last column reports the correlation between HML and HMLs in different samples.

Sample	HML			HMLs			Correlation
	m (ste)	α (ste)	β (ste)	m (ste)	α (ste)	β (ste)	
January 1927– December 2001	0.39 (0.12)	0.30 (0.13)	0.14 (0.08)	0.89 (0.27)	1.05 (0.19)	−0.25 (0.10)	0.16
January 1935– December 2001	0.44 (0.11)	0.47 (0.12)	−0.04 (0.05)	0.88 (0.18)	1.07 (0.18)	−0.27 (0.06)	0.52
January 1946– December 2001	0.39 (0.11)	0.51 (0.12)	−0.19 (0.04)	0.77 (0.16)	0.98 (0.17)	−0.33 (0.05)	0.65
January 1963– December 2001	0.44 (0.14)	0.58 (0.15)	−0.28 (0.04)	0.81 (0.20)	1.01 (0.21)	−0.42 (0.06)	0.80
January 1927– December 1962	0.33 (0.20)	0.04 (0.18)	0.35 (0.07)	0.98 (0.51)	1.11 (0.33)	−0.17 (0.15)	−0.03

The value premium can be defined as the average returns or the unconditional alphas of value-minus-growth portfolios. Table 1 reports both results. Consistent with Davis et al. (2000), the value premium exists in the long run, especially among small stocks.

From the first row of Table 1, the average returns of HML and HMLs in the full sample are 0.39% and 0.89%, and their unconditional alphas are 0.30% and 1.05% per month, respectively. From the third row, excluding the great depression of the 1930s increases somewhat the unconditional alphas, but not necessarily the average returns. For example, the average return of HMLs goes down slightly from 0.89% to 0.88%, even though its unconditional alpha goes up slightly from 1.05% to 1.07%. The unconditional alpha of HML rises from 0.30% to 0.47%, and its average return rises from 0.39% to 0.44%.

Using the postwar sample from January 1946 to December 2001 further increases the alpha of HML but decreases the alpha of the small-stock value strategy. And the sample gives lower average returns for both value strategies. In the post-Compustat sample from January 1963 to December 2001, the value strategies have slightly higher alphas than, but similar average returns as those from the longer samples. Only HMLs has a significant unconditional alpha in the pre-Compustat sample from January 1927 to December 1962. The average returns of HML and HMLs are not significant. Neither is the alpha of HML. We therefore do not focus on this subsample in subsequent analysis on time-varying risk. The correlation between

HML and HMLs is only 0.16 in the full sample and increases to 0.52 in the post-depression sample. Further, a structural break occurs around the early 1960s. The correlation between the two strategies is -0.03 before 1963 but is 0.80 afterward.

Table 1 also shows that most estimates of the unconditional market betas for value-minus-growth strategies are negative and significant.

3.2. Time-varying risk of the value strategies

This subsection studies the time-varying risk of the value strategies in different samples.

3.2.1. The full sample

We first sort conditional betas on the expected market risk premium. Our goal is to check whether the betas of the value-minus-growth portfolios vary across good and bad times and whether any differences are reliable. We then estimate the beta-premium sensitivities using the GMM procedure described in Section 2.2. The null hypothesis is that value portfolios have positive, but growth portfolios have negative beta-premium sensitivities.

Panel A of Table 2 reports the full-sample results. HML displays a countercyclical pattern of risk. The average rolling beta of HML is -0.16 in state “peak” and is 0.33 in state “trough.” The standard error for the difference is only 0.024, indicating that the difference is reliable. Using fitted betas yields similar results. The average fitted beta of HML is -0.33 in “peak” and 0.40 in “trough.” And the difference between the point estimates is again reliable.

However, no similar evidence can be found for the small-stock value strategy in the full sample. Panel A of Table 2 reports that the average conditional betas for HMLs are negative in all four states of the world. This is particularly troublesome for the time-varying risk hypothesis on the value premium because the anomaly is stronger among small firms.

Panel A of Table 2 also shows that HML has a positive beta-premium sensitivity. The value portfolio (H) has positive beta-premium sensitivities, 18.63 (rolling beta) and 29.37 (fitted beta), while the growth portfolio (L) has negative beta-premium sensitivities, -1.86 (rolling beta) and -4.04 (fitted beta). As a result, HML has positive beta-premium sensitivities: 20.42 (rolling beta) and 33.34 (fitted beta). Both are estimated with reasonable precision with standard errors of 10.26 and 15.73, respectively.

The results for the small-stock value strategy are different, however. From Panel A, the small-value portfolio (Hs) still has positive beta-premium sensitivities, 24.36 (rolling beta) and 24.83 (fitted beta). And from their standard errors, only the first estimate is reliably different from zero. In contrast to the null hypothesis, the small-growth portfolio (Ls) has positive beta-premium sensitivities: 21.63 (rolling beta) and 33.31 (fitted beta).

Panel A also shows that the conditional rolling beta of Hs tends to covary more than that of Ls with business cycles. As a result, HMLs has a positive but small rolling beta-premium sensitivity of 2.73 with a standard error of 4.96. However, in

Table 2

Average conditional betas in different states of the world for portfolios HML and HMLs

The rolling betas are estimated using 60-month rolling-window regressions, and the fitted betas are estimated from conditional market regressions. We use four conditioning variables, a constant term, dividend yield, term premium, default premium, and one-month Treasury bill rate. We define four states by sorting on the expected market risk premium, which is estimated as a linear function of the same instruments. State “peak” corresponds to the 10% lowest observations for the premium; state “expansion” corresponds to below average premium; state “recession” corresponds to above average premium, excluding the 10% highest observations; and state “trough” corresponds to the 10% highest observations for the premium. We report the standard errors of the difference between the HML and the HMLs betas in “trough” and “peak,” denoted “ste(diff).” We also report the estimates of beta-premium sensitivity, denoted “ φ_i ,” and their standard errors, denoted “ste(φ_i),” for portfolios H, L, HML, Hs (small-value), Ls (small-growth), and HMLs. All standard errors are adjusted for heteroskedasticity and autocorrelations of up to 60 lags.

Panel A. The full sample (January 1927–December 2001)

	Rolling beta					Fitted beta					
	Peak	Expansion	Recession	Trough	ste(diff)	Peak	Expansion	Recession	Trough	ste(diff)	
HML	-0.16	-0.11	0.07	0.33	0.024	-0.33	-0.15	0.05	0.40	0.022	
HMLs	-0.33	-0.23	-0.21	-0.18	0.028	-0.21	-0.22	-0.34	-0.31	0.033	
	φ_i	ste(φ_i)		φ_i	ste(φ_i)	φ_i	ste(φ_i)		φ_i	ste(φ_i)	
H	18.63	9.75	Hs	24.36	12.30	H	29.37	13.29	Hs	24.83	16.78
L	-1.86	1.56	Ls	21.63	9.13	L	-4.04	4.99	Ls	33.31	17.91
HML	20.42	10.26	HMLs	2.73	4.69	HML	33.34	15.73	HMLs	-8.48	15.70

Panel B. The post-depression sample (January 1935–December 2001)

	Rolling beta					Fitted beta					
	Peak	Expansion	Recession	Trough	ste(diff)	Peak	Expansion	Recession	Trough	ste(diff)	
HML	-0.16	-0.12	0.01	0.12	0.038	-0.31	-0.16	0.01	0.25	0.027	
HMLs	-0.35	-0.23	-0.21	-0.18	0.029	-0.55	-0.34	-0.14	-0.03	0.022	
	φ_i	ste(φ_i)		φ_i	ste(φ_i)	φ_i	ste(φ_i)		φ_i	ste(φ_i)	
H	14.20	10.00	Hs	22.51	14.91	H	19.05	10.95	Hs	16.11	14.51
L	-2.13	2.39	Ls	15.13	11.04	L	-6.26	4.01	Ls	-8.52	16.71
HML	16.13	10.68	HMLs	7.38	6.20	HML	25.28	12.39	HMLs	24.64	13.18

Panel C. The post-compustat sample (January 1963–December 2001)

	Rolling beta					Fitted beta					
	Peak	Expansion	Recession	Trough	ste(diff)	Peak	Expansion	Recession	Trough	ste(diff)	
HML	-0.29	-0.22	-0.27	-0.20	0.034	-0.50	-0.28	-0.23	-0.11	0.025	
HMLs	-0.46	-0.36	-0.38	-0.32	0.039	-0.78	-0.46	-0.25	-0.12	0.029	
	φ_i	ste(φ_i)		φ_i	ste(φ_i)	φ_i	ste(φ_i)		φ_i	ste(φ_i)	
H	-1.34	3.62	Hs	-0.68	4.53	H	8.32	6.45	Hs	4.74	0.51
L	-0.11	0.65	Ls	-1.63	3.20	L	-1.93	1.62	Ls	-16.70	6.79
HML	-1.23	3.24	HMLs	0.96	2.82	HML	10.32	6.93	HMLs	21.44	9.40

the case of fitted beta, the beta-premium sensitivity of the small-growth portfolio is higher than that of the small-value portfolio. As a result, the fitted beta-premium sensitivity of HMLs is -8.48 , although it is estimated with a high standard error of 15.70 . This evidence seems troublesome for the time-varying risk explanation of the value premium because it is stronger among small firms.

3.2.2. *The post-depression sample*

The great depression is the most extreme example of state “trough” in the full sample. It is therefore interesting to study the sensitivity of our results with respect to this period. We have also studied the postwar sample from January 1946 to December 2001. The results are similar to those from the post-depression sample (not reported).

Panel B of Table 2 reports the results from the sorting and the beta-premium regressions in the post-depression sample. HML still displays a countercyclical pattern of risk in that its average beta is negative in state “peak” and is positive in state “trough.” And from the standard error of their difference, the average betas in the two extreme states differ significantly.

Relative to the full-sample results, the beta-premium sensitivity of portfolio H decreases in magnitude using both the rolling beta and the fitted beta. The beta-premium sensitivity of portfolio L remains negative and its magnitude is higher than that from the full sample. Overall, the rolling beta-premium sensitivity of HML decreases from 20.42 to 16.13 , and the fitted beta-premium sensitivity of HML decreases from 33.34 to 25.28 . And only the fitted beta-premium sensitivity of HML remains reliably greater than zero.

Also from Panel B, the beta-premium sensitivities of the small-growth portfolio (Ls) are different from the full-sample estimates. This suggests that excluding the great depression changes greatly the behavior of small-growth stocks. As a result, the rolling beta-premium sensitivity of HMLs increases from 2.73 in the full sample to 7.38 in the post-depression sample, and the fitted beta-premium sensitivity increases from -8.48 to 24.64 .

Why does the great depression have such a sizable impact on small growth firms? We have tried to exclude other recessions from the sample and find this result to be specific to the great depression. We interpret this evidence as suggesting that financial factors unique to the great depression drive the behavior of small growth firms during this period. Bernanke (1983) shows that the great depression manifests many unique features not observed in other recessions. During 1930–1933, the U.S. financial system experienced widespread bank failures resulting in the shutdown of the banking industry in March 1933. Exceedingly high rates of default and bankruptcy affected almost all borrowers, especially small firms.

3.2.3. *The post-compustat sample*

The post-compustat sample from January 1963 to December 2001 has received much attention in the literature (see, e.g., Fama and French, 1992, 1993; Lakonishok et al., 1994). In general, we find that the evidence on time-varying risk in this sample is similar to, but weaker than, that in the post-depression sample.

From Panel C of Table 2, the rolling beta-premium sensitivity of HML declines from 16.13 in the post-depression sample to -1.23 in the post-compustat sample, and the fitted beta-premium sensitivity of HML decreases from 25.28 to 10.32. For the small-stock value strategy, HMLs, the rolling beta-premium sensitivity decreases to 0.96, but its fitted beta-premium sensitivity remains at a significant level of 21.44.

More important, why is the evidence for time-varying risk in the post-compustat sample weaker than that in the post-depression sample? One possibility is that investors have become more prone to overreacting to past earnings news in recent decades (see, e.g., Lakonishok et al., 1994). Another possibility is that the post-1963 sample is too special or short for standard inferences (see, e.g., Fama, 1998; Ang and Chen, 2003).

One special aspect of the post-1963 sample is its relatively small number of recessions. Because recessions are important for detecting downside risk, this aspect can at least partly explain the weaker evidence. Consistent with this argument, during the 39 years in the post-compustat sample, the U.S. economy experienced the two most prolonged expansions in history (in the 1960s and the 1990s), according to the National Bureau of Economic Research. Six business cycle troughs are evident in that period: November 1970, March 1975, July 1980, November 1982, March 1991, and November 2001. In contrast, during the 29 years from 1935 to 1962, the economy had no comparable luck of prosperity but experienced an equal number of troughs: June 1938, October 1945, October 1949, May 1954, April 1958, and February 1961.

While this evidence is admittedly anecdotal, it highlights the importance of recessions. If cyclical fluctuations are the driving force of time-varying risk, then the evidence corroborative of time-varying risk is perhaps supposed to be weaker after six out of the 12 recessions (not including the great depression) are removed from the sample.

3.3. Can the conditional CAPM explain the value premium?

Given the evidence that value-minus-growth betas correlate positively with the expected market risk premium, we now ask whether this correlation is strong enough to explain the observed magnitude of the value premium within the context of the conditional CAPM.

To this end, we perform conditional market regressions (see, e.g., Shanken, 1990; Ferson and Harvey, 1999). If the conditional CAPM can explain the value premium, then the intercepts from these regressions should be zero. Table 3 reports the results. A comparison between Tables 1 and 3 reveals that, with a few exceptions, controlling for time-varying betas generally reduces the magnitudes of the alphas. However, the improvement is fairly limited because the intercepts remain positive and mostly significant. This suggests that the conditional CAPM cannot explain the value anomaly.

Our results lend support to Lewellen and Nagel (2004), who use short-window market regressions to estimate time-varying alphas and betas and find that the average conditional alphas of value strategies are mostly positive and significant. We

Table 3

Jensen’s α from conditional market regression for HML and the small-stock value premium, HMLs, defined as the small-value minus the small-growth portfolio in the Fama and French 25 size and book-to-market portfolios

α is the intercept from $r_{it+1} = \alpha_i + (b_{i0} + b_{i1} \text{DIV}_t + b_{i2} \text{DEF}_t + b_{i3} \text{TERM}_t + b_{i4} \text{TB}_t)r_{mt+1} + \varepsilon_{it+1}$, where r_{it+1} denotes the returns of either HML or HMLs, and r_{mt+1} denotes the market excess return. The conditioning variables used are the dividend yield, DIV; the default premium, DEF; the term premium, TERM; and the Treasury bill rate, TB. The alphas and standard errors are in monthly percent, and the standard errors are adjusted for heteroskedasticity and autocorrelations of up to six lags.

	January 1927– December 2001		January 1935– December 2001		January 1946– December 2001		January 1963– December 2001		January 1927– December 1962	
	α	ste								
HML	0.29	0.11	0.39	0.10	0.37	0.11	0.49	0.14	0.07	0.15
HMLs	1.10	0.20	0.95	0.17	0.82	0.17	0.85	0.21	1.22	0.33

complement their analysis with alphas estimated from conditional market regressions.

4. Implications

Previous studies examine the relative risk of value and growth but reach different conclusions from ours. We revisit some of the well-known studies to shed light on the sources of the discrepancy. In an influential article, [Lakonishok et al. \(1994\)](#) examine the performance of value and growth stocks in different states of the world defined by sorting on the realized market excess returns. LSV find that value beats growth by a significant amount in the worst months of the market and in other months with negative market returns. Therefore, LSV argue that value cannot be riskier than growth because value does not expose investors to a greater downside risk.

However, the realized market excess return is a noisy measure for marginal utility or business cycles (see, e.g., [Fama, 1981](#); [Stock and Watson, 1999](#)). More precise measures are the default premium, the term premium, and the short-term Treasury bill rate, which are also the common instruments used to model the expected market risk premium.

Further, LSV identify good states with high, and bad states with low, ex post market excess returns. Because the ex post and the ex ante market excess returns are likely to be positively correlated (this correlation is 0.11 in our full sample), what LSV call good states ex post tend to be bad states ex ante, and vice versa, in terms of business cycles.

While LSV use a sorting procedure, [DeBondt and Thaler \(1987, Table 4\)](#) and [Chopra et al. \(1992, Table 7\)](#) effectively regress betas on the realized market excess returns in the context of the reversal effect, an earlier manifestation of the value premium (see, e.g., [Fama and French, 1996](#)). Define a dummy variable, d , such that it equals one if the realized market excess return is positive and zero otherwise. An

up-market beta, β_{iu} , and a down-market beta, β_{id} , can then be defined from

$$r_{it+1} = \alpha_i + \beta_{iu}r_{mt+1}d + \beta_{id}r_{mt+1}(1 - d) + \varepsilon_{it+1}. \tag{12}$$

Upon finding that the long-term loser or value portfolio has a lower down-market beta and a higher up-market beta than the long-term winner or growth portfolio, DeBondt and Thaler and Chopra, Lakonishok, and Ritter conclude that value does not carry a greater downside risk than growth.

Panel A in Table 4 replicates the DeBondt and Thaler (1987) regressions using our full sample from January 1927 to December 2001. Using their sample from January 1927 to December 1982 yields similar results (not reported). The results largely confirm theirs. First, once betas are allowed to vary with the market, the alphas are no longer significant, a result first obtained by Chan (1988). Second, as emphasized by DeBondt and Thaler, the insignificant alphas are not impressive because value stocks have higher up-market betas but lower down-market betas than growth stocks.

Panel B of Table 4 reports the same regressions as Eq. (12), but conditional on low and high expected market risk premium. The dummy variable now takes the value of one if the estimated $\hat{\gamma}_t$ is lower than its sample average $\bar{\gamma}$ (good times) and zero otherwise (bad times). The panel shows that the HML beta is -0.26 in good times and 0.34 in bad times. Both are estimated with relatively small standard errors. And

Table 4

Market regressions conditional on up and down realized market excess returns and on low and high expected market risk premium

Panel A reports market regressions conditional on up and down realized market excess returns: $r_{it+1} = \alpha_i + \beta_{iu}r_{mt+1}d + \beta_{id}r_{mt+1}(1 - d) + \varepsilon_{it+1}$, where r_{mt+1} denotes the realized market excess return. d equals one if the market excess return is positive and zero otherwise, i.e., $d = \mathbf{1}_{\{r_{mt+1} > 0\}}$. Panel B reports market regressions conditional on low and high expected market risk premium. The dummy variable is redefined as one if the estimated expected market risk premium is higher than its average level and zero otherwise, i.e., $d = \mathbf{1}_{\{\hat{\gamma}_t > \bar{\gamma}\}}$. The sample is from January 1927 to December 2001. Each panel contains regressions for both HML and the small-stock value premium, HMLs, defined as the small-value minus the small-growth portfolios in the Fama and French 25 size and book-to-market portfolios. The numbers in parentheses are standard errors adjusted for heteroskedasticity and autocorrelations of up to six lags.

	α	$r_{mt+1}d$	$r_{mt+1}(1 - d)$	Adjusted R^2
<i>Panel A. $d = \mathbf{1}_{\{r_{mt+1} > 0\}}$</i>				
HML	-0.35 (0.33)	0.30 (0.13)	-0.04 (0.07)	0.07
HMLs	0.74 (0.67)	-0.17 (0.25)	-0.34 (0.12)	0.03
<i>Panel B. $d = \mathbf{1}_{\{\hat{\gamma}_t > \bar{\gamma}\}}$</i>				
HML	0.25 (0.12)	-0.26 (0.05)	0.34 (0.08)	0.23
HMLs	1.04 (0.19)	-0.39 (0.07)	-0.18 (0.15)	0.03

the HMLs beta is -0.18 in bad times and -0.39 in good times. Overall, once the dummy variable is redefined using the expected market risk premium, value does expose investors to a greater downside risk. Therefore, the DeBonds and Thaler (1987) and Chopra et al. (1992) results are largely overturned.

From Panel B of Table 4, the alphas conditional on the expected market risk premium are significant, which is consistent with our early evidence. We do not interpret the insignificant alphas from Panel A as a failure to reject the conditional CAPM. The dummy is defined using the ex post market excess return that cannot be a valid conditioning variable ex ante.

5. Summary and interpretation

We have two main results concerning the relative risk of value and growth stocks. First, time-varying risk goes in the right way to explain the value premium. Value betas tend to covary positively, and growth betas tend to covary negatively with the expected market risk premium. As a result, value-minus-growth betas tend to covary positively with the expected market risk premium. This evidence applies to most sample periods and various measures of value and growth strategies. Second, although time-varying risk goes in the right direction, the positive covariance between the value-minus-growth betas and the expected market risk premium is far too small to explain the observed magnitude of the value premium within the conditional CAPM.

Our first result casts some doubt on the common perception in behavioral finance that value cannot be riskier than growth. For example, Barberis and Thaler (2003, pp. 1091–1092) summarize the related literature: “[R]ational models typically measure risk as the covariance of returns with marginal utility of consumption. Stocks are risky if they fail to pay out at times of high marginal utility—in ‘bad’ times—and instead pay out when marginal utility is low—in ‘good’ times. The problem is that . . . there is little evidence that the portfolios with anomalously high average returns do poorly in bad times, whatever plausible measure of bad times is used. For example, Lakonishok et al. (1994) show that in their 1968 to 1989 sample period, value stocks do well relative to growth stocks even when the economy is in recession. Similarly, DeBonds and Thaler (1987) find that their loser stocks have higher betas than winners in up markets and lower betas in down markets—an attractive combination that no one would label ‘risky.’ ”

We also show that behavioral studies fail to offer similar evidence to ours because they sort betas on the realized market excess return, a noisy measure of economic states. Our measure based on the expected market risk premium is more precise because it is constructed using a set of business cycle predictive variables. Further, because the ex post and the ex ante market returns are positively correlated, albeit weakly, what behavioral studies classify as good states ex post tend to be bad states ex ante, and vice versa, in terms of business cycles.

Our evidence on time-varying value and growth betas is predicted by the recent rational model of Zhang (2005). He argues that it is more costly for firms to reduce

than to expand capital. In bad times, firms want to scale down, especially value firms that are less productive than growth firms (see, e.g., Fama and French, 1995). Because scaling down is more difficult, value firms are more adversely affected by economic downturns. In good times, growth firms face less flexibility because they tend to invest more. Expanding is less urgent for value firms because their previously unproductive assets have become more productive. In sum, costly reversibility causes value betas to be countercyclical and growth betas to be procyclical.

Although time-varying risk goes in the right direction, the magnitude of the value premium remains positive and mostly significant after we control for time-varying risk using conditional market regressions. Therefore, it is necessary to consider other possible drivers of the value anomaly, both APT- or ICAPM-related risk (see, e.g., Fama and French, 1993, 1996; Liew and Vassalou, 2000; Petkova, 2005) and overreaction-related mispricing (see, e.g., Lakonishok et al., 1994).

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