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THE INFLUENCE OF THE EXCHANGE RATE ON THE BANKING SECTOR'S STOCK RETURNS: SOME EVIDENCE FROM THE GREEK AND SRI LANKAN STOCK MARKETS

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Abstract. This paper investigates the foreign currency exposure of large local banking institutions in Greece and Sri Lanka by employing multivariate regression analysis for the period August 1995 to November 1998 using daily observations. In contrast to weak relationship found in the U.S. and other developed countries, we find significant contemporaneous and lagged exposure coefficients in both markets, suggesting that a appreciation (depreciation) of the domestic currency value (Greek drachma/Sri Lankan Rupee) against three major currencies (US \$, DEM and JP Yen) has a positive (negative) impact on stock returns of the respective banking institutions. We also find that Greek banking institutions are exposed to all three currencies in contrast to Sri Lankan banking institutions. The important characteristic of our study is that the estimation of the exposure coefficients is based on individual firm level data.

Keywords. Foreign currency exposure; emerging capital markets; stock returns

1. INTRODUCTION

It is widely held that an exchange rate movement affects the value of the firm. Measuring foreign currency exposure is now become a central issue in the international finance, and the impact of foreign currency exposure on the value of the firm has been the subject of analytical literature in recent years. Jorion (1990) emphasizes that the exchange rate are four times as volatile as interest rates and ten times as volatile as inflation. The attention to this issue is more confounded by the introduction of floating exchange rates to the economies and the portfolio capital flows to the emerging stock markets.¹ The existing literature has identified three types of exchange rate risk exposures, namely, transaction, translation and the economic exposure. Transaction exposure occurs when one currency must be exchange for another, and when a change in foreign exchange rates occurs between the time of the transaction executed and the time it is settled. Translation exposure is the sensitivity of home currency book values and accounting earnings to the changes in exchange rates, arising from foreign currency investing and financing activities. Economic exposure arises as the effect of foreign exchange movements on corporate revenues, costs, profits, cash flows, assets, and liabilities, ultimately, on corporate value. It can be defined simply in terms of all expected cash flow effects from foreign exchange rate changes. However, we argue that there is fundamentally only one type of exposure that is economic exposure. The separate exposures only provide a sensible classification scheme for dealing with them in practice.

Exchange rate fluctuations affect future cash flows of firms and thereby stock values. Previous studies investigating foreign exchange exposure on stock returns oriented on stock return data from the United States, Japan and Australia. According to our knowledge, there is none or very few research studies focusing on this contemporary vital issue in emerging stock markets. On the other hand, the research findings of developed countries were unable to detect the significant relationship between these two variables.²

Therefore, the objective of this study is to bring together the two recent, but separate developments in the area of finance, namely, developments in the emerging stock markets³ and the effect of floating exchange rates. It is motivated to study foreign exchange exposure on banking sector's stock returns, which is actively traded in the Athens and Colombo stock exchanges respectively. It is believe that banking firms are highly sensitive to

¹ Emerging stock markets can be identified in different ways. The term "Emerging Market" can imply that a process of change is underway with stock markets growing in size and sophistication, in contrast to markets that are small and stagnant. The term can also refer to any market in a developing economy, with the implication that all have potential for development. A stock market might then be said to be "Emerging" if it meets at least one of two criteria. (1) An Emerging Economy Criterion, and (2) A developing country criterion - Emerging Market fact Book- International Monetary Fund 1998.

² Using monthly returns data of 287 US multinational firms, Jorion (1990) finds only few firms showing significant exchange exposures. Bodnar and Gentry (1994) reported only eleven of thirty -nine industries investigated having significant exchange rate exposure for the period from 1979 to 1988. Australian stock markets are analyzed in Loudon (1993) and Khoo (1994), both, however, fail to detect a significant statistically sensitive relationship between stock returns and the exchange rate changes.

³ The International Monetary Fund has recognized Athens stock exchange and the Colombo stock exchange as emerging stock markets.

exchange rate movements. Furthermore, the investigation is vital in relation to the Greece and Sri Lankan economies due to the various reasons. Because, the Greek economy is undergoing a series of structural changes along with the European Union directives and about to be integrated to the Euro Currency zone. In contrary, Sri Lanka is also in the process of introducing radical changes into the economy by liberalizing financial sector, privatization of public enterprises and taking measures to develop a Colombo as a regional financial center in Asia. Furthermore, the unique feature of this paper is to investigate the phenomenon more closely by assuming each individual banking firm as a unit of analysis.

This paper is organized as follows. The first section describes the relationship between exchange rate movements and the stock returns and discusses the importance of the study in the context of emerging capital markets. The section 2 and 3 presents the methodological issues involved. In sections 4 and 5 present the model specifications for capturing the foreign exchange exposures in Greece and Sri Lanka. The diagnostic test procedures are documented in section 6. The sample of study and the data is outlined in section 7, while the results are discussed in section 8 and general discussion is contained in the same section. The section 9 concludes the paper.

2. MODELING ECONOMIC EXPOSURE TO THE MULTIPLE RISK FACTORS

To give a perspective to the economic exposure on stock returns, the author considers a simple bivariate model as a starting point. Then consider the elaborate the implications of expanding a model of foreign exchange exposure to include other additional risk variables. The following bivariate model⁴ expresses the relationship between exchange rate and stock returns in the context of individual firm.

$$R_{it} = \alpha_0 + \beta_1 EX(t) + \varepsilon(t) \dots\dots\dots (1)$$

where, $EX(t)$ denotes the nominal bilateral exchange rate, R_{it} is the value of the firm, α_0 is the intercept term and $\varepsilon(t)$ is the random error term. This term is normally distributed with mean zero and a constant variance, i.e. $\varepsilon(t) \sim N(0, \sigma^2)$. Above bivariate model can be extended to detect multivariate exposures.⁵

The influence of the exchange rate effect on the banking sectors' stock returns cannot be studied in isolation with single foreign exchange rate, rather it needs to consider

⁴ Bivariate relationship is useful for illustrative purposes, focusing on bivariate relations can greatly distort the estimated exposures, because such estimates of exposure coefficients overlook the interrelations among exposures.

⁵ Schnabel J.A (1989) in his short article extensively reviewed the drawbacks of using single currency in the economic exposure model by referring to original work of the Adler and Dumas (1984) and the subsequent literature and contribute the corroborating suggestion that multiple regression model as appropriate vehicle for examining foreign currency exposure on firms cash flows.

the multiple of currencies. To capture the effect of multiple currency movements on stock returns we employed the following multi-factor model.

$$R_{it} = \alpha_1 + \beta_1 EX_1 + \beta_2 EX_2 + \beta_3 EX_3 + \varepsilon_t \dots\dots\dots(2)$$

where R_{it} is the stock returns of the each individual banking institution and the $\beta_1, \beta_2,$ and β_3 are the regression coefficients which measures the sensitivity of movements in US dollar, Deutsche Mark and Japanese Yen exchange rates for bank i at time t . ε_t is the error term.

However, exclusion of the other risk factors (except the exchange rate) in exposure model underestimates the true exposure. Choi et al. (1992), Khoo (1994), Choi and Prasad (1995) are emphasized the importance of incorporating the market rate of return into the exposure model. We therefore, specified the following multivariate model.

$$R_{it} = \alpha_2 + \beta_1 EX_1 + \beta_2 EX_2 + \beta_3 EX_3 + \beta_4 MRT + U_t \dots\dots\dots(3)$$

where, $\beta_1, \beta_2, \beta_3$ and EX_1, EX_2, EX_3 are as defined in the model 2 and the MRT is the market rate of return. U_t refers to the error term of model 3. The estimates based on model specifications 2 and 3 greatly distort the exposure coefficients with large F values and auto correlations. Therefore, the purpose of documenting above specifications is to provide a rational sequence to the phenomenon under study.

Since we are dealing with time series data, the pre requisite for any model specification is to test whether the time series is predicted on the requirement that the classical stationary assumption is satisfied. Therefore, the first step involved whether exchange rate and stock return series are stationary. If the series are stationary, a stable long run relation exist between them and use of OLS techniques on the levels is appropriate. Consequently, the second step tests whether the stock price and exchange rate series are said to be co-integrated. The next step consists of error correction representations for the co integrated series. As demonstrated by the Engle and Granger (1987), an Error Correction Model (ECM) can be used with co-integrated variables to examine the relation between the variables. Because, the ECM can capture the partial adjustments one variable makes to a shock experienced by another variable. Moreover, ECM relates changes in one variable to lagged changes and lagged linear combinations of levels of the variables. Therefore, ECM may be considered an econometric alternative to a theory linking the dynamic and statistic components of the relation between the series being investigated.

3. UNIT ROOT AND CO-INTEGRATION TESTS

3.1 Unit root test

A series is said to be integrated of order d , denoted by $I(d)$, if the number of times the series must be differenced to achieve stationary. We implement the Augmented Dickey Fuller test to determine whether univariate time series contain a unit root.

Especially, tested whether stock return series, exchange rate series and market indexes are integrated of order zero, $I(0)$, that is these series are stationary. This was achieved by performing the Dickey-Fuller and Augmented Dickey Fuller tests based on the standard regression with a constant and a time trend.

$$\Delta y_t = \alpha_0 + \alpha_1 t + \lambda y_{t-1} + \sum_{i=1}^p \beta_i \Delta y_{t-1} + \varepsilon_t \dots \dots \dots (4)$$

where, Δ is the first difference variable, hence $\Delta y_t = y_t - y_{t-1}$ and $\alpha_0, \alpha_1, \lambda, \beta_i$ are the coefficients and t is the time trend, ε_t is the white noise error term. The results show that the all variables are not stationary in the levels; however, both the Dickey Fuller and Augmented Dickey Fuller tests reject the null hypothesis of non-stationary after the variables have been first differenced. Thus variables are $I(1)$. Having established the order of integration of individual series, we then test for co-integration. The objective is to determine the stochastic trends in stock returns; exchange rates and market index series contain unit roots and have long run relationships.

3.2 Co-integration test

Consider two or more $I(1)$ variables. Although each series may wander widely and possess differing short run dynamics, some linear combination of the series may be stationary so that they are bound in a long run equilibrium relation. Engle and Granger (1987) refer to this Characteristic as co-integration. Co-integration tests are used to detect the long run relation between variables. In this end we applied the two-step procedure suggested by them. First, we run the following co-integrating regression for each banking institution in our sample.

$$SR_t = \alpha_1 + \beta_1(EXT_1) + \beta_2(EXT_2) + \beta_3(EXT_3) + \beta_4MRT + \varepsilon_t \dots \dots \dots (5)$$

where, SR_t is the stock return series of the each banking firms, $EXT_1, EXT_2,$ and EXT_3 are US dollar, DM and Japanese Yen exchange rates respectively. MRT is the market rate of return. ε_t refers to the error term. Secondly, we test for co-integration between stock returns and other explanatory variables by applying the Dickey Fuller test on the residual series from equation 5. More specifically, the co-integration test is based on the following regression equation,

$$\Delta \varepsilon_t = \theta \varepsilon_{t-1} + u_t \dots \dots \dots (6)$$

We test the hypothesis that ε_t is not stationary, i.e., the hypothesis of no co-integration. The hypothesis is rejected at one percent level for all the series examined.⁶

⁶ Unit root and co-integration test results are available on the request from authors.

4. THE EXPOSURE MODEL – GREECE

Since the series are co-integrated the Granger representation theorem implies that the dynamic relation between time series data of the stock returns and the exchange rate series should be investigated within the framework of Error Correction Model. The ECM captures both the short run dynamics between time series and their long run equilibrium relation.

Therefore, the following multivariate regression model is estimated to test our hypothesis.

$$\Delta \ln(R_i)_t = \alpha_1 + \beta_1 \Delta \ln(MRT)_t + \beta_2 \Delta \ln(MRT)_{t-1} + \beta_3 \Delta \ln(R_i)_{t-1} + \beta_4 \Delta \ln(EXT_1)_{t-1} + \beta_5 \Delta \ln(EXT_2)_{t-1} + \beta_6 \Delta \ln(EXT_3)_{t-1} + \beta_7 \ln(EXT_1)_{t-1} + \beta_8 \ln(EXT_2)_{t-1} + \beta_9 \ln(EXT_3)_{t-1} + \beta_{10} \ln(R_i)_{t-1} + V_t \dots\dots\dots(7)$$

This model encompasses unique characteristics. As shown in model specification, first differenced variables ($\Delta \ln(R_i)_t = \ln(R_i)_t - \ln(R_i)_{t-1}$) are used to capture the short run effect of variables and the non-differenced variables are employed to capture any long run effects that exist between variables. On the other hand, first-differenced variables are popular in applied research for removing the presence of auto correlation in the model specifications. Furthermore, this model assumes equity markets efficiently readjusts stock returns in response to contemporaneous movements in exchange rate and market rate of return factors. Accordingly, where $\Delta \ln(R_i)_t$ is the stock return of the each individual banking firm, β_1 , β_2 , and β_3 are the coefficients which captures the short run effect of market rate of return, the long run effect of market rate of return and the impact of banks past return movements on same banks' stock returns respectively. β_4 , β_5 and β_6 are the coefficients which captures the short run effect of movements of US dollars, Deutsche mark and Japanese yen movements on stock returns. The β_7 , β_8 , and β_9 are the first lagged variables introduced for capturing the long-term effect of foreign exchange movements on stock returns. β_{10} is the coefficient measures the long term influence of immediate past returns of the same banking firm on its stock returns and V_t is the error term. All variables are expressed in natural logarithmic terms.⁷

5. THE EXPOSURE MODEL – SRI LANKA

The error correction model we employed to detect the currency exposure on Greek banking institutions do not match to Sri Lankan sample of banking institutions. Because, the data generating process in Sri Lanka is different from Greece due to distinct socio-

⁷ Logarithmic transformations are often used in time series analysis as a means of removing growth over time in the variance of the data. On the other hand, using natural logarithm for variables (to the base e=2.71828denoted by ln) make easier to interpret the economic relationships.

economic factors. Therefore, we estimate the following model for detecting currency exposure in Sri Lankan banking institutions.

$$\ln R_{it} = \alpha_1 + \beta_1 \ln(\text{MRT}) + \beta_2 \ln(\text{MRT})_{t-1} + \beta_3 \ln(\text{MRT})_{t-2} + \beta_4 \ln(\text{US}) + \beta_5 \ln(\text{DM}) + \beta_6 \ln(\text{DM})_{t-1} + \beta_7 \ln(\text{YEN}) + \beta_8 \ln(\text{Rit})_{t-1} + \varepsilon_t \dots \dots \dots (8)$$

Where, $\ln R_{it}$ is the rate of return on the i th banking institution's stock, $\ln \text{MRT}$ is the market rate of return, which is the Colombo stock exchange all share price index. The $\ln \text{US}$, $\ln \text{DM}$ and $\ln \text{YEN}$ are the bilateral exchange rates relevant to the Sri Lankan rupees, and ε_t is the random error term. The parameter β_1 measures the effect of market rate of return on stock returns, β_2 and β_3 measures the lagged market rate of return on stock returns, the β_4 and β_5 measures the changes in US dollar and DM exchange rates on stock returns, β_6 measures the effect of lagged DM exchange rate on stock returns, β_7 measures the changes in Yen exchange rate movements on stock returns and β_8 measures the effect of lagged stock return on same banking institutions stock returns. The ε_t is the error term.

6. SPECIFICATION AND DIAGNOSTIC TESTS

Having established the relationship between exchange rates and stock returns according to the above model specifications, we subjected the model residuals to some key econometric testing procedures. This step was undertaken to ensure that the specified model equations were free from conventional econometric problems. First, employing Jarque-Bera test we check the normality of the series involved. Goldfeld-quandt test employed to test the heteroscedasticity. Lagrange multiplier test used to identify the serial correlation and chow break point test is employed to determine whether there exists equality of coefficients generated in the two sub periods.⁸

7. SAMPLE OF THE STUDY AND DATA

The sample of this study consists of banking firms listed in the Athens and Colombo stock exchanges respectively. The chosen sample period was August 1995 to November 1998 with daily observations of stock returns and exchange rates. The data set contains 860 daily observations for Greece and 821 observations for Sri Lanka, the difference in series is due to the differences in working days of each country. In all cases we used the logarithmic transformations of the stock return, market index and exchange rate series.

⁸ The diagnostic test results are not reported in the text due to the limited space and available on request.

Individual stock returns, ASE general index and bank index data were obtained from the Athens Stock Exchange data files. There are only eight banks, which has complete trading histories. These banks are Commercial Bank of Greece, Ergo Bank S.A., National Bank of Greece, NIBID, General Bank of Greece, Ionian Bank, Bank of Piraeus and Alfa Credit Bank respectively. Same set of data collected from the Colombo stock exchange. However, only five banks having complete trading information. The banks are Commercial Bank of Ceylon Ltd, Hatton National Bank Ltd, Development Finance Corporation of Ceylon Ltd, National Development Bank and Sampath Bank Ltd.

Bilateral nominal exchange rates⁹ were extracted from the Central banks of each country. In case of Greece, GRD/US\$, GRD/DM, GRD/JPY were obtained from the Bank of Greece. Exchange rates of SLR/US\$, SLR/DM, SLR/JPY were collected from the Central Bank of Sri Lanka.

8. ESTIMATION RESULTS

This section discusses the estimated coefficients in respect to each individual banking institution.

The estimated regression coefficients are negative and significant it means that increasing exchange rate (a depreciating domestic currency) has a negative effect on stock returns of banking institutions. This implies that weak drachma or Sri Lanka Rupee value would bring down the stock returns. On the other hand, positive significant coefficients mean that decreasing exchange rate (a appreciating domestic currency) has a positive effect on the stock returns, implying that strong domestic currency value would increase the stock returns. The results of OLS estimations are reported in table 1 (Greece) and table 2 (Sri Lanka) at the end.

8.1. Results of Greek banking institutions

Commercial Bank of Greece (CBG)

Among the estimated parameters, seven coefficients are found to have a significant effect on stock returns of Commercial bank of Greece. The short run dollar sensitivity coefficient is 0.306 and the long run dollar effect was found to be -0.192. The long run DM exposure coefficient is 0.216. These regression coefficients are significant at one percent and five percent levels respectively. This implies that in the short run one percent appreciation in Greek Drachma value (depreciation of US dollar exchange rate) would impacts in increase the CBG stock returns by 0.306 percent. In the same token, the long run

⁹ The distinction between real and nominal exchange rates are important in empirical research, however, there is little difference between the two in practice because they are highly correlated. Therefore, this paper makes use of nominal exchange rates.

DM exchange rate movements result in increase bank's stock returns. The long run dollar exposure coefficient reported negative value, implying that during the course of long run period US dollar movements have negative effect on CBG stock returns. According to the estimated coefficients it has proved that stock returns of CBG found to have sensitive to all three major currencies. The direction of exposure of this particular bank is consistent with their operations. Recently, the bank has extended their international activities covering the wide geographical regions during our sample period. The long run relation between market portfolio and the CBG stock returns was 0.109 and highly significant. This is not surprising because, during our sample period of study CBG reported second highest market capitalization in the Athens Stock Exchange. Moreover, The long run Japanese yen exposure sensitivity towards the banks stock return is -0.062 , showing that appreciation of GRD (depreciation of Japanese yen exchange rate) is effect to bring down the stock returns. The short run DM and Japanese yen exposure coefficients were dropped out from our model specification since they were found to be insignificant. The overall return variation accounted to all variables was 12%, though it is small, provides important economic meaning. Finally, the model fit to the employed variables and free from conventional econometric problems apart from the normality test.

Ergo Bank S.A. (EB)

The particular bank's long run DM exposure sensitivity is -0.156 and Yen exposure coefficient is 0.044 and significant at one and five percent levels respectively. Short run Dollar, DM and Yen coefficients are dropped out from the model specification because of the reason of non-significance. Therefore, it appears that immediate past long run DM exchange rate movements negatively and long run Yen exchange rate movements positively affects bank's stock returns. The short run market exposure coefficient (β_1) removed from the model due to non-significance, while long run exposure coefficient (β_2) is significant at one percent level. The model performed reasonably well.

National Bank of Greece (NBG)

Interestingly both short run and long run dollar sensitivity coefficients were found to be significant. The coefficient β_4 on short run dollar exchange rate movements was -0.211 and long run coefficient β_7 was -0.038 , implying that immediate past increase in dollar exchange rates (depreciating domestic currency) in the short run and the long run, impacts in decreased the NBG stock returns. In addition to that, the coefficients β_8 and β_9 (the long run DM and yen exposure coefficients) were found to be negative and significant at five and one percent levels respectively. Therefore, long run DM movements and Yen movements affected negatively on bank's stock returns. This nature of foreign currency exposure of this bank can be justified by screening the operations of the bank is involved. During our sample period loans in foreign currency increased at a faster pace of this bank, because of the increased demand from the industry. Banks adequate foreign exchange liquidity successfully absorbed the increased demand.

On the other hand, short run and long run sensitivity of market rate of return on particular bank's returns were highly significant. Therefore, it reflects the existence of

strong relationship between market portfolio and the NBG stock returns (the coefficients β_1 and β_2 are 0.580 and 0.306 respectively - table 1). This behavior is consistent with the relative weight of the banks market capitalization towards the ASE general index (NBG's capitalization at December 1997 stood at GRD 564 billion, an increase of 126.3 percent on the previous year. This figure represents the 21.7 percent of total banking sector capitalization and 5.8 of the total ASE capitalization).

NIBID

None of the currency exposure coefficients were significant apart from the long run DM exposure coefficient with respect to this bank. The coefficient appears to be -0.174 at five percent level significance. The long run market portfolio appears to be (β_2) positive and significant at one percent level. Among the banking institutions this particular banking firm has shown lowest return variation according to the coefficient of variation (R^2 was 4 percent). This is justified because this particular bank is mainly deals with investment banking activities.

General Bank of Greece (GBG)

The bank's long run dollar sensitivity is -0.092 and short run yen sensitivity is -0.207 respectively. Both the exposure coefficients were negatively affected towards GBG's stock returns during this period, implying that depreciation of domestic currency value (GRD) would reduce the bank's stock returns. The long run market sensitivity coefficient is 0.089 and significant at one percent level. Rest of the currency exposure coefficients is found to be insignificant and in turn removed from the model. The model worked considerably well.

Ionian Bank (IB)

This bank's exposure to foreign currency movements was found to be significant only to the long run dollar and long run DM movements. The coefficients on currency movements are -0.199 and 0.150 respectively. Therefore, it appears that immediate past dollar movements bring down stock returns of Ionian Bank in the long run, while DM injecting positive influence on bank's returns at the same time.

Bank of Piraeus (BOP)

Among the regression coefficients, all long run foreign currency exposures found to be highly significant at one percent level. The long run dollar exposure coefficient, β_7 is -0.123 and β_8 on DM is -0.064 , implying that one percent unit domestic currency depreciation would result in reduce the BOP's stock returns by 12 percent and 6 percent respectively. Moreover, the effect of the long run yen movements found to be positively responsive to the bank's returns (the value of the β_8 on DM is 0.150 reported in table 1). Parallel with long run DM exposure, the short run exposure too found to be effect

negatively, and implying that DM transactions were dominated the transactions of this particular bank. The short run dollar and yen exposure coefficients were omitted from the final specification since it appears insignificant. The model performed reasonably well except the normality of the error terms.

Alfa Credit Bank (ACB)

The short run dollar exposure coefficient is -0.414 and the long run DM exposure coefficient is -0.240 and both the coefficients found to be highly significant, showing that an immediate past domestic currency depreciation (an increase in the exchange rate) has a negative impact on the ACB's stock returns in the long and short run periods. Moreover, the banks stock returns were highly sensitive to market rate of return, since the coefficient is 0.101 and significant at one percent level. The short run DM, Yen and long run dollar, Yen variables are dropped from the model due to non-significant.

In this section, we examined the foreign currency effect on Greek Banking Institutions. We found that the exchange risk exposure patterns are firm specific. Therefore, we recognize that exchange rate exposure pattern may be examined by considering firm specific details such as corporate hedging policies, risk management techniques etc. In particular, we found that dollar exposure coefficients vary between -0.211 and 0.30 in the short run and in the long run it varies between -0.092 and -0.199 respectively. The long run DM exposure coefficient is significant in six out of eight banking institutions examined. Moreover, Japanese yen exposure was found to be significant in five out of eight banking institutions.

Therefore, our estimations revealed the existence of foreign exchange effect on Greek Banking institutions in the short and the long run periods relevant to the major currencies.

8.2. Results of Sri Lanka banking institutions

Commercial Bank of Ceylon Ltd

Commercial Bank of Ceylon Limited provides banking and related services such as personal banking, trade financing, resident and non-resident foreign currency operations, corporate and retail credit, project financing, lease financing and rural credits. However, the test results revealed that this particular bank is sensitive to the US dollar exchange rate movements. The coefficient β_1 on US dollar is found to be -0.033 and significant at ten percent level implying that appreciating US dollar would decrease the Commercial bank's stock returns. It is interesting to note that market rate of return is not sensitive to this particular bank's stock return generating process. However, lagged stock return of this particular bank is sensitive at five percent level towards stock returns.

Development Finance Corporation of Ceylon Ltd (DFCC)

DFCC provides a diverse range of project financing and investment banking services for development activities in Sri Lanka. By legislation this bank is not allowed to perform the commercial bank activities.

The long run US Dollar sensitivity coefficient is -0.052 and significant at five percent level, implying that currency depreciation (appreciation in US \$ exchange rate) effect to reduce the stock returns of the particular banking institution. The lagged stock return is found to be -0.010 , implying that past movements of this particular bank's stock values determines the future stock returns. However, the effect is found to be negative in this regard.

Hatton National Bank Ltd (HNB)

HNB offers comprehensive range of services including commercial credit, project lending and financing, corporate finance, leasing, and personal banking. This particular banking institute conducts its activities principally in Sri Lanka.

The bank's US dollar sensitivity coefficient was found to be -0.062 , significant at five percent level, showing that weaker Sri Lanka rupee is effected to reduce the stock returns. None of the currency exposure coefficients were found to be significant. Moreover, lagged stock value of this particular bank is also sensitive to current stock return movements (the coefficient β_8 is -0.013 and significant at five percent). It is interesting to note that market rate of return is not sensitive towards this bank's stock returns and therefore, we drop the particular variable from model specification.

National Development Bank Ltd (NDB)

This particular bank principally concerned with the business development financing, merchant banking, venture capital, stock broking, and fund management and property development.

The long run dollar sensitivity coefficient is -0.017 and significant at five percent level, showing that immediate past depreciation of the US dollar exchange rate reduces the particular banks stock returns. Moreover, the NDB's stock returns are sensitive to Japanese yen exchange rate movements. The estimated Yen exposure coefficient is 0.005 and significant at five percent level, indicates that, when Yen exchange rate is appreciating, in turn it would increase the stock value of National Development Bank.

Sampath Bank Ltd

The bank's sensitivity coefficients on US Dollar, DM and Japanese Yen exchange rates are 0.068 , 0.070 , and 0.071 respectively. All exchange rate exposure coefficients are positive and highly significant. The implication is that decreasing exchange rates applicable to the three major currencies would increase the stock returns of this particular bank. The results are surprising, because, this particular bank is exposed simultaneously to all the

three major currencies. Moreover, the contemporaneous and lagged market rate of return is also highly significant. In addition, we test the relationship by regressing stock returns against lagged stock returns and the significance of the coefficient would imply that the current stock return could be predicted by lagged stock returns.

The diagnostic tests are performed well except for the normality test for the Sri Lankan sample of banking institutions.

We examined the foreign currency effect on Greek and Sri Lankan sample of banking institutions. We found that the exchange rate exposure on stock returns is positive (negative) in relation to the appreciation (depreciation) to the exchange rate movements. However, existence of insignificant exposure coefficients does not mean that banking institutions are not exposed to the exchange rate movements. A fundamental feature of our study is in the sight that exchange rate fluctuations like any other macroeconomic factor should have varying effects on individual banking firms. Therefore, the reported variation in exchange rate exposure coefficients of banking institutions is a reflection of differences exists among the banking institutions. Fundamentally a selected banking institution's in our study belongs to the same line of business, but within the banking institutions there may differences in their activities and directions. Therefore, the signs and the magnitudes of the exposure coefficients differ among banking institutions. Especially, in case of Greece, we found that banking institutions are exposed to all three major currencies. In contrast, Sri Lankan banks are mainly exposed to the US Dollar exchange rate movements, except the one (Sampath) banking institution we examined. The possible reason is that selected banking institutions are mainly home biased; in turn proportion of the foreign currency transactions is very small in comparison to the Greek banks. At present Greek banks are heavily involved in foreign currency denominated operations. However, it is important to note that this research study is still progressing at the time and much work has remained to be done in this area.

9. CONCLUSIONS

In this paper we investigated whether there exists any relationship between banking institutions stock returns and exchange rate fluctuations using a sample of large Greek and Sri Lankan banking institutions, which is listed in the respective stock exchanges. Using the time series data, by employing multivariate regression, we find that Greek banking institutions are affected differently by exchange rate movements due to major currencies namely, US dollar, DM and Japanese yen against the Greek Drachma. In contrast, we found significant contemporaneous and lagged relationship between foreign currency movements and stock returns of Sri Lankan banking institutions. The proportion of variation of stock returns attributed to the exchange risk factors are large in Greek sample in comparison to the Sri Lankan sample of banking firms. The possible explanations for this are that the exposure is dependent on firm specific, country specific and other country dominated socio economic factors.

Although, we managed to document the significant exchange rate exposure coefficients for both countries, much more work is required in this area. Especially, investigating, the firm specific determinants of exchange rate exposures, the effect of hedging strategies of the firms and exploration of whether the human factor of each individual banking firm is responsible for return variation etc. Further more, future research is needed to address the efficiency of the foreign exchange risk management techniques for the each individual banking institutions and their organization and comparison the results obtained with non-financial firms covering the longer time horizons.

TABLE 1 - RESULTS OF GREEK BANKING INSTITUTIONS

$$\Delta \ln(R_{it}) = \alpha_0 + \beta_1 \Delta \ln(MRT)_{i,t-1} + \beta_2 \Delta \ln(MRT)_{i,t-1} + \beta_3 \Delta \ln(R_{it})_{i,t-1} + \beta_4 \Delta \ln(R_{it})_{i,t-1} + \beta_5 \Delta \ln(R_{it})_{i,t-1} + \beta_6 \Delta \ln(R_{it})_{i,t-1} + \beta_7 \Delta \ln(R_{it})_{i,t-1} + \beta_8 \Delta \ln(R_{it})_{i,t-1} + \beta_9 \Delta \ln(R_{it})_{i,t-1} + \beta_{10} \Delta \ln(R_{it})_{i,t-1} + V_t$$

DEPENDENT VARIABLE	α_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_{10}	R ²	F-STAT	D-W STAT
1. COMMERCIAL BANK OF GREECE			0.105* (7.30)	0.225* (6.96)	0.306* (2.22)			-0.192* (-6.58)	0.216* (6.09)	-0.043 (-2.35)	-0.062* (-7.34)	.12	19.45	2.00
2. ERGO BANK S.A.	0.619* (3.87)		0.059* (6.65)	0.173* (5.24)					-0.156* (-3.70)	0.044** (2.52)	-0.048* (-6.77)	.08	16.02	1.97
3. NATIONAL BANK OF GREECE	0.580* (3.32)	0.306* (6.96)	0.076* (5.29)	0.234* (7.202)	-0.211*** (-1.73)			-0.038*** (-1.74)	-0.091** (-2.23)	-0.017* (-1.00)	-0.037* (-4.87)	.15	18.60	2.13
4. NIBID	0.746* (3.062)		0.069* (5.57)	0.103* (3.04)					-0.174* (-4.00)		-0.039* (-5.64)	.04	10.32	2.00
5. GENERAL BANK OF GREECE	0.385* (3.42)		0.089* (5.961)	0.145* (4.31)			-0.207** (-1.83)	-0.092* (-3.19)			-0.059* (-5.79)	.06	11.29	2.00
6. IONION BANK			0.119* (7.60)	0.188* (5.79)				-0.199* (-6.80)	0.150** (6.67)		-0.060* (-7.47)	.10	24.17	2.00
7. BANK OF PIREAUS	0.514* (2.37)		0.086* (6.56)	0.175* (5.31)		-0.492* (-2.72)		-0.106* (-4.20)	-0.123* (-2.75)	0.064* (3.22)	-0.028* (-5.43)	.11	16.29	1.98
8. ALFA CREDIT BANK	0.998* (4.61)		0.101* (7.01)	0.063** (-1.90)	-0.414** (-2.32)				-0.240* (-5.06)		-0.053* (-6.86)	.06	11.63	1.99

Notes: * significant at 1 percent. **5 percent and*** 10 percent levels respectively. The t statistics is provided underneath of the regression coefficients.

TABLE 2 - RESULTS OF SRI LANKA BANKING INSTITUTIONS

$$\ln R_{it} = \alpha_1 + \beta_1 \ln(\text{MRT})_{i,t-1} + \beta_2 \ln(\text{MRT})_{i,t-2} + \beta_3 \ln(\text{MRT})_{i,t-1} + \beta_4 \ln(\text{US}) + \beta_5 \ln(\text{DM}) + \beta_6 \ln(\text{DM})_{i,t-1} + \beta_7 \ln(\text{YEN}) + \beta_8 \ln(\text{Rit})_{i,t-1} + \varepsilon_t$$

DEPENDENT VARIABLE	α_1	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	R ²	F-STAT	D-W STAT
1. COMMERCIAL BANK OF CEY.LTD	0.281** (2.30)				0.033*** (-1.95)	0.008 (-0.60)	-0.019 (-1.46)	-0.002 (-0.83)	-0.009** (-2.08)	.008	1.35	1.89
2. DFCC	0.274*** (1.85)	0.006 (0.87)			0.052** (-2.15)	-0.002 (-0.24)	-0.010 (-0.92)	-0.001 (-0.61)	0.010*** (-1.70)	.006	0.84	2.23
3. HATTON NATIONAL BANK LTD.	0.351** (2.14)				-0.062** (-2.10)	-0.007 (-0.51)		0.000 (0.19)	-0.013** (-2.39)	.007	1.45	2.10
4. NATIONAL DEVELOPMENT BANK LTD.		0.006 (1.43)			-0.017** (-2.17)	0.009 (1.22)		0.005** (2.00)		.012	3.46	2.01
5. SAMPATH BANK LTD.		0.052* (2.97)	0.057* (3.31)		0.086* (3.36)	0.070* (-2.79)	0.071* (-2.81)		-0.139* (-7.76)	.069	12.12	2.74

Notes: * significant at 1 percent, **5 percent and*** 10 percent levels respectively. The t statistics is provided underneath of the regression coefficients.

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