The Economic Exchange Rate Exposure: Evidence for a Small Open Economy

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Abstract: This study examines the economic exchange rate exposure for 22 industries in Pakistan. The key findings of the study are as follows. Firstly, it shows that industry-level share values are statistically significantly influenced by changes in the PKR/US-dollar exchange rate in general. Secondly it reports a statistically significant lagged response of stock values to exchange rate change. Finally, the highly capital intensive industries are, however, more exposed to changes in exchange rate as compared to less capital intensive industries. The robustness of the exchange rate exposure does not fall over time.

JEL classification: G15; F23; F31
Keywords: Exchange rate exposure; Small open economy; Capital intensive industries

I. Introduction

The role of foreign exchange rate in economic development is always remaining debatable and controversial in the development literature. With the passage of time, the importance of exchange rate is increasing due to the financial reforms and trade liberalization alike. Fluctuations in exchange rates are of great concern to households, policymakers and business firms. In the 1990s, markets for goods and finance are global. When business firms in one country want to trade, borrow, or lend in another country, they have to conduct their transactions in different currencies. Therefore, it is widely believed that the abrupt exchange rate movements have a significant impact on business firms' economic decisions. Particularly, those firms that engaged in international trade are quite sensitive to exchange rate fluctuations[1].

The rapid expansion in international trade and adoption of floating exchange rate regimes by money economies led to increase foreign exchange rate volatility. Greater exchange rate fluctuations (uncertainty) may increase the value of waiting and hence affect the competitiveness of firms engaged in international competition. A less volatility of exchange rate has positive impact on economic activities and makes domestic industries relatively less competitive. That is why; the knowledge about firms' exchange rate exposure is of great interest to investors seeking to hedge their portfolio and to corporate managers making management decisions.

As mentioned by existing body of theoretical literature, there are three types of exchange rate exposure under floating exchange rate regimes viz. translation exposure, transaction exposure and economic exchange rate exposure. Translation and transaction exposures are accounting based and defined in terms of book values of assets and liabilities denominated in foreign currency. However, economic exchange rate exposure is the sensitivity of firm value to changes in exchange rates. A firm is said to exhibit exchange

[1] As reported by Adler and Dumas (1984), even the value of firm whose entire operations are domestic may be affected by exchange rate fluctuations, if its input and output prices are influenced by exchange rate movements.

rate exposure if its share value is affected by exchange rate volatility (see, for details Adler and Dumas (1984).

Following by Adler and Dumas (1984) and Adler and Simon (1986), most of the empirical studies measured the economic exchange rate exposure as the slope coefficient of a univariate regression of stock returns on exchange rate changes. An alternative, 'residual" exposure or the deviation of the firm's exposure from the market portfolio's exposure is measured as the slope coefficient in a multivariate regression. Jorion (1990) was the first study that included the return of the market as an additional variable in univariate model to control for market movements.

A large number of studies including Jorion (1990), Bartove and Bodnar (1994), Choi and Prasad (1995), Allayannis (1996) and Doidge et al. (2000) were unable to establish any clear relationship between stock returns and changes in exchange rates. On the other hand, more recent studies (for instance, Miller and Reuer (1998a), Rees and Unni (1999), Bodnar and Wong (1999), Gao (2000), Dominguez and Tesar (2001), Pritamani et al. (2004), among others) have found somewhat stronger evidence of exchange rate exposure. Despite most of the studies estimated firms' economic exposure for developed economies, the overall evidence on the issue remains week, on average.

The objectives of this study are to (i) estimate the economic exchange rate exposure of the whole economy that is relatively small open and developing economy (ii) measure the exchange rate exposure at both the market and industry level and (iii) test for "residual" exposure in a multivariate model using market return as a control variable.

The rest of the study is outlined as follows. Section 2 explains the theoretical foundation for economic exposure to foreign exchange rate movements. The main hypotheses for this study are also discussed in this section. Section 3 summarizes the results of the previous studies in this area. Section 4 describes the analytical framework for estimating the economic exchange rate exposure. Variable description, sample period and sources of

data are also the part of this section, while Section 5 presents and discusses the empirical findings. Finally, Section 6 concludes the paper.

II. Economic Theory

The impact of a change in exchange rate on stock prices may be different at micro and macro levels, depending on the nature of the individual firm and of the market as a whole. Further more, the effect of changes in exchange rates on firm's value depends on the time horizon under consideration. For instance, according to the popular J-curve theory, in the short run, the real depreciation reduces rather than increases net exports because the drop in the real exchange rate forces the country to pay more for its imports. Therefore, the higher nominal exchange rate increases the outflow of financial capital due to high import prices and thus deflects economic activity as well as stock prices. However, in the long run, as higher nominal exchange rate leads to larger export quantities and thereby stimulates domestic economic activities and the stock market[2].

At micro level, it is widely believed that, as said by Luehrman (1991), changing exchange rates affect the competitiveness of firms engaged in international competition. A falling home currency promotes the competitiveness of firms in home country by allowing them to undercut prices charged for goods manufactured abroad. Moreover, many simple partial equilibrium models (for instance Shapiro) predict an increase in the value of the home country firm in response to real drop in the value of the home currency. Economic theory, in general, suggests that under a floating exchange rate regime, exchange rate appreciation reduces the competitiveness of export markets; it has a negative effect on the domestic stock market. Conversely, if the country (industry) is import denominated, exchange rate appreciation may have positive affect on the stock market by lowering input costs.

[2] Some firms and industries have ability to pass through exchange rate changes into product prices and thereby reduce their exchange rate exposure (see, for details Bodnar et al. (1998)). Another possibility is that the firms are not exposed to exchange rate changes, i.e. they have hedged currency risk by diversifying the sources of supply and the market where they sell.

III. Previous Research

Jorion (1990) examined the exposure of US multinationals to foreign currency risk through simple OLS regression analysis. He uses monthly data on stock returns and trade-weighted exchange rate. His sample period starts from January 1974 and ends in December 1987. He also considers three subperiods, 1971-75, 1976-80, and 1981-87. His results provided evidence that the relationship between stock returns and trade-weighted exchange rate differs systematically across multinationals. He also found that the co-movements between stock returns and the value of the dollar to be positively related to the percentage of foreign operations of US multinationals. Finally, his analysis points out firms with no foreign operations exhibit in practice little measurable difference in exchange-rate exposure.

Luehrman (1991) tested the null hypothesis that an exogenous real home currency depreciation boosts the competitiveness of home country manufacturers. The study uses the daily and weekly data on redistributions of value within an industry (as a proxy for competitiveness) that are acquired from world financial market rather than product markets. As reported by author, product market variables such as prices, trade flows, and market shares reflect exchange rate changes only with significant lags, the structure of which is unknown. He estimated the relationship between changes in exchange rates and redistributions of value within the world automobile and steel industries through OLS regression analysis. The analysis investigated the said association during several parts of the ten-year period from January 1978 through December 1987.

His results, based on firm-level data, on redistributions of value in steel and automobile industries do not support the usual hypothesis that an exogenous real depreciation of the domestic currency enhances home country competitiveness for the steel and automobile industries. The rejection of this hypothesis for the steel industry is more robust in 1985 to 1986 relative to other subperiods. The strongest results for the auto industry came from 1985-86 and 1981-82. However, he reported for some firms in both industries that an

appreciation of the home currency is associated with an increase in relative value for home country firms.

Bodnar and Gentry (1993) examined industry-level exchange rate exposure for Canada, Japan, and the USA. Estimating the domestic market model of industry portfolio returns via the change in the exchange rate as an explanatory variable, they found the change in the exchange rate has significant influence on industries' return in all three countries. Further, they modeled exchange rate exposure as a function of industry characteristic. For all three countries, they found that exchange rate changes were significantly influenced by the activities of the industries.

Bartov and Bodnor (1994) concluded that contemporaneous changes in the dollar value have little power in explaining abnormal stock returns. They also found that a lagged change in the dollar value is negatively associated with abnormal stock returns. The regression results showed that a lagged change in the dollar has significant explanatory power with respect to errors in analyst's forecasts of quarterly earnings.

Chow et al. (1997) examined the exchange rate risk exposure of US stocks and bonds from March 1977 to December 1989 over 1- to 48-month horizons. They employed the method of White (980) and Hansen (1982) to adjust the variance-covariance matrix for general conditional heteroscedasticity and autocorrelation in the error terms. They also used a vector autoregressive (VAR) model of changes in annual earnings per share and real exchange rates to investigate the effect of a shock in real exchange rates on current and future annual earnings per share.

The analysis results reveal that bonds are positively exposed to exchange rate changes across all horizons while stocks are positively exposed only for longer horizons. In addition, they found that, on average, the effect of unanticipated changes in the real exchange rate on earning is negative over short horizons but positive over long horizons. Finally, they reported that the interest rate and cash flow effects are offsetting over short horizons but complementary over long horizons.

He and Ng (1998) investigated whether the value of a Japanese multinational corporation is affected by exchange rate changes and whether lagged exchange rate changes have any explanatory power for current stock returns. They tested this relationship by regressing stock returns against both contemporaneous and lagged exchange rate changes. The study uses daily data over the period from January 1979 to December 1993.

They found that about 25 percent (43 out of the 171) of the firms experienced economically significant positive exposure effects for the entire sample period of January 1979 to December 1993. Their findings indicate that exchange rate exposure is positive related to a firm's export ratio and foreign activities and negative related to a firm's hedging. In addition, as reported by authors, firms with low short-run liquidity or with high financial leverage are less exposed to fluctuations in exchange rates; however, foreign exchange-rate exposure increases with firm size.

Glaum et al. (2000) contributed to the existing body of literature by examining the economic exposure of German corporations to change in the DM/U.S.-dollar exchange rate. Their analysis uses daily data over the period from January 1974 to December 1997. They also employed the same methodology to examine the exposure for four subperiods. Their results reveal that 39 out of the 71 firms (55%) have significant positive US dollar exposure for the total sample period. However, as reported by authors, these findings are unstable overtime.

Dominguez and Tesar (2001) estimated the augmented CAPM specification to test exchange rates exposure at firm and industry level. They used equal-weighted market returns and multiple exchange rates for eight countries (Chile, Thailand, France, Germany, Italy, Japan, the Netherlands and the U.K) covering the period January 1980 to May 1999.

They found that firm level and industry level share prices are significantly influenced by exchange rates. They claimed that exchange rates exposure does not fall (or become less statistically significant) overtime. Further, their estimations show that home currency

appreciation has a positive effect on firms' share value in four of the countries (France, Japan, the Netherlands and the U.K). In contrast, in Thailand, an increase in domestic currency value has negative influence on firms' stock prices. In remaining three countries (Chile, Germany and Italy) 50 percent of these firms exhibit positive exposure and 50 percent of firms exhibit negative exposures.

Pritamani et al. (2004) tested the dual-effect hypothesis on sub-samples of export and import oriented firms. The exchange rate exposures are estimated using monthly data relating to US economy from January 1975 to December 1997. Their results provided evidence that firms are affected by both the domestic economy and foreign markets. These effects are at least partially offsetting for exporters and additive for importers. They proposed an equally-weighted portfolio of purely domestic firms as an alternative portfolio to reduce biases and reported significantly negative exposure for exporters and significantly positive exposure for importers.

Entorf et al. (2006) used the well-known idea of Adler and Dumas (1984) and estimated the foreign exchange rate exposure for whole economy rather than firm- or industry-level. The sample period is January 1991 to July 2004. Their results based on data from 27 countries show that national foreign exchange rate exposures are significantly related to the current balance variables of corresponding economies.

IV. Model Specification

To estimate the economic exchange rate exposure of aggregate market-level, the study estimated the standard regression model developed by Alder and Dumas (1984). Hence, the specific model is expressed as follows:

$$R_{M,t} = a + \beta \Delta EX_t + \psi_t \qquad (1)$$

where a is a constant term, β measures the total foreign exchange rate exposure, $R_{M,t}$ is the return of the stock prices index in period t, ΔEX_t is the change in exchange rate over the same period, and ψ_t is an error term. The exchange rate is defined as the number of

domestic currency (Pak rupee) units required to purchase per one unit of foreign currency (US dollar). A positive value of the β means that a depreciation of the domestic currency corresponds to an increase in the stock returns (vise versa for negative value)[3].

To test for foreign exchange rate exposure at the industry level, the study followed Adler and Simon (1986) model. The economic exposures are measured as the slope coefficient of a univariate regression of stock returns on exchange rate changes:

$$R_{it} = a_i + \beta_i \Delta EX_t + \xi_{it} \qquad (2)$$

where a_i is a constant term, the coefficient β_i measures the economic exposure to change in exchange rate for firm or industry i, R_i denotes the stock return for industry index i at time t, ΔEX_t is as described above, ξ_{it} is an error term. A positive value of β_i implies that a depreciation of the domestic currency leads to an increase in the value of firm or industry i.

In order to measure the connection between stock returns and changes in currency values after taking into account the overall market's exposure to currency variations, the study estimates the following model as proposed in Jorion (1990). He includes the return of the market index, R_{Mt}, as an additional variable in the model (2) to control for market movements. The superscript '*' refers to the orthogonalized residuals[4]. The model then is defined as follows:

$$R_{it} = a_i + \beta_i \Delta EX_t^* + \lambda_i R_{Mt} + \xi_{it} \qquad \text{where} \qquad \Delta EX_t^* = \Delta EX_t - (\hat{a}^* + \hat{\Psi} R_{Mt}) \qquad (3)$$

The coefficient β_i in model (2) does not reflect the full effect of exchange rate changes on firm i's returns. Instead, it measures firm-individual exchange rate sensitivity in excess of the market's exchange rate reaction. If the value of β_i in model (2) is zero, this implies that firm i has the same exchange rate exposure as the market portfolio.

[3] The model is based on the assumption that share-price reactions to exchange-rate changes are linear and symmetric.

[4] Choi and Prasad (1995) suggested the use of orthogonalized exchange rate returns in order to control the problem of multicollinearity.

However, it does not imply that the firm's value is insensitive to exchange rate changes. Alternatively, the rejection of the hypothesis that β_i is, on average, zero, provides the evidence of exchange rate exposure. If the changes in exchange rate have no significant influence on market portfolio then the coefficients of model (2) and (3) will be identical (see, for details Bodnar and Wong (1999)).

V. Variable Description, Sample Period and Data Sources

To explore the economic exchange rate exposure, equations (1), (2) and (3) are estimated at the market and the industry level for a relatively small open and developing economy namely Pakistan. The study uses monthly data covering the period from June 1991 to December 2007.

Returns on KSE-100 Index are used as a dependent variable to measure the exposure for the whole economy[5]. Returns on sector wise Share Prices Indices are used as a dependent variable to estimate the exposure for industry level. The exchange rate data was obtained from International Financial Statistics (IFS) prepared by International Monetary Fund (IMF); KSE-100 Index and sectoral price indices data is obtained from Index Numbers of Stock Exchange Securities prepared by State Bank of Pakistan.

Calculation of Returns

The monthly stock returns are derived from monthly stock price indexes. The monthly return of each index is computed as the return from current month's index value to the following month's index[6]. Formally, the returns for stock price indices are calculated using the following formula developed by Rogalski (1984). For month t:

$$R_t = 100 \times [(P_t / P_{t-1}) - 1]$$

[5] The General Index of Share Prices (computed by State Bank of Pakistan) comprises all the ordinary shares registered on Karachi Stock Exchange (KSE). On the other hand, the KSE-100 Index developed in November 1991 on the bases of 100-different companies stock prices each company has a different weight depending on its market capitalization. The General Index of Share Prices has broader range as compared to KSE-100 Index. Since the General Index of Share Prices is preferred to used for exploring economic exchange rate exposure.

[6] The stock return is not a total market return since dividends are not included.

where R_t is monthly return while P_t is the monthly value of the index. If the following month's index point is missing, the return for that month is reported as missing. Analogous procedure is followed to estimate the weekly stock returns for individual firms.

VI. Results

In the following, the estimation results for the whole economy and for individual industries' economic exchange rate exposure are reported using model (1) and (2), respectively. The estimated results from model (1) are given as follows:

$$R_{Mt} = 1.08 - 0.155\Delta EX_t - 0.996\Delta EX_{t-1} - 0.590\Delta EX_{t-2}$$

$$\text{t} = (1.86) \quad (-2.238) \qquad (-3.452) \qquad (-2.876)$$

$$R^2 = 0.64$$

$$DW = 1.97$$

The t-values are reported in parentheses. It can be seen from the Durbin-Watson statistic that there is no autocorrelation in the estimated model. Overall, 64% fluctuations in market returns are explained by change in foreign exchange rate and two-month lagged exchange rate change. The results show that the overall economy is negatively exposed to exchange rate fluctuations. The coefficient on change in exchange rate at level as well as on both the legged values are negative and statistically significant at the 5% level.

The total exchange rate exposure is (-0.155) + (-0.996) + (-0.590) = (-1.741). The market returns are negatively exposed to an increase in foreign exchange rate by 0.155 cents on average in the month of increase, by another 0.996 cents in the next month and by yet another 0.59 on average in the following month. It is obtained, respectively, 0.08, 0.58 and 0.34 by dividing each β_i by -1.741. The interpretation of this is as follows: If the exchange rate increases by one percentage point, the market stock returns decreases by 8

percent immediately, 66 percent on average after one-month and 100 percent by the end of the second month.

The estimated results from model (2) are listed in Table 1. Column (1) shows the foreign exchange rate exposure of all included 22 industries. Similarly, columns (3) and (5) present the coefficients on the lagged exchange rate change to analyze lagged response of stock prices to exchange rate change. The corresponding t-values are reported in columns (2), (4), and (6). The last column provides information about the Durbin-Watson (DW) statistic, which is applied to test the null hypothesis that there is no first- order series correlation in residuals.

It can be seen from the table that the estimated Durbin-Watson statistic provide evidence that the serial correlation causes no estimation problem in model (2). The table shows that the exposure measure ranges -0.848 to 0.991, with a mean exposure coefficient is -0.106. The positive exposure coefficient ranges 0.033 to 0.991, while negative exposure coefficient ranges -0.162 to -0.848. Textile spinning sector has the highest positive exposure coefficient out of 10 positively exposed industries and food and allied industry has the highest negative foreign exchange rate exposure coefficient out of 12 negative exposed industries. In Table 1, it is indicated that 12 out of 22 industries (54%) have the economically and statistically significant exposure.

It is seen that all textile industries included textile spinning, textile weaving and cotton & textile have are exposed positively and statically significantly. Quite the opposite, the financial sector in Pakistan does not significantly response to movements in exchange rate; however, the returns on modaraba companies are affected by the lagged exchange rate change. Overall, 7 industries have significant one-month lagged exchange rate change exposure. The results reveal that the capital intensive industries (for instance, auto & allied, engineering, cement etc) are more exposed to change in exchange rate as compared to less capital intensive industries in the sample.

Next, in the third model, the market return has been included in order to measure the economic exchange rate exposure after taking into account the overall market's exposure to currency changes. However, in Model 3, the orthogonalized exchange rate change, residuals, is used to eliminate spurious of possible multicollinearity problem[7]. Also the two-month lagged exchange rate changes are used as regressor in the model to examine the lagged response of stock return to exchange rate change. The estimated results from Model 3 are presented in Table 2.

The results shown in Table 2 are quite similar to the results reported in Table 1. It implies that the robustness of the estimates do not decline even after controlling the overall market's exposure to currency change. Moreover, there is no significant evidence of multicollinearity problem in the estimated models.

In order to check whether the estimated economic exchange rate exposure are stable overtime or not, the Chow's structural break test is applied[8]. Two dates are exogenously selected on the basis of changes in the value of Pak rupee against US dollar. The first subperiod runs from January 1991 to December 2001. During this period, the Pak rupee depreciated against dollar. Whereas, during the second subperiod (ranges from January 2002 to December 2006), the Pak rupee appreciated and the exchange rate was less volatile during this period as compared to the first subperiod. The estimates of Chow test provide evidence that the estimated economic exchange rate exposures are stable overtime.

[7] Multicollinearity means a situation in which two or more independent variables are very highly correlated.

[8] The estimated results are not presented here to save the space. However, the results are available from author upon request.

Table 1
The Economic Exchange Rate Exposure for 22 Industries

Model: $R_{it} = a_i + \beta_{1i}\Delta EX_t + \beta_{2i}\Delta EX_{t-1} + \beta_{3i}\Delta EX_{t-2} + \xi_{it}$

The model is estimated for each industry using OLS. R_{it} is the stock index return for ith industry in month t, ΔEX_t is the rate of change in the nominal exchange rate in month t. An increase in ΔEX_t represents a depreciation of the Pak rupee.

Industry	β_1 (1)	t_{β_1} (2)	β_2 (3)	t_{β_2} (4)	β_3 (5)	t_{β_3} (6)	DW (7)
Textile Spinning	0.991	3.91	-0.721	-1.39	-0.366	-0.71	1.96
Textile Weaving & Composite	0.251	2.39	-1.350	-2.07	-0.971	-2.49	2.05
Cotton & Other Textiles	0.448	3.90	-0.760	-3.54	-0.689	-1.39	1.85
Jute	0.262	0.305	-0.900	-1.05	-0.828	-0.97	1.98
Chemicals & Pharmaceuticals	-0.337	-4.61	-0.467	-0.84	-0.517	-0.94	2.30
Engineering	0.122	2.13	-1.592	-1.71	-0.786	-0.84	1.70
Auto & Allied	-0.333	-3.42	-1.955	-2.46	-1.135	-3.43	1.96
Transport & Communication	-0.292	-4.32	-1.904	-2.06	-0.778	-4.84	1.81
Fuel & Energy	0.397	2.73	-0.420	-0.18	-0.775	-0.33	2.02
Cement	-0.596	-4.66	-1.037	-1.14	-0.074	-0.08	1.99
Cables & Electric Goods	-0.461	-0.68	-0.766	-1.13	-0.748	-1.10	1.94
Paper & Board	-0.596	-2.65	-1.037	-1.14	-0.074	-0.08	2.02
Glass & Ceramics	0.033	0.04	-0.927	-1.21	0.420	2.55	1.87
Sugar & Allied	0.337	0.44	0.259	0.34	-0.693	-0.91	2.07
Vanaspati & Allied	-0.162	-3.15	-0.436	-0.40	-0.740	-0.68	1.99
Food & Allied	-0.848	-3.90	-1.276	-2.36	0.049	2.80	1.96
Miscellaneous	-0.353	-0.57	-0.799	-1.30	0.135	0.22	1.92
Modaraba Companies	0.595	0.24	4.534	3.81	-3.350	-2.34	2.25
Insurance Companies	0.091	0.09	-0.257	-0.25	-1.219	-1.20	1.97
Leasing Companies	-0.459	-0.63	-0.358	-0.49	-0.473	-0.65	1.75
Banks & Invest. Companies	-0.671	-0.73	-1.638	-3.79	-0.669	-0.73	2.25
Banks & other Financial Institutions	-0.258	-0.33	-1.221	-1.58	-0.767	-0.99	1.67

Table 2
The Economic Exchange Rate Exposure for 22 Industries

Model: $R_{it} = a_i + \beta_{1i}\Delta EX_t^* + \beta_{2i}\Delta EX_{t-1}^* + \beta_{3i}\Delta EX_{t-2}^* + \beta_{4i}R_{Mt} + \xi_{it}$

where $\Delta EX_t^* = \Delta EX_t - (\hat{a}^* + \hat{\Psi}R_{Mt})$. ΔEX_t^* is orthogonalized exchange rate returns. The model is estimated for each industry using OLS. R_{it} is the stock index return for ith industry in month t, ΔEX_t is the rate of change in the nominal exchange rate in month t. An increase in ΔEX_t represents a depreciation of the Pak rupee.

Industry	β_1 (1)	t_{β_1} (2)	β_2 (3)	t_{β_2} (4)	β_3 (5)	t_{β_3} (6)	β_4 (7)	t_{β_3} (8)	DW (9)
Textile Spinning	1.063	2.50	-0.248	-0.58	-0.076	-0.18	0.458	1.22	1.86
Textile Weaving & Composite	0.356	3.73	0.669	2.37	-0.563	-3.16	0.676	1.73	1.79
Cotton & Other Textiles	0.527	2.43	-0.239	-0.65	-0.369	-1.00	0.512	1.90	1.73
Jute	0.303	0.36	-0.625	-0.74	-0.666	-0.79	0.265	2.68	2.04
Chemicals & Pharmaceuticals	-0.234	-4.67	-0.195	-3.55	-0.122	-3.35	0.662	3.12	1.97
Engineering	0.213	3.25	0.984	2.15	-0.432	-0.51	0.590	2.91	1.98
Auto & Allied	-0.219	-4.35	-1.225	-4.92	-0.698	-1.10	0.744	1.04	1.77
Transport & Communication	-0.111	-0.21	-0.750	-1.43	-0.086	-0.16	1.177	3.33	2.05
Fuel & Energy	4.303	2.95	0.850	2.38	-0.004	0.00	0.320	1.11	2.91
Cement	-0.488	-4.62	-0.347	-0.44	0.336	0.42	0.198	1.54	2.00
Cables & Electric Goods	-0.384	-2.64	-0.246	-3.41	-0.442	-0.73	0.500	2.11	2.08
Paper & Board	-0.488	-0.62	-0.347	-0.44	0.336	0.42	0.698	1.54	2.00
Glass & Ceramics	0.147	0.24	-0.192	-0.32	0.875	1.45	0.731	4.37	2.03
Sugar & Allied	0.432	0.65	0.868	2.31	-0.334	-0.51	0.607	1.86	1.75
Vanaspati & Allied	-0.084	-2.08	0.060	4.06	-0.433	-0.42	0.502	1.12	1.91
Food & Allied	-0.864	-0.95	-1.000	-1.09	0.075	0.08	0.324	3.02	2.09
Miscellaneous	-0.302	-0.52	-0.461	-0.79	0.346	0.59	0.329	2.85	2.10
Modaraba Companies	0.817	0.35	5.902	2.50	-2.518	-2.07	1.408	1.13	2.90
Insurance Companies	0.203	0.22	0.451	0.49	-0.792	-0.87	0.724	1.81	2.00
Leasing Companies	-0.329	-0.68	0.472	0.97	0.034	0.07	0.835	1.68	1.91
Banks & Invest. Companies	-0.493	-0.93	-0.495	-0.93	0.023	0.04	1.155	0.61	1.90
Banks & other Financial Institutions	-0.108	-0.23	-0.263	-0.57	-0.189	-0.42	0.967	3.15	2.00

VII. Conclusion

In this paper, an attempt is made to examine the industry level economic exchange rate exposure. The sample period ranges form June 1991 to December 2007. The exposure tests are estimated using the monthly changes of a single exchange rate namely the PKR/US-dollar exchange rate and monthly stock index returns for a sample of 22 industries and for whole economy as well.

The study differs from the previous research in this area in the following aspects. First, it explored economic exchange rate exposure for a developing country rather than developed countries. Second, it covered all type industries (even including banks and financial institutes) instead of only focusing on export- or/and import-oriented industries. Finally, the lagged values of change in exchange rate are included in the specification of the models to observe the lagged response of stock returns to change in exchange rate.

The findings indicate that the textile, auto & allied, cement, engineering transport & communication, fuel & energy and food & allied sectors are highly exposed to foreign exchange rate change. On the other hand, it is found that the banks and other financial institutes, sugar & allied, paper & board, glass & ceramics industries have not significant exchange rate exposure. This study can be extended at firm level in future that would be helpful to identify what kind of firms (i.e., multinational, domestic, exporters or importers) have more economic exchange rate exposure for a small open developing economy.

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