

Analysis of the Relationship between Bond Value and Share Value in the Security Market

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Abstract: This paper evaluates the bond and share value relationship to provide additional information for investors' decisions regarding investments in bonds and shares. It used bond and share values from one large advanced economy stock market (Japan) and from one developing economy stock market (Kenya). The paper is pertinent, as little prior research has combined advanced and developing economy stock market in such analysis. Applying a panel data with the OLS regression, it found that in both the advanced and developing economy stock markets, a significant but negative relationship exists between the share values and bond values. This thus provides a practical information for bond and share investors to know when to dive into a particular investment and to the academia for research and academic inquisition. The paper provides an agenda for further research to expand this analysis by pooling together a number of large advanced economy stock markets and a number of developing economy stock markets. Such future research would determine the degree with which one of the variables (bond value or share value), affect each other in advanced and developing economies – to provide more information to international stock speculators.

Keywords: Financial markets; bond investment; stock investment; advanced market; developing market

JEL Classification: G; G1; G11; G12; G13

1. Introduction

Bond and shares are amongst the most important traded financial instruments, which offer valuable economic function of transferring resources from the wealthy to the needy and providing information about price of capital for strategic economic planning decisions for governments and businesses. (The Economist, 2017) Prior research has bestowed the veracity, that not only does the invisible hand instil uncertainties and implicit risk of price or value oscillation in bonds and shares, but also that both time and an amalgam of systemic and un-systemic vagaries from business conditions (Fama & French 1989) constitute mixed factors that make bond and share values prediction somewhat tenuous. However, studies

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over the years seem to support a trend, for example, Bao and Hou (2014) opine that time factor might be a precursor that stimulates a correlated movement between equities and bonds. Of vital importance is that the understanding of their movement assists investors to hedge related risks. (Bao & Hou, 2014) This interrelatedness between stocks and bonds has motivated recent research for link between stock and bond returns. (Kojen, Lustig & Van Nieuwerburgh, 2017) Various diverse studies have thus emerged with different perspectives on bond and share value relationship. Bao and Hou (2014) analysed the heterogeneity in the related movement of corporate stocks and bonds. Adrian, Crump and Vogt (2015) investigated the non-linearity between shares and bonds. The prediction of bond risk premium using out of sample data has also received research attention. (Zhu, 2015)

Contemporary investors are diversifying investments to international stock markets outside of developed nations to take advantage of potential investment opportunities and values in developing markets. (Ghysels, Plazzi & Valkanov, 2016) Such investors would continuously need information that presents a comparable view of bond and share performance in both developed and developing markets. This research presents this view by using data from an advanced market (Japan) and from a developing market (Kenya) to demonstrate the relatedness between bond and share values. This paper is therefore important for investors as it provides germane information that supports their quest for diversification to developing markets. This is particularly important since investors use information on the correlation of investment types in risk decisions and hedging. (Selmi, Kollias, Papadamou & Gupta, 2017)

This paper has the following structure. The ensuing section after the introduction presents the problem statement and paper objective, this is followed by a review of related empirical literature. Following the literature, the research method is presented; this is followed by the analysis and discussion sections. The final section of this paper is the conclusion.

2. Research Problem and Objective

Although there are evolving literature, which interrogates how bonds and shares are related both in terms of information flow and related prices; (Fama & French, 1989; Demirovic, Guermat & Tucker, 2017; Kojen, Lustig & Van Nieuwerburgh, 2017; Nieto & Rodríguez, 2014); but most of these research appear to concentrate on developed markets. Currently, investors across the developed or advanced markets are looking for diversification and investment in emerging or developing markets; they are thus desirous of information that relates to the developing markets and most importantly if such information also links advanced markets such

that it could portend comparability of stock and bond behaviours. Such research is not common amongst the current genre of related literature. It becomes therefore important to know if bond and share prices in a combined advanced and developing market data may have a semblance of relationship and what form of relationship, if any.

Therefore, the question that forms the crux of this paper is whether bond and shares in a fusion of advanced and developing market data have any relationship. Hence, the core objective of this paper is to present an analysis to examine the relationship between bond and share prices in a combined advanced and developing market bond and shares data. This paper adds to prior related papers that have looked into forms of correlation between bond and share prices and related market information such as information in the bond and share market (Kraft, Vasvari & Wittenberg-Moerman, 2011; Chen et al, 2016) and the bond and share price movement. (Campbell & Ammer, 1993)

3. Related Literature

Bonds and shares constitute important financial instruments for raising capital to assist businesses or government entities. (Puscaciu, 2015; Kafayat, 2014) The importance of the linkage, which subsists between stocks and bonds, constitutes an ongoing research in the financial market literature, mostly as the linkage might have potential assistance in the prediction of stocks and bond values. (Koijen, Lustig & Van Nieuwerburgh, 2017; Demirovic, Guermat & Tucker, 2017) Whilst comparing for similarity of shocks in bond and shares, Saadaoui and Boujelbene (2016) found a significant movement in volatility and shocks transmission in stock and bonds between the emerging markets indices and Dow Jones index. In terms of firm size and stock returns, Banz (1981) found that smaller companies are more disposed to having higher adjusted risk returns than large companies. It has also been asserted that business conditions have strong impact on bonds and share values. (Fama & French, 1989; Narayan, Thuraisamy & Wagner, 2017) Such conditions include inter alia the influence of energy price such as oil price on equity values. (El-Sharif, Brown, Burton, Nixon & Russell, 2005) In addition, the business cycle has been found to affect the bonds and share values by applying the three-factor dynamic no-arbitrage model. (Koijen, Lustig & Van Nieuwerburgh, 2017) In relation to this, there is an indication that uncertainty about corporate bond parameters could affect the trading volume of bonds and its prices. (Guo, Lien, Hao & Zhang, 2017) According to Narayan, Thuraisamy and Wagner (2017), there is a high level of consistent form of predictability between bond and equity. Researchers have also compared the flow of bond and share information. An apparent uniqueness of bond information is the gradual flow of information in the bond market against the flow in the stock market (Chen, Zhang & Zhang, 2016),

which has attracted the interest of researchers as this constitutes apparent uncertainty for investors in stocks and bonds.

In their analysis of the nexus between stocks and bonds, Kojien, Lustig and Van Nieuwerburgh, (2017) established a three factor model that explains the interconnection between stocks and bonds and found that stocks with much values react more to shocks triggered by bond variables. In a related study, Bao and Hou (2014) applied an extension of the Merton model to analyse the co-movement of bonds and stocks. Their findings indicate that, more than other bonds, late maturing bonds are more likely to exhibit a robust correlation with equities and that this relationship is more pronounced in firms with higher levels of imminent or potential credit risk. However, Adrian, Crump and Vogt, (2015) document a non-linear dependency between stocks and bonds.

Furthermore, market uncertainties emanating from credit risks and stock volatilities constitute influences, which might appear ambiguous between bond and shares. (Demirovic, Guermat & Tucker, 2017) Therefore, this means that the relationship between bond and shares could be conditional depending on asset values, credit risks volatilities and of course, on the willingness and robustness with which shareholders and bondholders are willing to transfer wealth. (Demirovic, Guermat & Tucker, 2017) In their related research, Chen et al (2016) analysed the effectiveness with which bond information could be disseminated in the market. They find *inter alia*, that lagged bond returns could be predicted for firms and industries, which are related in nature, especially those corporate with weaker bargaining prowess. In addition, Chen et al (2016) indicate that the bond market information has the propensity to travel more effectively than the information in the share market.

According to Amadeo (2017) there is a likely opposite movement between stocks and bonds with rising stock prices likely to cause a downward bond prices. Similarly, in a study on the conditional relationship between stock prices and bond prices, the DCC and Go-GARCH models were applied to analyse the correlation between emerging market stock prices and bond prices; results showed a negative and significant correlation. (Basher & Sadorsky, 2016)

Other researchers have paid attention to the correlation between bond and share returns. (Nieto & Rodríguez, 2014; Selmi, Kollias, Papadamou & Gupta, 2017) For instance, Nieto and Rodríguez (2014) analysed the relationship between share returns and bond returns from the same company. Using, the panel data approach, their findings indicate a higher correlation under a higher corporate financial leverage. In their study, Selmi, Kollias, Papadamou and Gupta (2017) applied the copula quantile-on-quantile regression and found an existence of substantial heterogeneity on the correlation between bond and stock returns.

However, whether the bond and share relationship holds true for a combined advanced and developing market stock and bond values is unpopular in the literature. This paper contributes to the literature by analysing the relationship between stocks and bond prices by combining an advanced country stock market and a developing country stock market using the Japanese and Kenyan stocks and bonds prices. The analysis is presented in the following sections.

4. Research Method and Analysis

An archival data for this paper was collected from the QuandL archives of stock market data for Kenya and Japanese stock markets (QuandL, 2017) Data was collected for a period of sixteen months, which were arranged in a cross-sectional panel data method, which produced a total of 32 observations. The Gretl software was used to conduct a regression analysis; the regression model is presented below. Prior research on equity prices have also applied the regression statistics. (e.g. Li, 2015; Fontana & Scheicher, 2016; Dimic, Kiviaho, Piljak & Äijö, 2016)

The Regression Model:

$$\gamma = \beta_0 + \beta_1\chi_1 + \varepsilon$$

Where:

γ = bond value

β_0 = intercept

β_1 = regression coefficient

χ_1 = Share value

ε = error (representing uncounted independent variables)

Test of Significance Level: the significance level for the relationship test is at an alpha (α) of 0.05 or 95 percent confidence level.

Hypothesis: H0: *there is no relationship between the share value and bon value in a combined advanced and developing market data.*

Decision: since the alpha level is 0.05, the null hypothesis is subject to rejection if the P-value is less than 0.05 ($P < 0.05$), but the null hypothesis is acceptable if the P-value is higher than 0.05 ($P > 0.05$).

5. Results & Discussion

Table 1. Fixed-effects Regression Result

| Model 1. Fixed-effects, using 32 observations Included 2 cross-sectional units Time-series length = 16 Dependent variable: BondValue | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|
| | <i>Coefficient</i> | <i>Std. Error</i> | <i>t-ratio</i> | <i>p-value</i> | |
| const | 352.393 | 27.6556 | 12.7422 | <0.00001 | *** |
| ShareValue | -0.000614729 | 8.45323e-05 | -7.2721 | <0.001 | *** |
| Mean dependent var | 210.6281 | | S.D. dependent var | 181.9506 | |
| Sum squared resid | 357096.4 | | S.E. of regression | 110.9670 | |
| R-squared | 0.652050 | | Adjusted R-squared | 0.628054 | |
| F(2, 29) | 27.17267 | | P-value(F) | 2.25e-07 | |
| Log-likelihood | -194.5264 | | Akaike criterion | 395.0529 | |
| Schwarz criterion | 399.4501 | | Hannan-Quinn | 396.5104 | |
| rho | -0.007265 | | Durbin-Watson | 1.903295 | |
| Distribution free Wald test for heteroskedasticity - Null hypothesis: the units have a common error variance Asymptotic test statistic: Chi-square(2) = 2.00477 with p-value = 0.367002 | | | Test for differing group intercepts - Null hypothesis: The groups have a common intercept Test statistic: F(1, 29) = 1.18146 with p-value = P(F(1, 29) > 1.18146) = 0.286011 | | |

Table 2. WLS Regression Result

| Model 2. WLS, using 32 observations Included 2 cross-sectional units Dependent variable: BondValue Weights based on per-unit error variances | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------|----------------|-----|
| | <i>Coefficient</i> | <i>Std. Error</i> | <i>t-ratio</i> | <i>p-value</i> | |
| const | 339.621 | 25.8518 | 13.1372 | <0.00001 | *** |
| ShareValue | -0.000591979 | 7.85391e-05 | -7.5374 | <0.00001 | *** |
| Statistics based on the weighted data: | | | | | |
| Sum squared resid | 31.72236 | | S.E. of regression | 1.028305 | |
| R-squared | 0.654426 | | Adjusted R-squared | 0.642907 | |
| F(1, 30) | 56.81210 | | P-value(F) | 2.10e-08 | |
| Log-likelihood | -45.26661 | | Akaike criterion | 94.53321 | |
| Schwarz criterion | 97.46468 | | Hannan-Quinn | 95.50491 | |

Table 3. Dynamic Panel Regression Result

| Model 3. 1-step dynamic panel, using 32 observations Included 2 cross-sectional units H-matrix as per Ox/DPD Dependent variable: BondValue | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|--------------------|----------------|----------|
| | <i>Coefficient</i> | <i>Std. Error</i> | <i>z</i> | <i>p-value</i> | |
| BondValue(-1) | -0.187527 | 0.0174993 | -10.7162 | <0.00001 | *** |
| const | 13.7628 | 3.67941 | 3.7405 | 0.00018 | *** |
| ShareValue | -0.000484964 | 0.000121074 | -4.0055 | 0.00006 | *** |
| Sum squared resid | 633538.3 | | S.E. of regression | | 159.1902 |

The regression result in Tables 1 – 3 tested the hypotheses of no relationship between share value and bond value in a combined advanced and developing country stock market data. Tested at an alpha of 0.05, it can be seen from the result that the *P*-value is 0.001, which is less than the alpha of 0.05. This means that the results lie within the 95% confidence level. Worthy of note about the relationship is that the negative sign on the share-value regression coefficient indicates that an increase in share value might cause a decrease in bond value. This is a useful information for investors and market analysts. In addition, the data have a common error variance and common intercept as indicated in the test for heteroskedasticity and group intercept. This finding is similar to the finding of a causal linkage between equity and bond market in an entropy condition (Parker, 2017); but differ from Adrian et al., (2015) who found a non-linear dependency between stocks and bonds. Although Bao and Hou (2014) indicated a co-movement of bond and shares, but they highlighted that this would depend on certain characteristics at firm level. This paper is unique given that it combined the stock and bond data from an advanced and a developing country to conduct the analysis. It is also unique as it used three different panel regression techniques namely the fixed effect panel regression, the WLS panel regression and the DPD regression, which provided the same result.

6. Conclusion & Future Direction for Research and Policy

The main objective of this paper was to analyse the relationship between stock value and bond value in a combined advanced and developing country stock market data – using data from the Japanese and Kenyan Stock markets (representing an advanced country and a developing country stock markets) respectively. The pertinence of this paper draws from the paper’s argument that research dealing on bond and share movement appears skewed toward the developed markets but little research focussing on a combination advanced and developing country perspective. This research bridges this gap in research and

knowledge by combining the bond and share values from an advanced economy stock market and from a developing economy stock market. The paper applied the panel data arrangement and used three different panel regression statistics to analyse the relationship namely the fixed effect panel regression, the WLS panel regression and the DPD regression. At an alpha (α) of 0.05, the resulting P-value from the three panel regression techniques was less than the alpha, which is $P < 0.05$. The results also showed a significant but negative relationship between the share value and bond value, which indicates that increase in share value results to a likelihood of decrease in bond value. This provides an important new finding and thus a contribution to knowledge – showing that the stock and bond values might behave in a similar fashion in both advanced and developing market. However, more research is recommended, which would combine many developing countries' data with many advanced countries' data for further analysis. This paper is useful for bond and share investors, for stock market analysts and for the academia in case study teaching and research in the postgraduate classes such as in the MBA class.

7. Bibliography

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