THE LEVERAGE EFFECT ON THE VALUE PREMIUM VOLATILITY: FROM AN INTERNATIONAL PERSPECTIVE

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ABSTRACT

This paper investigates the leverage effect on the value premium volatility using GARCH and TARCH models utilizing a unique dataset, for twenty nine countries. The findings show that value premium returns are bigger in developed than in developing countries and vary from negative values in some countries to positive in other countries, suggesting that different markets may need different long-run investment strategies. Moreover, we show persistence of a finite unconditional variance that appears strong in developed countries but less significant in developing countries. Finally, leverage appears to have asymmetric effects on the value premium in eight countries including: USA, Canada, Denmark, Finland, New Zealand, Sweden, the UK and Poland.

Keywords: Value premium; Leverage Effect, Volatility, Conditional Variance, GARCH, TARCH.

I. INTRODUCTION

The concept of the value premium, as an explanatory variable in the Fama and French three-factor model, has encouraged lively debate (Fama and French, 1992, 1996, 1998; Liew and Vassalou, 2000; Black, 2006; Garlappi and Yan, 2011 and Ling and Koo, 2012).[1] The literature suggests that the value premium is a significant explanatory variable for the cross section variation in portfolio rates of return (Fama and French, 1992; 1998; 2006 and Athanassakos, 2009). However, there is a controversial discussion regarding the source of the value premium. A considerable strand in the literature suggests that the value premium is significant as it captures an additional element of systematic risk (Jensen *et al.*, 1996; Jensen and Mercer, 2002; Rigobon and Sack, 2003). This is typically known as the rational or risk based explanation, whereby value stocks are argued to be inherently more risky than growth stocks. This encourages investors to require a higher rate of return on value stocks compared to the required return on growth stocks.

On the other hand, inefficient market literature suggests the market over-reaction hypothesis as a source of the value premium (Lakonishok *et al*., 1994; Haugen and Baker, 1996; and Daniel and Titman, 1997). This hypothesis argues that agents overstate future rates of return on growth relative to value stocks. Thus, underpriced value stocks will, sooner or later, face a correction or a switch in investor sentiment, raising the prices of these stocks. The increase in value stocks' prices results in a higher return on those than for growth stocks (Lakonishok *et al*., 1994; Haugen and Baker, 1996; Daniel and Titman, 1997; Black and McMillan, 2006).

These two contrasting explanations are noteworthy because the risk based explanation suggests that the value premium rises due to systematic risk, indicating that there are no abnormal returns from a value investing strategy. However, over-reaction might lead to an irrational explanation, suggesting that it could be possible to derive a strategy which could yield abnormal returns. In addition, the validity of a risk based explanation justifies using the Fama and French three-factor model as a capital asset pricing model by practitioners and also may enhance the predictability of the assets returns.

This paper contributes to the literature by examining the behavior of value premium returns in 29 developed and developing countries. Our main objective is to investigate the leverage effect on the value premium volatility using TARCH models. Finding a leverage effect in the value premium

[1] The value premium is defined as the difference between the rate of return on value stocks and the rate of return on growth stocks. Value stocks have a high book-to-market equity (BE/ME) ratio, that is, they are stocks with low stock prices relative to the book value, whereas growth stocks can be characterised as high stock prices relative to book value (for more detail about the book-to-market ratio (Fama and French, 1992, 1998).

volatility will provide evidence for the risk argument explanation for the value premium. Examining such relationship using international data has interesting applications for fund managers and international investors who have global portfolios. We argue in this paper that leverage effect is an important element in understanding the source of the value premium. If the price of equity goes down, the book-to-market ratio rises and debt increases relative to equity; hence the firms become more risky and in turn, investors will require higher returns. Leverage can also help to explain a potential asymmetric relationship between positive and negative shocks. More explicitly, negative shocks characteristically increase volatility more than positive shocks. This process can be explained by the leverage effect (Black, 1976 and Christie, 1982), whereby a negative price shock increases the debt to equity ratio such that the stock becomes more risky, and thereby increases the volatility of returns. The countercyclical behavior of the volatility of stock returns is well documented in the literature (Mele, 2007).

The remainder of this paper is organized as follows. A brief review of literature is discussed in section 2. A description of the data is supplied in Section 3; the econometric method employed is discussed in Section 4. Section 5 reports the empirical results, and Section 6 concludes the paper.

II. LITERATURE REVIEW

There is a significant part of the literature suggests that the value premium my capture the leverage risk. For example, Fama and French (1992) suggest that the book-to-market ratio is a proxy for a state variable associated with relative financial distress. In other words, value stocks are typically in distress, so when they face a credit crunch they perform badly. Fama and French (1992) argue that the value effect absorbs the apparent role of leverage in average stock returns and suggest that the relative-distress effect, captured by book-to-market equity, can be interpreted as an involuntary leverage effect. Additionally, Petkova and Zhang (2005) show that the value premium tends to co-vary positively with time-varying risk attributes.

Penman *et al*. (2007) formalize the relationship between the book-to-market ratio and financial leverage. They decompose the book-to-market ratio into two factors: operating risk and financial leverage. Furthermore, Chen and Zhang (1998) find empirically that the book-to-market ratio has a positive relationship with leverage, they suggest that value firms' stocks have higher returns compared to growth firms' stocks because they are usually firms under distress, have high financial leverage and face substantial uncertainty in future earnings.

Elgammal and McMillan (2014), Black and McMillan (2006) and Li *et al.* (2009)

examine the role of risk, as measured by time-varying volatility, in determining the nature of the value premium. Li *et al.* (2009) report a positive relationship between the value premium and its conditional volatility. They confirm that value stocks have more exposure to their conditional volatility compared to growth stocks and thus earn a higher return. Li *et al.* (2009) introduce two different explanations for their findings. First, they suggest a missing systematic risk factor correlated with the conditional volatility and business cycle. Second, the value premium may relate to the lack of diversification of the value and growth portfolio.

The missed systematic risk factor story is motivated by models of investment of Kogan (2004) and Zhang (2005). Kogan (2004) links the conditional volatility of stock return and the real economy through the investment process. Kogan (2004) argues that the irreversibility of investment decisions makes the conditional volatility of value firms more countercyclical than that of growth firms. Zhang (2005) introduces evidence that the value premium is countercyclical. In bad states of the economy, value firms are burdened by more capital than they need and face large costs if they wish to reduce capacity. While, growth firms hold options to expand but will not have such excess capacity when demand falls. This time-varying nature of the risk premium results in the value premium being countercyclical.

Recently, Choi (2013) argues that asset risk and financial leverage interact to explain the risk of value versus growth stocks. During economic downturns, the asset betas and leverage of value firms increase, contributing to a sharp rise in equity betas. Asset betas of growth firms are much less sensitive to economic conditions, and, consistent with the tradeoff theory of capital structure, growth firms are also less levered, contributing to the relative stability of their equity betas. Given the above debate in the literature about the leverage risk as a justification for the value premium, the current paper believe that understanding the impact of leverage effect on value premium volatility may enhance our understanding of the association between leverage and value premium and consequently of the possible explanation for the source of value premium.

This paper belongs to a part of the literature which examines the value premium in international data. For example, King *et al*. (1994); Karolyi and Stulz, (1996) investigate the characteristics of the value premium in different markets and give evidence that stock markets move together. Black (2002) reports that local and global monetary policies -as macroeconomic factors- have asymmetric effects on value and growth stocks. Fama and French (1998) report that the global value premium is a useful variable can be used to explain the variation in the return on different portfolios. Arshanapalli *et al*. (1998) report positive value premiums in seventeen out of eighteen international markets. These results are supported by Liew and Vassalou (2000), and Cakici *et al.* (2013). However, there has been little

explicit focus on the role of leverage effect using international data. The purpose of this study is to bridge the gap in the literature by exploring the role of leverage effect in explaining the value premium. If researchers have not explicitly accounted for leverage, then perhaps the value premium absorbs the leverage effect. Hence, we contribute to the field by offering a careful analysis of the leverage effect on the value premium volatility, using a unique data set including developed and developing countries. The empirics utilize a time varying volatility methodology which allows examination of the leverage effect by testing the asymmetric relationship between positive and negative shocks.

This study distinguishes itself from previous studies in several aspects. First, it is the first study which analysis the impact of leverage effect on the value premium using a time varying volatility methodology technique and time series indices for developed and developing countries. This technique is used to avoid the problems of using methods like portfolio sorting, cross-sectional, and time series linear regression which impose unrealistic assumptions regarding the constant variance and the normality. Second, the study offers an analytical comparison between value premia in both developed and developing countries.

Previous researchers have used two different methodologies to investigate this issue, calculating the differences in returns across portfolios formed on the basis of a single factor at a time or using a combination of stocks belonging to different markets. This paper investigates the value premium in the individual markets using style price indices to construct the value premium, finding leverage effect in the value premium provides evidence for the risk based explanation for the value premium.

III. DATA

Data description

Our empirical investigation is conducted for value and growth portfolios in twenty-nine countries that represent major stock markets. The developed markets included in the data are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherland, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, the USA, and the UK. The developing markets represented are Brazil, The Philippines, Portugal, Russia, South Africa, and Taiwan. Where possible, the sample period is the period precedes the financial crisis from December 1991 to December 2006; however, the sample period is shorter for some countries, depending upon the availability of relevant data.[2] The data set choice can be justified by two main reasons. First, the paper aims to study the major developed and developing stock markets across different regions, therefore the markets has been chosen based on the market size and trade volume. For the emerging markets our study is limited to six markets due to the availability of the data. The sample period has been chosen to cover the period after the spread out Fama and French three factor model (where the value premium become recognized by different investors and markets). Finally the sample period ends before the last financial crises 2007-2009 to avoid any biasness in the data due to the financial crisis.

[2] Developed and developing countries are classified as international monetary fund classification (IMF 2007) (The classification of developed and developing countries depends on the calcification of International Monetary Fund (IMF), world economic and financial surveys, world economic outlook database, WEO groups and aggregates information, April 2007). Data from the Philippines, Poland, Portugal, Russia, South Africa and Taiwan are available from December 1996 to December 2006.

The monthly total return indices in local currency for value and growth stocks is from the Morgan Stanley International (MSCI) database provided by Ibbotson Associate-style total returns indices. Value indices include monthly total return indices for firms whose book-to market ratio is among the highest thirty per cent,[3] while growth indices include monthly total returns indices for firms whose book-to-market ratios are among the lowest thirty per cent. The value premium price index is calculated as the difference between the natural logarithm of value stock monthly total return index and growth stock monthly total return index. We construct the monthly value premium from this index[4].

Summary statistics

Exhibit (1) summarizes the characteristics of the value premium for each country. Similar to the findings of Fama and French (1998) and Black et al. (2007), the mean values for the value premium are positive over the sample period with the exception of four developed countries (Finland, Hong Kong, New Zealand, and Taiwan) and one developing country, (Brazil which has limited data). However, the value premium tends to be smaller than that suggested by Fama and French (1998) and larger than that suggested by Black (2006), with t-statistics indicating that the value premium is significantly different from zero in only six developed countries including Belgium, Japan and Netherlands which are significant, at the five per cent level, while Australia, Austria, and Spain are significant at the ten per cent level.

Exhibit 1: Summary statistics for value premiums

Countries	Mean	Median	Minimum	Maximum	SD	JB	Kurtosis
Australia	0.42***(1.68)	0.40	-11.10	10.89	3.37	11.45*	4.23
USA	0.18(0.78)	0.10	-10.01	10.28	3.08	31.66*	5.01
Austria	0.74***(1.87)	0.82	-15.15	16.00	5.33	0.18	3.10
Belgium	0.60**(2.31)	0.62	-8.35	16.96	3.49	93.57*	6.23
Canada	0.22(0.44)	-0.30	-17.85	52.30	6.78	3314.53*	23.26
Denmark	0.22(0.58)	-0.09	-13.13	20.05	5.02	25.13*	4.27
Finland	-0.77(-1.08)	-0.81	-25.80	32.46	9.59	26.86*	4.46
France	0.30(0.89)	0.46	-16.11	16.18	4.50	27.85*	4.91
Germany	0.49(1.65)	0.50	-18.06	12.10	3.99	133.07*	6.98
Hong Kong	-0.03(-0.09)	0.17	-13.83	26.36	4.95	180.52*	7.67
Ireland	0.50(1.01)	-0.39	-14.59	27.49	6.72	56.86*	5.00
Italy	0.39(1.14)	0.62	-24.36	12.15	4.56	291.36*	8.70
Japan	0.54**(2.23)	0.66	-9.74	9.93	3.26	8.48**	4.04
Netherland	0.81**(2.20)	0.73	-24.92	19.89	4.93	249.79*	8.77
New Zealand	-0.45(-0.94)	-0.66	-16.69	18.19	6.63	3.24	3.48
Norway	0.47(1.32)	0.13	-15.18	15.69	4.81	1.19	3.35
Singapore	0.57(1.50)	0.24	-21.91	27.63	5.12	423.69*	10.47
Spain	0.54***(1.78)	-0.07	-11.57	14.92	4.04	28.58*	4.46
Sweden	0.22(0.40)	0.41	-23.06	27.04	7.42	28.41*	4.90
Switzerland	0.10(0.30)	-0.01	-21.06	11.70	4.54	66.63*	5.85
UK	0.29(1.44)	0.36	-9.55	10.33	2.75	30.19*	5.03
Portugal	0.34(0.81)	0.41	-12.38	16.43	4.64	4.51	3.90
Taiwan	-0.01(-0.03)	0.05	-21.90	15.25	5.79	18.25*	4.69
Brazil	-0.47(-0.65)	-0.67	-11.42	19.17	5.47	11.10*	4.59
Philippines	0.01(0.03)	-0.09	-12.80	21.99	5.17	36.54*	5.39
Poland	0.57(0.96)	0.62	-32.38	15.26	6.53	232.9*	9.30
Russia	0.54(0.68)	-0.20	-18.28	25.15	8.67	6.08**	3.42
South Africa	0.17(0.39)	0.26	-11.06	15.37	4.67	5.41***	3.88
Thailand	0.50(0.61)	0.33	-29.40	32.50	8.88	67.12*	6.74

This Table presents summary statistics for the value premium in twenty-nine countries for the period from December 1991 to December 2006 in local currencies. SD denotes standard deviation. JB denotes the Jarque-Bera test for normality. The figures in parentheses beside the mean value are t-test statistics for the null hypothesis is H_0: the mean is equal zero and the asterisks ***, ** denotes significant t- test statistic at 10%t and at 5 % respectively.

The highest average value premia are in Netherlands (0.81) followed by Austria (0.74) with standard deviations similar than those for the other countries. Finland presents the highest negative monthly value premium (-0.77), although it is not significantly different from zero, with the

[3] Stocks are ranked according to BE/ME, which is book common equity for the fiscal year ending in calendar year *t* -1 ,divided by market equity at the end of December of year *t* -1 , then the highest 30% are considered as value stocks and the lowest 30% are considered as growth stocks (Fama and French 1992, 1998).

[4] Black, Fraser and McMillan (2007), among others, state that the change in the log of the value premium price index is a close approximation to the value premium derived directly from the returns data. Correlations between the two variables are in the region of 0.99.

highest standard deviation (9.59). The median values of the value premium are also consistent with previous findings. It is interesting to note that Australia, the U.S., Belgium, Japan, and the U.K. have the lowest standard deviations in the value premiums, while Finland, Russia, and Thailand have the highest standard deviations in value premiums, indicating that developed markets are less risky (referring to total risk) than emerging markets. This is consistent with the findings of Fama and French (1998) and Rouwenhorst (1999). The Jarque-Bera statistic indicates that most of the series are not normally distributed with the exception of Austria, New Zealand, Norway, Portugal, and South Africa. Moreover, Kurtosis statistics indicate that all value premium indices are leptokurtic. This suggests that these processes can be modelled using the ARCH family models (Bollerslev, 1986)[5].

Plots of the data for the value premium (VP) are given in Exhibit 2 suggest that the value premiums are stationary.[6] The data are more volatile over the sample period in some countries, such as Finland, Ireland, New Zealand, Sweden, Singapore, the Philippines, Poland,

Exhibit 2: The value premium for developed and developing countries (VP)

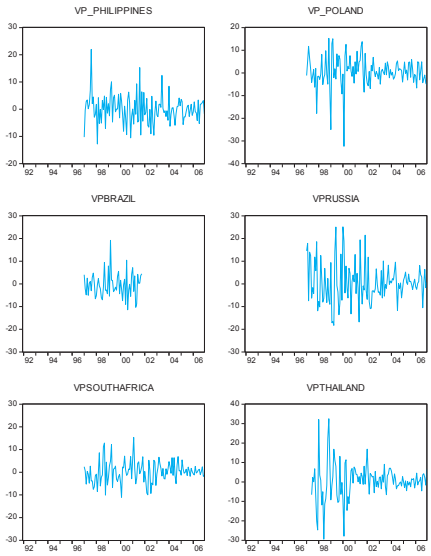
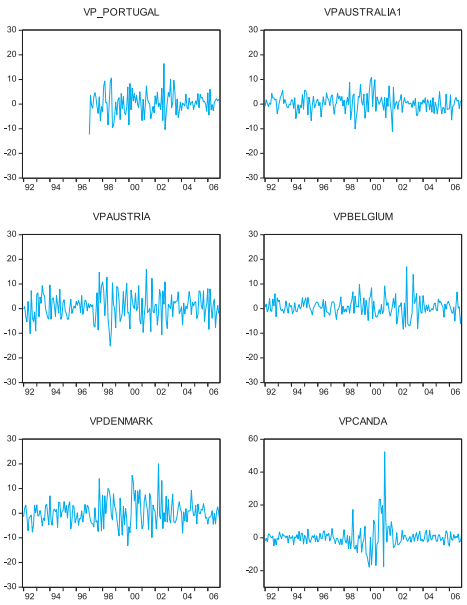


Exhibit 2 plots the value premium for twenty-nine countries: December 1991 – December 2006. These plots show the monthly value premium (in percent), calculated as $VP_t = (VPP_t - VPP_{t-1}) \times 100$ where VPP_t, VPP_{t-1} denotes the value premium price index in the periods (t) and (t-1) respectively.

Exhibit 2(Continued): The value premium for developed and developing countries (VP)



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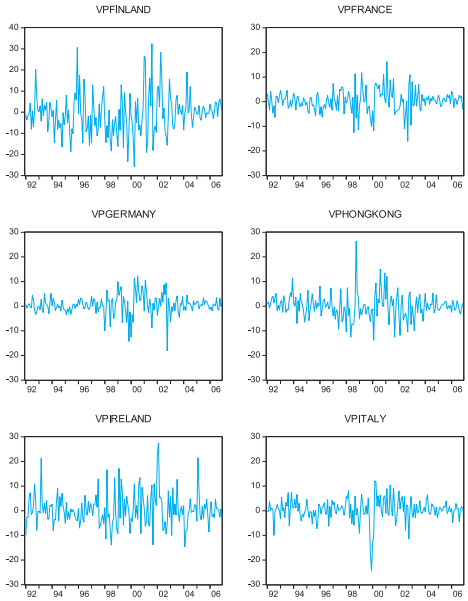
[5] The (ARCH) effect in the data is investigated using a Lagrange multiplier (LM) test for autoregressive conditional heteroskedasticity (ARCH) in the residuals. The ARCH effect in the data motivates us to use the GARCH models which model the autoregressive conditional heteroskedasticity. All results are available up on request.

[6] Augmented Dickey-Fuller (ADF) is used to formally test whether the data are stationary. All Augmented Dickey-Fuller (ADF) regression's results are available upon request.



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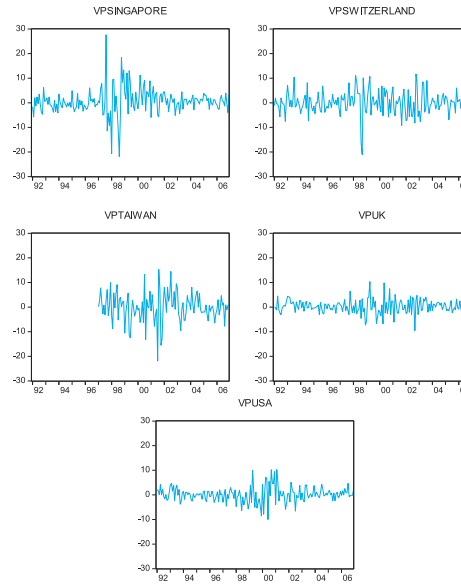

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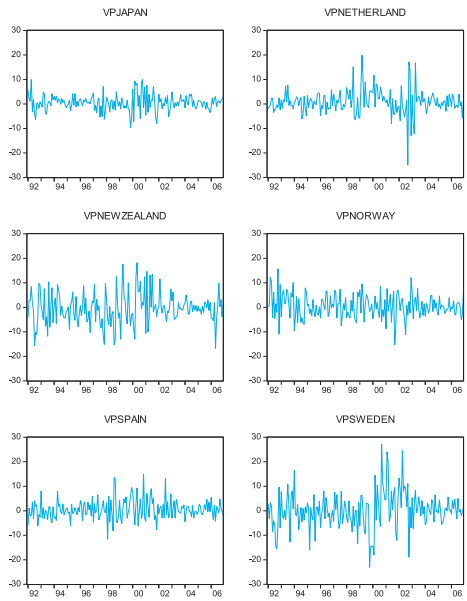

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countries. Overall, the period 1998-2002 is more volatile than the rest of sample period with the exception of Ireland in 2006, New Zealand in 1992 and 2006, and Norway in 1992. In general, developing countries are more volatile than developed countries for the period from 1997-2000, which may indicate that the crash of 1997 had more influence on emerging markets.

IV. METHODOLOGY

The expected return on a portfolio is given by E $(r_t \mid I_{t-1})$, where I_{t-1} denotes the information set available at the period (t-1), and r_t denotes the continuously compounded return on a portfolio. Subsequently, the unexpected return at time t is given by:

$$r_t - E(r_t | I_{t-1}) = \varepsilon_{t;} \quad \varepsilon | I_{t-1} : \mathrm{N}(0, h^2) \qquad (1)$$

Where $\mathcal{E}_t$ is serially uncorrelated with zero mean, constant unconditional variance, and conditional variance. Engle (1982) shows that describing the conditional variance as a distributed lag of past squared errors can capture persistence in the volatility of r_t. This is generalized by Bollerslev (1987) with a generalized autoregressive conditionally heteroscedastic (GARCH) model, which corresponds to an infinite order ARCH model but obviates the need to estimate a large number of coefficients.[7] The standard GARCH (1, 1) model [Engle *et al.*, 1987] is given as follows:

$$VP = \lambda_1 + \varepsilon_t \quad \varepsilon_t : N(0, h^2{}_t) \quad (2)$$

$$h^2{}_t = w + \alpha\varepsilon^2_{t-1} + \beta h^2{}_{t-1} \quad (3)$$

Where VP denotes the value premium and (α, β) and w are non-negative parameters, while it is necessary and sufficient that $(\alpha + \beta \leq 1)$ in order for a finite unconditional variance to exist; where measures the effect of volatility shock in period (t-1) on volatility on period (t), β measures the effect of historical information on the current volatility, and ($\alpha + \beta$) measure the speed at which this effect dies away.

[7] The autoregressive conditionally heteroscedastic model (ARCH) has been generalized by Bollerslev (1987), who includes the logged values of the conditional variance. The generalized autoregressive conditionally heteroscedastic model (GARCH) specifies the conditional variance to be a linear combination of past errors or p lags of the squared residuals from the conditional main equation and past or q lags of the conditional variance. GARCH process assumes constant unconditional mean and variance, while the conditional mean and variance are time-dependent. The model has the advantage of capturing long tails (leptokurtosis) resulting from time varying volatility without the needing to estimate a large number of coefficients.

The Threshold ARCH, or TARCH, model is used to measure the leverage effect on the value premium and to allow for negative and positive shocks to have an asymmetric effect on the value premium volatility, motivated by reasoning that good news and bad news have different predictability for future volatility (see, Bollerslev *et al.*, 1992 and Black, 2002). The specification for this model is:

$$h^2{}_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2{}_{t-1} \quad (4)$$

Where $d_t = 1$ if $\mathcal{E}_{t-l} < 0$ otherwise $d_t = 0$. Therefore, there are different effects on the conditional variance where $\mathcal{E}_{t-l} < 0$ (an unexpected decrease in price) denotes bad news and $\mathcal{E}_{t-l} > 0$ (an unexpected increase in price) denotes good news. The impact of good news is given by α ; the impact of bad news is given by $\alpha + \gamma$; and the leverage effect by γ . The leverage effect reflects the fact that the decrease in stock prices leads to an increase in financial leverage (since the value of equity falls relative to corporate debt); therefore both the required return on equity and the risk increase (see, Christie, 1982; Black, 2002; Bollerslev et al., 2006). The condition for the covariance stationarity is $\alpha + \gamma / 2 + \beta < 1$.

The asymmetry in the relationship between stock returns and conditional variance is well documented in the literature. This asymmetry has two different explanations (Bollerslev et al., 2006). First explanation is the leverage effect introduced by Black (1976) and Christie (1982) who explain that negative

shocks accompanied with a decline in current prices have higher impact on future volatility than positive shocks of the same magnitude because of financial leverage. The financial leverage, debt-to-equity ratio, increases as a result for stock price declining. The increase in financial leverage raises both the required return on equity and the future volatility. The second explanation is that the volatility feedback effect discussed by Campbell and Hentschel (1992), among others, who argue that if the volatility is priced this means an expected increase in the volatility will increase the required rate of return leading to an instant reduction in stock prices to allow for future returns to increase. Bollerslev *et al*. (2006) state the difference between the leverage effect and volatility feedback explanations lies in causality. The leverage effect justifies the impact of negative returns on volatility, while the volatility feedback explains the effect of volatility on returns. In this paper γ is used as a proxy for the leverage effect.

countries, including nine developed and four developing countries, with one significant negative value in Brazil, at the five percent level, while other countries have insignificant values.[8] This result gives weak evidence that the volatility shock in period (t-1) has a positive effect on volatility on period (t) for developed countries. However, the evidence appears stronger in developing countries.

Exhibit 3: Modelling the value premium with leverage effect

$VP_t = \lambda_1 + \varepsilon_t$
$\varepsilon_t : N(0, h^2_t)$
$h^2_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2_{t-1}$

Countries	λ_1	W	α	γ	β	Q4	A4	JB
Australia	0.38***	2.28**	0.47***	-0.43	0.56*	0.89(0.93)	-0.02(0.79)	1.88
USA	0.12	.20	0.03	0.13**	0.86*	3.38(0.50)	0.01(0.94)	0.35
Austria	0.59	1.76	0.09	0.15	0.78*	2.94(0.40)	0.08(0.30)	0.70
Belgium	0.65*	0.96	0.09	0.16	0.76*	2.97(0.56)	-0.01(0.85)	8.51**
Canada	-0.19	0.95***	0.10***	0.47**	0.66*	2.61(0.63)	0.16(0.04)	4.25
Denmark	-0.36	-0.07	0.01	0.20*	0.91*	1.66(0.80)	0.06(0.45)	0.26
Finland	-0.14	1.10**	-0.02	0.24*	0.90*	5.34(0.35)	0.01(0.99)	12.67*
France	0.20	0.33	0.13***	0.13	0.81*	3.87(0.42)	-0.03(0.68)	10.03*
Germany	0.40***	0.49**	0.22*	-0.11	0.80*	2.15(0.71)	-0.04(0.63)	57.31*
Hong Kong	0.29	0.52	0.09**	0.09	0.84*	4.62(0.33)	0.07(0.37)	21.61*
Ireland	0.40	42.48*	0.15**	0.29	-0.21	0.47(0.98)	0.10(0.20)	39.54*
Italy	0.39	2.42**	0.22	-0.04	0.68*	1.98(0.74)	-0.05(0.55)	89.57*
Japan	0.60*	0.56	0.25	0.10	0.65*	2.47(0.65)	0.01(0.93)	1.77
Netherland	0.60***	1.75***	0.12	0.18	0.74*	4.18(0.38)	-0.06(0.42)	221.80*
New Zealand	-0.65***	0.66	0.02	0.24*	0.85*	5.70(0.22)	-0.02(0.82)	11.31*
Norway	0.29	0.63	0.11	0.01	0.85*	3.31(0.51)	-0.06(0.46)	0.36
Singapore	0.42***	0.46	0.22**	0.09	0.75*	3.66(0.45)	0.08(0.31)	264.82*
Spain	0.33	0.39	0.06	0.06	0.89*	7.28(0.12)	-0.05(0.52)	12.42*
Sweden	-0.14	-0.32	0.02	0.14*	0.91*	4.79(0.31)	0.01(0.88)	12.57*
Switzerland	-0.01	2.30	0.13***	0.04	0.73*	7.68(0.10)	-0.01(0.92)	9.63*
Taiwan	-0.14	1.64	0.05	0.07	0.86*	3.48(0.48)	-0.04(0.69)	15.10*
Portugal	0.61***	1.53	0.40***	-0.12	0.60*	9.75(0.05)	-0.02(0.86)	0.67
UK	0.24	0.23	0.07	0.22***	0.80*	3.78(0.44)	0.09(0.25)	2.07
Brazil	-0.67	1.03	-0.10**	0.09	1.04*	9.06(0.06)	-0.06(0.65)	0.28
Philippines	0.22	21.3*	0.47**	-0.55**	0.04	3.66(0.45)	-0.04(0.68)	11.91*
Poland	0.52	4.10	0.29***	0.81**	0.48*	1.78(0.78)	-0.08(0.40)	25.02*
Russia	0.23	0.80	0.04	0.07	0.90*	4.14(0.39)	-0.07(0.44)	0.21
South Africa	0.23	15.09**	0.44***	-0.28	0.02	8.01(0.09)	0.21(0.03)	1.94
Thailand	0.52	1.94	0.29**	0.21	0.62*	2.44(0.66)	-0.12(0.21)	3.69

A_i denotes an ith order ARCH LM test, $A_i \sim X^2_i$; Q_i denotes an ith order Ljung-Box test for residual serial dependency, $Q_i \sim X^2_i$; and JB denotes the Jarque-Bera test for residual normality, JB ~ X^2_i.Probability values are in parentheses beside test statistics. The sample period is December 1991 to December 2006 when available. VP_i denotes the value premium for country i . (*, **, ***) denote a coefficient that is significant at 1%, 5% and 10% levels respectively. Where α, β and w are non-negative parameters, where α measures the effect of volatility shock in period (t-1) on volatility on period (t), ! measure the effect of historical information on the current volatility, and $(\alpha + \beta)$measures the speed at which this effect dies away. d_t = 1 if < 0 otherwise = 0 γ measure the leverage effect on value premium.

V. EMPIRICAL RESULTS

Exhibit 3 presents estimates from the TARCH (1, 1) model with the leverage effect for the value premium. The α estimates in Exhibit 3 satisfy the positivity condition in all countries except for Finland and Brazil, while they are significant only in thirteen

The GARCH parameters (β) in Exhibit 3 are significant and satisfy the non-

[8] The α estimates take significant positive values at ten percent level for Australia, France, Canada, Switzerland, Poland, Portugal, and South Africa; and at five percent level for Hong Kong, Ireland, Singapore, the Philippines, and Thailand; and at one percent level for Germany.

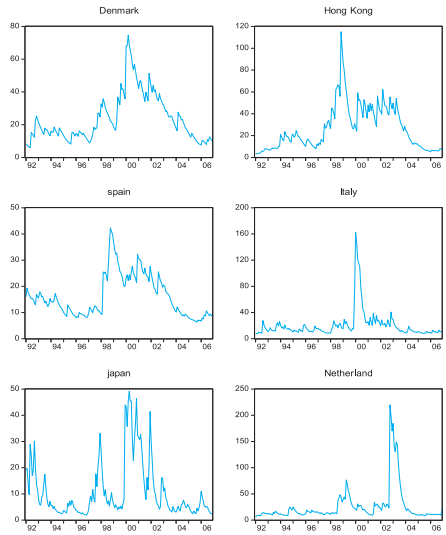
negativity condition for all countries except Ireland. These findings indicate that past information has a stronger impact on the volatility of the value premium compared to the most recent information. Almost all countries satisfy the sufficient condition with exceptions for Australia, Germany, and Portugal. Just seven developed countries, the U.S., Canada, Denmark, Finland, New Zealand, Sweden, and the U.K., and one developing country, Poland, have significant positive leverage effects for the value premium. This implies that a negative shock to those returns generates more volatility than a positive shock of equal magnitude. In other words, bad news has more effect on the volatility of value premium compared to good news[9]. That is, bad news reflects decrease in the equity price which leads to increase in the leverage ratio. This again can be connected with the argument of Fama and French (1992 and 1996) that the value premium could be a compensation for the financial distress risks in bad times. This result supports the risk based explanation of the value premium. Also our results are consistent with the results of Petkova and Zhang (2005) who show that the value premium tends to co-vary positively with time-varying risk attributes and with Penman *et al*. (2007), Chen and Zhang (1998) and Elgammal and McMillan (2014), who document the relationship between the book-to-market ratio and financial leverage. Finally, our results support those of Li *et al*. (2009) who report a positive relationship between the value premium and its conditional volatility. Our findings give evidence that there is a missing systematic risk of factor captured by the value premium.

Our findings launch interesting question Why do we find leverage in these eight markets and not elsewhere? What does differentiate these markets, where the risk argument is supported from the remaining markets where the risk argument is not supported. The answer of this question can be related to the differences in socio-cultural and political settings including the behavioral aspects of investors and the strength of the capital market. We find a significant leverage effect in the major eight markets which represent large North America and European large and well developed markets which is well documented in the literature as efficient markets (Chan *et al.*, 1997 and Vieito *et al.*, 2013). The puzzle is that we cannot find such evidence in other large markets such as Japan, Australia, Hong Kong, and Germany. For Japan, this can be explained by the limited evidence for the existence of the value premium in Japan market (Fama and French, 2012). Also it looks that Asian markets have different socio-cultural which may affect the behavioral aspects of investors and their perception to the risk captured by the value premium. Guidi and Guptab (2013) reject the EMH for the stock markets of Indonesia, Malaysia, the

[9] In contrast, the leverage effect in the Philippines is significantly negative which may indicate that good news in the Philippines stock market have more effect on the volatility of value premium compared to bad news of the same magnitude.

Philippines and Vietnam and report weak-form efficient stock markets in Singapore and Thailand.

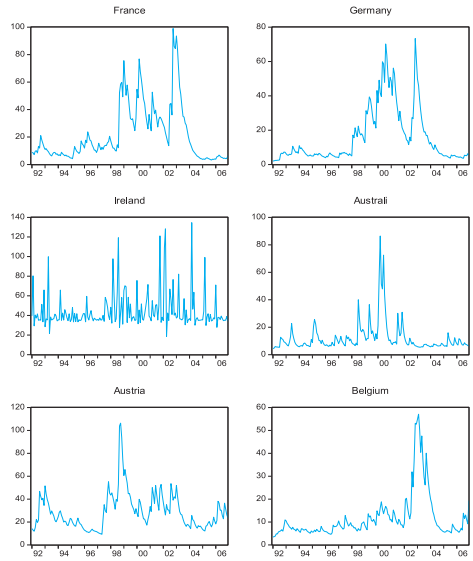
Exhibit 4 : Conditional Variance for the value premium



Plots of the conditional variance calculated from variance equation calculated as

$$VP_t = \lambda_1 + \varepsilon_t$$
$$\varepsilon_t : N(0, h^2{}_t)$$
$$h^2{}_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2{}_{t-1}$$

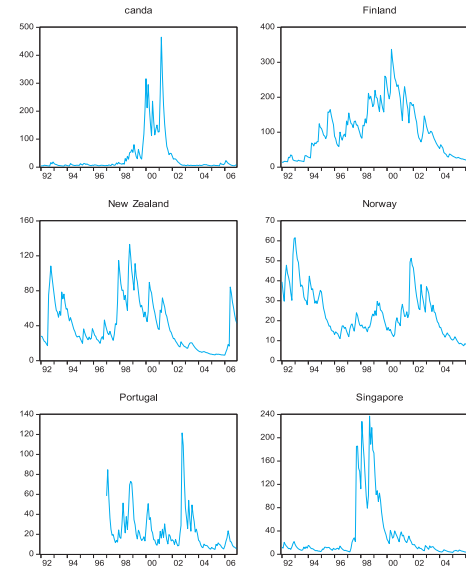
Exhibit 4 (Continued): Conditional Variance for the value premium



Plots of the conditional variance calculated from variance equation calculated as

$$VP_t = \lambda_1 + \varepsilon_t$$
$$\varepsilon_t : N(0, h^2{}_t)$$
$$h^2{}_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2{}_{t-1}$$

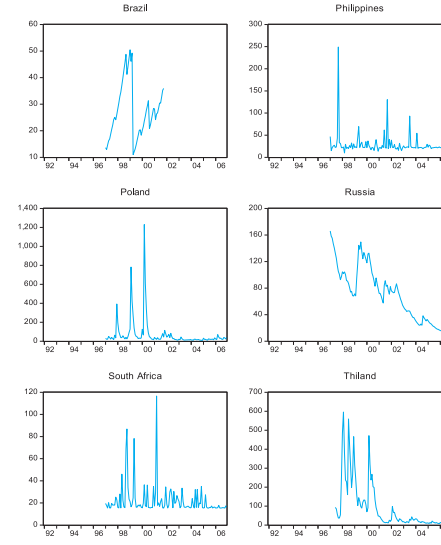
Exhibit 4 (Continued): Conditional Variance for the value premium



Plots of the conditional variance calculated from variance equation calculated as

$$VP_t = \lambda_1 + \varepsilon_t$$
$$\varepsilon_t : N(0, h^2{}_t)$$
$$h^2{}_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2{}_{t-1}$$

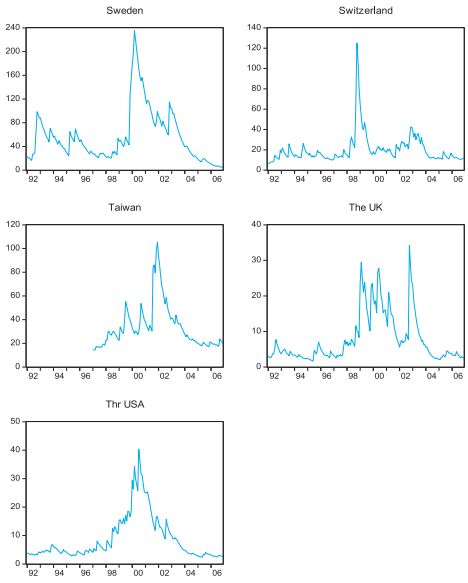
Exhibit 4 (Continued): Conditional Variance for the value premium



Plots of the conditional variance calculated from variance equation calculated as

$$VP_t = \lambda_1 + \varepsilon_t$$
$$\varepsilon_t : N(0, h^2{}_t)$$
$$h^2{}_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2{}_{t-1}$$

Exhibit 4 (Continued): Conditional Variance for the value premium



Plots of the conditional variance calculated from variance equation calculated as

$$VP_t = \lambda_1 + \varepsilon_t$$
$$\varepsilon_t : N(0, h^2_t)$$
$$h^2_t = w + \alpha\varepsilon^2_{t-1} + \gamma\varepsilon^2_{t-1}d_t + \beta h^2_{t-1}$$

As can be seen from the plots of conditional variance in Exhibit 4, for many countries there is an increasing trend in the risk associated with the value premium within the period 1998-2002.[10] This trend can be a response to the Asian stock market crises or the high-tech bubbles during this period. Some other countries have a longer risky period of 1998-2004 which include the dot com bubbles; these countries include Denmark, France, Finland, Germany and the U.K. The volatility in Belgium increased in 2002-2004 and reported an increasing trend after 2006, while Russia and Taiwan showed a decreasing trend. Finally, the rest of the countries fluctuated from one period to another with sharp peaks in some periods. Some countries showed more volatility than others; these include Canada, Finland, Netherlands, Sweden, the Philippines, Poland, Thailand, and Singapore. Exhibit 4 gives evidence that the developing countries fluctuated sharply compared to the developed. This may indicate that investment in developing countries is riskier than it is in developed countries. It can be concluded that the behaviors of the volatility of the value premium are driven by different factors in different countries and time periods.

[10] These countries include Austria, the U.S., Austria (which has other increasing trend periods at 1993 and at the end of the study period), Canada, Hong Kong, Sweden, and Spain.

VI. CONCLUSION

This paper addresses the role of leverage effect in explaining the value premium using a unique sample of international data. The results provide evidence for the existence of value premium over the sample period. Both developing and developed countries appear to have larger rates of return on value stocks compared to returns on growth stocks. It is also reasonable to conclude that value stocks total returns are even greater in developed countries compared to the developing countries. Furthermore, four out of twenty three developed countries have negative average value premia including Finland, Hong Kong, New Zealand, and Taiwan. Out of six developing countries, only Brazil has a negative mean value premium suggesting that it may be appropriate to use different investment strategies in different markets.

We provide evidence that sixteen out of twenty-nine countries have increasing trend in the value premium risk within the period of 1998-2002, while other countries have a wider risk period from 1998-2004. Countries, such as Canada, Finland, Netherlands, Sweden, the Philippines, Poland, Thailand, and Singapore show more volatility than other countries. Additionally, our conditional variance plots suggest that the value premium volatility in developing countries fluctuated sharply in comparison to those of developed countries. This may indicate that investment in developing countries is riskier than investment in developed countries which is consistent with the results of Fama and French (1998) and Rouwenhorst (1999).

The findings finally suggest that leverage appears to have asymmetric effects on the value premium in the U.S., Canada, Denmark, Finland, New Zealand, Sweden, the U.K., and Poland. This implies that a negative shock to those returns generates more volatility than a positive shock of an equal magnitude. These results indicate that bad news has more effect on volatility of the value premium than good news. This can be linked to the argument of Fama and French (1996) that the value premium could be a compensation for the financial distress risks in bad times. The most important implication of this paper that its results supports the risk based explanation for the value premium and offers a link between the financial leverage and the value premium strategy. The empirical findings contribute to our knowledge by providing additional evidence for the positive association between the leverage and value premiums and suggest that the value premium is working as proxy for non-diversifiable factors related to financial distress.

However, the limited evidence for leverage effect in some countries invites us to ask if the risk behind the value premium is idiosyncratic risk between different markets which may open the door to more research in the relationship between the value premium and financial distress. Also as our data is limited to the time period before the last financial crisis (2007-2009), an empirical investigation for the after crisis period should be targeted as a possible further research. Finally, we only report evidence for the significant leverage effect in eight international markets which stress the need for more investigation for other international markets and for the fundamental factors behind the different behavior of value premiums in different markets.

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