Volatility risk and the value premium: Evidence from the French stock market

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This paper documents that systematic volatility risk is an important factor that drives the value premium observed in the French stock market. Using returns on at-the-money straddles written on the CAC 40 index as a proxy for systematic volatility risk, I document significant differences between volatility factor loadings of value and growth stocks. Furthermore, when markets are classified into expected booms and recessions, volatility factor loadings are also time-varying. When expected market risk premium is above its average, i.e. during expected recessions, value stocks are seen riskier than their growth counterparts. This implies in bad times, investors shift their preferences away from value firms. Instead they use growth stocks as hedges against deteriorations in their wealth during those times. The findings are in line with the predictions of rational asset pricing theory and support a "flight-to-quality" explanation.

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1. Introduction

It is widely documented that value stocks earn higher average returns than growth stocks, also known as the value premium, and the economic interpretation of the value premium is a much debated issue.1 Fama and French (1995, 1996) argue that the value premium is compensation for risk missed by the capital asset pricing model (CAPM). This conclusion is based on evidence that there is common variation in the earnings and returns of distressed firms that is not explained by market earnings and returns, and including factors such as SMB and HML captures the value premium in returns on portfolios sorted with respect B/M, E/P, C/P, or D/P ratios. Although empirically robust across time and across markets, this explanation fails to provide a satisfactory economic intuition.2

On the other hand, economic theory suggests that if investors have mean-variance efficient preferences then they should care not only about market returns but also about aggregate market volatility. For example, according to Campbell (1993), and Chen (2002), risk-averse investors not only want to hedge against market risk, but also against innovations in market volatility. This is because investors are reluctant to lose wealth in periods of high volatility, which represents a deterioration in investment opportunities, and which usually coincides with periods of low consumption (recessions).3 Thus, if investors are averse not only to market risk, but also to innovations in aggregate volatility, then an asset that has positive covariance between its return and variables that correctly predict innovations in aggregate volatility should have lower expected returns. In other words, assets whose returns correlate positively with innovations in market volatility would be seen as hedges against volatility risk, and demanded by risk-averse investors, driving their prices up, implying lower average returns. In line with these predictions, recent studies by Ang et al. (2006), and Moise (2007) document that volatility risk is priced and negative in the cross-section of US stock returns. Furthermore, Arisoy et al. (2007) document that volatility risk plays an important role in constructing the stochastic discount factor (SDF) of the economy. However, as far as the author knows, there are yet no studies that look at the effect of volatility risk on different portfolios outside the US, and whether it is a determinant of the value premium or not, and this article is an attempt to fill this gap. More particularly, by using portfolios sorted according to B/M, E/P, C/P, and D/P ratios, I try to explain how returns on value and growth firms react to volatility risk, and whether

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1 Firms with high ratios of book-to-market equity (B/M), earnings-to-price (E/P), cash flow-to-price (C/P), or dividend yield-to-price (D/P) are referred to as “value” stocks, whereas firms with low B/M, E/P, C/P, or D/P ratios are referred to as “growth” stocks.

2 On the other hand, from a behavioral point of view, Lakonishok et al. (1994) and Haugen (1995) argue that the value premium in average returns arises because investors undervalue distressed stocks and overvalue growth stocks. When these pricing errors are corrected, value stocks have high returns and growth stocks have low returns. La Porta (1996), and La Porta et al. (1997) also reach similar conclusions.

3 French et al. (1987) and Campbell and Hentschel (1992) further document that periods of high volatility usually coincide with downward market moves.
volatility risk can account for the value premium observed in the French stock market.

To test the above hypotheses, one has to decide on a proxy that takes into account investors’ true measure of volatility risk. To do that, I resort to a measure from options market, and use returns on at-the-money straddles written on the CAC40 index. There are three main reasons for using at-the-money straddle returns as a proxy for volatility risk. First of all, options provide us with important insight about their underlying. Prices formed in option markets are forward looking, and reveal important information about investors’ expectations on the price dynamics of the underlying. Second and more importantly, straddles are volatility trades, and their returns are very sensitive to innovations in the volatility of the underlying, which makes them ideal for examining the effect of volatility risk. Third, since options themselves are tradable assets, using straddle returns as a proxy for volatility risk helps avoid the problem of mimicking portfolios, and helps better represent a dynamically managed portfolio that corresponds to investors’ true investment opportunity set.

The use of at-the-money straddles as a proxy for aggregate volatility risk is further justified by the idiosyncratic volatility discount model developed in Barinov (2008). According to the model, firms with growth options offer a hedging channel to investors because when aggregate volatility increases the value of the growth options also increases. This idiosyncratic hedging channel explains why firms with growth options, i.e. growth firms, are seen as hedges against volatility risk and why they are preferred by investors who are averse to losing wealth during recessions. Like the value of any option, the value of at-the-money straddles also increases with innovations in aggregate volatility, thus the hypotheses developed here are very much related to the theory behind the idiosyncratic volatility discount, and can be seen as direct tests of the model.

Thus, using returns on at-the-money straddles of the CAC40 index as a proxy for aggregate volatility risk, I document the following. First, I find that value firms consistently have negative and significant volatility betas, whereas growth firms consistently have positive and significant volatility betas. Noting the negative relationship between straddle returns and volatility, i.e. at-the-money straddle returns are positive (negative) at times of high (low) volatility, and assuming that investors are averse to innovations in aggregate volatility, this indicates that value firms are expected to lose (earn) more than their growth counterparts at times of high (low) market volatility.

Second, I document significant time variation in the volatility betas of value and growth portfolios. When markets are classified into expected booms and recessions, volatility betas of value and growth stocks change considerably. More particularly, the volatility beta differential between value and growth firms are significantly higher at months when the expected risk premium is above its average, i.e. during expected recessions. This implies value stocks are seen much riskier at bad times, which is usually associated with increased volatility and market downturns. On the other hand, with their significant and positive volatility betas, growth firms are seen as hedges against volatility risk at those times. The opposite holds in good states when expected risk premium is below its average. During expected booms, the volatility betas of value (growth) firms become less negative (positive), indicating that value firms are seen less risky at those times.

Third, a conditional version of intertemporal CAPM (ICAPM), which allows market beta and volatility beta depend linearly on observable conditioning variables, performs much better than unconditional CAPM. Significant improvement in Jensen’s alphas for conditional ICAPM confirms the hypotheses that investors care not only about market risk but also about volatility risk, and both risk factors are time-varying. The results, if persistent, indicate that volatility risk (a distress and recession proxy) is an important risk factor that drives the difference in the returns of value and growth stocks in the French stock market.

The findings are further related to recent studies that explain value premium within a rational expectations framework. For example, the business cycle explanation of Lettau and Ludvigson (2001), and Petkova and Zhang (2005) argue that it is the time variation in the conditional betas of value and growth stocks in bad and good times of the economy that drives the value premium. In conditional CAPM and CCAPM settings, respectively, the authors find that value stocks have lower market (consumption) betas during bad times relative to growth stocks, thus conclude that value is riskier than growth. Although similar in spirit, this paper differs from theirs by testing the observed value premium using a two-factor model within the ICAPM framework of Merton (1973). Similar to Campbell (1993), and Chen (2002), I assume that investors are averse not only to market risk but also to aggregate volatility risk, and argue that it is the difference in the sensitivity of stocks to aggregate volatility, which drives the observed value premium. Conditional CAPM cares only about market risk and disregards investors’ hedging demands due to intertemporal changes in the investment opportunity set. Thus, a two-factor ICAPM is expected to be a more fruitful framework in allowing us to capture not only the market risk component, but also investors’ hedging need component against deteriorations in their wealth due innovations in aggregate volatility.

The rest of the paper is organized as follows. Section 2 presents data and methodology used to test the hypothesis of whether volatility risk can explain the differences in returns on value and growth stocks in the French market. Section 3 reports the associated empirical findings, and details the tests for time variation in market and volatility factor loadings. The final section offers concluding remarks.

2. Data and methodology

2.1. Data

The data covers the period January 1997 to December 2007. The options data were obtained from Euronext website. Portfolio returns for value and growth stocks were obtained from Kenneth French’s website. For the risk-free rate, I use 3-month PIBOR (Paris Interbank Offer Rate) rate obtained from Datastream International.

As of November 2008, CAC40 index represents 55.28% of the total market capitalization of all French stocks traded in Euronext Paris primary market with a total market capitalization of 597.56 billion Euros. Furthermore, CAC40 index options are the most actively traded index options in terms of number of contracts in Europe, and second in terms of total value after FTSE-100 index options. As of 2007, the annual trading volume for CAC40 index options were 9,793,350 for PXA contracts which account for 559.51 billion Euros. Traded on the French options market MONEP
Table 1
Average monthly returns.

<table>
<thead>
<tr>
<th></th>
<th>BMH</th>
<th>BML</th>
<th>CPH</th>
<th>CPL</th>
<th>DVH</th>
<th>DYL</th>
<th>EPH</th>
<th>EPL</th>
<th>MKT</th>
<th>STR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.55</td>
<td>0.92</td>
<td>1.60</td>
<td>0.75</td>
<td>1.71</td>
<td>0.72</td>
<td>1.41</td>
<td>0.95</td>
<td>1.13</td>
<td>-2.01</td>
</tr>
<tr>
<td>HML</td>
<td>0.63</td>
<td>0.85</td>
<td>0.75</td>
<td>0.75</td>
<td>0.99</td>
<td>0.72</td>
<td>1.41</td>
<td>0.95</td>
<td>1.13</td>
<td>(0.54)</td>
</tr>
</tbody>
</table>

This table reports the descriptive statistics for the 8 portfolios sorted with respect to book-to-market (B/M), cash earnings-to-price (C/P), dividend yield-to-price (D/P), and earnings-to-price (E/P) ratios, and CAC All Shares returns (MKT), and at-the-money straddle returns written on CAC 40 index (STR). The sample covers the period from January 1997 to December 2007 (132 months). BMH, CPH, DVH, and EPH represent value portfolios sorted with respect to B/M, C/P, D/P, and E/P, and BML, CPL, DYL, and EPL represent growth portfolios sorted with respect to B/M, C/P, D/P, and E/P. HML represents the return differential between value and growth portfolios for the four categories examined. The numbers in parentheses are the p-values associated with the hypothesis that return differentials are equal to zero. All return figures are given in percentages.

Straddles are volatility trades, and at-the-money straddle returns are very sensitive to levels of volatility. When there is large variation in the prices of the constituents of the CAC40 index, the returns on at-the-money straddles are exceptionally large, and when the market experiences relatively low levels of volatility, the buyers of at-the-money straddles face negative returns. Due to their sensitivity to the level of volatility, returns on at-the-money straddles are ideal for studying the effect of volatility risk on portfolio returns.

The method to compute daily at-the-money straddle returns is as follows. First, options that significantly violate arbitrage-pricing bounds are eliminated. Then, options that expire during the following calendar month are identified. The reason for choosing options that expire the next calendar month is that they are the most liquid data among various maturities. Options that expire within 10 days are excluded from the sample because they show large deviations in trading volumes, which casts doubt on the reliability of their pricing associated with increased volatility. Next, each option is checked whether it is traded the next trading day or not. If no option is found in the nearest expiry contracts, then options in the second-nearest expiry contracts are used. To calculate the daily return of an option, raw net returns are used.

Once daily call and put returns are calculated, they are grouped according to their moneyness levels. I classify options with moneyness level (S–K) between –50 and 0, as at-the-money options. The return on an at-the-money straddle is then the equally weighted average of the return on an at-the-money call and at-the-money put computed as above. Finally, daily at-the-money straddle returns are cumulated to monthly returns, which form the basis of the empirical tests.

Table 1 presents the monthly average returns on the 8 test portfolios, the market portfolio, and at-the-money straddles. Consistent with the literature, at-the-money straddles written on the CAC40 index lost on average 2.01% per month (0.23% daily) for the sample period studied. During the same period French stocks earned 1.13% per month on average. Looking at portfolio returns, one can see that value portfolios outperform growth portfolios for all the four ratios considered, ranging from 0.45% per month for portfolios sorted according to earnings-to-price ratio to almost 1% per month for portfolios sorted according to dividend yield-to-price ratio. However, the insignificant p-values imply that return differentials between value and growth portfolios are not significantly different from zero.

Table 2 documents the correlations between the monthly returns of the 8 test portfolios, the market portfolio, and returns on at-the-money straddles written on the CAC40 index for the period covering January 1997 to December 2007. Straddle returns are negatively correlated with all portfolios, whereas the 8 portfolio returns and the market portfolio returns are positively correlated.

3. Empirical findings

To test the main hypothesis that volatility risk – proxied by at-the-money straddle returns – is an explanatory risk factor for the returns on value and growth portfolios in the French stock market, I regress the excess returns of 8 portfolios sorted according to B/M, E/P, CE/P, and D/P ratios on excess straddle returns, and on the market factor. Furthermore, to see the overall effect of the proposed two-factor model on the value-minus-growth (HML) strategy, I repeat the same regressions for 4 HML portfolios that are composed of a long position in the value portfolio and a short position in the growth portfolio. In particular, we test the following two-factor ICAPM,

$$r_{it} - r_f = \alpha_i + \beta_{im}(r_{mt} - r_f) + \beta_{it}(r_{at} - r_f) + \epsilon_{it},$$

where $r_{it}$’s are the realized returns of 12 test portfolios, $r_f$ is the risk-free rate, $r_{mt}$ is the return on CAC All Shares index, and $r_{at}$ is the return on at-the-money straddles written on the CAC40 index. The above analysis relies on monthly holding period returns, both because microstructure effects tend to distort daily returns, and to rule out non-synchronous trading effect that could be present in daily data.

3.1. Volatility factor loadings

Table 3 presents the estimates of $\alpha_i$, $\beta_{im}$, and $\beta_{it}$ for the 8 test portfolios and 4 HML strategies, with respect to CAPM and the two-factor model presented in Eq. (1). Although the standard CAPM explains the returns on 8 portfolios successfully, looking at the HML portfolios, one can see that the market betas for all the 4 HML portfolios are insignificant and the explanatory power of the standard CAPM is very poor, with adjusted $R^2$’s almost equal to zero. On the other hand, the proposed two-factor model performs much better than the standard CAPM in explaining the value premium, with adjusted $R^2$’s ranging from 0.08 to 0.16. More strikingly, despite the insignificance of market betas, volatility betas for all the 4 HML strategies are still significant and negative. Furthermore, volatility betas are negative and significant for all 4 value portfolios, and positive and significant for all 4 growth portfolios.

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9 According to Buraschi and Jackwerth (2001), most of the trading activity in S&P 500 options is concentrated in the nearest (0–30 days to expiry) and second nearest (30–60 days to expiry) contracts.

10 Stoll and Whaley (1987) report abnormal trading volumes for options close to expiry.

11 I also use the alternative classification, i.e. 0 < S–K < 50, as at-the-money options. The results are similar, and are available upon request.
ing from an omitted variables bias. The documented negative correlation negative (positive) market betas for HML portfolios during increase in alphas coupled with the change in the sign of market value (growth) firms in the CAPM specification. Second, an unconditional version of ICAPM might not be the correct specification. The increase in alphas coupled with the change in the sign of market betas might be an indication of a possible time variation in market and volatility betas. For example, Petkova and Zhang (2005) document negative (positive) market betas for HML portfolios during significant negative (positive) volatility betas in the ICAPM specification, one cannot see the necessary improvement in Jensen’s alphas. The alphas in the proposed ICAPM are consistently higher than those of CAPM by 10–20 basis points. There might be two possible explanations for this. First of all, CAPM might not be the correct specification, because it might be suffering from an omitted variables bias. The documented negative correlation between market and straddle returns coupled with

Table 2  
Return correlation matrix.

<table>
<thead>
<tr>
<th></th>
<th>BMH</th>
<th>BML</th>
<th>CPH</th>
<th>CPL</th>
<th>DYH</th>
<th>DYL</th>
<th>EPH</th>
<th>EPL</th>
<th>MKT</th>
<th>STR</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMH</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BML</td>
<td>0.65</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPH</td>
<td>0.89</td>
<td>0.64</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPL</td>
<td>0.70</td>
<td>0.94</td>
<td>0.69</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DYH</td>
<td>0.90</td>
<td>0.61</td>
<td>0.86</td>
<td>0.65</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DYL</td>
<td>0.71</td>
<td>0.56</td>
<td>0.68</td>
<td>0.95</td>
<td>0.67</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPH</td>
<td>0.93</td>
<td>0.70</td>
<td>0.87</td>
<td>0.72</td>
<td>0.93</td>
<td>0.74</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPL</td>
<td>0.67</td>
<td>0.95</td>
<td>0.67</td>
<td>0.95</td>
<td>0.61</td>
<td>0.95</td>
<td>0.69</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MKT</td>
<td>0.85</td>
<td>0.93</td>
<td>0.82</td>
<td>0.93</td>
<td>0.82</td>
<td>0.94</td>
<td>0.88</td>
<td>0.92</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>STR</td>
<td>-0.58</td>
<td>-0.35</td>
<td>-0.60</td>
<td>-0.42</td>
<td>-0.61</td>
<td>-0.38</td>
<td>-0.58</td>
<td>-0.39</td>
<td>-0.51</td>
<td>-1</td>
</tr>
</tbody>
</table>

This table reports the correlations between the monthly returns of the 8 portfolios sorted with respect to book-to-market (B/M), cash earnings-to-price (C/P), dividend yield-to-price (D/P), and earnings-to-price (E/P) ratios, and CAC All Shares returns (MKT), and at-the-money straddle returns written on CAC 40 index (STR). The sample covers the period from January 1997 to December 2007 (132 months). Monthly at-the-money straddle returns, and whether it can explain the value premium observed in French stocks. Left hand side of the table reports estimation results for standard CAPM, and right hand side of the table reports the results for the proposed two-factor model presented in Eq. (1). The dependent variable for each regression is the excess return of one of 12 portfolios sorted according to book value-to-market value (B/M), cash earnings-to-price (C/P), dividend yield-to-price (D/P), and earnings-to-price (E/P) ratios. Each regression is estimated with monthly data from January 1997 through December 2007 (132 months). Monthly at-the-money straddle returns, rStr, are calculated by cumulating the daily returns each month. rMkt is the return of CAC All Shares index, and rf is the 3-month PIBOR rate. The numbers presented at the top are the coefficient estimates of time-series regressions, and the numbers in parentheses are their associated t-statistics. All r-values are corrected for autocorrelation (with lag = 4), and heteroskedasticity as suggested by Newey and West (1987).

Denote significance levels at 1%, respectively.

Denote significance levels at 5%, respectively.

Denote significance levels at 10%, respectively.

On the other hand, despite the significance of volatility betas in the ICAPM specification, one cannot see the necessary improvement in Jensen’s alphas. The alphas in the proposed ICAPM are consistently higher than those of CAPM by 10–20 basis points. There might be two possible explanations for this. First of all, CAPM might not be the correct specification, because it might be suffering from an omitted variables bias. The documented negative correlation between market and straddle returns coupled with significant negative (positive) volatility betas for value (growth) firms, implies an upward (downward) bias for market betas of value (growth) firms in the CAPM specification. Second, an unconditional version of ICAPM might not be the correct specification. The increase in alphas coupled with the change in the sign of market betas might be an indication of a possible time variation in market and volatility betas. For example, Petkova and Zhang (2005) document negative (positive) market betas for HML portfolios during
good (bad) times implying time variation in betas of value and growth portfolios. Similarly, the dominance of good times in our sample period might be a potential explanation to the increased alphas and change in sign of HML market betas. Section 3.2 will further examine this alternative explanation and test whether conditional specifications of CAPM and ICAPM bring any improvement over Jensen’s alphas.

Overall, the above documented results offer an alternative explanation to the observed value premium in the French stock market. Returns of value stocks covary negatively with innovations in aggregate market volatility, and the opposite is true for returns of growth stocks. When volatility increases at-the-money straddle returns are positive. This empirical fact combined negative (positive) volatility betas for value (growth) firms indicate that investors see value (growth) firms riskier (less risky) with respect to volatility risk. Consistent with Barinov (2008), growth firms, in hedging their investors against unexpected increases in volatility, earn lower equilibrium returns than those justified by their CAPM betas. On the contrary, value firms with their negative volatility betas are seen as riskier, and earn higher returns than their growth counterparts, as documented in Table 1. The next section examines whether there exists a possible time variation in the sensitivity of value and growth stocks with respect to market and volatility risk.

3.2. Is there time variation in market and volatility factor loadings?

Time variation in market beta is extensively documented in the literature. Recently, using a conditional CAPM framework, Petkova and Zhang (2005) report significant differences in betas of HML portfolio, i.e. HML portfolios exhibit positive market betas during bad times and negative betas during good times. On the other hand, recent studies by Chen (2002), and Vayanos (2004) document a strong countercyclical pattern in aggregate volatility, i.e. it peaks just before or during recessions, and it falls sharply late in recessions or early in recovery periods. Thus, similar to the well-documented time variation in market risk, I ask the question whether volatility risk might also be time-varying, and whether portfolios might have not only different market risk loadings, but also different volatility risk loadings at different points in time. This question is further justified by the failure of the proposed unconditional two-factor ICAPM in the previous section. The inability of the model to explain HML return differentials, increased alphas, and change in the sign of market betas indicate that an unconditional version of two-factor ICAPM might not be the correct specification. Thus, I argue that both volatility risk and market risk might be time-varying, and propose a conditional ICAPM, which allows for testing the possible existence of time variation in both market risk and volatility risk.

Alternatively, one could assume a conditional CAPM framework, and argue that only the market betas should change. However, as opposed to conditional ICAPM, in conditional CAPM investors do not care about intertemporal substitution, but care only about market risk. On the other hand, a conditional ICAPM setting allows us to capture both the intertemporal hedging component due to changes in aggregate volatility, and also the growth option component that is closely related to volatility (i.e. the value of growth options, and at-the-money-straddles, increases with innovations in volatility). Finally, there are other variables that are related to the expected market risk premium, and I argue that aggregate volatility risk is able to capture other dimensions of risk, thus a conditional ICAPM is preferred to a conditional CAPM.

To examine the above hypothesis whether there exists time variation in market and volatility factor loadings of value and growth portfolios, I start with two different regimes, high vs. low volatility, and bear vs. bull markets. The method is as follows. First, I divide the sample into two subsamples. To define different volatility regimes, I first estimate average monthly standard deviation of the returns on CAC All Shares index for the sample period studied. The months that correspond to volatilities higher (lower) than monthly average standard deviation are included in the high (low) volatility regime. For bear and bull markets, I take the average monthly return of CAC All Shares index, and define the period where monthly returns are above this average as bull markets, and months below this average as bear markets.

This procedure results in 81 months of low volatility versus 51 months of high volatility markets, and 74 months of bull markets versus 58 month of bear markets during the January 1997–December 2007 sample period. Tables 4 and 5 present average monthly returns on the 8 portfolios, the market factor, and at-the-money straddles during those periods. As can be seen, average monthly returns on at-the-money straddles are positive at high volatility and bear markets (15.13% and 18.55%, respectively), and negative at low volatility and bull markets (−9.85% and −14.90%, respectively), confirming that straddles are volatility trades and earn positive (negative) returns at times of high (low) volatility. Furthermore, the return differential between value and growth firms (represented by HML) is much higher at times of low volatility and bull markets, confirming the hypothesis that investors require a positive risk premium for holding HML portfolios, because HML returns correlate negatively with market volatility as documented in Table 3. However, looking at return differentials at volatile and bear markets, this is the case only for portfolios sorted according to book-to-market ratio. It seems that low book-to-market firms offer a hedge to investors by losing less at times of high volatility and market downturns. For the three remaining portfolios, although the return differential is much lower, growth portfolios still lose around 0.50% more than their value counterparts in bad states of the economy, which is contradictory to the our expectations.

According to the theory outlined, one would expect negative return differentials for the HML strategies in high volatility and bear markets, because growth portfolios are expected to lose less than their value counterparts due to their more valuable growth options in bad states of the economy. One reason for positive return differentials might be due to use of realized returns in classifying market states. However, as advocated by Petkova and Zhang (2005), expected market risk premium performs much better than ex post realized market excess returns in measuring the state of the economy, and testing for the time variation in the risk of a trading strategy. Thus, I proceed by dividing the sample into good and bad states of the economy using expected risk premiums.

3.2.1. Expected market risk premium and factor loadings

Following Petkova and Zhang (2005), I define bad states of the economy as months where the expected market risk premium is above its average, and good states of the economy as months where expected risk premium is below its average. The expected risk premium is estimated as follows. First, following Ferson and Harvey (1991), I regress excess realized market returns on a set of conditioning variables, i.e.

\[ r_{mt+1} - r_{ft+1} = \delta_0 + \delta_1 \text{DIV}_t + \delta_2 \text{TB}_t + \delta_3 \text{TERM}_t + \epsilon_{mt+1}. \]

where \( \text{DIV} \) represent the dividend yield of the SBF 250 index obtained from Datastream International, \( \text{TB} \) is the 3-month PIBOR rate, and \( \text{TERM} \) is the difference between the yields of 10-year

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and 1-year French government bonds, both of which are obtained from OECD.\textsuperscript{13}

The expected market risk premium is then simply the fitted component of (2), i.e.
\[
\hat{\gamma}_t = \hat{\beta}_0 + \hat{\beta}_1D\text{IV}_t + \hat{\beta}_2TB_t + \hat{\beta}_3\text{TERM}_t,
\]
and the estimated result for (3) is given by,
\[
\hat{\gamma}_1 = 0.0887 + 0.9679 \text{ DIV}_t - 2.5492 \text{ TB}_t - 0.0754\text{TERM}_t.
\]

The above estimates indicate that the only significant determinant for the expected market risk premium in the French stock market is the risk-free rate (PIBOR). Because the risk-free rate captures expectations about inflation, the negative and significant estimate for PIBOR term implies that, expected risk premium is high when expected inflation is low, which is in line with intuition.\textsuperscript{14}

Next, I classify months with expected risk premiums above its average as bad states of the economy, i.e. expected recessions, and months with expected risk premiums below its average as good states of the economy, i.e. expected booms. This results in 48 months with expected recessions, and 84 months with expected booms.

Monthly average returns reported in Table 6 indicate that growth portfolios lose less than their value counterparts in bad states of the economy when expected market risk premium is above its average. On the contrary, in good states, when expected risk premium is below its average, value portfolios earn more. Furthermore, the return differentials of HML portfolios between expected recessions and booms range from –1.06% for the HML strategy with cash earnings-to-price ratio to –1.40% for the HML strategy with book-to-market ratio. The results lend support to the predictions of the outlined theory, i.e. that HML strategies are expected to perform much worse in bad states of the economy when expected risk premium is above its average.

Next, I estimate the market and volatility betas given by Eq. (1) for expected booms and recession periods. To establish the differences in market and volatility betas in expected boom and recession states, I re-estimate Eq. (1) this time with slope dummies, i.e.
\[
r_{it} - r_f = \alpha_i + \beta_{it}(r_{mt} - r_f) + \beta_{mtd}(r_{mt} - r_f) + \beta_{itd}(r_{mt} - r_f) + \beta_t(s_{it} - s_f) + \epsilon_{it},
\]
where $d$ is a dummy variable which takes on values 1 when the expected risk premium is above its average (expected recessions), and 0 when the expected risk premium is below its average (expected booms). Correspondingly, $\beta_{\text{M}}$, $\beta_{\text{D}}$, and $\beta_{\text{Y}}$ are the estimates of differences in the market betas, and volatility betas when one goes from expected boom states to expected recession states.

Table 7 presents the estimates of intercept term, market betas and volatility betas for the 12 test portfolios in expected booms and recession periods First, one can see that the dummy estimates of market betas are consistently positive for value portfolios, and consistently negative for growth portfolios, indicating that market betas of value (growth) portfolios are always higher (lower) during expected recessions. Similarly, market betas of HML portfolios are always negative during expected booms and positive during expected recessions, confirming Petkova and Zhang (2005) that value portfolios are more risky than growth firms in bad states of the economy when expected market risk premium is above its average. Second, looking at dummy estimates of volatility betas, one can see that they are always negative for value and HML portfolios, and positive for growth portfolios, indicating that volatility betas become more negative for value portfolios and more positive for growth portfolios during expected recession periods. Furthermore, the difference in volatility betas is statistically significant for portfolios sorted according to $E/P$, and $C/P$ ratios, confirming the hypothesis that there exists time variation in the sensitivity of value and growth portfolios with respect to volatility risk.

On the other hand, although letting market and volatility betas change between recessions and expansions helps capturing the sensitivity of value, growth, and HML portfolios with respect to business cycle conditions, it still fails to bring a significant improvement over Jensen’s alphas. Only 4 out 12 portfolios exhibit an improvement in alphas. The reason for this limited gain might be due to restricting the business cycle dynamics of market and volatility betas to only two possible values. However, time variation in expected returns and consequently in betas might actually bring much more improvement over unconditional specifications, be it CAPM or ICAPM. Furthermore, when one lets not only market beta but also volatility beta change linearly with respect to appropriate conditioning variables, the improvement in Jensen’s alphas are remarkable. None of the alphas for conditional ICAPM are significantly different from zero. They range from 0 basis points to 60 basis points and are consistently smaller than alphas of conditional CAPM, unconditional ICAPM, and ICAPM. The results support the hypothesis that not only market risk but also volatility risk is time-varying, and models which take into account this time variation tend to perform better in explaining the observed value premium in the French stock market.

Petkova and Zhang (2005) show that it is the time variation in the expected risk premium, and the associated changes in conditional betas of value and growth stocks, which determine the value risk premium in US stock returns. I further document that, not only conditional market betas, but also conditional volatility betas play an important role in capturing the observed value premium in French stock returns. The findings are in line with Barinov (2008) who argues that value stocks are riskier than growth stocks.

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Table 6

| Portfolio, market, and straddle returns in expected booms and recessions. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                  | B/M             | BML             | CPH             | CPL             | D/Y             | DYH             | DYL             | EPH             | EPL             | MKT             | STR             |
| Panel A: Expected recessions (48 months) |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|                  | (0.32)          | (0.53)          | (0.53)          | (0.35)          | (0.17)          | (0.17)          | (0.17)          | (0.17)          | (0.17)          |                  |
| Panel B: Expected booms (84 months)      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Mean             | 3.73            | 3.06            | 3.48            | 2.98            | 3.44            | 2.85            | 3.53            | 3.25            | 3.31            | –13.25          |
|                  | (0.26)          | (0.45)          | (0.50)          | (0.31)          | (0.59)          | (0.59)          | (0.70)          | (0.70)          | (0.70)          |                  |
| Panel C: HML return differentials between expected booms and recessions |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Mean             | 1.40            | 1.07            | 1.26            | 1.10            |                  |                  |                  |                  |                  |                  |
|                  | (0.05)          | (0.10)          | (0.07)          | (0.09)          |                  |                  |                  |                  |                  |                  |

This table reports the descriptive statistics for the 8 portfolios sorted with respect to book-to-market (B/M), cash earnings-to-price (C/P), dividend yield-to-price (D/Y), and earnings-to-price (E/P) ratios, and CAC All Shares returns (MKT), and at-the-money straddle returns written on CAC 40 index (STR). The sample covers the period from January 1997 to December 2007 (132 months). Expected booms (recessions) correspond to months where expected risk premiums are below (above) their sample average. B/M, C/P, D/Y, and E/P represent value portfolios sorted with respect to B/M, C/P, D/Y, and E/P, respectively. The conditional ICAPM specification in Eq.(6) assumes that market volatility as a conditioning variable is further in line with the literature, which documents time variation in volatility.

Looking at Table 8, one can see that conditional specifications bring much more improvement over unconditional specifications, be it CAPM or ICAPM. Furthermore, when one lets not only market beta but also volatility beta change linearly with respect to appropriate conditioning variables, the improvement in Jensen’s alphas are remarkable. None of the alphas for conditional ICAPM are significantly different from zero. They range from 5 basis points to 60 basis points and are consistently smaller than alphas of conditional CAPM, unconditional ICAPM, and ICAPM. The results support the hypothesis that not only market risk but also volatility risk is time-varying, and models which take into account this time variation tend to perform better in explaining the observed value premium in the French stock market.

Petkova and Zhang (2005) show that it is the time variation in the expected risk premium, and the associated changes in conditional betas of value and growth stocks, which determine the value risk premium in US stock returns. I further document that, not only conditional market betas, but also conditional volatility betas play an important role in capturing the observed value premium in French stock returns. The findings are in line with Barinov (2008) who argues that value stocks are riskier than growth stocks.
because they hold growth options which are more sensitive to innovations in aggregate volatility, implying less valuable growth options, thus lower returns for them during recessions. On the other hand, the proponents of rational asset pricing theory argue that the HML portfolio captures some macroeconomic distress or risk aversion factor that covary strongly with value and growth portfolios, and thus can explain the value premium. I document that, it is the difference in the sensitivity of value and growth stocks to volatility risk (a recession and distress proxy), which determines the value premium. The findings documented here support the concept of “rational markets theory”, and indicate a “flight-to-quality” during expected recessions. Investors shift their preferences away from value firms, which are considered as being relatively risky at those times. Instead, they use growth stocks, whose returns covary positively with innovations in volatility, and therefore are expected to pay off during times of low market returns and recessions. This leads to higher hedging demands for growth stocks, higher prices and lower expected returns.

4. Conclusion

Asset pricing literature has differing views on the empirically documented value premium. From a behavioral point of view, Lakonishok et al. (1994), La Porta (1996), and La Porta et al. (1997) argue that the value premium in average returns arises because investors undervalue distressed stocks and overvalue growth stocks. When these pricing errors are corrected, value stocks have lower returns and growth stocks have higher returns. On the other hand, the proponents of rational asset pricing theory argue that the HML portfolio captures some macroeconomic distress or risk aversion factor that covary strongly with value and growth portfolios, and thus can explain the value premium. I document that, it is the difference in the sensitivity of value and growth stocks to volatility risk (a recession and distress proxy), which determines the value premium. The findings documented here support the concept of “rational markets theory”, and indicate a “flight-to-quality” during expected recessions. Investors shift their preferences away from value firms, which are considered as being relatively risky at those times. Instead, they use growth stocks, whose returns covary positively with innovations in volatility, and therefore are expected to pay off during times of low market returns and recessions. This leads to higher hedging demands for growth stocks, higher prices and lower expected returns.

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sion factor. However, empirical studies thus far have failed to point out what macroeconomic risk factors might be the source of this premium. I argue that volatility risk is an important factor that investors take into account while pricing value and growth stocks. Proxying volatility risk with the return on at-the-money straddles of the CAC40 index, I document the following.

For all the four categories of B/M, E/P, C/P, and D/P portfolios examined, value portfolios have negative and significant volatility betas, whereas growth portfolios have positive and significant volatility betas. Since straddles earn positive returns at times of high volatility and negative returns at times of low volatility, it asserts that the sensitivity of value and growth stocks to volatility risk is an important determinant of the value premium observed in French stocks. Due to their negative volatility betas, value stocks are expected to experience far worse returns when volatility is high, and on the contrary, with their positive volatility betas growth firms are seen as potential hedges against volatility risk. Thus, investors demand growth stocks to protect themselves against innovations in volatility. This “flight-to-quality” phenomenon explains why growth stocks are in general priced higher and have lower returns, and seen as less risky compared to their value counterparts.

Furthermore, the sensitivity of value and growth stocks to volatility is also time-varying. When markets are classified into expected booms and recessions, one observes significant changes in the difference of volatility betas between growth and value stocks. The volatility beta differentials between growth and value portfolios are considerably higher in expected recession periods, which is usually associated with increased volatility and market downturns. Value stocks earn higher returns than implied by their CAPM betas in good times. On the contrary, they lose more than implied by their CAPM betas in bad times of the economy. This implies that value stocks are seen as riskier in bad times when expected market risk premium is above its average. The opposite is true for growth stocks. The results support the view of the rational asset pricing theory, and offer a risk-based explanation for the value premium observed in the French market.

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References


