Pakistan's Trade Performance *vis-à-vis*
Its Major Trading Partners

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In contrast to earlier empirical research that documents the import and export price elasticities at an aggregate level, this article estimates bilateral price and income impacts on Pakistan's trade performance with its four major trading partners, i.e., USA, UK, Germany, and Japan. Using quarterly data for the period 1982-I–1996-IV and the Three-stage Least Square technique, the study documents the impact of real devaluation, real income, export incentives, and domestic inflation on trade performance with respect to each of the four trading partners.

1. INTRODUCTION

In 1982 a major shift occurred in Pakistan's exchange rate policy. First, a managed float replaced a fixed exchange rate system prevalent since 1947. Secondly, it was delinked from the US dollar and pegged to a basket of currencies, with the US dollar as an intervening/anchor currency. The rationale for the switch in exchange rate regime was that a trade share-weighted float would be responsive to the changing trade flows among major trading partners and bilateral currency fluctuations, and that it would induce greater geographical and commodity diversification of exports. However, the year-to-year variability notwithstanding, the 5-year average share of 4 major trading partners of Pakistan, i.e., USA, UK, Japan, and Germany, has remained in the narrow range of 31-39 percent during 1980-95. The corresponding average for individual countries is USA 10-12 percent, UK 6-7 percent, Germany 5-7 percent, and Japan 11-13 percent. During the same period, these four countries (combined) accounted for an average 53-68 percent of the total trade deficit of Pakistan. Moreover, export commodity diversification remains weak. Textile yarn and its manufactures dominate and constitute 72 to 85 percent of total exports to each of the four countries during 1990–1995.

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The issue of effectiveness of real depreciation to correct the trade balance is at the centre of the phenomena of stagnation observed above.[1] The 'elasticity pessimism' debate applies equally well to country-specific export/import performance as it does to overall or commodity group-specific trade. In case of Pakistan the empirical evidence for aggregate and commodity-specific exports and imports is mixed. Although a number of studies estimating overall export and import demand functions exist for Pakistan, the findings of three recent ones are particularly relevant.[2] Azhar (1995), using annual trade data for 1981–95 and employing the concept of 'effective devaluation (ED)', i.e., nominal devaluation minus the proportionate increase in the cost of production, concluded that devaluation did not boost exports. He estimated that ED for the spinning sector of textile industry ranged between 1.8 and 2.8 percent for 10 percent nominal devaluation. Khan and Aftab (1995) used quarterly series pertaining to the 1983–93 period to assess the impact of depreciation of Real Effective Exchange Rate (REER) on the trade balance of Pakistan. Using Instrumental Variable (IV) estimation technique they estimated aggregate as well as disaggregate (10 commodities) export demand functions. They concluded that "Marshall-Lerner condition is barely satisfied for Pakistan since the sum of import and export demand elasticities is only slightly greater than one". At the disaggregate level they found that only one-third of Pakistan's major exports are likely to respond positively to a devaluation. Khan and Hasan (1994) used annual data from 1972 to 1991 to estimate a 4-equation model to asses the impact of devaluation on imports and exports. Using the technique of Three-stage Least Squares (3SLS) they conclude "that devaluation may improve trade balance in Pakistan". The Marshall-Lerner conditions have been tested and found to satisfy the conditions for a devaluation that would be successful in improving the trade balance.[3]

The present writers do not know of any study that assesses the price and income impacts on trade balance with respect to each of the above four major trading partners. Empirically, the present study is an extension of the above studies to individual country level. However, it provides a different policy perspective to the management of trade-weighted exchange rate. In improving country-specific trade performance, bilateral exchange rate movements need to be closely monitored. Rupee exchange rate adjustment anchored closely to US$ is likely to risk frequent under- or overvaluation of Rs/Yen, Rs/German Mark or Rs/Sterling parity if these currencies fluctuate or are misaligned

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[1]It is to be noted that cumulative real depreciation of the Rupee during 1982–96 ranged from 47 percent against the US Dollar to 65 percent against the Japanese Yen. Moreover, Pakistan trades with UK, Germany, and Japan in their respective currencies instead of the US Dollar.

[2]For some earlier studies on the impact of devaluation on Pakistan's trade performance, see Sarmad (1987, 1989) and Khan (1974).

[3]Annual data used in this study for estimation purposes is equally split between a fixed (1972–81) and a flexible (1982–91) exchange rate regime. Performance of exports during the fixed exchange rate regime cannot legitimately be attributed to adjustment in the exchange rate regime. Thus, the impact of the flexible exchange rate regime on exports during the entire period may be overstated.

with the US$. For example, in 1996 the rupee became overvalued against the Pound Sterling, Japanese Yen, and Deutsche Mark. This overvaluation was not because of the change in the value of the rupee but due to depreciation of these currencies against the US Dollar.[4] Consequently, one needs to assess the responsiveness of changing bilateral parities, instead of only those against the US Dollar, to Pakistan's trade performance.[5] The policy issue is whether we can reduce our trade deficit with each of the trading partners by retaining US Dollar as the intervening currency or by pursuing a more independent policy of bilateral currency adjustments. From a modelling perspective, the paper adds a new dimension by incorporating and quantifying the impact of the 'incentive index' for exports to each of the four trading partners. Section 2 of the paper outlines the estimation model and data description. Discussion on empirical validation forms part of Section 3. The summary and conclusions are presented in Section 4.

2. ESTIMATION MODEL AND DATA

Simple and popular specifications based on neo-classical trade theory are specified to study the impact of devaluation on the trade balance of Pakistan with respect to each of the four trading partners. Following the recent practice in empirical research we specify the export demand and the export supply functions simultaneously.[6]

(a) Export Demand Function

Pakistan's exports to country i (X_i^d) are specified to depend on real income ($RGDP_i$) and consumer price level of country i (CPI_i), unit value of exports from Pakistan (UVE_{Pak}), and nominal exchange rate (expressed as Rupees per unit of foreign currency) with country i (NER_i).

$$X_i^d = F\ [RGDP_i,\ CPI_i,\ UVE_{Pak},\ NER_i] \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Using Cobb-Douglas functional form the estimable form of the above equation is:

$$X_i^d = A\ *\ RGDP_i^{\alpha_1}\ *\ \left(NER_i\ *\ \frac{CPI_i}{UVE_{Pak}}\right)^{\alpha_2}\ *\ e^v \quad \ldots \quad \ldots \quad (2)$$

Taking logarithmic transformation to linearise Equation (2) we have:

$$lnX_i^d = lnA\ +\ \alpha_1\ lnRGDP_i\ +\ \alpha_2\ lnRER_i\ +\ V \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

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[4]The Euro recently depreciated by almost 20 percent against the US Dollar, since its inception in January 1999. Consequently the Rupee, closely anchored to the US Dollar, is once again overvalued against the Euro.

[5]Unfortunately aggregate import and export functions estimated so far assess only the impact of changes in the Rupee/US Dollar parity.

[6]See Goldstein and Khan (1978, 1980) and Balassa, *et al.* (1989).

Where $\alpha_1 > 0$ and $\alpha_2 > 0$ are real income and real exchange rate elasticities for export demand[7] and $i =$ is United States, United Kingdom, Germany, and Japan.

(b) Exports Supply Function

Supply of exports to country i (X_i^S) depends on real income of Pakistan ($RGDP_{Pak}$), wholesale price index in Pakistan (WPI_{Pak}), unit value of exports in Pakistan (UVE_{Pak}), nominal exchange rate with country i (NER_i), and export incentives index ($INDX$).

$$X_i^S = F[RGDP_{Pak}, WPI_{Pak}, UVE_{Pak}, NER_i, INDX] \qquad \ldots \qquad \ldots \qquad (4)$$

Using Cobb-Douglas functional form the above equation can be estimated as:

$$X_i^S = C * RGDP_{Pak}^{\beta_1} * \left[NER_i * \frac{UVE_{Pak}}{WPI_{Pak}} \right]^{\beta_2} * INDX^{\beta_3} * e^V \qquad \ldots \qquad (5)$$

Taking logarithmic transformation to linearise Equation (5) we have:

$$lnX_i^S = lnC + \beta_1 \, lnRGDP_{Pak} + \beta_2 \left[NER_i * \frac{UVE_{Pak}}{WPI_{Pak}} \right] + \beta_3 \, lnINDX \qquad (6)$$

Where $\beta_1 > 0$, $\beta_2 > 0$ and $\beta_3 > 0$ are the elasticities with respect to real income, real exchange rate, and incentive index.

(c) Equilibrium Condition

By imposing the equilibrium condition on the export demand and export supply equations, i.e., $X_i^S = X_i^D = X$, and solving for export prices, we have:

$$ln\,UVE_{Pak} = \lambda_o + \lambda_1 \, lnX_i^S + \lambda_2 \, lnRGDP_{Pak} + \lambda_3 \, lnWPI_{Pak} +$$
$$\lambda_4 \, lnNER_i + \lambda_5 \, lnINDX + \varepsilon \qquad \ldots \qquad \ldots \qquad (7)$$

where the relationship between reduced form coefficients and structural coefficients is as follows:

$$\lambda_0 = \frac{-1}{\beta_2} \, lnC, \lambda_1 = \frac{1}{\beta_2} > 0, \lambda_2 = \frac{-\beta_1}{\beta_2} < 0, \lambda_3 = 1 > 0, \lambda_4 = 1 < 0, \lambda_5 = \frac{-\beta_3}{\beta_2} < 0$$

[7] $RER_i = \left[NER_i * \frac{CPI_i}{UVE_{Pak}} \right].$

(d) Import Demand Function

Given that Pakistan is a small economy and is not able to affect its import prices, only the import demand equation is included in the model. Pakistan's imports from country i a priori depend on its real income ($RGDP_{Pak}$), unit value of imports (UVI_{Pak}), nominal exchange rate with country i (NER_i), domestic price level (WPI_{Pak}), and foreign exchange reserves ($FORX$) used as a proxy for foreign exchange constraint.[8]

$$IMP_i = F\left(RGDP_{Pak},\, UVI_{Pak},\, NER_i,\, FORX\right) \qquad \dots \qquad \dots \qquad (8)$$

Using Cobb-Douglas functional form the above equation can be specified as:

$$IMP_i = Z * RGDP_{Pak}^{\partial_1}\left[NER_i * \frac{UVI_{Pak}}{WPI_{Pak}}\right]^{\partial_2} * FORX^{\partial_3} * e^k \qquad \dots \qquad (9)$$

Taking logarithmic transformation to linearise Equation (9) we have:

$$lnIMP_i = lnZ + \partial_1 lnRGDP_{Pak} + \partial_2 lnRER_i + \partial_3 lnFORX + k \quad \dots \quad (10)$$

where $\partial_1 > 0$, $\partial_2 < 0$ are elasticities with respect to real GDP of Pakistan and real exchange rate. The impact of availability of foreign exchange reserves is given by $\partial_3 > 0$.

(e) Domestic Price Function

A price equation was incorporated into the model to quantify the impact of devaluation on domestic price level, which, in turn, alters the relative prices of traded versus non-traded goods. It is specified as a reduced form hybrid equation with money supply ($M2$), overall demand, i.e., growth rate in income ($GGDP_{Pak}$), and imported inflation (UVI_{Pak}) impulses determining the domestic price level.

$$WPI_{Pak} = F\left[M2,\, UVI_{Pak},\, GGDP_{Pak}\right] \qquad \dots \qquad \dots \qquad \dots \qquad (11)$$

Taking logarithmic transformation to linearise Equation (11) we have:

$$ln WPI_{Pak} = \delta_0 + \delta_1 lnM2 + \delta_2 lnUVI_{Pak} + \delta_3 lnGGDP_{Pak} + q \qquad \dots \quad (12)$$

where $\delta_1 > 0$, $\delta_2 > 0$ and $\delta_3 < 0$ are the expected a priori signs of impact coefficients. Re-writing Equations (3), (7), (10), and (12) we have the following set of four interlinked equations. These equations are estimated for each of the four trading partners.

$$lnX_i^d = lnA + \alpha_1 lnRGDP_i + \alpha_2 lnRER_i + v \qquad \dots \qquad \dots \qquad (3)$$

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[8]Foreign exchange reserves are not an ideal proxy for foreign exchange constraint. Total pool of foreign exchange available, i.e., remittances, export revenue, and loan and grant inflows to finance the imports may be a superior measure of availability of foreign exchange. In the absence of quarterly data on these indicators, foreign exchange reserves are used in the import function.

$$lnUVE_{Pak} = \lambda_0 + \lambda_1 \ lnX_i^s + \lambda_2 \ lnRGDP_{Pak}$$
$$+ \ \lambda_3 \ lnWPI_{Pak} + \lambda_4 \ lnNER_i + \lambda_5 \ lnINDX + \varepsilon \qquad \ldots \qquad (7)$$

$$lnIMP_i = lnZ + \partial_1 \ lnRGDP_{Pak} + \partial_2 \ lnRER_i + \partial_3 \ lnFORX + k \quad \ldots \quad (10)$$

$$lnWPI_{Pak} = \delta_0 + \delta_1 \ lnM2 + \delta_2 \ lnUVI_{Pak} + \delta_3 \ lnGGDP_{Pak} + q \ \ldots \quad (12)$$

Export demand and unit value of exports (Eqns. 3 and 7) are simultaneously determined. Competitiveness of exports (Eqn. 7) is also influenced by the domestic price level, which, in turn, is determined by monetary and imported inflation (Eqn. 12). Implicitly, domestic price level enters both export and import function (Eqns 3 and 10) to determine the real exchange rate. Thus, using a Three-stage Least Square technique is more appropriate as it uses the information on the correlation of the stochastic disturbance terms of structural equations.[9]

The estimation of the model is based on quarterly series of trade data extending from 1982 Q1 to 1996 Q4. We use the 1980 as the base year to convert nominal values of GDP, imports and exports, and exchange rate to real values. Quarterly GDPs/GNPs, consumer price index, and exchange rates of different countries are obtained from various issues of *International Financial Statistics* (IMF).[10] Information regarding the imports and exports of Pakistan from/to four countries is extracted from various issues of *Quarterly Direction of Trade Statistics* (IMF). Information regarding the foreign exchange reserves and the unit values of imports and exports is obtained from various issues of *Economic Survey* (Finance Division, Government of Pakistan). For Pakistan, quarterly GDP is not officially published. The historical series was obtained from Bengali (1995). The author estimated the GDP of Pakistan on a quarterly basis, at constant factor cost of 1980-81 for the years 1971-72 to 1989-90. To construct values for the subsequent years, the following step-wise procedure is adopted: (a) ratio of quarterly to yearly estimate is calculated for 5 years preceding 1989-90 to obtain 5-year average quarterly ratios; (b) the average ratios calculated in (a) are applied to annual GDP (at constant factor cost) to estimate quarterly GDP for 1991–96); (c) to convert GDP at factor cost to market prices, the ratios of quarterly to annual GDP of 1991–96 calculated in (b) above are applied to GDP at market prices.

As mentioned earlier, incorporating export incentive index (INDX) is a significant innovation to the traditional model. Therefore, a few words about its construction are in order. Historically, two types of incentives are offered to exporters:

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[9]Three-stage Least Square (3SLS) technique is superior to other single-equation techniques as it is a full-information or system method using all equations in a model simultaneously. Thus, it is likely to give more efficient estimates. Moreover, Iterative 3SLS is asymptotically equivalent to Full Information Maximum Likelihood Method (FIML), which gives efficient estimates in large samples. See Goldstein and Khan (1978); Khan (1974); Hasan and Khan (1994); Khan and Aftab (1995).

[10]For UK, GDP instead of GNP is taken due to the non-availability of the latter.

concessionary interest rates on export financing and customs duty rebates on imported inputs used in the export of goods. Income tax rebates are a recent phenomenon and, as such, historical data on quarterly magnitude of rebates are non-existent. Nominal concessionary interest rates during 1982–96 have ranged from 3 to 13 percent as compared to an average of 11 to 15 percent charged on normal advances. Customs rebates on worldwide total exports have gradually increased over time and reimbursements were in excess of Rs 2.5 billion in 1996.[11] Actual data of each series were converted into an index form. Concessionary interest rates index gradually moved upwards from the base value of 100 in 1982-I to 433 in 1996-IV. Customs rebate index moved upwards but with a fluctuating trend from 100 in 1982-I to 1198 in 1996-IV. During the intervening quarters of 1992-III, 1993-IV, and 1996-III it attained its highest values of 1543, 1510, and 1648, respectively. The two indices were simply added to form the export incentive index variable (INDX).

3. INTERPRETATION OF RESULTS

Table 1 gives a comparative view of some of the key impact elasticities obtained from 3SLS estimates for the four trading partners. While the results can be discussed separately for each of the trading partners, we adopt a different approach as the focus is on the impact of bilateral exchange rate adjustment. Major trade-related impact indicators are compared separately across all the trading partners.

(a) Partner's Income and Export Demand

A priori our exports should respond positively to changes in trading partner's income. A one-percent increase in incomes of the trading partner increases our exports in the range of 1.4 and 5.7 percent. The highest impact is from Germany and the lowest is from the United Kingdom. Germany has been traditionally an importer of carpets, high quality handicrafts, bed linen, and leather goods from Pakistan. Thus, a high income elasticity is probable.

(b) Real Devaluation and Exports

Except in the case of Germany, the demand for our exports to real rupee devaluation is similar to that for the remaining three countries. It ranges between 0.43 for UK to 0.63 for USA. The impact of real devaluation on exports to Germany, although positive, is fairly small and statistically not significant as compared to the other three trading partners. This indicates that sub-groups within our textile manufactures exports to Germany are almost price-inelastic. As real devaluation is unlikely to boost exports, non-price competitive strategies (including product diversification) will need to be adopted for Germany.

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[11]Customs duty rebate figures were obtained from Pakistan Sea Customs, Karachi. Country-specific total export rebate data would have been ideal for this study.

Table 1

Summary of the Results

	Variables	United States	United Kingdom	Germany	Japan
(a)	**Exports**				
1	Income Elasticity for Export Demand	2.36**	1.42**	5.68**	2.12**
2	Export Demand Elasticity w.r.t. Real Devaluation	0.63**	0.43**	0.11	0.61**
3	Export Supply Elasticity w.r.t. Real Devaluation	2.94**	11.09** [a]	−4.41** [a]	−1.58**
4	Incentive Index for Exports	0.71**	0.52	−0.08	−0.12*
5	Impact of Domestic Prices on Unit Value of Exports	0.76**	0.87**	0.81** [b]	−0.42
(b)	**Imports**				
6	Pakistan's GDP Elasticity for Import Demand	1.13**	0.38	0.18	0.98**
7	Import Demand Elasticity w.r.t Real Devaluation	−0.19	−0.75**	−0.61**	−0.70**
8	Lagged Foreign Exchange Reserves for Import Demand	−0.32**	−0.29**	0.32**	0.44**
(c)	**Domestic Prices**				
9	Impact of Money Supply on Domestic Prices	0.59**	0.48**	0.54**	0.47**
10	Impact of Unit Value of Imports on Domestic Prices	0.13**	0.29**	0.20**	0.29**
11	Impact of GDP Growth on Domestic Prices	−0.02**	−0.03**	−0.02**	−0.03**
(d)	**Marshall-Lerner Condition**				
	MLC	0.82	1.18	0.72	1.31
13	Modified MLC	0.76	1.16	0.69	1.0

Notes: ** = Significant at 95 percent level; * = Significant at 90 percent level;
  a = Lagged Two Periods; b = Lagged One Period.
  The table has been constructed on the basis of estimated equations of the Appendix given at the end.

(c) Export Supply and Devaluation

Excepting the results of USA and UK, which indicate that real devaluation invokes higher supply response, the results for the other two trading partners are counter-intuitive and discouraging. For USA the supply response is almost immediate, while for UK it is much larger but comes with a lag of 2 quarters. Manufactured exports can respond much faster to price signals in the short run than semi-manufactured and primary goods whose exports are sensitive to the availability of surpluses. A look at commodity-specific export trends within the aggregate exports to each country may explain the negative and statistically significant supply response to Germany and Japan.

In the case of Germany, even allowing for 2 quarter lag, the estimate is negative and significant. One explanation is that importers of Pakistani goods in Germany attempt to appropriate the entire profits accruing from real devaluation of the rupee rather than sharing them with domestic exporters, thus discouraging positive supply response even in the longer run. For Japan, the above phenomenon leads to an immediate slackening of supply of exports.[12]

(d) Impact of Export Incentives

Except for USA, the impact of customs rebate and concessionary export financing on the supply of exports is counter-intuitive (Germany and Japan) and statistically not significant (UK and Germany). As noted above, the incentive index is largely dominated by the customs rebate data, and if exports to USA have higher imported content—along with the fact that it is the largest single destination of Pakistan's exports, it is not surprising that the impact of export incentive is positive and statistically significant for USA.[13]

(e) Domestic Prices and Unit Value of Exports

Domestic inflation renders our exports less competitive in partner countries. Except for Japan, the impact of one-percentage-point increase in domestic price level is fairly robust. It ranges from a high of 0.87 for exports to UK to 0.76 for USA. In the case of Japan, the impact is negative and statistically not significant. At a policy level, reining in inflation will help our exports indirectly as well as reduce pressure for frequent nominal devaluation.

(f) Imports and GDP of Pakistan

A priori with an increase in domestic incomes, the demand for imports from the trading partners should rise. The income elasticity for imports from USA and Japan is in a close range of unity, i.e., a one-percent increase in our GDP increases imports from these two countries by an equivalent percent. For UK and Germany, it is positive and small but statistically not significant. Basic chemicals and raw material imports may explain the weak income elasticity of imports from these two latter countries. Consumer durables from Japan and specialised imports from USA are plausible reasons for high income elasticity of imports.

(g) Imports and Real Devaluation

For every one percent real devaluation of the rupee, imports from UK, Germany, and Japan decline in the range of 0.61- 0.75 percent. Bulk imports of agricultural

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[12]During the period of analysis, Japan constituted a sizeable market for Pakistani yarn.

[13]USA is the single largest market for Pakistani exports, with a share of 15 percent in 1995-96, followed by 7 percent to Germany, and 6.5 percent to Japan and UK. The aggregate nature of the index may tend to overstate its positive impact for USA.

commodities, mainly in the public sector (e.g., wheat), to meet demand-supply imbalance, may partly explain the low price elasticity of 0.2 with respect to USA.[14]

(h) Exchange Reserves and Imports

Although exchange reserves have significant impact on our capacity to import from each of the trading partners, they operate differently for each country. A negative impact of one quarter lagged foreign exchange reserves on imports from USA and UK indicates a stock (import) adjustment behaviour. Pakistan imports wheat and soyabean oil in bulk from the USA, thus lags and leads in planning and payment cycle affect the exchange reserves before the physical import of goods. Similar is the case of imports of chemicals (mainly by multinational pharmaceuticals) from the UK. The negative sign is also a clue to an indirect causation. The higher or lower imports in the current quarter from these countries may be the result of speculative imports resulting from lower/higher foreign exchange reserves one quarter earlier and expectation of an imminent nominal devaluation. However, the positive impact of lagged exchange reserves on current imports from Germany and Japan indicates normal behaviour of importers.

(i) Determination of Wholesale Prices

As compared to the export and import functions, the estimates of the price equation are fairly robust across all four trading partners. The impact of one-percent change in money supply on domestic price level varies from 0.47 for Japan to 0.59 percent for the USA. The impact of imported inflation on domestic inflation appears to be the highest in the model for USA and the lowest for Japan. This result partly reinforces the estimate of the positive impact of customs rebate on imported inputs for exports to USA. A higher growth rate in GDP helps dampen inflationary tendencies.

4. SUMMARY AND CONCLUSION

Many studies have examined the impact of devaluation on the import and export performance of Pakistan at an aggregated and sub-aggregated level. This study aims to fill a void in empirical research by examining the price and income effects on Pakistan's bilateral trade performance with four major trading partners, i.e., USA, UK, Germany, and Japan. Using quarterly data for the period 1982-I–1996-IV, and employing Three-stage Least Square technique, we empirically estimate a four-equation model for each of the trading partners. The income effect is the strongest for Germany, followed by USA. Export demand elasticity w.r.t. real devaluation is the highest for USA, closely followed by Japan. Concessionary export financing and customs rebates do not stimulate export to any of the trading partners except for the USA. A comparison of Marshall-Lerner condition across the four

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[14]In 1994-95, food (wheat and soyabean oil) imports from USA constituted 43 percent of total imports from the USA.

trading partners reveals that real devaluation is unlikely to improve our trade balance with USA and Germany while it can arrest the trade balance deterioration with UK and Japan. In the case of USA it is the price inelasticity of imports, while in the case of Germany it is the price inelasticity of exports.

In the absence of any common empirical findings applicable to all the four major trading partners, what then are the policy implications of the study for exchange rate management of the Pakistani rupee? The principle of pegging the Rupee to a basket of currencies is not called into question but the basis of assigning weights to different currencies in the basket is a major policy issue. The tendency of real devaluation to improve our trade balance with the UK and Japan suggests that weights of basket currencies should reflect trade elasticities. However, a high responsiveness of our exports to the USA to real exchange rate changes favour status quo, i.e., weights be determined by trade shares. In the latter case, our trade balance is unlikely to improve with the UK or Japan. The policy-makers have to assess the cost of retaining trade shares as the weighting criteria and of the US Dollar as the anchor currency against potential benefits of a more dynamic and sensitive alignment of the Rupee as dictated by trade elasticities.

Appendices

Appendix

Estimated 3SLS Regression Results for the United States

I. Export Demand Equation

$$ln(X_i^d) = -21.26 + 2.36ln(RGDP_i) + 0.63ln(RER_i)$$
$$(-6.93) \quad (5.08) \quad (2.38)$$
$$R^2 = 0.85 \quad DW = 2.02$$

II. Export Supply Equation

$$ln(UVE_{Pak}) = 2.56 + 0.34ln(X_i^s) + 0.01ln(RGDP_{Pak}) + 0.76ln(WPI_{Pak}) + 0.04ln(NER_i)$$
$$(1.27) \quad (4.61) \quad (0.04) \quad (4.09) \quad (0.16)$$
$$-0.24ln(INDX) + 0.30AR(4)$$
$$(-4.38) \quad (2.75)$$
$$R^2 = 0.88 \quad DW = 1.41$$

III. Import Demand Equation

$$ln(IMP_i) = -8.35 + 1.13ln(RGDP_{Pak}) - 0.19ln(RER_i) + 0.19ln(FORX) - 0.32ln(FORX(-1))$$
$$(-2.48) \quad (3.35) \quad (-1.41) \quad (1.40) \quad (-2.04)$$
$$R^2 = 0.25 \quad DW = 1.61$$

IV. Price Equation

$$ln(WPI_{Pak}) = -2.84 + 0.59ln(M2) + 0.13ln(UVI_{Pak}) - 0.02ln(GGDP_{Pak}) + 0.72AR(1)$$
$$(-11.43) \quad (16.76) \quad (2.77) \quad (-2.92) \quad (11.55)$$
$$R^2 = 0.997 \quad DW = 1.76$$

Note: 1. *t*-ratios are reported in brackets. 2. *AR* refers to the Auto regression term.
3. The set of instruments used for this model is: $lnWGNP_i$, $lnWPS_i$, $GDP_{Pak}(-1)$, lnX_i, $lnIMP_i$, $lnUVI$, $lnUVI(-1)$, $lnM2$, $lnINDX$, $lnNER_i$, $lnFORX(-1)$, Constant .

Estimated 3SLS Regression Results for the United Kingdom

I. Export Demand Equation

$$ln(X_i^d) = -20.70 + 1.43ln(RGDP_i) + 0.43ln(RER_i)$$
$$\quad\quad (-2.63)\quad\quad (2.15)\quad\quad\quad (2.65)$$
$$\quad\quad R^2 = 0.54 \quad\quad\quad\quad DW = 1.73$$

II. Export Supply Equation

$$ln(UVE_{Pak}) = 2.39 + 0.09ln(X_i^s) - 0.11ln(RGDP_{Pak}) + 0.87ln(WPI_{Pak}) - 0.13ln(NER_i)$$
$$\quad\quad (3.78)\quad (2.62)\quad\quad\quad (-2.40)\quad\quad\quad\quad (8.31)\quad\quad\quad (-1.19)$$
$$\quad\quad -0.05ln(INDX) + 0.75AR(1)$$
$$\quad\quad\quad (-1.57)\quad\quad\quad\quad (8.98)$$
$$\quad\quad R^2 = 0.97 \quad\quad\quad\quad DW = 1.95$$

III. Import Demand Equation

$$ln(IMP_i) = -2.64 + 0.38ln(RGDP_{Pak}) - 0.75ln(RER_i) + 0.41ln(FORX) - 0.29ln(FORX(-1)$$
$$\quad\quad (-1.06)\quad\quad (1.55)\quad\quad\quad (-5.99)\quad\quad\quad (2.38)\quad\quad\quad (-1.97)$$
$$\quad\quad + 0.37AR(1)$$
$$\quad\quad\quad (2.00)$$
$$\quad\quad R^2 = 0.64 \quad\quad\quad\quad DW = 1.82$$

IV. Price Equation

$$ln(\underline{WPI_{Pak}}) = -2.36 + 0.47ln(M2) + 0.29ln(UVI_{Pak}) - 0.03ln(GGDPP) + 0.78AR(1)$$
$$\quad\quad (-5.95)\quad (7.13)\quad\quad\quad (3.02)\quad\quad\quad (-3.74)\quad\quad\quad (11.11)$$
$$\quad\quad R^2 = 0.997 \quad\quad\quad\quad DW = 1.97$$

Note: 1. *t*-ratios are reported in brackets. 2. *AR* refers to the Auto regression term.
3. $lnWGDP_i$, $lnWPS_i$, $lnGDP_{Pak}(-1)$, lnX_i^d, $lnIMP_i(-1)$, $lnUVE_{Pak}(-1)$, $lnUVI_{Pak}(-1)$, $lnFORX(-1)$, $lnM2$, $lnINDX$, $lnNER_i$, Constant.

Estimated 3SLS Regression Results for Germany

I. Export Demand Equation

$$ln(X_i^d) = -81.10 + 5.68ln(RGDP_i) + 0.11ln(RER_i) - 0.03(Time) + 0.27AR(1)$$
$$\quad\quad (-2.93)\quad\quad (2.89)\quad\quad\quad (0.47)\quad\quad\quad (-2.89)\quad\quad (2.33)$$
$$\quad\quad R^2 = 0.36 \quad\quad\quad\quad DW = 2.24$$

II. Export Supply Equation

$$ln(UVE_{Pak}) = -1.96 - 0.23ln[X_i^s(-2)] + 0.35ln(RGDP_{Pak}) + 0.81ln(WPI_{Pak}) - 0.08ln(NER_i)$$
$$\quad\quad (-1.22)\quad (-2.67)\quad\quad\quad (2.73)\quad\quad\quad\quad (2.70)\quad\quad\quad (-0.63)$$
$$\quad\quad -0.02ln(INDX) + 0.004Time - 0.10AR(1)$$
$$\quad\quad\quad (-0.38)\quad\quad\quad (0.40)\quad\quad\quad (-0.70)$$
$$\quad\quad R^2 = 0.97 \quad\quad\quad\quad\quad DW = 1.95$$

III. Import Demand Equation

$$ln(IMP_i) = 0.64 + 0.18ln(RGDP_{Pak}) - 0.61ln(RER_i) - 0.41ln(FORX) + 0.33ln(FORX(-1)$$
$$\quad\quad (0.29)\quad\quad (0.73)\quad\quad\quad (-6.09)\quad\quad (-2.17)\quad\quad\quad (2.19)$$
$$\quad\quad + 0.39AR(1)$$
$$\quad\quad (2.56)$$
$$\quad\quad R^2 = 0.59 \quad\quad\quad\quad DW = 1.95$$

IV. Price Equation

$$ln(WPI_{Pak}) = -2.62 + 0.54ln(M2) + 0.20ln(UVI_{Pak}) - 0.02ln(GGDP) + 0.77AR(1)$$
$$\quad\quad (-6.60)\quad (7.64)\quad\quad\quad (2.02)\quad\quad\quad (-3.14)\quad\quad (11.21)$$
$$\quad\quad R^2 = 0.997 \quad\quad\quad\quad DW = 1.91$$

Note: 1. *t*-ratios are reported in brackets. 2. *AR* refers to the Auto regression term.
3. $lnWGDP_i$, $lnWPS_i$, $lnGDP_{Pak}(-1)$, $lnX_i^d(-1)$, $lnIMP_i(-1)$, $lnUVE_{Pak}(-1)$, $lnUVI_{Pak}(-1)$, $lnFORX(-1)$, $lnM2$, $lnINDX$, $lnNER_i$, Constant .

Estimated 3SLS Regression Results for Japan

I. Export Demand Equation

$$ln(X_i^d) = -34.12 + 2.12ln(RGDP_i) + 0.61ln(RER_i) - 0.05(\text{Time}) + 0.09AR(1)$$
$$(-2.49) \quad (3.03) \quad\quad (4.09) \quad\quad (-7.51) \quad (1.96)$$
$$R^2 = 0.72 \quad\quad DW = 1.69$$

II. Export Supply Equation

$$ln(UVE_{Pak}) = 10.56 - 0.63ln(X_i^s) - 0.04ln(RGDP_{Pak}) - 0.42ln(WPI_{Pak}) + 0.01ln(NER_i)$$
$$(7.70) \quad (-16.50) \quad\quad (-0.67) \quad\quad (-1.61) \quad\quad (0.09)$$
$$- 0.08ln(INDX) + 0.02(\text{Time}) - 0.09AR(1)$$
$$(-1.95) \quad\quad (1.81) \quad\quad (-1.52)$$
$$R^2 = 0.81 \quad\quad DW = 1.67$$

III. Import Demand Equation

$$ln(IMP_i) = -2.72 + 0.98ln(RGDP_{Pak}) - 0.70ln(RER_i) - 0.74ln(FORX) + 0.44ln(FORX(-1))$$
$$(-1.06) \quad (3.44) \quad\quad (-6.95) \quad\quad (-3.83) \quad\quad (2.73)$$
$$+ 0.37AR(1)$$
$$(2.33)$$
$$R^2 = 0.73 \quad\quad DW = 1.81$$

IV. Price Equation

$$ln(WPI_{Pak}) = -2.28 + 0.47ln(M2) + 0.29ln(UVI_{Pak}) - 0.03ln(GGDP_{Pak}) + 0.78AR(1)$$
$$(-5.97) \quad (7.78) \quad\quad (3.54) \quad\quad (-4.04) \quad\quad (11.49)$$
$$R^2 = 0.997 \quad\quad DW = 1.94$$

Note: 1. *t*-ratios are reported in brackets. 2. *AR* refers to the Auto regression term.

3. $lnWGDP_i$, $lnWPS_i$, $lnGDP_{Pak}(-1)$, lnX_i^d, $lnIMP_i$, $lnUVE_{Pak}(-1)$, $lnUVI_{Pak}(-1)$, $lnFORX(-1)$, $lnM2$, $lnINDX$, $lnNER_i$, Constant .

DEFINITION OF INSTRUMENT VARIABLES: *WGDP_i/WGNP_i* and *WPS_i*

$WGDP_i/WGNP_i$ represent weighted Total Real World Income (excluding the income of the partner country *i*) of ten major trading partners of Pakistan, i.e., Canada, France, Italy, The Netherlands, Hong Kong, Korea, and Saudia Arabia, along with the USA, UK, Germany, and Japan. The share of Pakistan's exports to these countries in total exports is used as weights, measured in US Dollars and the constant base of 1980. These countries were selected because their share in Pakistan's exports is at least 2 percent of total exports. Weighted Consumer Price of ten countries (*WPS_i* excluding the CPI of the partner country *i*) at a constant base of 1980 is computed by using the above export share weights.

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