GLOBAL SECTOR BETA

Bee-Hoong Tay
Department of Finance, Faculty of Business Management,
Universiti Teknologi MARA,
KM12, Jalan Muar, 85200 Segamat, Johor, Malaysia
E-mail: taybe869@johor.uitm.edu.my

Zulkifli Mohamed
Faculty of Business Management,
Universiti Teknologi MARA
Wisma KUB, Jalan Sultan Ibrahim, 15050 Kota Bharu, Kelantan, Malaysia
E-mail: zulkifli030@kelantan.uitm.edu.my

ABSTRACT
This paper aims to study the extent of variation in global sector beta in making international portfolio investment decisions. Market model is used to determine global sector beta and the variation in beta value is determined by investigating the stability of the global sector beta from different sub-periods right through the year 1990 to 2010. Monthly global sector price index and global market index are sourced from DataStream. Global sector that exhibits high variation in beta value is less stable; likewise, global sector with low beta variation is regarded as more stable and a preferable sector to invest for investors who wish to diversify into international global sector portfolio. The results of the study indicate that Health Care, Consumer Services and Financial Sector for Singapore as well as Oil and Gas and Financial Sectors for UK are sectors with the relatively stable beta. On the other hand, Oil and Gas, Basic Materials and Technology sector for Singapore as well as Basic materials, Consumer goods, Telecommunication and Technology sector for UK are the sectors with unstable beta values. Even though the sector's beta value estimation has it weaknesses, but it practically has helped investors to identify the weak and negative correlation stocks to be included in the portfolio. These kinds of stocks are believed to be able to maximize portfolio's diversification benefit.

Keywords: Global sector beta, diversification, international portfolio management.

1. INTRODUCTION

Global sector based portfolio allocation strategies have gained much attention nowadays. Investment in global sector that provide benefits of portfolio diversification had caused increase attention paid on the global sector beta, which often used as a risk measure of investment as well as important component in determining cost of capital.

This study is motivated by the increasing volumes and transactions trend of international portfolio investment, specifically

Malaysian investors who seek the opportunities to diversify their investment to other markets. The following table provides the value of portfolio investment of the four largest foreign investment countries in which the Malaysian entrepreneur invested their money to, namely United Kingdom (UK) and Singapore. It showed the increasing trend of the portfolio investment from year to year which includes investment on shares and corporate securities, Malaysian Government Securities, money market instrument, private debt securities, financial derivatives products and foreign government securities.

Table 1.
Malaysian Portfolio Investment by Countries (RM million)

	1st Quarter 2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Singapore	15994	43554	79305	80471	41442	36296	21251	14169	12921	9155	16072
United Kingdom	17477	50035	79026	62720	31927	26113	22361	19213	13089	10249	8161

Source: Bank Negara Malaysia

The above table shows that value of investment increase from year to year since 2001 and starts to show the declining trend since 2008. The scenario signified the impact of global financial meltdown which involves a series of events that started from subprime loan crisis in United State in year 2007. Despite that, the overall figure for the whole 2000s period shows increasing trend.

Forces of globalization that narrow down the barriers between each country have provided a more conducive environment for conducting business and investment activities internationally. Investors are no longer limited to investment in own countries, but, they are looking for the opportunities to invest worldwide due to more transparent transactions and accessibilities to global information as well as increasing number of global merger and acquisition. In making the investment decision involving international portfolio investment, investors need to consider which countries as well as which sectors to invest in order to spread out the risk. To reduce the risk of international investment, investors can diversify their portfolio by investing within countries or global sectors that have low correlation of required rate of return with each other.

In regard to this, many studies in 1990s have shown that country factors dominated global sector factors in determining international investment returns [Heston and Rouwenhorst (1994); Griffin and Karolyi (1998); Rouwenhorst (1999); L'Her et al.(2002); Ferreira and Ferreira (2006)]. However, increasing correlations between country returns as a results of structural changes brought by

the forces of globalization and liberalizations that witnessed the openness of an economy in addition to reduce barriers to international investments and business has caused global sector factors gained its importance since the end of 1990s. There are increasing researches that support the raising importance of global industry factors in determining international stock returns [Baca, Garbe and Weiss (2000); Cavaglia, Brightman and Aked (2000); L'Her et al.(2002); Cavaglia et al. (2004)].

On the other hand, global sector based asset allocation strategy have became increasingly popular and importance in international asset pricing and risk estimation of global sector portfolio. Study of global industry beta by Lie and Faff (2003) over 20-year periods from 1975 to 1994 found considerable variation in beta value across the global industries. According to their study, global industry betas were estimated for thirty-four industries using ordinary least squares for five sub-periods within the period of study. The study concluded that there were nine industries with a relatively stable beta, namely Automobiles; Building Materials Components; Chemicals; Food and Household Products; Industrial Components; Insurance; Machinery and Engineering; Multi Industry and Real Estate. In addition, there are eleven global industries with unstable betas which comprises of Gold Mines; Leisure and Tourism; Metal and Non-Ferrous; Transport Shipping; Wholesale and International Trade; Capital Equipment; Consumer Goods; Energy; Finance; Materials and Services. The remaining fourteen industries were classified as having 'moderately stable' betas.

In addition, Gong et al. (2006) in estimates of a range of industry beta have concluded that United States-listed water and air transport industries have low market betas in 1990s relative to 1980s. Due to the fact that the industry betas were time-varying and baffled with the sample selection problems, the beta risk estimation for water and air transportation industries thus vary with different estimation design and this bring to instability of the beta value for this industry eventually. On the other hand, in a study on the impact of capital controls on Malaysian banking industry beta by Brooks and Shoung (2006) revealed that the banking industry beta were more stable with the introduction of capital control and it was drawn to the grand mean of unity.

Before making international investment decisions which normally involving substantial funds, investors need to consider global countries factors and/or global sector factors which will guide them in the portfolio diversification process. In other words, to achieve benefits of diversification, investors need to consider whether to diversify their

investment to different countries or based on different sectors worldwide. Thus, with increase attention paid on the global sector factors, which involves evaluation on the global sector systematic risk measured by beta coefficients, this study thus aimed to investigate the extent of variation on global country sector betas for Singapore and United Kingdom in determining investment decisions. In addition, the study also includes the examination on stability of the global sector betas in order to support the reliability of using beta value as an investment tool. The study on global country sector betas for the two countries will provide useful information to Malaysian investors in terms of stability of global country sector betas that may be the investment tools used to evaluate the investment cost of capital.

2. THE MODEL

The global sector betas for a particular country are estimated using market model as stipulated as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it} \quad (1)$$

where R_{it} is the return on global country sector index i in period t; R_{mt} is the return on global country market index for a particular country; α_i is the parameter of the regression equation; β_i is the global country sector betas for sector i and e_{it} is a random disturbance term. A global sector beta greater than one indicates that the sector is more volatile than the market, while a global sector beta value less than one suggests that the sector is less volatile than the market.

3. METHODOLOGY

The data used in this study are derived from DataStream database. Monthly global sector index data for ten global sectors and a global market index for that particular country are derived from July 1990 to June 2010. The ten global sectors are Oil and Gas [Oil and gas producer, oil equipment and alternative energy]; Basic Materials [Chemical and basic resources]; Industrials [construction and material; industrial goods and services]; Consumer Goods [automobiles and parts; food and beverage; personal and household good]; Health Care[healthcare equipment and services; pharmaceutical and biotechnology products]; Consumer Services[retail, travel & leisure and media]; Telecommunication[fixed line telecommunication ;mobile telecommunication]; Utilities[electricity, gas, water and multiutility]; Financials [banks, insurance, real estate, financial services] and Technology[software and computer services; technology hardware and equipment]. However, for Singapore, analysis on Telecommunication Sector for sub-period July 1990: June 1994 is exempted as the data

available only from December 1993, likewise, analysis for Utility Sector is exempted as the data available only from February 2001, which deemed to be insufficient.

The analysis on beta variation used in this study is based on the analysis by Lie and Faff (2003) where the computed betas are divided into five sub-periods with four years in each sub-period for further analysis. The sub-periods are July 1990: June 1994; July 1994: June 1998; July 1998: June 2002; July 2002: June 2006 and July 2006: June 2010. The degree of variation of global country sector beta over the sup-periods are classified as 'relatively stable' for variation of less than 50%; 'moderately unstable' for variation between 50% and 100% and 'unstable' for variation of more than 100%.

4. RESULTS AND DISCUSSION

Table 2.
Singapore: Global Country Sector Beta for five sup-periods

	Oil and Gas	Basic Materials	Industrials	Consumer Goods	Health Care	Consumer Services	Telecom	Financials	Technology
1990:7-1994:6	0.55	1.33	1.08**	1.81**	0.67**	0.86**	NA	1.04**	0.09
	2.76*	11.13*	15.90*	10.65*	10.21*	19.99*	NA	34.79*	0.36
1994:7-1998:6	0.02**	1.45	0.94	1.08	0.81	0.83	0.36**	1.12	(0.34)**
	0.08*	8.50*	7.97*	5.63*	8.46*	12.75*	1.56	18.18*	-0.7
1998:7-2002:6	0.80	1.38	0.72**	0.94**	0.78	0.76	0.37	1.20**	0.46
	4.65*	6.70*	15.15*	6.24*	10.61*	13.43*	3.09*	35.07*	1.91
2002:7-2006:6	1.18	0.64**	0.98	1.08	0.79	0.85	0.53	1.04	0.81**
	3.47*	3.33*	11.64*	4.63*	7.19*	12.38	3.21*	20.26*	1.93
2006:7-2010:6	1.29**	1.56**	0.95	0.94	0.84**	0.75**	0.62**	1.09	0.77
	7.20	11.64*	21.48*	11.20*	7.33*	16.09*	7.77*	30.97*	4.00*
Percentage of beta change (%)	6300	145	51	93	27	15	74	16	335

Note: * denotes statistical significance at 5% level and ** denotes low or high beta in each period
Table 2 stipulates the results on the global sector beta for Singapore for five sub-periods. The t-statistics for the hypothesis that beta coefficient equal to zero is reported below each beta value. The sign ** denotes low or high beta in each period.

The results show that there are three sectors with a 'relatively stable' global sector beta, namely Health Care, Consumer Services and Financial Sectors. There are three sectors recorded to have 'moderately stable' beta, which comprises of Industrials, Consumer Goods and Telecommunication Sectors. The remaining sectors have 'unstable' global sector beta with a variation of beta value exceeded 100%. There are consists of Oil and Gas, Basic Materials and Technology Sectors.

The Consumer Services sector exhibits lowest percentage of beta changes throughout the period. The beta values estimated for this sector are close to the value of one or unity. Thus, it implies that investors will face systematic risk as much as that of the market if they invest in this sector.

On the other hand, the study revealed substantial variation on Oil and Gas Sector in Singapore of 6300%. Such variation takes into account the differences of beta value of 0.02 in sub-period 1994:7-1998:6 to 2006:7-2010:6. Singapore as one of the top global oil trading and refining hubs was affected by the spiked in the oil prices with less than $20 per barrel averagely prior to year 1990, to an average of $70 per barrel in 2010. Increase in oil price and other factors such as strategic location as shipping center and bunkering center have significantly affect the performance of this sector in Singapore. In addition, the period with lowest beta value for Oil and Gas on 1994:7-1998:6 falls in the period that witnessed the 1997/98 Asian Financial Crisis which affects the performance of Straight Times index. The index during the period was volatile and dropped by approximately forty percent.

Table 3.
Singapore: Extreme Global Sector Beta

Sub-periods	Number of Lowest Beta	Number of Highest Beta	Extreme Beta
1990:7-1994:6	2	3	5
1994:7-1998:6	3	0	3
1998:7-2002:6	2	1	3
2002:7-2006:6	1	2	3
2006:7-2010:6	2	3	5

To identify which sub-periods in the study experienced highest number of extreme global sector beta, which would indicates period with considerable swing global beta value, total number of lowest and highest global sector beta estimation in each sub-period is used. For Singapore, there are two sub-periods that produced the highest number of extreme beta. There are sub-period 1990:7-1994:6 and 2006:7-2010:6 with two sectors with lowest beta and three sectors with highest beta value.

Table 4: United Kingdom: Global Country Sector Beta for five sup-periods

	Oil and Gas	Basic Materials	Industrials	Consumer Goods	Health Care	Consumer Services	Telecom	Utilities	Financials	Technology
1990:7-1994:6	0.85	1.17	1.04	1.39**	0.77	1.17**	0.89	0.62	1.27	0.64**
	7.99*	14.10*	11.48*	11.03*	9.65*	20.76*	7.35*	4.52*	19.77*	4.18*
1994:7-1998:6	0.83	0.85**	0.76**	0.77	0.94**	0.74**	0.95	0.87**	1.39**	0.75
	5.60*	4.91*	4.11*	3.12*	6.72*	7.07*	3.58*	4.79*	13.59*	3.17*
1998:7-2002:6	0.98	1.12	1.41	1.34	0.53	1.06	1.28**	0.08**	1.17**	2.34**
	5.24*	7.56*	11.42*	6.93*	3.73*	10.14*	5.04*	0.65	12.61*	5.90*
2002:7-2006:6	1.04**	1.27	1.43**	1.16	0.59	1.10	0.54**	0.35	1.17	1.85
	7.94*	11.20*	9.99*	6.81*	5.98*	15.28*	2.91*	3.36*	15.72*	8.39*
2006:7-2010:6	0.81**	1.79**	0.96	0.65**	0.51**	0.95	0.63	0.57	1.37	0.91
	6.59*	9.18*	13.79*	8.45*	4.08*	12.43*	4.87*	4.45*	11.04*	8.11*
Percentage of beta change (%)	28	110	87	115	86	57	137	61	18	268

Table 4 present the results on the global sector beta for United Kingdom. The results indicate that compared to Singapore, there are only two sectors with 'relatively stable' global sector beta and there are Oil and Gas, and Financial Sectors. Meanwhile, Industrials, Health Care, Consumer Services and Utilities Sectors are found to have 'moderately stable' global beta. The remaining four sectors are classified as having 'unstable' beta, which include Basic Materials; Consumer Goods, Telecommunication and Technology Sector.

Table 5: United Kingdom: Extreme Global Sector Beta

Sub-periods	Number of Lowest Beta	Number of Highest Beta	Extreme Beta
1990:7-1994:6	1	2	3
1994:7-1998:6	3	3	6
1998:7-2002:6	2	2	4
2002:7-2006:6	1	2	3
2006:7-2010:6	3	1	4

In addition, the extreme beta is found in period 1994:7-1998:6 with three sector with lowest beta and three sectors with highest beta. One interesting finding here is during the sub-period of 1994:1998, Asian Financial Crisis which spread since 1997 was expected to have impact on extreme beta of Asian country such as Singapore, however, the results shows that it had indeed give some impact on the global sector in United Kingdom.

5. CONCLUSION

As conclusion, this study shows mixed results with the study by Lie and Faff (2003). According to this study, betas for Industrials sector for both countries are moderately stable and it is not consistent with Lie and Faff (2003) where Industrial Components has relatively stable beta. For Financial Services, Healthcare & Personal Care and Utility & Gas, previous study showed moderately stable beta but this study shows mixed results, for instance, Financial Sector are relatively stable for both countries. Last but not least, results for UK is consistent with study by Lie and Faff (2003) where Consumer Goods has unstable beta, but not consistent with Singapore.

The results of the study suggests the investors to invest in Oil and Gas, Basic Materials and Technology sectors for Singapore and Basics Materials, Consumer Goods, Telecommunications and Technology sectors in UK during good economic conditions where market index are generally in uptrend. While, when market is in downturn, investors should invest in the sector which is less volatile. For instance, Health Care, Consumer Services and Financial Sector in Singapore but Oil and Gas and Financial Sector in UK.

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