Downside Risk of International Stock Returns

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Abstract

This paper investigates the downside risk exposure of international stock returns in fourteen major industrialized economies around the world. For the period 1975 to 2010, we find that differences in returns on value and growth portfolios can be rationalized by assets' reagibilities to market's downside shocks. International value stocks are particularly sensitive to market's permanent downside shocks, while international growth stocks are particularly sensitive to market's temporary downside shocks. In line with recent evidence for the US, risk associated with unfavorable changes in market's cash-flow innovations carries a premium which is pervasive and statistically significant.

Keywords: cash-flow news; discount-rate news; downside risk; asset pricing

JEL classification: G11; G12

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1 Introduction

The idea that investors care differently about downside losses versus upside gains dates back to Roy (1952) and Markowitz (1952). If investors are more sensitive to economic downturns than to periods of economic recovery, stocks that tend to do poorly in bear markets should have on average higher returns. This paper examines the downside risk exposure of the cross section of international value and growth portfolio returns. Value stocks receive a lot of attention by both financial analysts and academics on grounds of their high average returns compared to growth stocks.

Evidence suggests that value premium is pervasive in a large number of countries. In this paper, we focus on fourteen industrialized economies including the United States (US), Canada and twelve major EAFE (Europe, Australia and the Far East) markets. In our country choice, we strictly follow Fama and French (1998) who show that value stocks have higher average returns than growth stocks in markets around the world. In addition, we study Canada given the evidence in Athanassakos (2009). The online data library of Kenneth R. French allows a comprehensive examination of the international value premium since 1975.

Ang et al. (2006) demonstrate that the cross section of US stock returns reflects a premium for bearing downside risk. Exploiting this insight, Botshekan et al. (2012) show that cross-sectional differences in returns on stocks traded on the NYSE, AMEX and NASDAQ over the period from 1963 to 2008 can be rationalized by the exposure of these stocks to downside cash-flow risk. This result is striking in view of the seminal finding of Campbell and Vuolteenaho (2004) that value stocks have considerably higher cash-flow betas with high risk prices than their growth counterparts. Despite the fact that the value premium is a robust feature of international financial data, little research has been done on equity markets in the rest of the world.

In this paper, we study the exposure of international portfolio returns to the market's upside and downside fluctuations. We approximate the market by the Center for Research in Security Prices (CRSP) value-weight index. The empirical ability of US financial indicators to predict foreign excess returns is well documented since Bekaert and Hodrick (1992), Campbell and Hamao (1992), Ferson and Harvey (1993), and Cheung et al. (1997). To distinguish between cash-flow and discount-rate shocks in up and down markets we employ a four-beta decomposition constructed by Botshekan et al. (2012).

Our results are easily summarized: First, we find that differences in returns on value and growth portfolios in fourteen major industrialized economies around the world can be rationalized by assets' sensitivities to market's downside shocks. International value stocks are particularly sensitive to market's permanent downside shocks, while international growth stocks are particularly sensitive to market's temporary downside shocks. This result echoes Campbell et al. (2009) who argue that cash flows of US growth stocks are particularly sensitive to temporary movements in aggregate stock prices, while cash flows of US growth stocks are particularly sensitive to permanent movements in aggregate stock prices.

Furthermore, risk associated with unfavorable changes in market's cash-flow innovations carries the largest premium which is pervasive and statistically significant. This finding supports recent evidence in Botshekan et al. (2012) on the empirical success of downside cash-flow betas to capture the cross-sectional dispersion in returns on US stocks. Our results withstand a series of robustness checks.

We start with a vector autoregressive (VAR) model of Campbell and Vuolteenaho (2004) with four state variables–excess market return, term yield spread, ten-year price-earnings ratio and small-stock value spread–estimated over the full sample period from December 1928 to December 2010. To guard against the possibility that the "bad beta, good beta" decomposition is driven by the Great Depression market crash in the early 30's (Bianchi, 2010), we reevaluate the asset pricing tests relying on a VAR model estimated over a shorter sample period.

We address the concern of Chen and Zhao (2009) and test the robustness of our results to a broad range of alternative state variables. In particular, we consider the dividend yield, real dividend growth, stock return variance, inflation, the short-run interest rate and different measures of value spread and price-earnings ratio. Moreover, we employ an alternative estimation technique which allows to calculate the cash-flow news directly as opposed to backing it out as a residual as is standard in the literature on macroeconomics and finance. Our conclusions support Engsted et al. (2010) who show that in a properly specified VAR model, there is little difference between backing out the cash-flow news or the discount-rate news when the respectively other component is directly modelled.

In order to reduce commonalities in value and growth portfolios due to the strong factor structure, we follow the recommendation of Lewellen et al. (2010) and include industry portfolios in test assets alongside with the benchmark international portfolios. In addition, we impose restrictions on risk premia directed by the economic theory by setting the zero-beta equal to the risk-free rate; we control for size and value effects, experiment with a lower and higher number of test assets, split up the sample of portfolio returns, change the specification of downside risk and vary the value of the coefficient of loglinearization.

Finally, we study the sensitivity of our results to upside and downside shocks originated on regional European markets. This exercise is motivated by a recent study of Baele (2005) who finds significant spillover effects of both the US and aggregate European markets' shocks on a large number of local European equity markets. Our findings confirm the importance of downside risk in stock market fundamentals for determination of assets' risk exposure and hold under various robustness tests.

The remainder is structured as follows. The next section briefly sketches the decomposition of the market returns into a cash-flow component and a discount-rate component and defines the upside and downside cash-flow and discount-rate betas. Section 3 describes the data. Section 4 presents our empirical results and Section 5 concludes.

2 Methodology

2.1 Campbell-Shiller Decomposition

Changes in asset prices must be associated with unexpected changes in future cash flows or discount rates (Campbell and Shiller, 1988). Elaborating on this insight, Campbell (1991) extends the loglinear present-value approach to decompose the unexpected market return, η_t, into a sum of cash-flow and discount-rate shocks:

$$\eta_t = r_{M,t} - E_{t-1}\left[r_{M,t}\right] = \eta_{cf,t} - \eta_{dr,t}, \tag{1}$$

where $r_{M,t}$ is the market log return, E_{t-1} is the expectation operator at time $t-1$ and ρ is a constant[1] strictly less than 1. The term $\eta_{cf,t} = (E_t - E_{t-1})\sum_{j=0}^{\infty}\rho^j \Delta d_{t+j}$ represents the revision in expectations of future discounted dividend growth rates. This expression is referred to as cash-flow news. Analogously, $\eta_{dr,t} = (E_t - E_{t-1})\sum_{j=0}^{\infty}\rho_{t+j}^{j} r_{M,t+j}$ represents the revision in expectations of future returns. It is typically referred to as discount-rate news.

We assume that the data are generated by a first-order[2] autoregressive

[1] The interpretation of the discount coefficient ρ should not necessarily be linked to the time-series average of the log dividend yield. For example, Campbell (1993, 1996) links it to the average log consumption-wealth ratio.

[2] As discussed by Campbell and Shiller (1988), the assumption that the VAR is first-order is not restrictive, since this formulation allows for higher-order VAR models by stacking lagged values into the state vector.

rule of motion for a vector of state variables, $\mathbf{z}_t$:

$$\mathbf{z}_t = \mathbf{a} + \boldsymbol{\Gamma}\mathbf{z}_{t-1} + \mathbf{u}_t \tag{2}$$

with $r_{M,t}$ as the first element of an m-by-1 state vector, $\mathbf{z}_t$, and $r_{M,t} - E_{t-1}[r_{M,t}]$ as the first element of an i.i.d. m-by-1 vector of shocks, $\mathbf{u}_t$. In Equation (2), $\mathbf{a}$ and $\boldsymbol{\Gamma}$ are an m-by-1 vector and m-by-m companion matrix of constant parameters, respectively.

It follows immediately that the discount-rate news can be extracted via

$$\eta_{dr,t} = \mathbf{e1}'\boldsymbol{\lambda}\mathbf{u}_t, \tag{3}$$

where $\boldsymbol{\lambda} \equiv \rho\boldsymbol{\Gamma}(\mathbf{I} - \rho\boldsymbol{\Gamma})^{-1}$ and $\mathbf{e1}$ denotes an m-by-1 vector whose first element is unity and the remaining elements are all zero.

The cash-flow news can be further backed out as a residual

$$\eta_{cf,t} = (\mathbf{e1}' + \mathbf{e1}'\boldsymbol{\lambda})\,\mathbf{u}_t. \tag{4}$$

Since market returns contain two components, two betas can be defined for each stock by projecting asset returns on the innovations in market's cash-flow and discount-rate news. Appropriate scaling leads to

$$\beta^i_m = \frac{Cov\left(r^i_t, \eta_{cf,t}\right)}{Var\left(\eta_t\right)} + \frac{Cov\left(r^i_t, -\eta_{dr,t}\right)}{Var\left(\eta_t\right)} = \beta^i_{cf} + \beta^i_{dr}, \tag{5}$$

where β^i_m denotes the traditional market beta of asset i, and β^i_{cf} and β^i_{dr} are its "bad" cash-flow and "good" discount-rate components in the sense of

Campbell and Vuolteenaho (2004).

2.2 Downside and Upside Risks in Cash-Flow and Discount-Rate Betas

The idea that investors care differently about uncertainty towards unexpected downside versus upside portfolio movements dates back to Roy (1952) and Markowitz (1952). In fact, an economic notion of compensation for high sensitivity to downside market movements has a lot of intuitive appeal. Ang et al. (2006) provide empirical evidence on significant reward for bearing downside risk on equity markets. Along the lines of Botshekan et al. (2012), we measure upside and downside risks by using conditional variances and covariances. For instance, the downside cash-flow beta

$$\beta^i_{cf-} \equiv \frac{Cov(r^i_t, \eta_{cf,t} \,|\eta_t < 0\,)}{Var(\eta_t \,|\eta_t < 0\,)} \tag{6}$$

is used to measure the sensitivity of asset return to market cash-flow news when unexpected market fluctuations are restricted to be negative. Conditioning on market news being positive or negative is natural, as it has a zero mean by construction. In the empirical analysis, we experiment additionally with other intuitive cut-off points for downside risk: We condition on the market news being below or above its one or two standard deviations. We also use the unconditional market return as a conditioning variable and restrict it to be negative or below its one or two standard deviations.

Analogously to Equation (6), upside cash-flow beta is assigned to measure the comovement of asset return with market cash-flow news when unexpected market fluctuations are positive:

$$\beta^i_{cf+} \equiv \frac{Cov(r^i_t, \eta_{cf,t}\,|\eta_t \geq 0)}{Var(\eta_t\,|\eta_t \geq 0)}. \tag{7}$$

Downside discount-rate beta

$$\beta^i_{dr-} \equiv \frac{Cov(r^i_t, -\eta_{dr,t}\,|\eta_t < 0)}{Var(\eta_t\,|\eta_t < 0)}, \tag{8}$$

and upside discount-rate beta

$$\beta^i_{dr+} \equiv \frac{Cov(r^i_t, -\eta_{dr,t}\,|\eta_t \geq 0)}{Var(\eta_t\,|\eta_t \geq 0)} \tag{9}$$

are defined accordingly.

3 Data

3.1 International Asset Returns

We study monthly international value-weight dollar returns of value and growth portfolios in fourteen industrialized economies: the G7 countries plus Australia, Belgium, Hong Kong, the Netherlands, Singapore, Sweden, and Switzerland. In our country choice, we strictly follow Fama and French (1998) who document a strong value premium in markets around the world. In addition, we study Canada given the evidence on robust value premium on Canadian stock markets in Athanassakos (2009).

For each country, there is one value and one growth portfolio built by sorting on one of the four valuation ratios: book-to-market (B/M), earnings-price

(E/P), cash-earnings-to-price (CE/P), and dividend-price (D/P). Hence, there are eight portfolios per country and 112 portfolios in total. The value portfolios contain firms in the top 30% of a ratio and the growth portfolios contain firms in the bottom 30%. Asset data for Canada is available from January 1977 to December 2010; asset data for other countries is available from January 1975 to December 2010. There are two bins of portfolios. In one, a firm is included in a sort variable's portfolios if data for that variable are available. In the other, firms are included only if there are data on all four ratios. Our results are reported for the first portfolio sort. The second portfolio sort generates identical qualitative results. We considered both local currency and dollar returns for each portfolio bin.

Table 1 presents summary statistics of international portfolio returns in the fourteen markets under investigation. The table gives the average monthly returns across all value or all growth portfolios for each country as well as the respective minima, maxima and standard deviations. The average monthly value premium varies from 0.15% in Switzerland to 0.78% in Japan. Supporting the evidence from other studies, the Jarque-Bera test[3] underpins considerable excess kurtosis in international asset returns. The Ljung-Box test of first order indicates significant autocorrelation in most markets.

[Insert Table 1 here]

[3]These results are not reported here but readily available upon request.

3.2 VAR State Variables

Following common practice, we use a set of variables that are informative about the future state of economy and asset returns and strictly follow Campbell and Vuolteenaho (2004) in specifying the VAR model. The state variables are defined as follows. The first is the excess market return measured as the log excess return on the Center for Research in Security Prices (CRSP) value-weight index over Treasury bills. The second is the term yield spread between long-term and short-term bonds. The third is the market's smoothed price-earnings ratio from Shiller (2000), constructed as the log ratio of the S&P 500 price index to a ten year moving average of the S&P 500 earnings. Finally, the fourth variable is the small-stock value spread computed from the Kenneth R. French data library as the difference between the log book-to-market ratios of small value and small growth stocks. Further details on data construction are available in the appendix to Campbell and Vuolteenaho (2004).

Summary statistics of VAR state variables for the period December 1928 to December 2010 deviate only insubstantially from Campbell and Vuolteenaho (2004) for the period December 1928 to December 2001 and are therefore not provided here explicitly.

Bianchi (2010) argues that the success of the "bad beta, good beta" intertemporal CAPM (ICAPM) of Campbell and Vuolteenaho (2004) is driven by the stock market crash that preceded the Great Depression. Against this backdrop, we work with two sample periods for the VAR model: the full sample running from December 1928 to December 2010 and a shorter sample running from December 1974 to December 2010. The second sample period is chosen such that it corresponds to the available data on international portfolio returns.[4] Following Campbell and Vuolteenaho (2004) we set $\rho = 0.9957$ or 0.95 per annum in Table 2 and use this value throughout the paper.

[Insert Table 2 here]

Table 2 shows the OLS parameter estimates for a first-order VAR model including a constant, log excess market return, term yield spread, price-earnings ratio, and small-stock value spread. Each row corresponds to a different dependent variable. The first five columns report coefficients on the explanatory variables listed in the column header; the last column shows the adjusted $\overline{R^2}$ statistics. The correlation between the implied cash-flow news and the negative of the discount-rate news is -0.02 over the full sample period and 0.34 over the shorter sample period. Our estimates in Panel A are very much in line with Campbell and Vuolteenaho (2004) and hence not discussed here for the sake of brevity.

Lower forecasting power of the autoregressive model in Panel B reflects lower degrees of freedom in the estimation. The $\overline{R^2}$ coefficient in the return forecasting equation declines from 2.36% to 1.05% with marginal predictive power coming from a modest degree of momentum in market returns and–to a lower extent–forecasting potential of the value spread. The remaining rows in Panel B summarize the dynamics of the system.

[4]Please note that the VAR estimation starts one period earlier than the evaluated sample of portfolio returns due to the first-order lag structure.

4 Empirical Results

This section presents our main results. We first discuss the cross section of estimated betas defined in Section 2.2. We then turn to the cross-sectional asset pricing tests and perform an extensive sensitivity analysis.

4.1 Downside and Upside Cash-Flow and Discount-Rate Betas

Table 3 displays average betas for international value and growth portfolios estimated over the longest available sample of international returns from January 1975 to December 2010. The only exception is Canada for which the portfolio data is available since January 1977. For each country there are eight portfolios: four value portfolios with high B/M, E/P, CE/P, or D/P ratios and four growth portfolios with low B/M, E/P, CE/P, or D/P ratios. Panel A of Table 3 delivers the betas when the news components are derived from a full sample VAR. Panel B of Table 3 shows the betas when the VAR system is estimated over a shorter period.

[**Insert Table 3 here**]

A number of interesting observations emerge from Table 3. First, international value stocks have greater risk loadings with respect to the permanent shocks while international growth stocks tend to reveal a greater reagibility to temporary stock market fluctuations. This result corroborates recent findings in the literature. On a cross section of US portfolios, Campbell and Vuolteenaho (2004) show that differences in cash-flow betas can explain why value stocks offer higher average returns than growth stocks. On a set of European stock markets, Nitschka (2010) finds that high average returns on value portfolios are associated with their disproportionately high national cash-flow betas.

However, the cash-flow and discount-rate betas hide that value portfolios are more sensitive to strong offside market movements than their growth counterparts. Splitting the cash-flow and discount-rate betas into their upside and downside components makes this point clear.

Most interestingly, value and growth portfolios differ with respect to their reagibilities to market's downside shocks. International value stocks are particularly sensitive to market's permanent downside shocks, while international growth stocks are particularly sensitive to market's temporary downside shocks. Hence, value portfolios tend to compensate for their high exposure to permanent downside market fluctuations while growth portfolios tend to payoff for their high exposure to temporary downside market fluctuations.

4.2 Cross-Sectional Pricing Results

This section summarizes asset pricing results. It presents the benchmark findings for a large cross section of international value and growth portfolios in fourteen countries under investigation. First, we discuss the results for the VAR model estimated over the full sample period. To take into account recent criticism of Bianchi (2010), we reestimate the system over a shorter sample period that matches the available data on international returns.

To explore the sensitivity of our conclusions we split up the sample of portfolio returns, change the number of test assets, consider a broad range of alternative state variables, introduce various plausible definitions of downside risk, employ an alternative estimation technique which allows to calculate the cash-flow news directly and independently of the discount-rate news, and study a regional European market VAR. In addition, we control for HML and SMB factors, set the zero-beta rate equal to the risk-free rate as is done in Campbell and Vuolteenaho (2004) and change the value of the linearization parameter in the approximation of log returns.

4.2.1 Benchmark Asset Pricing Tests

This section reports our benchmark cross-sectional estimates. The asset pricing tests are assigned to evaluate the ability of the four-beta empirical model with downside and upside cash-flow and discount-rate risks to capture the variation in international equity returns. We compare the cross-sectional performance of the four-beta model with a standard CAPM and its "bad beta, good beta" variant introduced by Campbell and Vuolteenaho (2004). For testing, we employ the standard two-stage Fama-MacBeth (1973) methodology. We consider the single-beta CAPM

$$\overline{R^{e,i}} = \lambda_0 + \lambda_m \beta_m^i + \varepsilon^i, \tag{10}$$

against the two-beta ICAPM

$$\overline{R^{e,i}} = \lambda_0 + \lambda_{cf} \beta_{cf}^i + \lambda_{dr} \beta_{dr}^i + \varepsilon^i, \tag{11}$$

and the four-beta model in the spirit of Botshekan et al. (2012)

$$\overline{R^{e,i}} = \lambda_0 + \lambda_{cf^-}\beta^i_{cf^-} + \lambda_{cf^+}\beta^i_{cf^+} + \lambda_{dr^-}\beta^i_{dr^-} + \lambda_{dr^+}\beta^i_{dr^+} + \varepsilon^i, \tag{12}$$

where bar denotes time-series mean and $R^{e,i}$ is defined as the simple return on portfolio i in excess of the simple risk-free interest rate.

Table 4 summarizes our baseline findings. For each model, it gives the estimated average pricing error (λ_0), the estimated risk premia (λ's) in percent per annum as well as the standard measures of the regression fit. Estimates are from a cross-sectional regression of average simple excess returns (monthly in fractions) on an intercept and estimated betas. T-statistics corrected for the bias in standard errors generated by estimated regressors (Shanken, 1992) are reported in parentheses below coefficient estimates. For each model we report the unrestricted prices of market risk.[5] The test assets are 112 international value and growth portfolio returns in fourteen major equity markets over the longest available period 1975 to 2010. All returns are dollar denominated. The first row in each panel presents the results from the single-beta CAPM in Equation (10), the second row gives the estimates from a two-beta ICAPM in Equation (11), and finally, the third row displays estimates from the four-beta model in Equation (12).

[Insert Table 4 here]

Confirming Fama and French (1992), the standard market beta is not an

[5] We have also experimented with a restricted version of a cross-sectional regression which constrains the zero-beta to equal the risk-free rate but obtained qualitatively very similar results.

adequate measure of asset risk and the traditional CAPM fails to explain the international value premium. The poor fit of the model is a robust phenomenon across dollar and home currency returns. The adjusted R^2 turns out to be very close to zero and is negative in the restricted case without a constant. In contrast, the two- and four-beta models do a much better job and explain slightly more than a quarter of the cross-sectional variation in average returns on international portfolios.

The two-beta ICAPM of Campbell and Vuolteenaho (2004) attaches a positive and strongly significant premium to the market cash-flow risk. High estimates of the cash-flow risk premium appear broadly in line with figures reported in Campbell and Vuolteenaho (2004). International stock exposure to the market cash-flow risk is rewarded with a higher compensation than assets' loadings on market discount rates. This pattern is consistent with the intertemporal asset pricing theory of Merton (1973) and recent evidence for the US. Furthermore, Nitschka (2010) derives analogous conclusions for a cross section of European stock returns.

The four-beta model with upside and downside cash-flow and discount-rate risks produces a similar fit but reveals that risk premia on upside and downside cash-flow betas differ considerably with the latter exceeding the former. Risk associated with unfavorable changes in market's cash-flow innovations carries the largest premium which is pervasive and statistically significant.[6] This result is in line with recent evidence in Botshekan et al. (2012) who study a cross section of US stocks traded on the NYSE, AMEX and NASDAQ over the period from 1963 to 2008.

[6] Controlling for size and book-to-market effects does not alter our conclusions.

4.2.2 Sample Split

To verify that our results are not attributed to the specific time period we study, we split up the sample of portfolio returns in the middle. Table 5 and Table 6 give the results for the early and modern subsamples, respectively.

[Insert Table 5 here]

[Insert Table 6 here]

Similar to the benchmark case, the estimated market price of risk in the single-beta CAPM is not significant and the model fails in explaining the cross section of international returns over 1975 to 1992. Interestingly, the simple CAPM works much better over the second sample half from 1993 to 2010. The two-beta ICAPM attaches a significant premium to the cash-flow risk throughout. The general model fit declines, however, by roughly ten percentage points compared to the full sample period. In contrary, the performance of the four-beta model remains roughly constant when the sample is halved. The premium on downside cash-flow risk is estimated with a right sign and high precision in all cases.

4.2.3 Other Test Assets

This subsection examines the sensitivity of our findings to the choice of test assets. In order to reduce commonalities in value and growth portfolios due to the strong factor structure, we follow Lewellen et al. (2010) and include 48 US industry portfolios[7] in test assets alongside with 112 benchmark international

[7] The set of industry portfolios is based on portfolio four-digit SIC code and is kindly provided in the online library of Kenneth R. French.

portfolios. Alternatively, we have focused on the G7 country portfolios: With eight portfolios per country there are 56 portfolios in total. Results from these exercises are very similar to our benchmark findings and are hence omitted for brevity. We have also looked at samples consisting of G5 and G6 countries. We repeated the cross-sectional tests for a larger sample of countries, including the G10 countries (a group with actually 11 countries). We did the pricing exercises with four bins of returns in home and common currencies with portfolios for which all four valuation ratios are available and with a different set of portfolios for which only one out of four ratios is available. In addition, we have extended the test assets by including the standard set of 25 value-weighted Fama-French portfolios and 20 risk-sorted portfolios constructed by Campbell and Vuolteenaho (2004) available until the end of 2001. None of our cross-sectional results were affected by the choice of test assets.

4.2.4 Alternative VAR Specifications

The ingenious return decomposition technique of Campbell and Shiller (1988) and Campbell (1991) has been applied broadly in the literature on macroeconomics and finance. However, Chen and Zhao (2009) argue that this approach can be sensitive to variables included in the VAR. To address this concern we examine the robustness of our conclusions to a broad range of alternative state variables. In particular, we consider the dividend yield motivated by Campbell et al. (2009) and Chen (2010) who point out that a VAR that includes the dividend-price ratio as a state variable produces unbiased news forecasts. In addition, we study the role of the real dividend growth, stock variance, and a different measure of price-earnings ratio based on the one-year moving average of past earnings (Shiller, 2000; Chen and Zhao, 2009). We have also experimented with the short-term interest rate (Ang and Bekaert, 2007), inflation (Chen and Zhao, 2009) and a different measure of value spread obtained from 25 double sort Fama-French portfolios. Some of these results are summarized in Table 7.

[Insert Table 7 here]

The first row of the table gives the estimates from a cross-sectional regression of average returns on betas obtained based on a VAR model including the log excess market return, term yield spread, ten-year price-earnings ratio, small stock value spread, and the dividend yield. The second row of the table is obtained on the basis of a VAR model with the log excess markets return, term yield spread, ten-year price-earnings ratio, small stock value spread and the real dividend growth as state variables. Finally, the third row of the table results when the underlying VAR model includes the log excess return, term yield spread, one-year price earnings ratio, small stock value spread, and the stock variance.

We find that minor changes in the VAR specification have no strong effect on the estimates. In particular, the downside cash-flow risk remains a significant determinant of average returns on international value and growth portfolios.

4.2.5 Different Cut-Offs for Downside Risk

To guard against the possibility that our results are due to the specific definition of downside market risk as periods in which the market news is below zero, this subsection reestimates the model in Equation (12) using other plausible cut-offs.

For example, the first row of Table 8 defines downside markets as periods in which the unconditional return on the market portfolio is below its mean, μ_M. The downside cash-flow beta is hence computed as

$$\beta^i_{cf^-} \equiv \frac{Cov(r^i_t, \eta_{cf,t} \left| r^e_{M,t} < \mu_M \right.)}{Var(\eta_t \left| r^e_{M,t} < \mu_M \right.)}, \tag{13}$$

and all remaining betas are defined accordingly.

[Insert Table 8 here]

We have also restricted the market news or the total unconditional market return to one or two standard deviations below its mean or to observations below the negative of one or two standard deviations. Our analysis suggests that changes in the downside risk specification do not matter for our intuition.

4.2.6 Direct Modelling of the Cash-Flow News Component

Following a long history in the literature, this paper has so far relied on a direct estimation of the discount-rate news and treated the cash-flow news as a residual. However, Chen and Zhao (2009) argue that this approach might unfavorably affect discount-rate premia and overestimate the importance of the cash-flow premia at the same time. As a way out, the authors suggest to measure the cash-flow and discount-rate news components directly and independently of each other. This method acknowledges the fact that there is a noisy part in stock returns which cannot be explained by permanent shocks to the dividend stream or transitory shocks associated with changes in discount rates. This circumstance allows us to rewrite Equation (1) as

$$\eta_t = r_{M,t} - E_{t-1}\left[r_{M,t}\right] = \widetilde{\eta_{cf,t}} - \eta_{dr,t} + \xi_t, \tag{14}$$

where η_t and $\eta_{dr,t}$ are the same as above. Chen and Zhao (2009) estimate the cash-flow news directly from a VAR whose first component is the dividend growth rate of the market portfolio as

$$\widetilde{\eta_{cf,t}} = \mathbf{e1}'\boldsymbol{\lambda}_1\boldsymbol{\varpi}_t, \tag{15}$$

where $\boldsymbol{\lambda}_1 = \left(\mathbf{I} - \rho\boldsymbol{\Gamma}_1\right)^{-1}$, $\boldsymbol{\Gamma}_1$ is the companion matrix and $\boldsymbol{\varpi}_t$ is the residual vector.

Table 9 reports cross-sectional risk premia when the cash-flow news is estimated directly from Equation (15) and the return VAR is the same as in the benchmark case discussed in Section 3.2. The first row of the table strictly follows the Chen and Zhao's (2009) VAR specification with the log real growth rate of the market portfolio dividend, log excess market equity return, and the log real dividend yield. To mitigate the seasonality of dividends we work with annual growth rates. In Campbell et al. (2009), the dividend yield is replaced by the price-earnings ratio motivated by a strong empirical relation between earnings and dividends, on the one hand, and the predictive ability of the price-earnings ratio for stock market returns, on the other hand. We follow this approach in the second row of Table 9. Finally, the third row of the table obtains for a VAR with dividend growth rates predicted by past dividend growth rates, past stock returns, and both past dividend yield and price-earnings ratio.

[**Insert Table 9 here**]

Our findings support that downside cash-flow betas emerge as the main determinant of the cross-sectional dispersion in average international stock returns. However, in line with Chen and Zhao (2009) our estimates suggest that separate modelling of the cash-flow and discount-rate shocks lowers the economic magnitude of risk premia and the overall cross-sectional fit of the model.

4.2.7 Common Regional Stock Market Shock

To study the role of downside risk for a cross section of international portfolios, we have relied on a decomposition of market return measured by the CRSP value-weight index. The use of the CRSP index in our application makes it possible to directly compare our results with previous findings in the literature. Moreover, it is motivated by a number of studies which document the success of US domestic variables to explain fluctuations on foreign stock markets. For instance, Campbell and Hamao (1992) argue that US stock markets have the potential to move expected stock returns in other countries. Cheung et al. (1997) provide evidence on significant common predictable components within the Pacific, the European, and the North American stock markets. They find that US variables have the ability to predict excess returns on the stock markets in the other two regions, but not vice versa.

More recently, Baele (2005) focuses on the extent to which volatility in a large number of European equity markets is driven by common global, i.e. US, and regional or local, i.e. European, shocks. He finds that spillover intensity of both the US and aggregate European shocks increased substantially over the 1980s and 1990s. Motivated by these findings, this subsection studies the importance of regional European stock market shocks for a cross section of returns in fourteen major capital markets, including the US, Canada, and the EAFE countries.

Following Baele (2005), we use the Datastream equity index due to its broad coverage and high homogeneity as compared to other indices such as the Morgan Stanley Capital International (MSCI). Specifically, we proxy the regional European market index by the Datastream-Europe (TOTMKER) index and test the robustness of our results to the Datastream-EMU (TOTMKEM) index. All returns are denominated in US dollars. Our results turn out stable to other proxies of the regional market portfolio: We experimented with an international index portfolio of the major industrialized markets and two index portfolios for Europe from the online data library of Kenneth R. French.[8]

Adopting the approach in Campbell and Vuolteenaho (2004), the market's smoothed price-earnings ratio is constructed as the log ratio of the equity price index to a moving average of earnings. The data source is the IMF

[8]The returns on the index portfolios are constructed by averaging the returns on the country portfolios. Each country is added to the index when return data for the country begin. Countries are weighted in the index portfolios in proportion to their EAFE weights.

database. The yield spread is measured as a difference between the yield on five-year constant maturity and short-term German bonds. Finally, we use the US small stock value spread given the evidence in Nitschka (2010). He shows that fluctuations in the US value spread and US consumption-wealth ratio–known since Lettau and Ludvigson (2001) as the *cay* residual–can be useful to explain excess returns on the G7 stock markets. However, we do not include the *cay* residual into the vector of state variables for two reasons. First, it is available on a quarterly basis, while constructing a monthly counterpart is not supported in view of the time aggregation problem (Mankiw and Shapiro, 1986). Second, the predictive power of the *cay* variable is particularly pronounced at the business cycle frequency for three- to four-year returns. We find that minor changes in the VAR specification have no strong impact on our results. We have experimented with the ten-year German bond yield, combinations of the EMU yield on ten-year government bonds or Euro area government bonds, the EMU EONIA euro overnight index average, and the Euribor rate.

Table 10 summarizes asset pricing results obtained with a VAR including a constant, the return on the Datastream index, the corresponding price-earnings ratio, German term yield and US value spread. The pattern in the underlying downside cash-flow betas reminds strongly our benchmark results documented in Table 3 and is therefore not reported here.

[Insert Table 10 here]

A CAPM with a European stock market proxy explains about 11% of the cross-sectional variation in international value and growth portfolio returns.

The two-beta ICAPM with a European stock market proxy attaches a highly significant premium to the cash-flow risk and explains well the cross-sectional differences in returns, albeit at a price of high risk premia. For comparison, Campbell and Vuolteenaho (2004) report cash-flow risk prices between 60% and 70% per annum on a cross section of US portfolios over 1963 to 2001. Finally, bringing the four-beta model to the data yields results very similar to our benchmark specification and supports the importance of downside cash-flow risk for the cross section of international stock returns.

5 Conclusion

This paper examines the downside risk exposure of international value and growth portfolios around the world. We focus on fourteen industrialized economies including the US, Canada, and twelve major EAFE (Europe, Australia and the Far East) countries for which a consistently strong and sizeable value premium is documented.

First, we show that the value premium in the world's largest equity markets can be rationalized by differences in international asset returns' sensitivities to the market's downside shocks. International value stocks are particularly sensitive to market's permanent downside shocks, while international growth stocks are particularly sensitive to market's temporary downside shocks.

Furthermore, in line with recent evidence for the US, risk associated with unfavorable changes in market's cash-flow innovations is rewarded with a premium which is pervasive and statistically significant.

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Table 1: Descriptive Statistics of International Portfolios

	Mean (%)		Min (%)		Max (%)		Std. (%)	
	V	G	V	G	V	G	V	G
FR	1.54	1.02	-30.92	-27.45	34.39	35.36	7.59	6.80
GM	1.36	0.97	-32.56	-30.25	30.32	31.76	6.52	6.60
IT	1.14	0.88	-26.75	-30.48	54.03	36.93	8.42	7.78
JP	1.33	0.55	-18.56	-23.46	34.78	31.09	6.54	6.62
UK	1.53	1.23	-27.05	-24.79	57.33	56.51	6.95	6.57
US	1.31	1.01	-22.13	-25.38	25.10	16.72	4.55	5.01
NL	1.40	1.08	-51.95	-28.56	36.96	26.75	7.62	5.89
BE	1.51	1.21	-44.72	-30.60	54.25	28.44	6.85	5.93
SZ	1.21	1.06	-33.74	-32.23	27.02	28.41	6.23	5.72
SD	1.80	1.30	-30.79	-30.39	41.15	29.64	7.88	7.52
AS	1.63	1.10	-44.01	-54.11	25.24	24.00	6.82	7.75
HK	2.05	1.56	-37.48	-45.27	46.82	41.67	9.40	8.80
SG	1.67	1.16	-41.73	-45.33	58.93	60.83	8.68	8.39
CA	1.31	0.93	-26.30	-31.61	23.36	27.17	5.73	6.94

The table shows the average monthly returns, minima, maxima and average standard deviations across all value (V) or all growth (G) portfolios for France (FR), Germany (GM), Italy (IT), Japan (JP), the United Kingdom (UK), the United States (US), the Netherlands (NL), Belgium (BE), Switzerland (SZ), Sweden (SD), Australia (AS), Hong Kong (HK), Singapore (SG), and Canada (CA). The sample period for Canadian returns is 1977:01-2010:12 and 1975:01-2010:12 otherwise.

Table 2: VAR Parameter Estimates

Panel A: VAR sample period 1928:12-2010:12						
Variable	Constant	$r^e_{M,t}$	ty_t	pe_t	vs_t	$\overline{R^2}$(%)
$r^e_{M,t+1}$	0.07	0.11	0.01	-0.02	-0.01	2.36
	(3.41)	(3.93)	(1.87)	(-3.12)	(-2.28)	
ty_{t+1}	0.01	0.03	0.89	-0.02	0.07	83.61
	(0.14)	(0.21)	(63.68)	(-0.87)	(2.81)	
pe_{t+1}	0.02	0.52	0.00	0.99	-0.00	99.07
	(1.88)	(24.50)	(0.98)	(299.42)	(-0.90)	
vs_{t+1}	0.02	-0.02	0.00	-0.00	0.99	98.26
	(1.16)	(-0.62)	(0.09)	(-0.32)	(206.21)	
Panel B: VAR sample period 1974:12-2010:12						
Variable	Constant	$r^e_{M,t}$	ty_t	pe_t	vs_t	$\overline{R^2}$(%)
$r^e_{M,t+1}$	0.05	0.09	0.00	-0.00	-0.02	1.05
	(2.29)	(1.95)	(0.19)	(-0.73)	(-1.57)	
ty_{t+1}	0.02	-0.27	0.88	-0.04	0.13	76.93
	(0.09)	(-0.77)	(37.82)	(-0.81)	(1.10)	
pe_{t+1}	0.03	0.46	-0.00	0.99	-0.00	99.38
	(1.71)	(14.25)	(-0.33)	(242.38)	(-0.42)	
vs_{t+1}	0.07	-0.03	-0.00	0.01	0.93	89.00
	(2.73)	(-0.55)	(-0.45)	(1.34)	(53.81)	

The table shows the OLS parameter estimates for a first-order VAR model. OLS t-statistics are in parentheses.

Table 3: Betas of International Portfolios

Panel A: VAR sample period 1928:12-2010:12

	β_{cf}		β_{cf-}		β_{cf+}		β_{dr}		β_{dr-}		β_{dr+}	
	V	G	V	G	V	G	V	G	V	G	V	G
FR	0.16	0.14	0.23	0.16	0.25	0.20	0.71	0.70	0.80	0.85	0.63	0.40
GM	0.10	0.06	0.12	0.07	0.10	-0.04	0.65	0.69	0.89	1.01	0.47	0.63
IT	0.06	0.05	0.03	-0.02	0.02	0.06	0.61	0.66	0.82	0.90	0.44	0.66
JP	0.06	0.05	0.08	0.04	0.09	0.06	0.32	0.43	0.52	0.59	0.25	0.45
UK	0.12	0.10	0.16	0.08	0.15	0.21	0.71	0.66	0.84	0.88	0.86	0.68
US	0.18	0.13	0.29	0.14	0.31	0.07	0.66	0.91	0.66	0.92	0.52	0.89
NL	0.11	0.08	0.12	0.11	0.05	-0.05	0.88	0.67	1.21	0.90	0.66	0.51
BE	0.12	0.08	0.17	0.06	0.19	0.10	0.57	0.56	0.74	0.81	0.47	0.34
SZ	0.11	0.09	0.17	0.11	0.11	0.10	0.63	0.59	0.88	0.98	0.55	0.36
SD	0.14	0.08	0.14	-0.04	0.25	0.08	0.68	0.84	0.89	1.03	0.19	0.64
AS	0.15	0.14	0.28	0.24	0.21	0.08	0.64	0.84	1.00	1.29	0.40	0.48
HK	0.14	0.13	0.25	0.28	0.11	-0.04	0.69	0.77	0.86	0.98	0.59	0.61
SG	0.13	0.12	0.13	0.09	0.25	0.18	0.83	0.88	1.17	1.19	0.85	0.75
CA	0.18	0.09	0.15	-0.02	0.50	0.15	0.70	0.98	0.83	1.31	0.30	0.79

Table 3: *Continued*

Panel B: VAR sample period 1974:12-2010:12												
	β_{cf}		β_{cf-}		β_{cf+}		β_{dr}		β_{dr-}		β_{dr+}	
	V	G	V	G	V	G	V	G	V	G	V	G
FR	0.45	0.41	0.58	0.53	0.59	0.39	0.43	0.42	0.46	0.50	0.42	0.27
GM	0.36	0.32	0.50	0.49	0.31	0.18	0.40	0.43	0.53	0.64	0.29	0.41
IT	0.30	0.31	0.37	0.34	0.20	0.29	0.38	0.41	0.48	0.54	0.31	0.43
JP	0.19	0.23	0.33	0.31	0.17	0.17	0.20	0.28	0.31	0.33	0.24	0.33
UK	0.40	0.37	0.51	0.45	0.53	0.52	0.44	0.42	0.49	0.55	0.56	0.44
US	0.46	0.48	0.56	0.49	0.59	0.42	0.40	0.57	0.38	0.57	0.28	0.58
NL	0.46	0.34	0.62	0.48	0.35	0.19	0.55	0.42	0.74	0.55	0.47	0.36
BE	0.36	0.30	0.53	0.41	0.45	0.29	0.35	0.35	0.43	0.51	0.35	0.24
SZ	0.36	0.32	0.53	0.49	0.36	0.27	0.39	0.37	0.53	0.58	0.34	0.24
SD	0.41	0.40	0.53	0.40	0.41	0.32	0.42	0.54	0.55	0.67	0.18	0.48
AS	0.41	0.46	0.70	0.75	0.37	0.24	0.40	0.53	0.59	0.80	0.28	0.33
HK	0.41	0.43	0.57	0.66	0.37	0.19	0.44	0.49	0.55	0.63	0.33	0.36
SG	0.46	0.46	0.57	0.55	0.60	0.49	0.53	0.55	0.74	0.75	0.49	0.46
CA	0.46	0.46	0.47	0.46	0.67	0.43	0.44	0.62	0.50	0.84	0.18	0.49

The table shows the average cash-flow and discount-rate betas and their downside and upside components across all value (V) or all growth (G) portfolios in each country. The downside (upside) market is defined as periods in which the market news is below (above) zero. The sample period for Canadian returns is 1977:01-2010:12 and 1975:01-2010:12 otherwise.

Table 4: Benchmark Asset Pricing Tests

Panel A: VAR sample period 1928:12-2010:12								
λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
6.59%	4.21%							2.21
(2.52)	(1.32)							
5.86%		56.26%	-2.96%					26.95
(2.59)		(4.61)	(-0.93)					
5.18%				19.37%	6.29%	1.11%	0.79%	27.89
(2.19)				(4.09)	(1.67)	(0.45)	(0.31)	
Panel B: VAR sample period 1974:12-2010:12								
λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
6.14%	4.69%							3.02
(2.33)	(1.49)							
4.72%		46.69%	-29.26%					27.26
(2.05)		(4.64)	(-3.53)					
2.88%				16.35%	7.36%	-5.33%	-2.46%	28.97
(1.14)				(3.46)	(2.37)	(-1.31)	(-0.55)	

The table reports the risk prices in percent per annum and the measures of fit from two-stage Fama-MacBeth (1973) regressions. The downside (upside) market is defined as periods in which the market news is below (above) zero. Shanken (1992) corrected t-statistics are in parentheses. The sample period for Canadian returns is 1977:01-2010:12 and 1975:01-2010:12 otherwise.

Table 5: Early Sample Period

λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
Panel A: VAR sample period 1928:12-2010:12								
10.30%	-0.22%							-0.90
(3.06)	(-0.05)							
9.50%		57.08%	-8.12%					17.48
(3.11)		(3.47)	(-1.88)					
8.53%				25.90%	0.80%	-6.04%	6.72%	31.49
(2.92)				(4.42)	(0.17)	(-2.00)	(2.11)	
Panel B: VAR sample period 1974:12-2010:12								
λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
9.63%	0.60%							-0.87
(2.83)	(0.15)							
8.07%		47.05%	-36.96%					17.31
(2.59)		(3.46)	(-3.30)					
3.86%				23.04%	3.82%	-18.01%	9.16%	26.31
(1.18)				(3.78)	(0.95)	(-3.42)	(1.59)	

The sample period for Canadian returns is 1977:01-1992:12 and 1975:01-1992:12 otherwise. For further details see notes to Table 4.

Table 6: Modern Sample Period

λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
Panel A: VAR sample period 1928:12-2010:12								
3.03%	8.42%							7.68
(0.99)	(2.26)							
2.38%		54.91%	2.01%					20.94
(0.84)		(3.59)	(0.50)					
1.94%				13.20%	11.19%	8.11%	-5.10%	26.06
(0.67)				(2.28)	(2.43)	(2.73)	(-1.62)	
Panel B: VAR sample period 1974:12-2010:12								
2.78%	8.56%							8.12
(0.90)	(2.32)							
1.52%		46.01%	-21.71%					21.06
(0.53)		(3.65)	(-2.09)					
1.87%				10.16%	10.45%	6.86%	-13.64%	28.37
(0.61)				(1.78)	(2.78)	(1.39)	(-2.54)	

The sample period for international portfolio returns is 1993:01-2010:12. For further details see notes to Table 4.

Table 7: Different Underlying VAR State Variables

Panel A: VAR sample period 1928:12-2010:12						
VAR Nr.	λ_0	λ_{cf-}	λ_{cf+}	λ_{dr-}	λ_{dr+}	$\overline{R}^2(\%)$
(1)	5.23%	20.32%	5.53%	0.48%	1.07%	28.46
	(2.22)	(4.20)	(1.52)	(0.20)	(0.44)	
(2)	4.63%	19.73%	6.64%	1.14%	1.60%	29.14
	(1.98)	(4.21)	(1.71)	(0.47)	(0.61)	
(3)	3.79%	10.27%	1.48%	-8.44%	5.69%	25.64
	(1.61)	(3.67)	(0.58)	(-2.25)	(1.95)	

Panel B: VAR sample period 1974:12-2010:12						
VAR Nr.	λ_0	λ_{cf-}	λ_{cf+}	λ_{dr-}	λ_{dr+}	$\overline{R}^2(\%)$
(1)	4.53%	12.72%	4.65%	-8.73%	-1.92%	13.36
	(1.63)	(2.46)	(1.36)	(-1.22)	(-0.27)	
(2)	4.54%	14.91%	6.96%	-5.78%	-3.80%	28.04
	(1.72)	(3.16)	(2.35)	(-1.37)	(-0.92)	
(3)	0.83%	4.31%	3.40%	-8.19%	-0.00%	32.15
	(0.32)	(2.09)	(1.41)	(-1.72)	(-0.00)	

The underlying VAR model includes (1) the log excess market return, term yield spread, ten-year price-earnings ratio, small stock value spread, and the dividend yield; (2) the log excess market return, term yield spread, ten-year price-earnings ratio, small stock value spread, and the real dividend growth; (3) the log excess market return, term yield spread, one-year price-earnings ratio, small stock value spread, and the stock variance. For further details see notes to Table 4.

Table 8: Alternative Downside Risk Thresholds

Panel A: VAR sample period 1928:12-2010:12						
VAR Nr.	λ_0	λ_{cf-}	λ_{cf+}	λ_{dr-}	λ_{dr+}	$\overline{R}^2(\%)$
(1)	4.28%	14.42%	11.73%	1.89%	0.33%	28.26
	(1.82)	(2.77)	(2.86)	(0.81)	(0.11)	
(2)	7.25%	42.91%	-1.43%	-1.45%	-2.02%	29.03
	(3.25)	(4.52)	(-1.10)	(-0.55)	(-1.97)	
(3)	5.85%	47.38%	-2.41%	-0.07%	-2.47%	29.11
	(2.68)	(4.58)	(-1.16)	(-0.03)	(-1.78)	
Panel B: VAR sample period 1974:12-2010:12						
VAR Nr.	λ_0	λ_{cf-}	λ_{cf+}	λ_{dr-}	λ_{dr+}	$\overline{R}^2(\%)$
(1)	2.81%	12.85%	9.91%	-2.81%	-4.70%	30.64
	(1.17)	(2.60)	(2.92)	(-0.72)	(-1.08)	
(2)	6.27%	37.82%	-1.37%	-22.30%	-3.55%	30.20
	(2.71)	(4.08)	(-0.97)	(-3.28)	(-2.30)	
(3)	4.82%	41.51%	-1.80%	-22.39%	-2.78%	29.15
	(2.12)	(4.39)	(-0.99)	(-3.53)	(-1.54)	

The downside (upside) market is defined as periods in which (1) the market return is below (above) its mean; (2) the market news is one standard deviation below (above) its mean; (3) the market return is one standard deviation below (above) its mean. For further details see notes to Table 4.

Table 9: Directly Modelled Cash-Flow News Components

Panel A: VAR sample period 1928:12-2010:12						
VAR Nr.	λ_0	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
(1)	5.10%	1.05%	1.63%	-2.07%	-8.25%	17.63
	(1.93)	(2.07)	(2.63)	(-0.54)	(-1.99)	
(2)	5.38%	0.86%	1.32%	-1.53%	-7.56%	15.11
	(2.00)	(2.03)	(2.42)	(-0.41)	(-1.83)	
(3)	5.89%	1.28%	1.76%	-1.59%	-6.57%	13.90
	(2.22)	(2.19)	(2.27)	(-0.45)	(-1.65)	
Panel B: VAR sample period 1974:12-2010:12						
VAR Nr.	λ_0	λ_{cf^-}	λ_{cf^+}	λ_{dr^-}	λ_{dr^+}	$\overline{R}^2(\%)$
(1)	7.47%	0.56%	0.39%	3.09%	-5.04%	7.42
	(2.88)	(2.33)	(1.16)	(0.71)	(-1.01)	
(2)	7.51%	0.52%	0.36%	3.11%	-4.98%	7.21
	(2.90)	(2.33)	(1.12)	(0.71)	(-1.00)	
(3)	7.66%	0.47%	0.30%	3.19%	-4.81%	6.70
	(2.96)	(2.27)	(1.03)	(0.73)	(-0.97)	

The cash-flow news component is estimated directly from a VAR including (1) log real dividend growth rate, log excess market return, log real dividend-price ratio; (2) log real dividend growth rate, log excess market return, log real price-earnings ratio; (3) log real dividend growth rate, log excess market return, log real dividend-price ratio, and log real price-earnings ratio as state variables. The discount-rate news is estimated based on a benchmark VAR reported in Table 2. For further details see notes to Table 4.

Table 10: Asset Pricing Tests for Regional Stock Market VAR

Panel A: Regional Stock Market Proxied by Datastream-Europe								
λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf-}	λ_{cf+}	λ_{dr-}	λ_{dr+}	$\overline{R}^2(\%)$
6.16%	28.42%							11.71
(4.24)	(2.80)							
8.76%		129.06%	-44.78%					25.15
(5.61)		(3.96)	(-1.82)					
10.47%				42.92%	26.32%	-23.75%	-2.80%	21.83
(8.04)				(2.74)	(2.30)	(-2.38)	(-0.36)	

Panel B: Regional Stock Market Proxied by Datastream-EMU								
λ_0	λ_m	λ_{cf}	λ_{dr}	λ_{cf-}	λ_{cf+}	λ_{dr-}	λ_{dr+}	$\overline{R}^2(\%)$
5.64%	29.82%							11.45
(3.43)	(2.77)							
8.22%		109.59%	-34.13%					27.23
(4.95)		(4.45)	(-1.66)					
11.49%				33.08%	28.50%	-33.28%	-0.97%	27.68
(10.62)				(3.17)	(3.23)	(-3.03)	(-0.18)	

The underlying VAR model includes log excess market return proxied by the Datastream-Europe (Datastream-EMU) index in Panel A(B) of the table, the corresponding ten-year price-earnings ratio, the German term yield spread, and the US small stock value spread. The VAR sample period is 1974:12-2010:12. For further details see notes to Table 4.