International Review of Accounting, Banking and Finance

Vol 8, No. 2/3/4, Summer/Fall/Winter, 2016, Pages 15- 26

IRABF

Ⓒ2016

Value and Growth Stocks: European Evidence

Li-Chueh Tsai[a]

a. Ph.D Program in Finance, Feng Chia University, Taichung, Taiwan

A B S T R A C T

In the four European regions (EU Without UK, EU With UK, UK, and Scandinavia), we use value and growth portfolios of firms sorted on various value-growth proxies, such as book-to-price (B/P), earnings-to-price (E/P), cash earnings-to-price (CE/P), and dividend-to-price (D/P), to examine whether the return distribution of a value portfolio stochastically dominates that of a growth portfolio. This study uses the LMW tests to test whether value index portfolios outperforms growth index portfolios based on B/M, E/P, CE/P, and D/P ratios. Using forty years of European data on value and growth stocks, we show that the non-book-to-price ratios are better than the book-to-price ratio as a value-growth proxy in Europe, except for Scandinavia. Specially, the evidence during the recent period shows a clear second-order stochastic dominance relationship of growth stocks over value stocks based on the book-to-price ratio in all four regions. Furthermore, during the boom market, the superior performance of value stocks over growth stocks that sorted by the non-book-to-price ratios also exists by the book-to-price ratio for all Europe stock markets, except for Scandinavia. However, during the recession period, all value-growth strategies based on various sorting criteria work poorly in all regions.

Keywords: Value premium, Value- growth strategy, Stochastic Dominance

JEL classification: G11, G12, D35

1. Introduction

The presence of value premium in a stock market means that firms with high book-to-price (B/P), earnings-to-price (E/P), cash earnings-to-price (CE/P), or dividend-to-price (D/P) ratios yield higher average returns than those firms associated with the corresponding low ratios (Fama and French, 1998; Bauman et al., 1998; Abhyankar et al., 2008, 2009). The rationale behind the results varies, depending on whether the risk-based model or the behavioral-based model is used. According to the risk-based model, the higher-than-average returns for the value-growth strategy reflect a compensation for bearing more risk (Fama and French, 1992, 1993), but the behavioral-based model argues that value premium is likely due to mispricing (De Bondt and Thaler, 1985).

The evidence presented by Capaul et al. (1993), Fama and French (1998), Arshanapalli et al. (1998), and Bauman et al. (1998) suggests that value portfolios offer investors relatively more-favorable returns than growth portfolios in developed non-U.S. markets. Dimson et al. (2003) find a strong value premium in the United Kingdom for the period 1955-2001. Recently, while Fama and French (2012) find value premiums in average returns for the Europe region, Walkshäusl (2015) enhance the value-growth strategies of Europe by taking into account the firm's equity financing activities. Furthermore, Connors and Gao (2011), Pled and Iatridis (2012), Lo (2013), and Chang et al. (2014) show that the market-to-book factor is important in the regression analysis of empirical finance.

However, Abhyankar *et al*. (2009) question the argument that the value premium is pervasive around the world, because they find that there are no significant stochastic dominance relationships between value and growth portfolios for the UK, France, Germany, and Italy. Because of a diversification benefit associated with the European value investing strategy, this study uses index portfolios of European firms sorted on various value-growth proxies to examine whether the return distribution of value portfolio stochastically dominates that of a growth portfolio. For example, Rosenberg *et al*. (1985), Capaul *et al*. (1993), Lakonishok *et al.* (1994), Fama and French (1992, 1993, 1995, 1996, 1998), Zhang (2005), Xing (2008), and Abhyankar *et al*. (2009) have documented that value portfolios offer investors relatively more-favorable returns than growth portfolios in US markets. As for outside US markets, Dimson *et al.* (2003), Chan *et al*. (1991, 1993), Capaul *et al*. (1993), Abhyankar *et al*. (2009), and Gharghori *et al*. (2013) also report the value premium in the UK, Canadian, Japanese, and Australian markets, respectively. As noted above, Lee *et al*. (2014) also provide that the value premium was positive before the 2008 financial crisis, but reversed during the crisis.

Our statistical inferences from the perspective of stochastic dominance do not depend on any asset pricing model. If the distribution of stock returns is such that all expected utility maximizers prefer value stocks to growth stocks, then risk compensation is unlikely to be a compelling explanation for the superior performance of a value-growth investment strategy (Seyhun, 1993).

Capaul et al. (1993) note that they are unable to predict whether the phenomenon of value premiums will continue, diminish or entirely disappear, since lacking a well articulated theory to explain the superior performance of the value-growth strategy. We then examine the relative performance of value versus growth through the lens of stochastic dominance for the recent period and after 2008.

Zhang (2005) argues that risk/return dispersions between stocks are lower in good times, and Petkova and Zhang (2005) argue that value stocks are riskier than growth stocks in bad times. According to the risk-based models in resolving the value premium puzzle, if value

stocks are fundamentally riskier, they must *underperform* growth stocks during poor worldwide economic conditions (Lakonishok et al., 1994). However, Lakonishok et al. (1994) shows that value stocks *outperform* growth stocks during the recession period. Given the advantages of the stochastic dominance approach, we finally reexamine the stochastic dominance relations between value and growth stocks under the boom or recession periods.

This study uses the Linton *et al.* (2005) test (hereafter LMW) to examine whether value stocks outperform growth stocks based on different value-growth proxies for European stock markets. LMW applies the idea of the sub-sampling bootstrap procedure to the sampled blocks of data without replacement to account for non i.i.d. (identically and independently distributed) features of the data under examination. The appeal of the test is that it deals with the issue in return autocorrelation.[1] We present the first-order stochastic dominance (FSD) and second-order stochastic dominance (SSD) relationships between value and growth portfolios based on various value-growth proxies. While an FSD relationship of value stocks over growth stocks implies that investors who prefer more to less would have preferred value to growth stocks, an SSD relationship of value stocks over growth stocks implies that investors who are risk-averse would have favored value over growth portfolios.

The value premium historically reported in the literature is that value firms have earned higher returns than growth firms before 1990. However, many empirical studies have found that the value premium has reversed, weakened or disappeared in the US, the Asian, the Europe, the Oceania and other countries after the 2008 global financial crisis. The European stock market is the second largest markets in the world. Besides, the European Union (EU) has the significant impacted after 2008 global financial crisis. The importance of the EU stock markets has the great influence in the world. This study is mainly to investigate the value premium in the European Union (EU) to see whether the value premium has been existed or disappeared during the recent years. First, the motivation of the paper is to see the trend of value premium whether disappeared or reversed in the four European regions for the full sample period from 1975 to 2014. Second, the examination of the value premium whether still exist in the different EU stock markets after 2008 a financial crisis. Third, we hope to examine whether the value strategy still helpful to the professional investors in the boom and recession periods. Do investors still gain the higher returns by investing the value stocks instead of growth stocks after 2008? Therefore, the findings of this study have become the important implications for the investors.

Using forty years of European data on value and growth portfolios, we demonstrate that the non-book-to-price ratios (E/P, CE/P, and D/P) are better than the book-to-price ratio as a value-growth proxy in Europe, except for Scandinavia. The presence of a stochastic dominance relationship of value stocks over growth stocks implies that risk compensation is unlikely to be a compelling explanation for the profitability of the value-growth strategy in Europe. However, during the recent period, the evidence shows a clear second-order stochastic dominance relationship of growth stocks over value stocks based on the book-to-price ratio in all four regions.

Furthermore, we also show the presence of value premium for the boom periods in Europe, except for Scandinavia, regardless of the sorting criteria used in defining value and growth

[1]In financial economics, many studies apply this test to evaluate performance, including the IPO effect (Abhyankar et al., 2006), the currency carry trades (Fong, 2010), the monthly effect (Cho et al., 2007; Lee et al., 2013), the dim sum bond (Fung et al., 2014), the share repurchases (Hsu et al. 2015), the fat cat portfolio (Lin et al., 2015), the journal rankings (Kao et al., 2016), and the value effect (Hsu et al., 2015; Chung et al., 2016).

stocks. Our results imply that investors would explicitly prefer value stocks to growth stocks during the boom periods. However, during recession periods, all value-growth strategies based on various sorting criteria work poorly. For the regions of the EU with UK and the UK, value stocks underperform growth stocks, which is consistent with the risk-based predictions (Lakonishok et al., 1994).

2. Data

2.1 Portfolio Formations

Our monthly return data of value and growth portfolios formed on the basis of B/P, E/P, CE/P, and D/P ratios are obtained from Kenneth French's website. French combines the 16 markets into four regions: (1) *EU With UK*, including Austria, Belgium, Switzerland, Germany, Spain, France, Great Britain, Greece, Ireland, Italy, the Netherlands, and Portugal; (2) *EU Without UK*, excluding Great Britain and Ireland; (3) *United Kingdom (UK)*, including Great Britain and Ireland; and (4) *Scandinavia*, which includes Denmark, Finland, Norway, and Sweden. For each country, the value-weighted value and growth portfolios using the above four ratios are constructed. All our returns are in U.S. dollars and we do not require that the same firms have data on all four valuation ratios. The data are collected using *Kenneth R. French's Data Library* and the sample period is from 1975 to 2014 in 9 of 14, and the remaining are from the 1980s to 2014.[2]

Value and growth portfolios are first constructed at the end of December each year by sorting on the four ratios. Next, the stocks' returns are calculated for the following twelve months. Stocks in the top 30% of each ratio are defined as value portfolios, while stocks in the bottom 30% are defined as growth portfolios.

Table 1 reports the summary statistics of the monthly returns for the European value and growth portfolios formed on the basis of B/P, E/P, CE/P, and D/P ratios. We find that regardless of region or valuation ratio, all value portfolios have larger mean returns than growth portfolios, but most value portfolios also have larger standard deviations than growth portfolios. Standard statistical tests reject the null hypothesis of return normality for all value and growth portfolios in Europe.

2.2 Methodology

The stochastic dominance approach compares the cumulative distribution functions of the two candidate portfolios (*A* and *B*) at all points in the sample. The null hypothesis is that the cumulative distribution function of portfolio *A* stochastically dominates the cumulative distribution function of portfolio *B* for the J^{th} order of stochastic dominance. The first order of stochastic dominance ($J = 1$) invokes the assumption of non-satiation of investors. That is, investors are assumed to prefer more to less. The second order ($J = 2$) only assumes that investors are risk averse, which is still general but more restrictive than the first order of stochastic dominance. The hypotheses can be written as

$$H_0 : D_A^{(J)}(r) \le D_B^{(J)}(r) \text{ for all } r \quad (\text{i.e., } A \succ_J B),$$

[2]The sample period of each market is described in Table 1 in detail. The website address of *Kenneth R. French's Data Library* is http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/.

$H_1 : D_A^{(J)}(r) > D_B^{(J)}(r)$ for some r (i.e., $A \nsucc_J B$),

where $\succ_J$ indicates stochastic dominance at the J^{th} order. The test statistic proposed by LMW is

$$\overline{LMW}^{(J)} = \sup_r \sqrt{n}\left\{\hat{D}_A^{(J)}(r) \le \hat{D}_B^{(J)}(r)\right\}, \tag{1}$$

where the operator $\hat{D}^{(J)}$ can be shown as

$$\hat{D}_A^{(J)}(r) = \frac{1}{n(J-1)!}\sum_{i=1}^{n}(r - A_i)^{J-1} I(A_i \le r), \tag{2}$$

$$\hat{D}_B^{(J)}(r) = \frac{1}{n(J-1)!}\sum_{i=1}^{n}(r - B_i)^{J-1} I(B_i \le r). \tag{3}$$

Since the sub-sampling approach allows for general dependence and for autocorrelation in the returns, LMW use this approach to compute the empirical *p*-values for testing the hypotheses. The LMW sub-sampling method requires computing $n-b+1$ times the following test statistic for a sub-sample of size b given the data sample:

$$\overline{LMW}_k^{(J)} = \sup_r \sqrt{b}\left\{\hat{D}_{A,k}^{(J)}(r) \le \hat{D}_{B,k}^{(J)}(r)\right\} \text{ for } k = 1,..,n-b+1. \tag{4}$$

The empirical $\hat{p}$ -values from the sub-sampling can be obtained as follows:

$$\hat{p} = \frac{1}{n-b+1}\sum_{k=1}^{n-b+1} I(\overline{LMW}_k^{(J)} - \overline{LMW}^{(J)} > 0) \tag{5}$$

We reject the null hypothesis at a significant level if $\hat{p} < \alpha$ (the level of significance).

In this study, we evaluate the performance of value portfolio (*H*) against growth portfolio (*L*) using the LMW stochastic dominance test, which involves testing two null hypotheses regarding the return distribution. We first test whether the distribution of *V* stochastically dominates the distribution of *G*: $H_0^1 : H \succ L$. Second, we test for the converse hypothesis of whether the distribution of *G* stochastically dominates the distribution of *V*: $H_0^2 : L \succ H$. If we fail to reject $H_0^1 : H \succ L$ but reject $H_0^2 : L \succ H$, we conclude that the value portfolio stochastically dominates the growth portfolio. However, if we reject or fail to reject both null hypotheses, we conclude that there is no stochastic dominance relation between the two portfolios.

3. Empirical Results

We first report the results for the entire sample periods without being concerned about the boom or recession periods. In addition to the full sample period from 1975 to 2014, we also test the recent period from 2008 to 2014 as a robustness check separately.

3.1 Results for the full-period sample

Table 2 presents the test results for the full sample. Panel A shows the test results for the FSD. Panel A shows that in EU Without UK, value stocks stochastically dominate growth stocks under one out of four sorting criteria (i.e. D/P). More specifically, for the D/P sorting criteria we reject the null hypothesis that growth portfolios stochastically dominate value portfolios, but fail to reject the null hypothesis that value portfolios stochastically dominate growth portfolios. In the case of the B/P, E/P, and CE/P sorted portfolios we find no evidence

of FSD. The same pattern is closely reflected in Scandinavia. No stochastic dominance relationship between value and growth stocks is significant at the 10% level for Scandinavia.

However, our FSD results for the cases of EU With UK and UK tell a different story. We find significant evidence that in EU, value stocks stochastically dominate growth stocks under three out of four sorting criteria (E/P, CE/P, and D/P). The same pattern is closely reflected in UK. Our evidence demonstrates the existence of a value premium based on the E/P and CE/P sorting criteria for UK.

Panel B presents the test results for the SSD. For EU With UK or EU Without UK, we find a significant SSD relationship of value stocks over growth portfolios formed on the basis of E/P, CE/P and D/P. The only exception is the case of B/P as the sorting criterion. Finally, the SSD test results of UK are consistent with their FSD results that value stocks stochastically dominate growth stocks based on E/P and CE/P, while no significant dominance relationship is found in Scandinavia. In sum, Table 2 reports that the non-book-to-price ratios are better than the book-to-price ratio as a value-growth proxy in Europe, except for Scandinavia.

Table 1: Summary statistics for the monthly returns of the international index portfolios formed on the basis of B/P, E/P, CE/P, and D/P ratios for the full sample period from 1975 to 2014.

Panel (A)

Area	Ratio	Level	Mean	Std.	Skewness	Kurtosis	Min	Median	Max	JB
EU	B/P	Value	1.201	6.028	-0.411	4.788	-26.57	1.38	25.83	77.44***
Without UK		Growth	0.979	5.092	-0.579	4.889	-23.97	1.11	16.80	98.20***
	E/P	Value	1.162	5.741	-0.483	5.087	-26.25	1.46	24.18	105.81***
		Growth	0.915	5.168	-0.443	4.481	-20.75	1.04	17.29	59.55***
	CE/P	Value	1.190	5.716	-0.401	4.060	-20.16	1.41	20.92	35.36***
		Growth	0.839	5.092	-0.616	5.613	-26.54	0.87	17.40	166.93***
	D/P	Value	1.217	5.448	-0.400	4.874	-22.59	1.55	21.80	83.04***
		Growth	0.893	5.373	-0.476	4.188	-21.12	1.06	17.00	46.37***
EU	B/P	Value	1.241	5.844	-0.293	5.209	-26.72	1.46	26.76	104.43***
With UK		Growth	1.027	4.981	-0.373	5.782	-22.84	1.25	25.33	165.87***
	E/P	Value	1.252	5.615	-0.316	5.355	-24.14	1.40	24.36	118.95***
		Growth	0.968	5.071	-0.321	5.646	-22.32	1.23	25.84	148.26***
	CE/P	Value	1.287	5.530	-0.311	4.654	-20.24	1.54	24.11	62.48***
		Growth	0.919	5.055	-0.416	6.287	-25.38	1.20	25.75	229.89***
	D/P	Value	1.246	5.353	-0.189	5.345	-23.24	1.56	25.63	112.86***
		Growth	0.953	5.307	-0.329	5.256	-22.71	1.10	26.20	110.44***

Panel (B)

Area	Ratio	Level	Mean	Std.	Skewness	Kurtosis	Min	Median	Max	JB
UK	B/P	Value	1.403	7.027	0.914	10.460	-27.09	1.21	52.61	1179.96***
		Growth	1.201	6.280	1.158	13.849	-24.13	1.04	53.42	2461.07***
	E/P	Value	1.509	6.719	0.988	11.299	-24.71	1.35	53.92	1455.62***
		Growth	1.153	6.433	1.056	13.735	-26.42	0.93	54.01	2394.14***
	CE/P	Value	1.567	6.812	1.096	12.600	-22.22	1.62	57.33	1939.24***
		Growth	1.131	6.415	1.098	13.013	-24.77	0.86	53.27	2101.56***
	D/P	Value	1.387	6.578	0.973	10.173	-24.95	1.38	47.74	1104.86***
		Growth	1.160	6.719	1.041	13.497	-24.79	0.92	56.51	2290.54***
Scandinavia	B/P	Value	1.515	7.013	0.069	4.700	-26.88	1.47	34.47	58.22***
		Growth	1.204	6.657	-0.330	4.583	-27.34	1.25	23.92	58.87***
	E/P	Value	1.555	6.627	-0.114	4.960	-29.72	1.66	31.28	77.85***
		Growth	1.244	6.695	-0.157	4.646	-25.59	1.24	25.09	56.13***
	CE/P	Value	1.584	7.096	0.225	4.998	-26.38	1.48	33.37	83.87***
		Growth	1.116	6.926	-0.242	4.784	-28.68	1.06	25.99	68.37***
	D/P	Value	1.497	6.378	-0.090	4.700	-27.93	1.51	28.64	58.46***
		Growth	1.021	6.908	-0.281	4.716	-29.99	1.18	24.57	65.26***

Note: All reported returns are value-weighted. JB is the Jacque-Bera statistic for testing the null hypothesis that returns are normally distributed. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 2: Stochastic dominance tests for value and growth portfolios formed on the basis of B/P, E/P, CE/P, and D/P ratios from 1975 to 2014 for the full sample period.

Panel (A) First-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.176	0.114	0.616	0.145	0.059*	0.031**	0.924	0.070*
EU With UK	0.102	0.150	0.714	0.046**	0.362	0.002***	0.958	0.094*
UK	0.216	0.112	0.312	0.094*	0.347	0.062*	0.788	0.125
Scandinavia	0.522	0.353	0.674	0.152	0.892	0.160	0.906	0.146

Panel (B) Second-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.142	0.250	0.215	0.075*	0.113	0.019**	0.647	0.068*
EU With UK	0.134	0.221	0.284	0.085*	0.257	0.042**	0.761	0.091*
UK	0.191	0.265	0.493	0.084*	0.420	0.065*	0.836	0.271
Scandinavia	0.647	0.221	0.864	0.141	0.896	0.148	0.943	0.111

Note: *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

3.2 Results for the recent-period sample

Table 3 presents the results of the LMW tests for stochastic dominance relationships between the value and growth portfolios based on B/P, E/P, CE/P, and D/P ratios after 2008. Panel A shows that, regardless of the four value-growth proxies, no significant FSD relationship is found between value and growth portfolios during the recent period. However, Panel B shows that there is an SSD relationship of growth stocks over value stocks based on BP, regardless of the four sample regions, since we reject (at the 5% significance level) the null that the value stocks second-order stochastically dominate the growth stocks, but fail to reject the alternative that the growth stocks second-order stochastically dominate the growth stocks. Based on the E/P and CE/P, growth portfolios also stochastically dominate value portfolios after 2008 in the case of EU With UK and EU Without UK. Overall, Table 2 and 3 indicate that after 2008, the value premium in European stock markets disappears or even reverses.

3.3 Results for a boom-period sample

Following Abhyankar et al. (2008) and Hsu et al. (2015), Table 4 and Table 5 show the stochastic dominance test results of the value and growth portfolios during the boom and recession periods, respectively, as defined by the National Bureau of Economic Research (NBER) business cycle reference dates. In Table 4, the test results of the boom period are qualitatively similar to the results of the full-sample period. In other words, the value portfolios stochastically dominate the growth portfolios for the first orders, except for Scandinavia. Furthermore, the value-growth strategy based on the BP during the boom period performs better.

Table 3: Stochastic dominance tests for value and growth portfolios formed on the basis of B/P, E/P, CE/P, and D/P ratios after 2008

Panel (A) First-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.000***	0.025**	0.057*	0.042**	0.039**	0.000***	0.116	0.187
EU With UK	0.000***	0.066*	0.039**	0.014**	0.042**	0.040**	0.000***	0.056**
UK	0.136	0.277	0.114	0.152	0.120	0.372	0.726	0.397
Scandinavia	0.122	0.160	0.477	0.121	0.162	0.188	0.682	0.377

Panel (B) Second-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.000***	0.877	0.000***	0.324	0.048**	0.530	0.167	0.587
EU With UK	0.000***	0.848	0.000***	0.403	0.013**	0.513	0.469	0.586
UK	0.016**	0.873	0.154	0.597	0.246	0.653	0.746	0.370
Scandinavia	0.013**	0.513	0.217	0.347	0.373	0.301	0.775	0.333

Note: *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

Table 4: Stochastic dominance tests of value vs growth portfolios for the boom periods

Panel (A) First-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.170	0.067*	0.800	0.134	0.065*	0.044**	0.913	0.070*
EU With UK	0.126	0.000***	0.575	0.025**	0.348	0.008***	0.959	0.005***
UK	0.398	0.015**	0.851	0.020**	0.749	0.008***	0.712	0.040**
Scandinavia	0.546	0.354	0.620	0.103	0.854	0.182	0.822	0.115

Panel (B) Second-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.134	0.097*	0.393	0.063*	0.121	0.035**	0.857	0.074*
EU With UK	0.126	0.055*	0.554	0.056*	0.229	0.040**	0.854	0.073*
UK	0.305	0.096*	0.746	0.052*	0.621	0.041**	0.874	0.090*
Scandinavia	0.549	0.232	0.865	0.106	0.856	0.189	0.900	0.118

Note: *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

3.4 Results for a recession-period sample

Table 5 reports the results of FSD and SSD tests of value v.s. growth stocks based on the various value-growth ratios for the recession period. Panel A of Table 5 shows that there is no significant FSD relation for the recession periods, except for the only case of the value-growth strategy based on the B/P for the UK. Furthermore, Panel B also shows that there is no

significant SSD relation, except for the cases of the value-growth strategies based on the B/P or E/P for the EU With UK, and the strategy based on the B/P for the UK. However, these exception cases show that the superior performance relationship of growth stocks over value stocks. Overall, all value-growth strategies based on various sorting criteria work poorly in Europe during the recession period.

Table 5: Stochastic dominance tests of value vs growth portfolios for the recession periods

Panel (A) First-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.247	0.592	0.189	0.141	0.195	0.432	0.876	0.155
EU With UK	0.131	0.185	0.438	0.279	0.379	0.112	0.152	0.133
UK	0.091*	0.828	0.131	0.517	0.111	0.318	0.361	0.238
Scandinavia	0.387	0.366	0.410	0.348	0.596	0.263	0.202	0.280

Panel (B) Second-order SD tests

	B/P		E/P		CE/P		D/P	
	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2	H_0^1	H_0^2
	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$	$V \succ G$	$G \succ V$
EU Without UK	0.112	1.000	0.167	0.258	0.214	0.419	0.486	0.657
EU With UK	0.022**	1.000	0.062*	1.000	0.229	0.426	0.313	0.703
UK	0.021**	0.417	0.105	0.265	0.168	0.422	0.219	0.366
Scandinavia	0.394	0.495	0.195	0.409	0.309	0.429	1.000	0.252

Note: *, **, *** denote significance at the 10%, 5% and 1% level, respectively.

4. Conclusion

This study examines the extent of value premium based on several different value-growth proxies in the European stock markets under the perspective of stochastic dominance. Our sample period covers monthly data from January 1975 to December 2014.

Using a sample of forty-year data on value and growth index portfolios, we find that the non-book-to-price ratios are better than the book-to-price ratio as a value-growth proxy in Europe, except for Scandinavia. There is a clear stochastic dominance relation of value stocks over growth stocks based on the earnings-to-price, cash earnings-to-price, or dividend-to-price in Europe with or without the United Kingdom over the full-sample period from 1975 to 2014. However, this stochastic dominance relation of value stocks over growth stocks disappear or even reverse during the recent period from 2008 to 2014. Regardless of the sorting criteria, we also find a significant stochastic dominance relation of value stocks over growth stocks during a boom period, except for the only case of Scandinavia. During the recession period, all value-growth strategies based on various sorting criteria works poorly in Europe.

References

Abhyankar, A., Chen, H. and Ho, K. (2006) The long-run performance of initial public offerings: Stochastic dominance criteria. *Quarterly Review of Economics and Finance* 46, 620-637.

Abhyankar, A., Ho, K., and Zhao, H. (2008) Value versus growth: stochastic dominance criteria. *Quantitative Finance* 8(7), 693-704.

Abhyankar, A., Ho, K., and Zhao, H. (2009) International value versus growth: evidence from stochastic dominance analysis. *International Journal of Finance and Economics* 14(3), 222-232.

Arshanapalli, B., Coggin, T. D., and Doukas, J. (1998) Multifactor asset pricing analysis of international value investment strategies. *Journal of Portfolio Management* 24(4), 10-23.

Bauman, W. S., Conover, C. M., and Miller, R. E. (1998) Growth versus value and large-cap versus small-cap stocks in international markets. *Financial Analysts Journal* 54(2), 75-89.

Capaul, C., Rowley, I., and Sharpe, W. F. (1993) International value and growth stock returns. *Financial Analysts Journal* 49(1), 27-36.

Cho, Y., Linton, O., and Whang, Y. (2007) Are there Monday effects in stock returns: a stochastic dominance approach. *Journal of Empirical Finance* 14(5), 736-755.

Chang, Y., Chen, T., Chou, H., and Shen, Y. (2014) Corporate social responsibility and analyst's Recommendation. *International Review of Accounting, Banking and Finance* 6(2), 1-42.

Chung, Y., Hsu, C., Ke, M., Liao, T., Chiang, Y. (2016) The weakening value premium in the Australian and New Zealand stock markets. *Pacific-Basin Finance Journal* 36, 123-133.

Connors, E., and Gao, L. S. (2011) Corporate environmental performance, disclosure and leverage: an integrated approach. *International Review of Accounting, Banking and Finance* 3(3), 1-26.

De Bondt, W. F. M. and Thaler, R. (1985) Does the stock market overreact? *Journal of Finance* 40(3), 793-805.

Dimson, E., Nagel, S., and Quigley, G. (2003) Capturing the value premium in the United Kingdom. *Financial Analysts Journal* 59(6), 35-45.

Fama, E. F. and French, K. R. (1992) The cross-section of expected returns. *Journal of Finance* 47(2), 427-465.

Fama, E. F. and French, K. R. (1993) Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33(1), 3-56.

Fama, E. F., and French, K. R. (1998) Value versus growth: The international evidence. *Journal of Finance* 53(6), 1975-1999.

Fama, E. F., and French, K. R. (2012) Size, value, and momentum in international stock returns. *Journal of Financial Economics* 105(3), 457-472.

Fong, W. M. (2010) A stochastic dominance analysis of yen carry trades. *Journal of Banking and Finance* 34(6), 1237-1246.

Fung, H., Hsu, C., Lee, W., and Yau, J. (2014) Dim sum bonds: do they whet your appetite? *Journal of Portfolio Management* 41(5), 127-135.

Fong, W. M., 2010, A stochastic dominance analysis of yen carry trades, *Journal of Banking & Finance* 34(6), 1237-1246.

Gharghori, P., S. Stryjkowski, and M. Veeraraghavan, 2013, Value versus growth: Australian evidence, *Accounting and Finance* 53(2), 393-417.

Hsu, C., Lee, K., Chang, Y., and Fung, H. (2015) Value versus growth: Taiwan evidence. *Managerial Finance* 41(8), 845-856.

Hsu, C., Fung, H., and Chang, Y. (2015) The performance of Taiwanese firms after a share repurchase announcement. *Review of Quantitative Finance and Accounting*, DOI: 10.1007/s11156-015-0537-x.

Lakonishok, J., Shleifer, A., and Vishny, R. W. (1994) Contrarian investment, extrapolation, and risk. *Journal of Finance* 49(5), 1541-1578.

Linton, O., Maasoumi, E., and Whang, Y. J. (2005) Consistent testing for stochastic dominance under general sampling schemes. *Review of Economic Studies* 72(3), 735–765.

Lee, K., Hsu, C., and Ke, M. (2013) Testing the monthly effect of agricultural futures markets with stochastic dominance. *International Review of Accounting, Banking and Finance* 5(3/4), 35-60.

Lee, E., N. Strong, and Z. Zhu, 2014, Did the value premium survive the subprime credit crisis, *British Accounting Review* 46(2), 166-178.

Lin, T., Wang, T., and Hsu, C. (2015) The performance of fat cat portfolios with companies announced by TWSE and GTSM: A stochastic dominance analysis. *Review of Securities and Futures Markets* 27(4), 119-142.

Lo, Y. L. (2013) Corporate transparency on market-timing ability through Dutch auction stock repurchase. *International Review of Accounting, Banking and Finance* 5(2), 35-54.

Kao, E., Hsu, C., Lu, Y., and Fung, H. (2016) Ranking of finance journals: A stochastic dominance analysis. *Managerial Finance* 42 (4), 312-323.

Petkova, R., and Zhang, L. (2005) Is value riskier than growth? *Journal of Financial Economics* 78(1), 187-202.

Pled, V., and Iatridis, G. E. (2012) Corporate social responsibility reporting: Evidence from environmentally sensitive industries in the USA. *International Review of Accounting, Banking and Finance* 4(2), 61-98.

Seyhun, H. N. (1993) Can omitted risk factors explain the January effect? A stochastic dominance approach. *Journal of Financial and Quantitative Analysis* 28(2), 195-212.

Walkshäusl, C. (2015) Equity financing activities and European value-growth returns. *Journal of Banking and Finance* 57, 27-40.

Zhang, L. (2005) The value premium. *Journal of Finance* 60(1), 67-103.