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An Exploration of How Political Risk Components Affect the Stock Volatility Considering ICRG and GARCH Model

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Abstract. Five main components of political risk were extracted from the International Country Risk Guide (ICRG) Rating model, this paper researches the elements: Government Stability, Socioeconomic Conditions, Investment Profile, Internal Conflict and External Conflict. We have chosen four countries to examine: the United Kingdom, China, Mexico and Iran. We would like to investigate the relative importance of political risk factors on stock market volatility. In addition we aim to explore the influence of each factor on stock market volatility, in order to highlight the areas of importance for investors when making investment decisions and the government when making political decisions. Considering both qualitative and quantitative issues within the investigation, it is found that less economically developed countries are likely to be more exposed to political risks than its developed counterpart and individual countries have different influential factors from political risk. Moreover each stock market is influenced by a unique series of political factors, with very little overlap between each market in terms of relevant variables.

Introduction

Political risk, or "geopolitical risk" is the risk of investment returns based on political changes or instability in a country, which is a worldwide phenomenon affecting stock markets since the twentieth century. Political risk is a master category of risk contained within it a plethora of factors stemming the breadth of political, economic and social conditions. Risks have been proposed to be both real and socially constructed, with political risks being based on talk centricities and vote centricities. With economies ever interwoven managing risk on both political and firm level, it is of the utmost importance in this complex business environment. Political risk, can be used to anticipate potential upheavals in business, these shocks will be analyzed in the stock volatility. There are so many avenues to consider when forming a picture of political risk, elements affecting this risk may include: failed states, states of emergency, countries in transition, the quality of culture and law, unemployment, political instability, erosion of support for government, military mutiny, fiscal and monetary decisions, taxation, international relations, this list has not been exhausted.

In 1979, Professors William D. Coplin and Michael K. O'Leary developed one worldwide known original political risk system that is called the "International Country Risk Guide" (ICRG) model for quantifying and rating political risk. This Model is used to estimate firm and country risk rating. The model comprises of twenty two variables in three subcategories of risk[1]: political, financial, and economic. They created indexes for each of these categories and base it on a points system, one hundred, being the highest risk possible. The political risk rating section of the model consists of twelve weighted variables, over a range of political and social attributes. It is the five highest weighted attributes of this model that we have used to investigate this political risk on returns and volatility, i.e., Government Stability, Socioeconomic Condition, Investment Profile, Internal Conflict and External Conflict. We are using ICRG theory and reasoning behind political risk, however our investigation does note rate political risk on a points system to represent the degree of the political risk, we select specific variables that can be embodied as those five main political components to explore their relationship between the political risk and the country's stock market. It is interesting to inspect the degree of the effects of individual political outcomes, to highlight the importance of these risks when considering decision making, at firm and country level. This will help illuminate readers

as to the triggers of financial crisis or potential increases in volatility so they can account for it in their investment decisions. In regards to making political analysis, we aim to help the government and investors optimize their effectiveness and efficiency in their involvement in the market.

The paper is divided into five chapters. The first part is the introduction where an outline of the philosophy of political risk and the purpose of this paper is illustrated. The second part is introduced the political risk components, including specific literature related to each variable. The third section conveys our data preliminary analysis and methodology. The forth is the exhibition of our result and relative analysis of return and volatility regressions. The final chapter includes a conclusion, limitations and suggested studies for the future.

ICRG Political Risk Model--Five Political Risk Components

In the ICRG system, these five components are the main body to evaluate one country's political risk. They assess and rank the impact for each part of a country and finally give an overall score to represent its political risk. Inspired by this model, we are interested to see what role for each political factor has played.

Government Stability

It covers various areas within government, one of which is the issue of elections. There is substantial but mixed evidence that the frequency of elections and the expectation of a certain party victory have implications on stock volatility based on previous studies[2]. To represent this factor, we have selected two dummy variables, one variable being; if the current year is election year and the other if the current party is changed. Otherwise the dummy variables will be zero[3].

Socioeconomic Conditions

Socioeconomic conditions are the basic analysis for the country economic environment since the policy and economy are continuously banded together. As well, the socioeconomic condition is the base of the stock market. We are using the socio-economic factors to determine the stage of development for each country and using these as a comparative base. The most common variables representing this condition are: growth rate of GDP per head, GINI index, unemployment rate and CPI.

Investment Profile

Through globalization, open economies expose themselves to international political risks in alongside domestic. One study found that besides revealing the impact of political risk on foreign investors' trading, currently a gap in the literature, they have tracked the differential effect of political risk upgrades and downgrades on market returns [4]. Export/ import percentage of GDP, corporate tax rate and economic freedom are used as index for investment profile.

Internal Conflict

In the most general setting stock volatility may reflect diffuse and easily changed beliefs about the future, specifically pertaining to bad news[5]. The peso problem is often linked with political instability and one in which we consider when examining the model. It is represented by strikes, homicide crime rate and riots and civil wars.

External Conflict

External uncertainties arising after major economic and political shocks, like the 9/11 attacks, the Cuban Missile Crisis and the Gulf Wars appear to generate short sharp recessions and recoveries Bloom (2009). This is represented using the variable External War, it is modeled by a dummy variable; 1 given the current year is at war and 0 otherwise. The percentage of the Military spending on GDP is another variable in this part, which reflects the government's attitude towards the nation security and degree of the tensions.

By adopting these five components, we consider both the internal and external factors of the political risk. In addition, geopolitical uncertainty and instability are important factors affecting both politics and business in different capacities. Changes in government, policy or events large enough to change the economic landscape will affect the market, investors hold off, to see which policies are put forward to stimulate investment. It is not unrealistic to assume that the stock market returns and volatility is likely to be affected.

Data Collection and Methodology

We have tried to rectify this by including four countries in our case study. We divided the country into three economic world groups based on the United Nations Development Programme (UNDP). The United Kingdom (0.947 HDI) is a more economically developed country which belongs to first economic world. Since its policy and financial systems in each aspect have been developing consistently, we make a preliminary assumption that the political risk is lower than the other three countries. Mexico is in the second economic world with a HDI of (0.854). Iran has a HDI of (0.709), and China with a HDI of (0.687), they are both in the third economic world, however, their economic and policy systems are diverse, unique and worth a deeper exploration[6]. China, as a communist state is ruled by one party. Their communist economic system is entirely different from the capitalist and socialist economies. In recent years, the high speed development of economic of China has attracted world's economists' eyes to explore each aspect of the Chinese economy. Therefore, it is pivotal to look into the political risk of China. Mexico and Iran are two countries with conflicts either internal or external. Mexico has more internal conflict (drug-war), while Iran has been stifled with external conflicts such as Iraq and America. We have specifically chosen these countries as our sample as they have different features pertaining to our key model components.

Data Collection

The data consists of monthly stock returns (log price of relatives) on Shanghai Composite Index (SCI) for China, Financial Times Stock Exchange 100 Index (FTSE) for the United Kingdom, Indices de Precios y Cotizaciones (IPC) for Mexico and Tehran Stock exchange (TSE) for Iran from June 1998 to June 2017. All of these indices are the widely recognized standards to evaluate the market performance of a country. We focus on the effects of change in these variables with respects to the stock market, as they are directly dependent on government actions. The severity of fluctuations in these variables, reflect the degree of alterations in policy of a single country. Therefore we would like to consider the relationship between that policy risk and the stock market. All data is collected from DataStream, the World Bank database, nation statistics and country union statistics.

Methodology

ICRG model as a template, constructs risk ratings, this encapsulates political, economic and financial country risks. The section on political risk has 12 components of the full ICRG model, of which we have narrowed the focus, for an in depth analysis of 5 of these components. The five chosen were the most important factors, based on their weighting in the ICRG model. The primary purpose in this paper is to explore how political components affect the stock volatility in the four different economically developed countries. Deduced from the standard deviations of the same variables in each of the four countries, we can see the volatility effect in each component of the policy risk and compare the degree of risk for each country. In considering the countries stage of development, we can achieve the analysis of how political components vary given different country characteristics. In order to eliminate the bias due to multicollinearity, we will both run the Durbin-Watson statistics test and Breusch-Pagan-Godfrey test for autocorrelation and heteroscedasticity. If the findings indicate the problems exists we will run the new regressions under Whites or HAC (Newey-West) correction.

$$\mathrm{R_{it}} = \alpha_{it} + \beta_{1it} * V + \beta_{2it} * SS + \beta_{3it} * Ey + \beta_{4it} * PC + \beta_{5it} * GR + \beta_{6it} * CPI + \beta_{7it} * HDI + \beta_{8it} * UE + \beta_{9it} * GINI + \beta_{10it} * E(I) + \beta_{11it} * T + \beta_{12it} * EF + \beta_{13it} * EX + \beta_{13it} * S + \beta_{14it} * SP + \beta_{15it} * C + \beta_{16it} * CW + \beta_{17it} * \mathrm{RIOTS} + \beta_{18it} * EW + \beta_{19it} * M + \varepsilon_{it} \quad (1)$$

The GARCH(1,1) model that was developed by Bollerslev and Taylor (1986) is widely recognized as one of the most appropriate models to calculate return volatility; this is because it accounts for the effect of both the main function's residuals and the conditional variance itself.

$$R_{it} = \mu_{it} + \rho * R_{i,t-1} + u_{it}$$
$$\sigma_{it}^2 = \omega_{it} + \gamma u_{i,t-1}^2 + \delta \sigma_{i,t-1}^2 \quad (2)$$

After we achieve the conditional variance of the return from the GARCH analysis, the last step is to delve deeper to probe how the market stock volatility monthly affected by the policy variables among the four countries. An OLS regression on the volatility will be employed, and the same adjusted variables will be plugged into the function in order to make the volatility and returns consistent and comparable. The model is:

$$\sigma_{i,t} = c_{it} + \theta * f_{i,t}^* + \tau_{i.t} \quad (3)$$

The notation f represents the series of different political variables. Eviews is the main software employed in this investigation to estimate the volatility and shocks of the returns.

Empirical Results Analysis

GARCH Analysis

In order to estimate the return volatility, we run the GARCH (1, 1) model on the market returns for the four countries individually, the results are shown in Table 1; this will give us an indication of the impact of shocks and the persistence of the effects of political risk factors

Table 1 GARCH Analysis- Showing the estimates of the Volatility of Returns

GARCH Analysis								
Method: ML - ARCH (Marquardt) - Normal distribution							**Dependent Variable: RETURN**	
Presample variance: backcast (parameter = 0.7)							GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)	
	The United Kingdom		**Mexico**		**China SCI**		**Iran**	
	Coefficient	**z-stat**	**Coefficient**	**z-stat**	**Coefficient**	**z-stat**	**Coefficient**	**z-stat**
C	0.7	3.11	1.61	3.12	-0.14	-0.31	0.56	2.36
RETURN(-1)	-0.0006	-0.01	0.01	0.21	0.004	0.07	0.56	***8.4
Variance Equation								
C	1.011073	1.82	4.73	1.81	6.27	1.45	0.47	1.49
RESID(-1)^2 (a)	0.19	***4.28	0.1	**2.16	0.42	***4.10	0.17	***2.58
GARCH(-1) (b)	0.79	***17.35	0.83	***12.88	0.61	***8.33	0.81	***11.32
coefficient a+b	**0.98**		**0.93**		**1.03**		**0.98**	
R-squared	-0.00045		0.000014		-0.01		0.3	
Adjusted R-squared	-0.003		-0.003		-0.01		0.29	

As a typical GARCH model estimates the volatility of stock returns, the sum of the coefficients on the lagged squared error and lagged conditional variance is very close to unity for the United Kingdom, Mexico and Iran (0.98, 0.8, 0.98 respectively), which implies that shocks to the conditional variance will be highly persistent and the series are stationary. However, the sum result of China SCI return is totally different to the sum of the lagged squared residuals and the lagged conditional variance is slightly larger than 1 (around 1.03). In this situation, China's data series is non-stationary and highly autocorrelated. Even though we do not expect to get this result which indicates the unpredicted variance in the long-run, the GARCH model still captures the conditional variance soundly, since the variance equation is significant. In summation as all the coefficients of the lagged

squared residuals and lagged conditional variance are significant, the GARCH (1, 1) model is appropriate and sufficient to achieve the return volatility and our conditional variances are reliable.

Volatility Analysis

There are a number of variables which were found to be commonly significant (table 2), for the UK and Mexico; Party Change was significant with a similar coefficient size, indicating a similar influence on volatility. Votes are significant for both Mexico and the UK and both have a negative relationship with volatility. So as the Votes increase there is a downward movement to volatility, with a small influence on volatility, illustrating its lack of importance in the grand scheme of what influences volatility. The GINI index variable was significant for Mexico, having a positive relationship, with a very minor impact on overall volatility. CPI is significant for both China and Iran with a positive relationship for both variables, again both having relatively small impact on overall volatility. Economic freedom was significant for Mexico, of which had negative coefficients, indicating a negative relationship. This variable again is contributing to less than 1% variability of volatility. Homicide rate squared, was significant for both UK and China, however each of the countries had opposite signs. Each impacting returns in roughly the same way, with the coefficients absolute values being similar (Unusual that it should be positive for the UK). The last variable that has a commonality between the countries is strikes per person, the UK has a positive relationship and Mexico had a negative relationship, however both have very small coefficients, therefore it may be considered of very little importance in the overall impact on volatility.

Table 2 Volatility regression Results(parts)

The Volatility Regression(parts)								
The United Kingdom			**Mexico**		**China**		**Iran**	
	FTSE		**IPC**		**SCI**		**TSE**	
	Coefficient	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**	**Coefficient**	**t-stat**
Government Stability								
Party Change	-1.34	**-2.32	1.88	***2.94	N/A	N/A	-0.19	-0.81
Votes	-0.61	*-1.71	-0.03	**-2.20	N/A	N/A	0.25	0.19
Socioeconomic Condition								
GDP per head	N/A	N/A	N/A	N/A	N/A	N/A	1.74	**2.41
GINI index	0.26	1.61	0.17	*1.68	-0.31	-1.44	-0.13	-1.27
Unemployment rate	0.58	**2.56	-0.07	-0.24	0.49	0.19	-0.06	-0.33
CPI	0.02	0.5	N/A	N/A	0.45	*1.88	0.01	**2.07
Investment Profile								
Economic Freedom	-0.52	-1.38	-0.2	*-1.90	-0.31	-0.71	-0.05	-0.71
Export	4.77	0.61	-15.04	***-4.26	-0.02	-0.2	N/A	N/A
Import	N/A	N/A	N/A	N/A	N/A	N/A	0.37	***2.95
Exchange rate	3.56	0.97	N/A	N/A	-2.25	-1.42	0	-0.88
Internal Conflict								
Homicide rate^2	1.25	*1.67	0	0.59	-1.56	**-2.03	-0.43	-0.83
Strikes person	0	**-2.10	0	***3.77	0	1.03	0	-1.28
Riots	-0.87	***-2.82	-0.48	-1.09	-0.06	-0.09	-0.13	-0.69
Civil war	3.23	***4.18	1.33	1.51	N/A	N/A	N/A	N/A
External Conflict								
Military	N/A	N/A	N/A	N/A	N/A	N/A	-11.41	***-4.17
R-squared	0.32		0.58		0.39		0.74	
Adj R-squared	0.29		0.55		0.36		0.71	

The coefficient is significant at: *0.1 **0.05 ***0.01

The volatility of stock market returns in the UK and Mexico, are affect by government stability variables, Party Changed, Votes, instead of Election; it is concluded that volatilities of the return in more developed countries have a higher political risk of government stability. There is no common significant variable in Socioeconomic Condition, but that kind of the political risk has important

impact on all the countries. Investment profile case major shocks to the volatility in Mexico, China and Iran, which means the developing countries bear more political risk on foreigner trade. The United Kingdom stands most of the stock volatility from the internal conflict while there is no country stock volatility affected by External Conflict.

This is still very useful as investors can evaluate which political risk factors disrupt the market leading both to highs and lows in returns. It is found the Election exerts the most important effect on shocks of the stock returns no matter the political style of the country or in which of the economic worlds it operates. It is China and Iran that the socioeconomic condition and investment profile factors have the most significant impact, which suggests that the stock returns of the countries in the third economic world have a higher political risk of their country social and economic environments. Investors clearly pay attention to country security generally the due to significance of the Homicide rates in the majority of countries. The Civil War for Mexico has a large negative influence on volatility, while military spending is the most important variable for Iran. This means that regardless of the economic world, the political risks are significant for Internal Conflict and External Conflict based on their country's culture and history. From the results it is apparent that the most important and the most economically significant variables are different for each individual country, signifying no commonality to be generalised at least for large impacts on volatility

Conclusion

To sum up the results, it is suggested that the less economically developed countries are likely to be more exposed to political risks than its developed counterpart. This is due to the increased number of challenges faced by a developing country; tougher political decisions have to be made. The results from the volatility are mixed and varied. However it is fair to postulate that there are more political variables that influence both volatility and returns for the less developed countries, which implies that the importance of these political risks increase with decreasing economic development and is a central finding within the research.

Considering the five political risk components, the risk of Government Stability has a considerable influence on both stock returns and volatility irrelevant of the country the market operates. This is also true for volatility affected by the socioeconomic conditions. Investment Profile risk causes similar significant shocks on volatility in Mexico, China and Iran, which suggests that trade in less developed countries tolerate more risk influence from other countries' policy. Internal Conflict and External Conflict risk exert an impact on returns in Mexico and Iran due to their own war history but no influence on volatility; these results are contrary in the United Kingdom.

It is undeniable that many of the political factors we have chosen to explore play a noteworthy role in influencing volatility. It is therefore conceivable that potential investors and governments alike should consider the results presented in this study. The five elements taken from the (IRCG), have been important in influencing volatility and returns over the four countries, however the influence has not been consistent across all of the countries or between the returns and volatility. For this reason there is potential to further explore this area, perhaps on a larger scale, to delve into the relative importance of economic development and to assess if there are any results that are common.

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