ARGUMENTA
OECONOMICA
CRACOVIENSIA

No 1–2(24–25) • 2021
ISSN 1642-168X
e-ISSN 2545-3866
AOC, 2021; 1–2(24–25): 31–47
https://doi.org/10.15678/AOC.2021.2402

Asad Karim
Sajid Gul
Ali Zeb
Obaid Ullah

A COMPARATIVE ANALYSIS OF THE EFFECTIVENESS OF PRECAUTIONARY AND MERCANTILIST APPROACHES TO ACCUMULATION OF FOREIGN EXCHANGE RESERVES IN PAKISTAN

Abstract

Objective: This study explores and compares short-run and long-run analyses of the validity of precautionary and mercantilist approaches to accumulation of foreign exchange reserves (FER) in Pakistan.
Research Design & Methods: This study uses quarterly data from 1990 (1st) to 2015 (4th). The autoregressive distributed lags (ARDL) test is used to check short-run and long--run analyses of the mercantilist and precautionary approaches for the accumulation of foreign exchange reserves in Pakistan.

Asad Karim, International Islamic University, International Institute of Islamic Economics (IIIE), Sector H-10, Islamabad, Pakistan, 44000, ORCID: https://orcid.org/0009-0009-5378-1705.

Sajid Gul, Zhengzhou University, School of Mathematics and Statistics, Zhengzhou, Henan, PR China, e-mail: sgqaustat@gmail.com, ORCID: https://orcid.org/0000-0002-2535-0512.

Ali Zeb, Zhengzhou University, School of Business, Zhengzhou, Henan, PR China, ORCID: https://orcid.org/0000-0002-3063-611X.

Obaid Ullah, Lanzhou University, School of Economics, Lanzhou, Gansu, PR China, ORCID: https://orcid.org/0000-0002-5911-5174.

Findings: The empirical results of the study reveal that Pakistan accumulates FER for a precautionary motive. The variables associated with precautionary motives are economically and statistically important in explaining FER accumulation. In contrast, variables linked to mercantilist motives are statistically significant, while insignificant economically for FER accumulation.
Implications/Recommendations: In an underdeveloped economy like Pakistan's, a large volume of international reserves helps not only in handling exchange rate strategies, but also in pursuing macroeconomic policies such as: export promotion, development projects, repayment of foreign debt, maintaining employment opportunities, and improvement of the financial sector.
Contribution: The econometric estimates show that Pakistan accumulates FER for a precautionary motive. The variables associated with precautionary motives are economically and statistically important in explaining FER accumulation. In contrast, variables linked to mercantilist motives are statistically significant, while insignificant economically for FER accumulation. These results are also true for most of the research studies, including on China, that we see in the literature.

Keywords: foreign exchange reserves, foreign debt, international monetary fund, State Bank of Pakistan.
JEL Classification: C12, C13, C22, C82, E58, E62.

1. Introduction

This study explores the validity of precautionary and mercantilist approaches to accumulating foreign exchange reserves (FER) in Pakistan. Central banks hold FER as a financial resource for the exchange rate and adjustment of monetary policies in the economy. According to the fifth edition of the International Monetary Fund (IMF) balance of payment (BOP) manuals, foreign exchange reserves are defined as those foreign assets that are easily accessible to, and controlled by, monetary authorities for financing external imbalances in the economy directly or indirectly by intervening in exchange markets to affect exchange rates, and for a variety of other purposes. There is disagreement among stakeholders about FER holdings; some believe that FER are unutilized and useless. Friedman and Friedman (1953) criticized fixed exchange rates with the view that they involve unutilized FER. The proponents of FER holdings argue that they should be accumulated to smooth imbalances (Kemal 2002). Recently, there has been a growing pattern of reserve accumulation among underdeveloped and developed countries. The IMF assesses that worldwide FER holdings have increased from USD 1.58 trillion to USD 11.60 between 1996 and 2014, with the shares of underdeveloped economies having improved – from USD 0.45 trillion to USD 7.97 trillion (30% to 72%). This has occurred despite the vast majority of economies moving from fixed to flexible exchange rate

regimes. Countries previously needed to hold low levels of FER to avoid currency crises. This unprecedented rise in FER is a reason for concern for central banks regarding management policies.

Countries that accumulate FER either erect a barrier against the unexpected withdrawal of foreign exchange (precautionary motive) or control exchange rates to support the export sector (mercantilist motive). According to the precautionary approach, underdeveloped economies' financial integration has expanded their exposure to hot money and volatile capital streams, which can be rapidly stopped and reversed (Edwards & McCarthy 2004). The decline in growth rates caused by the crisis persuaded policymakers to adopt tight internal and external adjustment policies for output stabilization. In these circumstances, FER holdings can be considered output stabilizers. According to the mercantilist approach, FER accumulation is the outcome of the undervalued exchange rate strategies implemented by some Asian countries to target domestic investment and boost their exports and export industries (foreign direct investment, FDI).

A few studies have empirically assessed the accumulation of FER in Pakistan, but no study has focused on the precautionary and mercantilist motives. Khan, Ahmed and Kazmi (2005) argued that FER demand in Pakistan is more sensitive to capital account vulnerability. They argued that FER accumulation in Pakistan results from asymmetric State Bank of Pakistan (SBP) intervention in the forex market. Our study attempts to assess the relevance of the two alternative views that seek to explain FER accumulation in the context of a single country – Pakistan. To achieve the desired objectives, variables such as BOP uncertainty, imports, average propensity to import (APM), inter-bank call rate, exchange rate uncertainty for the precautionary motive, balance of trade (BOT), and measure of the real effective exchange rate (REER) for the mercantilist motive are considered. Davidson and MacKinnon (1981) employ a hybrid model by merging the precautionary and mercantilist models. Our results show that Pakistan's accumulation of FER supports the precautionary motive and rejects the mercantilist rationale. These results align with Aizenman and Lee (2007), Prabheesh, Malathy and Madhumathi (2009), and several other studies.

Only a few studies have conducted empirical work on Pakistan's demand for international reserves. Yet none has focused on a comparative analysis of the effectiveness of precautionary and mercantilist motives and their relative importance in driving the accumulation of foreign reserves.

2. Accumulation of Foreign Exchange Reserves (Empirical Studies)

Since the 1960s, different studies have examined the adequacy of FER and their determinants. Among the work done by various authors, the analysis done by Heller (1966) stands out because it proposed a precise formula for determining ideal and optimal levels of FER. The procedure presented by Heller showed what occurred if the actual or real level of FER is higher or lower than the ideal or optimal levels of FER, whereas most of the various studies showed only FER's quantitative and relative nature. Heller (1966) developed a model to analyze the impacts of changes in external imbalance. The study examined different factors affecting the volume of FER holdings. It articulated the three variables with the ideal levels of FER, namely marginal propensity to import (MPI), the opportunity costs of holding, measured as the difference between the return on government bonds and the return on liquid FER, and the average of yearly BOP imbalances. The study utilized data from sixty countries between 1949 and 1963 and tested the ideal levels of the FER model. The optimal levels of FER for particular nations were ascertained, and the volume of natural or actual FER relative to the ascertained optimal FER was used as a measure of adequacy. The established amount showed by how much the volume of actual FER exceeded or was less than the ideal or optimal. The results showed that the total level of FER in the world is adequate. However, the problem concerns the distribution of FER across various countries. The study further concluded that European and North American countries have more FER than is optimal.

In contrast, Latin America, Africa, and Asia have an aggregate level of FER below the ideal or optimal level. The study further compared the actual to optimum levels as well as imports to test the credibility of estimates. Finally, the results showed that primary/optimum FER better predicts FER volume adjustments than does FER to imports.

In addition, Kenen and Voivodas (1972) found that adjustments in FER can be expressed as a simple autoregressive plan. To put it another way, BOP variations, as calculated by adjustments in FER, reflect current disturbances and the "carry-forward" or "duration" of all past troubles. They propose the hypothesis that a country's BOP can be expressed by three parameters: the mean, the variance of net disturbances, and the duration or carry--forward. The study utilized data from 14 countries to test the hypothesis. The authors found a positive and significant result in eight countries for the duration parameter, while the results were insignificant in the remaining

eight countries. They further found that the mean for the disturbances variable showed negative and negligible signs. Lastly, the variance for the disturbance variable showed positive signs and was significant in all countries. They further examined FER demand substituting domestic (internal) money supply instead of net disturbances. This domestic (internal) money supply impacted domestic FER demand. The final results showed that only net disturbances variance was significant, while the remaining variables were insignificant.

Cruz (2015) examined the mercantilist motive for holding FER in ten Latin American countries: Bolivia, Argentina, Brazil, Dominican Republic, Colombia, Nicaragua, Peru, Uruguay, Honduras, and Mexico. The study utilizes annual data from 1996 to 2011. It considers FER as a determinant of actual exchange rates. The variables included in the model are real exchange rates, real income/per capita, terms of trade (TOT), interest rates (accurate), government expenditure, current account, workers' remittances, and foreign aid. The study finds no evidence of FER accumulation via tradable goods because they appreciate the exchange rate. The study concludes that FER accumulation in Latin America supports the precautionary motive.

Similarly to Aizenman and Marion (2004), Prabheesh, Malathy and Madhumathi (2009) examined the relative importance of the mercantilist and preventive approaches to FER demand in India. The variables included in their model are FER opportunity cost proxied by Treasury bill rates, imports, foreign institutional investments included for the precautionary motive, and REER included for the mercantilist motive. The ARDL co-integration results indicate a long-run relationship between FER and explanatory variables. The results show that mercantilist demand for FER is more statistically significant than the precautionary motive.

Akdoğan (2010) analyzed the movements of FER and their relation to different economic variables (consumption, gross domestic product – GDP, imports, exports, inflation, and interest rates) for a sample of four developing countries – Argentina, Turkey, Brazil, and Korea – by utilizing annual data from 1960 to 2009. The study applied unrestricted VAR for structural shifts and the Granger causality test. The results indicate two main points: 1) for Turkey and Argentina, interest rate differentials with the US contain potentially helpful information for FER accumulation; and 2) for Korea, net exports and consumption differentials with the US contain helpful information for FER movements, suggesting that the precautionary motive is stronger relative to portfolio adjustment for explaining FER accumulation.

3. Accumulation of Foreign Exchange Reserves

In the literature, only a few studies have been done on Pakistan. The first study on the precautionary motive by Khan, Ahmed and Kazmi (2005) used quarterly data from 1981 (1st) to 2003 (2nd) to analyze the determinants of FER in the case of Pakistan. The variables used were FER, BOP, inter-bank call rate used as a proxy for opportunity cost, APM, workers remittances, and level of imports. Dummy variables were also included in the model to capture the impact of the 9/11 event and the takeover by the military and autonomy of the SBP. The authors also compared the role of short-run monetary disequilibrium with the main determinants of FER holdings. Their co-integration results revealed that, except remittances, all variables were significant. They identified the existence of a long steady run FER demand function. They also found that imports and variations in BOP had a positive effect on FER, and that the inter-bank call rate and remittances had a negative impact on FER in Pakistan. They concluded that the variations in BOP and imports were the leading indicators of rising FER in the case of Pakistan. The speed adjustment parameter in the error correction mechanism (ECM) was also insignificant. They concluded that the monetary disequilibrium drove FER in the short run, confirming the applications of the economic view to BOP in Pakistan. The dummy variable used for the autonomy of the SBP was significant in ECM, suggesting that SBP autonomy has a significant positive effect on FER holdings.

The second study on the mercantilist motive, by Tariq *et al*. (2014), examined accurate exchange rates and the FER nexus in Pakistan with the mercantilist approach. The authors followed Ramachandran (2004) to analyze the mercantilist motive for Pakistan. They utilized a wide range of data selected annually from 1973 to 2008. The first regimes were chosen from fixed regimes (1973–81), two were selected from managed authorities (1982–99), and the third regime was selected from floating regimes (2000–08). The model includes FER-lagged actual exchange rates, APM for trade openness, lagged interest rate differentials for opportunity cost, and remittances. The study adopted an ECM approach and co-integration to assess FER determinants in Pakistan. It also imposed two dummies for regime shifts. The study found a positive and significant relationship between FER and real exchange rates and revealed that FER holdings were a by-product of export growth strategies due to exchange rate devaluation. Furthermore, the authors found that the switch from fixed to floating exchange rate policies by the SBP was done to raise Pakistan's FER holdings.

A study by Chaudhry *et al*. (2011) empirically investigated the relationship between FER and inflation in Pakistan by applying ARDL and co-integration bound testing techniques. The study used annual data from 1960 to 2007. The variables included were FER measured at current prices and GDPD as a proxy for inflation. The results showed a negative association between FER and the inflation rate in Pakistan, indicating that any shortfall in FER has some harmful effects on prices of goods.

4. Econometric Methodology

4.1. Data Nature and Sources

In this study, quarterly data from 1990 (1st) to 2015 (4th) was taken from different databases, the Pakistan Bureau of Statistics, International Financial Statistics (IFS), the Pakistan Institute of Development Economics (Statistical Paper Series) for data on quarterly GDP, and the State Bank of Pakistan.

4.2. Empirical Model

First, we designed a precautionary model and then a mercantilist model. Next, we combined both models to make a hybrid model.

Precautionary Model

$$\log\left(\frac{RES}{GDP}\right)_t = \alpha_0 + \alpha_1 \log(IM)_t + \alpha_2 \log(IBCR)_t + \alpha_3 \log(BOP\_U)_t + \alpha_4 \log(APM)_t + \alpha_5 \log(ER_U)_t + \varepsilon_t . \quad (1)$$

In equation 1, RES/GDP is the dependent variable, which denotes the stock of reserves to GDP ratio (nominal), IM, IBCR, BOP_U, APM, ER_U denote the value of imports, inter-bank call rate, balance of payments variations, average propensity to import, exchange rate uncertainty. ε_t represents random disturbance.

Mercantilist Model

$$\log\left(\frac{RES}{GDP}\right)_t = \beta_0 + \beta_1 \log(td\_REER)_t + \beta_2 \log(BOT)_t + \varepsilon_t . \quad (2)$$

In this equation, the term $(\text{td\_REER})_t$ denotes deviation of the real effective exchange rate from its trend and $(\text{BOT})_t$ denotes balance of trade. Variable ε_t represents random disturbance. The term deviation of the real effective exchange rate from its trend is expected to be inversely related

to FER because a negative $(\text{td\_REER})_t$ represents an undervalued real effective exchange rate and enhances FER. We used balance of trade data to control for export growth. We expected this sign to be positive because of a positive $(\text{BOT})_t$. This shows that exports increased due to accumulating FER. If a country accumulates FER for the mercantilist motive, then the value of export growth will be expected to be positive (Aizenman & Lee 2007, Dooley, Folkerts-Landau & Garber 2003, Prabheesh, Malathy & Madhumathi 2009).

Hybrid Model

We combined both models to make one hybrid model:

$$\log\left(\frac{RES}{GDP}\right)_t = \delta_0 + \delta_1 \log(IM)_t + \delta_2 \log(IBCR)_t + \delta_3 \log(BOP\_U)_t + \delta_4 \log(APM)_t + \delta_5 \log(ER\_U)_t + \delta_6 \log(td\_REER)_t + \delta_7 \log(BOT)_t + \varepsilon_t. \quad (3)$$

Alternative Models

In this study, we have to choose between two rival models, where neither can be nested within the other, i.e. neither is a restricted version of the other. We have two rival models called the precautionary and mercantilist models, we well as one hybrid model which combines the precautionary and mercantilist models. Davidson and MacKinnon (1981) J-tests are employed. These tests are used for testing the hybrid model. When the alternative hypothesis cannot be derived as a particular case of the null hypothesis, non-nested hypothesis tests are used. This may be caused by different sets of regressors in competing possible models or through other stochastic term distributions.

J-test Approach

The augmented equation is as follows:

$$\log\left(\frac{RES}{GDP}\right)_t = \alpha_0 + \alpha_1 \log(IM)_t + \alpha_2 \log(IBCR)_t + \alpha_3 \log(BOP\_U)_t + \delta_4 \log(APM)_t + \alpha_5 \log(ER\_U)_t + \beta\left(\frac{RES}{GDP}\right)_t^{M2} + \varepsilon_t, \quad (4)$$

where $\beta\left(\frac{RES}{GDP}\right)_t^{M2}$ is the predicted value from model 2.

We add the predicted values from model 1 as an explanatory variable in model 2 and then estimate again to obtain the new results. The augmented equation is as follows:

$$\log\left(\frac{RES}{GDP}\right)_t = \beta_0 + \beta_1 \log(td\_REER)_t + \beta_2 \log(BOT)_t + \alpha\left(\frac{RES}{GDP}\right)_t^{M1} + \varepsilon_t, \quad (5)$$

where $\beta\left(\frac{RES}{GDP}\right)_t^{M1}$ is the predicted value of model 1.

5. Results and Discussion

Before the model estimation, the augmented Dickey Fuller (ADF) test is applied to determine the unit's existence and order of integration of all the variables involved. A data series with mean and auto covariances depending on a time trend is non-stationary.

5.1. Unit Root Tests

Table 1 contains the ADF test results, where all variables are stationary at first difference.

Table 1. Results of ADF Test

Variables	Order of integration	ADF results	*t*-stat/*p*-value	Integration order
log(RES/GDP)	level 1st difference	–1.4371 –8.1073	–2.8897/0.5613 –2.8903/0.0000	I(1)
log(IM)	level 1st difference	–2.1905 –9.1526	–2.8897/0.211 –2.8900/0.000	I(1)
log(APM)	level 1st difference	–0.7224 –6.4212	–2.8897/0.8356 –2.8903/0.0000	I(1)
log(IBCR)	level 1st difference	–1.9839 –8.9746	–2.8909/0.2934 –2.8909/0.0000	I(1)
log(BOP_U)	level 1st difference	–2.7768 –13.443	–2.8900/0.0652 –2.8900/0.0000	I(1)
log(BOT)	level 1st difference	–2.7841 –16.043	–2.8900/0.0641 –2.8900/0.0000	I(1)
log(ER_U)	level 1st difference	–2.1253 –18.003	–2.8900/0.2534 –2.8900/0.0000	I(1)
log(REER)	level 1st difference	–1.6304 –8.8497	–2.8998/0.4634 –2.8998/0.0000	I(1)

Source: authors' own calculations based on data from Pakistan Bureau of Statistics, International Financial Statistics (IFS), the Pakistan Institute of Development Economics (Statistical Paper Series).

5.2. ARDL Bound Test Results

ARDL Bound Test Precautionary Model

Table 2 shows the ARDL bound test results for the precautionary model. The results of the bound test indicate that at a 1% level of significance, the *F*-statistic has a more excellent value than the upper determined value. Consequently, we reject the null hypothesis that there is no long-term relationship. As a result, the bound test demonstrates that our precautionary model does have a long-term relationship.

Table 2. ARDL Bound Test Precautionary Model

Test statistic	Value	*k*
F-statistic	4.7721	5
Critical Value Bounds		
Significance	Lower bound (I0)	Upper bound (I1)
10%	2.26	3.35
5%	2.62	3.79
1%	3.41	4.68

Source: same as for Table 1.

ARDL Bound Test Mercantilist Model

Table 3 shows the ARDL bound test results for the mercantilist model. The results of the bound test indicate that the value of the null hypothesis is rejected of no long-run correlation since the *F*-statistic is higher than 0.05 at the 5% level of significance. As a result, the bound test ensures that a long--term relationship persists in our mercantilist model.

Table 3. ARDL Bound Test Mercantilist Model

Test statistic	Value	*k*
F-statistic	5.3624	2
Critical Value Bounds		
Significance	Lower bound (I0)	Upper bound (I1)
10%	3.17	4.14
5%	3.79	4.85
1%	5.15	6.36

Note: Significance level at $\alpha = 5\%$.

Source: same as for Table 1.

Short-run and Long-run Parameter Estimates of the Precautionary Model

Table 4 shows the outcome of the ARDL short-run and long-run coefficient of co-integration for the precautionary model. Here the dependent variable is a log of FER to GDP ratio, and the explanatory variables are INTERBANK CALL RATE, log(IM), log(APM), log(BOP_U), and log(ER_U). The value of error correction term (ECT) in Table 4 has a significant and negative sign, illustrating the speed of adjustment towards a long-run equilibrium state. It also shows the rate of convergence in the long run. If this sign is positive and insignificant, there is no sign of convergence in the long run. It also shows the long-run causality running from independent to dependent variables.

Table 4. Estimates of Short-run and Long-run Coefficients of the Precautionary Model

Dependent variable: log(RES/GDP) Selected Model ARDL: (1,0,1,0,1,1)				
Variable	Coefficient	S. E	*t*-stat	Prob
Short-run Cointegrating Form				
(INTER BANK CALL RATE)	3.0308	0.8778	3.4525	0.0008
log(APM)	–3.8175	0.2511	–15.1995	0.0000
log(BOP_U)	2.8209	0.2804	10.0601	0.0000
log(ER_U)	0.3853	0.9841	0.3915	0.6963
log(IM)	0.1854	0.3886	4.674	0.0003
CointEq (–1)	–0.1721	0.0745	–2.3109	0.0230
Cointeq = log(RES/GDP) – (17.603*IBCR – 19.2324* log(APM) + 16.3841* log(BOP_U) – 18.4203*log(IM) + 10.5720*log(ER_U) + 15.6218)				
Long-run Coefficients				
INTER BANK CALL RATE	17.6036	10.5376	1.6705	0.0982***
log(APM)	19.2323	8.1499	–2.3598	0.0204**
log(BOP_U)	16.3841	6.8332	2.3977	0.0185**
log(ER_U)	10.5720	8.0757	1.3091	0.1937***
log(IM)	0.6998	5.0387	2.657	0.0001**
C	15.6218	24.6260	0.6343	0.5274

Note: (***), (**) and (*) denote significance levels at 10%, 5% and 1%, respectively.
Source: same as for Table 1.

Table 4 also shows the long-run coefficients of ARDL. For the precautionary model, the estimated long-run relationship coefficients are essential for log(APM), IBCR, and log(BOP_U), but negligible for log(ER_U). As shown by the model, FER varies positively in reaction to variations in the BOP. The SBP's strategy, where the central bank plays a significant role, is compliant with the positive sign of the variability test. In the foreign exchange market, the central bank is very influential. Imports have a positive symbol, implying that scale elasticity is positive in Pakistan. APM is also an optimistic and essential indicator, which is seen as a proxy for trade openness. As the demand for FER rises, trade openness also increases. However, the APM's resulting sign is optimistic, matching our expectations and consistent with the conventional buffer-stock model's theoretical prediction. IBCR, on the other hand, gave an unexpectedly positive sign. This positive sign of the IBCR implies that the opportunity cost channel may be of limited relevance for a developing country like Pakistan. A larger stock of FER can be used for several purposes, such as rupee value appreciation in the foreign exchange market, import payments, debt payments, and inflation control. The opportunity cost of capital has little relevance for most countries; however, according to Aizenman and Marion (2004), most studies found it negligible or essential.

Short-run and Long-run Parameter Estimates of the Mercantilist Model

The short-run and long-run coefficients for the mercantilist model are shown in Table 5. The value of ECT in Table 5 is negative and significant, showing the speed of adjustment towards a long-run equilibrium state. It shows us the rate of convergence in the long run. If this sign is positive and significant, there is no evidence of convergence in the long run. Table 5 also shows the long-run coefficients of ARDL. For both log(REER) and REER, the estimated coefficients of the long-run relationship for the mercantilist model are statistically less relevant to BOT. The interpretation that countries accumulate FER to hold the exchange rate depreciated is backed by the negative sign of the log(REER). This finding supports the results of Prabheesh, Malathy and Madhumathi (2009), who found the very same thing. When countries accumulate FER, the REER decreases, and exports become less expensive. If the REER increases, the result is inexpensive exports to that country. The 10% decrease in log(REER) will result in a long-run increase of 45% in the RES/GDP ratio. In the long run, this result supports the theory of the mercantilist motive that depreciated REER increases FER. The country supplies domestic currency to the international market

Table 5. Estimates of Short-run and Long-run Coefficients of the Mercantilist Model

Dependent variable: log(RES/GDP) Selected Model ARDL: (1,1,0)				
Variable	Coefficient	S. E	*t*-stat	Prob
Short-run Cointegrating Form				
log(REER)	3.0308	1.1083	2.7345	0.0074
log(BOT)	0.5062	0.1772	2.8556	0.0052
CointEq (–1)	–0.1721	0.0494	–3.4795	0.0008
Cointeq = log(RES/GDP) – (–4.5692*log(REER) + 2.9405*log(BOT)) = 16.3841				
Long-run Coefficients				
log(REER)	–4.5691	2.0500	–2.2288	0.0281
log(BOT)	2.9404	1.3676	2.1499	0.0340
C	16.3841	9.5562	1.7144	0.0896

Note: (***), (**) and (*) denote significance level at 10%, 5% and 1%, respectively.
Source: same as for Table 1.

and demands FER to devalue the domestic exchange rate. Our results support the studies of Aizenman and Lee (2007), Prabheesh, Malathy and Madhumathi (2009), and several others. The exchange rate value is negatively related to FER and is not highly significant. The coefficient of export growth proxied by BOT is statistically significant and positive. It supports the view that countries accumulate FER to increase their exports. The value of log(BOT) is 2.904, which shows that if LBOT increases by 10%, FER will also grow by 29%. This value is likewise not highly significant. We concluded that the mercantilist motive here is statistically significant but economically insignificant. Aizenman and Lee found that the variables linked to mercantilist explanations, namely export growth and depreciated real exchange rate, are not highly significant. While variables connected to precautionary motives are highly effective in a sample of 128 countries, our results are consistent with those (Aizenman & Lee 2007).

J-test Output

The J-test results are shown in Tables 6 and 7. In Table 6, we added predicted values of model 2, i.e. $\log(\text{RES/GDP})^{M2}$ in model 1, and then estimated the model. The results show that *t*-statistic values for the regression coefficient of the variable are statistically insignificant. The study reveals that the mercantilist model is unsuccessfully challenging the precautionary model. In Table 7, we added predicted values of model 1 $\log(\text{RES/GDP})^{M1}$

in model 2 and then estimated the model. The results reveal that the value of *t*-statistic coefficients associated with this added variable is statistically significant.

Table 6. J-test Results of the Precautionary Model

Dependent variable: log(RES/GDP)
Method: ARDL
Maximum dependent lags: 1 (Automatic selection)
Model Selection method: AIC
Dynamic regressors (1 lag, automatic): IBCR log(APM) log(BOP_U) log(IM) log(ER_U)
Fixed regressors: $\log(RES/GDP)^{M2}$ C
Selected Model: ARDL (1,0,1,0,1,1)

Variable	Coefficient	S. E	*t*-stat	Prob
log(RES/GDP)(–1)	0.6051	0.0801	7.5529	0.0000
IBCR	–1.0004	0.8848	–1.1316	0.2607
log(APM)	0.5336	0.2527	2.1115	0.0374
log(APM)(–1)	–0.4653	0.2168	–2.1461	0.0345
log(BOP_U)	1.2982	0.3438	3.7756	0.0003
log(ER_U)	–5.0671	0.9911	–5.1122	0.0000
log(ER_U)(–1)	2.7788	1.1569	2.4017	0.0183
$\log(RES/GDP)^{M2}$	–0.1222	0.1233	–0.9910	0.3243
C	–13.4993	4.1776	–3.2313	0.0017

Source: same as for Table 1.

Further, it indicates that the precautionary model successfully challenges the mercantilist model in explaining variations in the accumulation of FER in Pakistan. Or we can say that the precautionary model is more applicable than the mercantilist model in Pakistan. We conclude that Pakistan accumulates FER with a precautionary motive like other developing countries. These results support other studies (Aizenman & Lee 2007, Prabheesh, Malathy & Madhumathi 2009). They show that countries accumulate FER mainly for precautionary motives, and the variables associated with this motive are the most significant.

6. Conclusions and Policy Recommendations

In developing economies, Asian countries hold a considerable amount of Forex reserves. But what factors have contributed to the accumulation

Table 7. J-test Results of the Mercantilist Model

Dependent variable: log(RES/GDP)				
Method: ARDL				
Maximum dependent lags: 4 (Automatic selection)				
Model Selection method: AIC				
Dynamic regressors (4 lagS, automatic): log (REER) log(BOT)				
Fixed regressors: log(RES/GDP)^{M1} C				
Selected Model: ARDL (2,1,0)				
Variable	Coefficient	S. E	*t*-stat	Prob
log(RES/GDP)(–1)	0.6085	0.1006	6.0478	0.0000
log(RES/GDP)(–2)	–0.1349	0.0912	–1.4792	0.1424
log(REER)	2.2398	1.0522	2.1285	0.0359
log(REER)(–1)	–2.3435	1.0679	–2.1943	0.0306
log(BOT)	0.2353	0.1752	1.3431	0.1824
log(RES/GDP)^{M1}	0.5166	0.1068	4.8377	0.0000
C	0.5062	1.6945	0.2987	0.7658

Source: same as for Table 1.

of the stockpiled resources in these countries? Some researchers have used the buffer stock model, which indicates that precautionary motives have increased the stock of FER in these countries. Other researchers believe that mercantilist motives prompt FER holdings. This study compares mercantilism and motives in the accumulation of FER by Pakistan utilizing quarterly data from 1990 to 2015. Previous studies for Pakistan analyzed the role of precautionary factors in the determination and adequacy of demand for reserves and the part played by the mercantilist motive in FER demand. However, this paper examines the relative importance of precautionary and mercantilist reasons. The econometric estimates show that Pakistan accumulates FER for a precautionary motive. The variables associated with precautionary motives are economically and statistically crucial in explaining FER accumulation. In contrast, variables linked to mercantilist reasons are statistically significant while insignificant economically for the FER heap. These results are also accurate for most developing economies, including China.

Our study has several implications. First, the hoarding of FER (mercantilist motive) is not pursued in Pakistan, which is the right approach given Pakistan's BOP position. Second, the main driving factor for holding FER in Pakistan is the precautionary motive, particularly in light of the

uncertainty associated with BOP and ER. Given the history of large--scale fluctuations in the exchange rate (BOP), Pakistan has to maintain a sufficient amount of FER to meet unexpected demand. Currently, FER in Pakistan amount to USD 18 billion, equivalent to four months' imports. Although, historically, Pakistan has maintained a lower amount of FER, it faces severe crises because of this practice. To avoid any such situation developing, Pakistan could increase its FER by up to six months of imports. To achieve that target, Pakistan could allow nominal exchange rates to follow market conditions, i.e. to allow the rupee to devalue according to purchasing power parity (PPP). The research will enable Pakistan to build FER and its BOP position.

References

Aizenman, J. and Lee, J. (2007) "International Reserves: Precautionary versus Mercantilist Views, Theory and Evidence". *Open Economies Review* 18: 191–214, https://doi.org/10.1007/s11079-007-9030-z.

Aizenman, J. and Marion, N. (2004) "International Reserve Holdings with Sovereign Risk and Costly Tax Collection". *The Economic Journal* 114(497): 569–91, https://doi.org/10.1111/j.1468-0297.2004.00232.x.

Akdoğan, K. (2010) "Foreign Exchange Reserve Demand: An Information Value Approach". *Central Bank Review* 10(2): 33–44.

Chaudhry, I. S., Akhtar, M. H., Mahmood, K. and Faridi, M. Z. (2011) "Foreign Exchange Reserves and Inflation in Pakistan: Evidence from ARDL Modelling Approach". *International Journal of Economics and Finance* 3(1): 69–76, https://doi.org/10.5539/ijef.v3n1p69.

Cruz, M. (2015) "The Need for Official Reserves in Latin America: Assessing the Precautionary Motive, 1995–2011". *Cuadernos de Economía* 34(65): 327–47, https://doi.org/10.15446/cuad.econ.v34n65.42611.

Davidson, R. and MacKinnon, J. G. (1981) "Several Tests for Model Specification in the Presence of Alternative Hypotheses". *Econometrica: Journal of the Econometric Society* 49(3): 781–93, https://doi.org/10.2307/1911522.

Dooley, M. P., Folkerts-Landau, D. and Garber, P. M. (2003) "An Essay on the Revived Bretton Woods System". *National Bureau of Economic Research Cambridge*. Mass., USA.

Edwards, B. and McCarthy, J. D. (2004) "Resources and Social Movement Mobilization" in: D. A. Snow, S. A. Soule, H. Kriesi (eds), *The Blackwell Companion to Social Movements*, 116–52. Malden: Blackwell Publishing.

Friedman, M. and Friedman, M. (1953) *Essays in Positive Economics*. University of Chicago Press.

Heller, H. R. (1966) "Optimal International Reserves". *The Economic Journal* 76: 296–311, https://doi.org/10.2307/2229716.

Kemal, A. (2002) "Optimal Level of Reserves in Developing Economies with Special Reference to Pakistan". *Public Policy Papers* 1.

Kenen, P. B. and Voivodas, C. S. (1972) "Export Instability and Economic Growth". *Kyklos* 25(4): 791–804, https://doi.org/10.1111/j.1467-6435.1972.tb01082.x.

Khan, K., Ahmed, E. and Kazmi, A. A. (2005) "The Demand for International Reserves: A Case Study of Pakistan [with Comments]". *The Pakistan Development Review* 44(4II): 939–57, https://doi.org/10.30541/v44i4iipp.939-957.

Prabheesh, K., Malathy, D. and Madhumathi, R. (2009) "Precautionary and Mercantilist Approaches to Demand for International Reserves: An Empirical Investigation in the Indian Context". *Macroeconomics and Finance in Emerging Market Economies* 2(2): 279–91, https://doi.org/10.1080/17520840902726367.

Ramachandran, M. (2004) "The Optimal Level of International Reserves: Evidence for India". *Economics Letters* 83(3): 365–70, https://doi.org/10.1016/j.econlet.2003.11.015.

Tariq, M., Haq, Z., Kakakhel S. J., Jehangir, M. and Aamir, M. (2014) "Real Exchange Rate and Foreign Exchange Reserves: A Mercantilist View". *Life Science Journal* 11: 13–25.