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DOES IDIOSYNCRATIC RISK MATTER? EVIDENCE FROM THE JAPANESE STOCK MARKET

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Abstract

It would seem that a relationship exists between the idiosyncratic risk and stock returns, and the idiosyncratic risk exhibits a positive and statistically significant trend. The goal of this paper is to use data from Japanese markets to investigate the two issues for the 2000-2014 period and provide further evidence that adds to the existing conflicting results. Our results suggest that existence of a positive relationship between the equally weighted measure of idiosyncratic risk and subsequent stock returns, but we don't find a rise in idiosyncratic volatility over the period.

Keywords: Idiosyncratic Risk, Stock Markets Volatility, Stocks Returns
JEL Classifications: G10, G11, G12

1. Introduction

The relationship between idiosyncratic risk and future market returns is conflicting and confusing. Campbell *et al.* (2001) analyzed long-term trends in both firm-level and market volatility in US stock markets from 1962 to 1997. They reported that only firm-specific risk exhibited a significant upward trend during the 1962-1997 period, while market and industry volatilities showed no significant trend. Their empirical evidence suggests that idiosyncratic risk commands a positive risk premium. Goyal and Santa-Clara (2003) claimed that the average stock variance is positively related to market returns, but Ang *et al.* (2009) showed that stocks with high idiosyncratic risk deliver abysmally low returns. Guo and Savickas (2008) and Kearney and Poti (2008) found that market returns are positively related to lagged market variance and negatively related to lagged idiosyncratic variance in US. Kearney and Poti (2008) suggested that market and average idiosyncratic variance predict market returns because they jointly proxy for average correlation, and hence for a component of systematic risk.

However, not all the empirical studies agree with these findings and these evidences are clearly at odds with traditional asset pricing theories which predict that only systematic (market) risk should matter in equilibrium. Investors bearing idiosyncratic risk, which can be eliminated through diversification, should get no reward for it. The evidence on the relation between idiosyncratic volatility and stock returns has been disputed in a number of more recent articles.

The evidence shows that idiosyncratic risk has predictive power only in the case of small capitalization stocks. Wei and Zhang (2005) showed that the positive relation between market returns and lagged idiosyncratic volatility is sample specific. Brown and Ferreira (2004) found that only the idiosyncratic risk of small capitalization stocks had a significant positive

relation with future stock returns. Bali *et al.* (2005) argued that this relation depended on the weighting scheme used to calculate the stock variance and is only valid for small capitalization stocks traded on the NASDAQ (liquidity premium). Angelidis and Tessaromatis (2008a) found that the small stocks idiosyncratic volatility is strong predictor of the small capitalization premium of market returns. Angelidis and Tessaromatis (2008b) argued that there was a positive relationship between the equally weighted measure of idiosyncratic risk and subsequent stock returns, but no relation was found between the value weighted measure of idiosyncratic risk – which by construction over-weights large capitalization stocks – and future market returns.

The recent literature on idiosyncratic risk focuses also on another main issue: Whether the risk exhibits a significant positive trend. Campbell *et al.* (2001) report that firm-specific risk exhibits a significant upward trend during the 1962-1997 period. But Guo and Savickas (2008) used G7 country data and provided evidence that the value-weighted idiosyncratic volatility increased during the late 1990s and reversed to the pre-1990s level afterward. Brandt *et al.* (2008) and Bekaert *et al.* (2008) rejected the hypothesis of a permanent increase in asset-specific risk. Timotheos (2010) argued that the rise of idiosyncratic risk is not a global phenomenon: A high-volatility regime was observed during the 1997-2000 period followed by a low-volatility regime, which implied that the increase couldn't have been attributed to a long-run trend.

Few studies have examined the relation between stock returns and idiosyncratic risk in Japan, with the exception of Guo and Savickas (2008) as well as Ang *et al.* (2009). Ang *et al.* (2009) showed that high idiosyncratic volatility had low future average returns across 23 developed markets (including Japan). Guo and Savickas (2008) showed that idiosyncratic volatility had statistically significant predictive power for aggregate stock market returns by using data from G7 countries.

These observations led us to analyze recent changes to the relationship between idiosyncratic volatility and stock returns on the Japanese market. Thus, our paper contributes to the existing finance literature by investigation the idiosyncratic risk in the Japanese stock market during the recent period.

Specifically, the following questions are investigated:

Does average idiosyncratic risk increase over time?

Is the relation between average idiosyncratic risk and expected market returns positive, negative, or statistically insignificant?

The structure of this article is as follows: Section 2 describes the measures of idiosyncratic risk, while Section 3 presents the dataset and shows preliminary statistics. Section 4 investigates the forecasting ability of idiosyncratic risk, while the last section concludes.

2. Idiosyncratic Risk

In this paper, we use the CAPM to control for systematic risk. The idiosyncratic risk is thus the residual from the regression of the excess return. Daily idiosyncratic return is calculated as the residual of the following regression (see Angelidis and Andrikopoulos, 2010):

$$r_i = \alpha + \beta_i r_m + \varepsilon_i \tag{1}$$

Where,
r_i, the stock return,
r_m, the value-weighted market return,
ε_i, the firm-specific return

IV, Idiosyncratic risk in month t,

$$IV = \sqrt{n_t}\sqrt{var(\varepsilon_{t,i})} \tag{2}$$

MV, Market risk in month t,

$$MV = \sqrt{n_t}\sqrt{var(r_{i,m})} \tag{3}$$

The monthly value-weighted asset-specific risk is calculated as,

$$IV_t = \sum_{i=1}^{N} w_{i,t} \sqrt{n_t}\sqrt{var(\varepsilon_{t,i})} \tag{4}$$

$w_{i,t}$, the market capitalization weight of stock I in month t-1,
n_t, the number of days in month t;

Assuming that the βs of all securities against the market are one, (see Xu and Malkiel, 2001), the variance of stock i at month t,$(V_{i,t})$, is broken in two parts: a systematic variance which is equal to the variance of the market, (MV_t) and an idiosyncratic variance which is equal to the variance of the idiosyncratic return $(IV_{i,t})$. This relation is described in the following equation:

$$V_{i,t} = MV_t + IV_{i,t} \tag{5}$$

Therefore, the average aggregate idiosyncratic variance is calculated as:

$$IV_t^{Equal} = TV_t^{Equal} - MV_t^{Equal} \tag{6}$$

The corresponding value weighted asset specific risk is defined as:

$$IV_t^{Value} = TV_t^{Value} - MV_t^{Value} \tag{7}$$

Where,
TV_t^{Equal} is the equally weighted variance of all securities in month t,
TV_t^{Value} is the value weighted variance of all securities in month t.

3. The Sample

Our data are constituted 225 values from the Nikkei 225 index values in a daily basis over the period from January 2000 to July 2014. During this period, not much research on the idiosyncratic risk on the Japanese market was published. This period also coincides with the first decade after a period of deflation in Japan.

Nikkei 225 Index daily return data are collected form Factset Database. Factset is financial database and designates a software editor. The company provides financial information and analytical software for investment professionals

Campbell *et al.* (2001) show that a decline in overall market volatility in US stock markets from 1962 to 1997. In Europe, Kearney and Poti (2008) find that European stocks have indeed become more volatile, and that idiosyncratic risk is the largest component of this volatility. Figure 1 plots stocks market volatility of Japanese market (Nikkei 225). We observe a big spike in stock market volatility during the 2000 stock market crash; we also observe another spike during the 2008 crash.
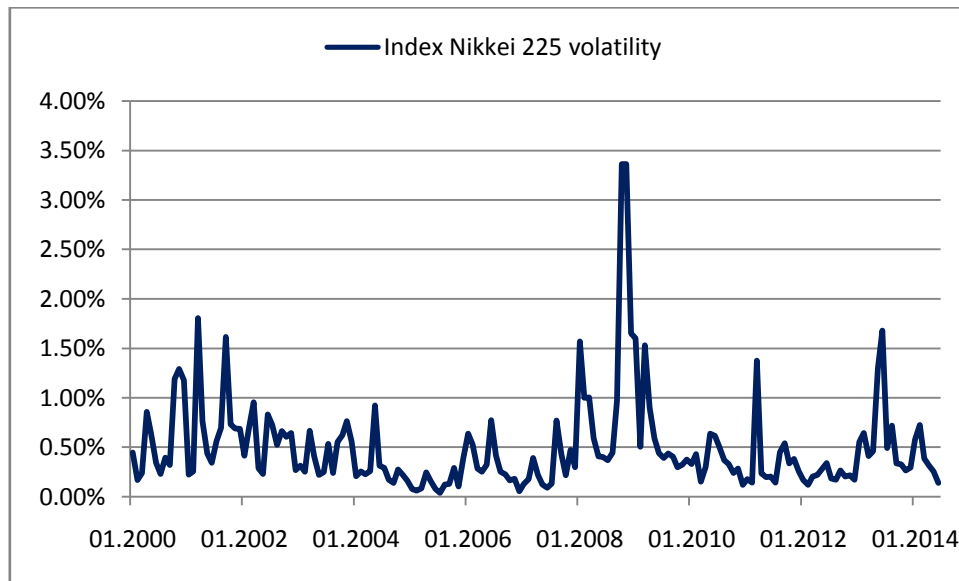
Figure 1. Stock Market Volatility Nikkei 225

Table 1 shows that stock market volatility in Nikkei 225, we obtained similar results to those of Guo and Savickas (2008).Using equal weights to calculate the idiosyncratic variance increase idiosyncratic risk, the average VI is 0.018 while that of the EV is 0.024. Value-weighted idiosyncratic volatility is persistent with the first-order autoregressive coefficients 0.89, and the autoregressive coefficient decays slowly. Similar observations are made for the equally weighted idiosyncratic volatility and the stock market volatility.

Table 1.Univariate Statistics

Descriptive statistics	Value-weighted idiosyncratic volatility	Equal-weighted idiosyncratic volatility	Stock market volatility (Nikkei 225)	Stock market return (Nikkei 225)
Mean	0.0180	0.0249	0.0049	0.0004
Max	0.1136	0.1289	0.0336	0.1285
Min	0.0029	0.0069	0.0004	-0.2383
Standard deviation	0.0149	0.0182	0.0047	0.0579
Skew	3.15	2.82	3.26	-0.48
Kurt	16.86	13.73	17.71	3.71
J.- B.	1682	1066	1875	10
AR (1)	0.8889	0.8994	0.7998	0.1517
AR (6)	0.6449	0.6866	0.5942	-0.0813
AR (12)	0.5746	0.6268	0.5004	-0.0094

The persistence of idiosyncratic volatility suggests that an increase in the average idiosyncratic volatility is followed by higher than average idiosyncratic volatility in subsequent months (see Angelidis and Tessaromatis, 2008a). Our statistics are comparable to those of Guo and Savickas (2008), who used data over the 1973-2003 period for Japan. Table 2 shows that idiosyncratic volatility in Japan.

Table 2. Univariate Statistics (Guo and Savickas, 2008) (Quarterly Observations)

Japan Jan 1973 to Dec 2003	Value-weighted idiosyncratic volatility	Equal-weighted idiosyncratic volatility	Stock market volatility	Stock market return
Mean	0.024	0.039	0.007	0.001
Standard deviation	0.013	0.018	0.007	0.107

Notes: The Data Stream data for Japan over the period 1973:Q2 to 2003:Q4 (Guo and Savickas, 2008).

In Table 3, we investigate whether it has a stochastic trend using the augmented Dick-Fuller (DF) unit root test. We consider two specifications. We reject the null hypothesis of a stochastic trend for Japan, our results suggest that stock market volatility appears to be stationary. Our finding is very similarly to that of Guo and Savickas (2008), but we don't find an upward trend in stock market volatility for Japan.

Table 3. Augmented Dick-Fuller Tests (In comparison to Guo and Savickas, 2008)

	VWIV		EWIV		MV	
	Constant	Trend	Constant	Trend	Constant	Trend
Nikkei 225 01/2000 – 07/2014	-0.572***	-0.532***	-4.307***	-4.438***	-6.677***	-6.678***
Gao and Savickas (2008) 01/1973 – 12/2003	-3.69***	-3.33*	-1.85	-3.85**	-1.88	-7.92***

Notes: The table reports the results augmented Dick-Fuller unit root tests.
*Denotes significance at the 10% level.**Denotes significance at the 5% level.***Denotes significance at the 1% level. The critical values corresponding to these significance levels are (-2.57, -2.87, -3.43) for the test with a constant and (-3.14, -3.43, -4.01) for the test with a linear time trend.VWIV is the value-weighted idiosyncratic volatility; EWIV is the equal-weighted idiosyncratic volatility; and MV is stock market volatility.

Figure 2 plots the equal-weighted idiosyncratic volatility (thin line) along with the value-weighted idiosyncratic volatility (thick line). We observe strong co-movement in both measures of idiosyncratic volatility.
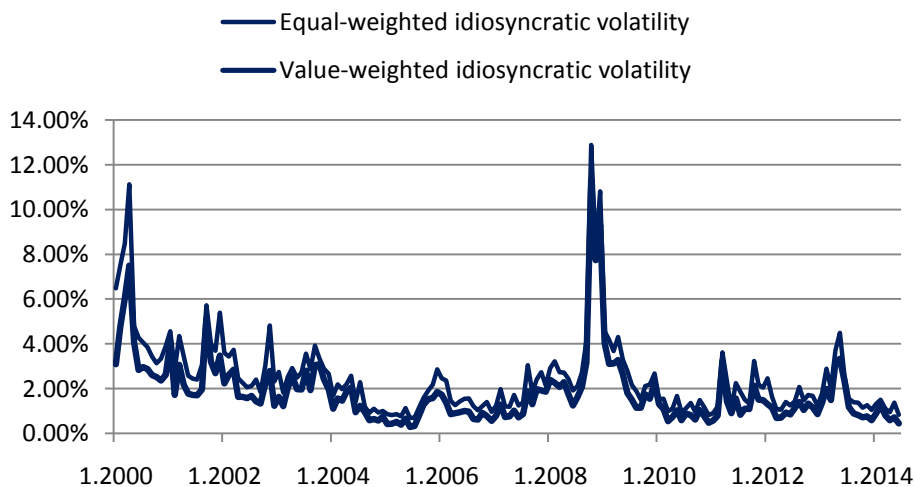
Figure 2. Value-(Thick Line) and Equal-Weighted Idiosyncratic Volatility (Thin Line) of All Stocks

4. Forecasting Ability of Idiosyncratic Risk

The existing evidence on the relationship between idiosyncratic volatility and future stock returns in the US market is conflicting. In this section, we investigate whether average idiosyncratic volatility forecasts stock market. We examine the relationship between idiosyncratic variance and subsequent stock returns in the Japanese markets by regressing capitalization weighted excess monthly market stock returns on various measures of lagged volatility. We estimate the following equation:

$$r_{t+1} = \alpha + \beta X_t + \varepsilon_{t+1} \tag{8}$$

Where,
r_{t+1}, is the log excess monthly return of the market at month t+1
X_t, includes different combinations of market and idiosyncratic volatilities.
And t = 2000:01, 2014:06

Market variance is included since the CAPM predicts a linear and positive relation between market returns and systematic volatility. Based on the evidence of positive skeweness and excess kurtosis, we take logarithmic transformations of the idiosyncratic risk measures.

Table 4. Forecasting Stock Returns Using Equal and Value-Weighted Idiosyncratic Volatility

Forecasting Stock Returns			
MV(-1)		-0.0261 (-0.028)	
Adjusted R²		*-0.006*	
Equal-weighted idiosyncratic volatility		Value-weightedidiosyncraticvolatility	
EWIV(-1)	-0.419* (-1.731)	VWIV(-1)	-0.437 (-1.484)
Adjusted R²	*0.011*	*Adjusted R²*	*0.007*
MV(-1)	1.762 (1.443)	MV(-1)	2.078 (1.535)
EWIV(-1)	-0.716** (-2.258)	VWIV(-1)	-0.914** (-2.139)
Adjusted R²	*0.018*	*Adjusted R²*	*0.015*

Notes: The table reports the forecast regression results of stock market returns on the equal-weighted idiosyncratic volatility (EWIV), value-weighted idiosyncratic volatility (VWIV) and stock market volatility (MV). The t-statistics are reported in parentheses.*Denotes significance at the 10% level. **Denotes significance at the 5% level. The data are used for the Nikkei 225 over the period 2000:01 to 2014:06.

Similarly to Guo and Savickas (2008), we find that the EWIV and VWIV are negatively related to stock market returns (Table 4). We show that MV does not forecast stock market returns. Again, the value-weighted idiosyncratic volatility itself does not forecast stock market returns in Japan. For comparison, we show the results of Guo and Savickas (2008) in Table 5. The equal-weighted idiosyncratic volatility by itself is negative and statistically significant. We show that MV does not forecast stock market returns either (the first row, Table 4). If we include both MV and the EWIV in the forecasting equation, the effect of the EWIV becomes significantly negative, as well as for VWIV.

Table 5. Forecasting Stock Returns (Guo and Savickas, 2008)

Forecasting Stock Returns			
MV(-1) *Adjusted R²*	1.030 (1.540) -0.004		
Equal-weighted idiosyncratic volatility		Value-weightedidiosyncraticvolatility	
EWIV(-1) *Adjusted R²*	0.770 (1.178) -0.004	VWIV(-1) *Adjusted R²*	0.397 (0.431) -0.008
MV(-1) EWIV(-1) *Adjusted R²*	3.004** (2.549) 0.140 (0.170) 0.009	MV(-1) VWIV(-1) *Adjusted R²*	3.121 (1.248) -0.982 (-1.364) -0.005

5. Conclusions and Suggestions for Future Research

Our study confirms the existence of a positive relationship between the equally weighted measure of idiosyncratic risk and subsequent stock returns on the Japanese stock market. This result poses a problem regarding the validity of the CAPM, according to which the expected yield of securities depends on the systematic risk level. Indeed, according to our finding, beta levels are not able to entirely explain security return rates. Similar to the size effect, the issues of the idiosyncratic risk can be justified by the problems of liquidity and lack of visibility or medium-sized enterprises compared to the rest of the market. It creates the possibility of arbitrage, from which investment funds should profit. Could Asset-specific risk be a proxy for systematic risk omitted from the capital-asset pricing model (CAPM)? It is important to investigate whether our finding on the Nikkei 225 index are also featured in the equity markets of other countries.

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