The Behavior of Public External Debt in Pakistan:

A Financial Macroeconomic Analysis

Abdul WAHEED*

Abstract

Like many other developing countries, Pakistan is a highly indebted low-income country and is facing serious hardships in external debt servicing. This paper analyzes the behavior of public external debt in Pakistan and assesses the effectiveness of alternative policy measures to control its growth. The study particularly focuses on resource gap in a flow of funds framework and constructs a financial macroeconomic model of Pakistan. The model is then used to develop a medium term strategy to reduce the burden of public external debt significantly by the end of the next five years. Among the eight policy simulations, the results indicate that increase in exports, increase in taxes, reduction in bond rate, reduction in lending rate and devaluation of the currency appear to be very significant in reducing foreign borrowing and bringing the external debt to sustainable levels. The study also found that further reduction in domestic deposit rate, bank rate and required reserve ratio has less significant effects on public debt sustainability. The study concludes that continued government policy reforms and sound debt management are essential for getting out of the current external debt problem.

1. Introduction

In developing countries, governments often face a deficit in their budgets. The expectation is that taxes should cover a large share of public spending. However, there are many social, political and economic constraints on the level of taxation.[1] The government can also raise funds through domestic financing (borrowing from central bank, banking system, private sector), or external financing (concessional/non-concessional). However, any government deficit entails a cost, regardless of its financing. The aim is to minimize the cost and risk for the overall economy.

External financing often appears more attractive for the government of these countries because of lesser crowding out effects on private investment, and reduced risks of inflationary pressure. However, a rising external debt tends to weaken the economy. When debt is contracted on commercial terms (which is the case in Pakistan now), a higher foreign interest rate leads to an increase in debt service payments, which may translate into a larger fiscal deficit. When the government borrows to lower the ongoing deficit, this leads to an unsustainable level of debt. In the long run, this may leads to a debt crisis. The literature on the foreign borrowing as a source of development finance has been comprehensively reviewed, both on theoretical and empirical grounds

by White (1992) and Waheed (2004a, 2005). Similarly, as a critique of foreign financing, Griffin (1970), Griffin and Enos (1970), posited that external finance may discourage domestic savings and be redirected into consumption rather than investment. A number of studies have tried to test this hypothesis but the results have been mixed. This issue has been analyzed and discussed in detail by Waheed, 2004b.

Currently the external debt situation of South Asian countries is not satisfactory, however, the problem is more severe in Pakistan in terms of debt burden and debt service indicators.[2] The persistence of large twin deficits for an extended period covering two consecutive decades (1980s and 1990s) has resulted in the unprecedented rise in public external debt in Pakistan. By the late 1990s, external vulnerability increased, and the country was able to stave off a crisis only by freezing and forcibly rolling over foreign currency deposits and rescheduling Paris Club debt. However, the external debt situation remained unsustainable, and the World Bank, based on standard debt ratios, first placed the country in the category of 'Moderately Indebted Low Income Country' (see World Bank 1998: 67), and then classified it in the group of 'Severely Indebted Low Income Country' (see World Bank 2001: 140).[3]

It is very striking that debt reduction has never been a serious objective of economic planning and policy in the past. Rather debt has been used as an instrument for achieving other objectives. This strategy is obviously not the most appropriate one and the policy maker can no longer afford to by-pass the issue of debt-sustainability in designing economic policies. This study is designed to fill this gap; it addresses the external debt problem explicitly in a planning model and suggests alternative policy measures for bringing the external debt to sustainable levels.

The rest of the paper is organized as follows. Section 2 describes the macroeconomic accounting framework and behavioral structure of model and calibration procedure. In section 3 the model is used to make statistical simulations under alternative assumptions to study the effectiveness of alternative policy prescription in addressing the public external debt problem. The last section provides conclusion and policy implications. An appendix is added at the end to present the algebraic expression of the model.

2. Model Specification and Calibration

In order to search for a sustainable solution to the public external debt problem, it is essential to focus on the structural elements in the economy and the nature of economic dynamics that generate the need to borrow. The debt problem can be analyzed in the framework of traditional neo-classical growth model (see Crouch 1973), or overlapping-generations models (see Samuelson 1958) or gap models (see Chenery and Strout 1966, Bacha 1990). For this study as well, the framework of the gap model is adopted. The following sub-sections discuss the specification of the model, data sources and calibration procedure.

2.1. Model Specification

Macroeconomic models have been extensively used in Pakistan in the making of policies and their assessments. However, these models suffer from a critical weakness in the treatment of the financial sector.[4] The relatively simple treatment of the financial sector in these models makes them inadequate to study certain aspects of monetary, fiscal, and financial sector policies, especially those that lead to changes in the flow of funds between sectors. In this study, this limitation in the macro-modeling literature on Pakistan is addressed by developing a flow of funds model of Pakistan's economy, with a detailed financial sector and a somewhat simplified real sector.

The current model is based on the emerging literature on gap models. The existing gap models, however, have certain limitations. For example, the two-gap model (see Chenery and Strout 1966) does not distinguish the contributions of public and private sector to the overall resource deficits. Such a distinction is important because the foreign resource inflow to finance the budget deficit is usually in the form of loans (concessional/non-concessional), while the private sector's resource imbalance is mostly financed by foreign direct or portfolio investment. The three-gap model (see Bacha 1990) splits the domestic resources gap into public and private sectors. However, the three-gap model assumes no foreign capital inflows to the private sector, no market for government bonds, and no private capital flight. The current study tries to relax some of the assumptions of the gap models and overcome the limitations of the previous empirical studies based on gap models. Though small and simple, this model is tractable and relevant. One more important feature of this model is that it can be directly linked to the World Bank's Revised Minimum Standard Model (in short RMSM) and IMF`s Financial Programming Model (see Tarp and Brixen 1996). It is believed that the framework developed in this study could be useful for a systematic evaluation of public debt behavior in Pakistan. The macroeconomic consistency framework, the behavioral structure and calibration procedures are discussed in detail in the following sub-sections.

2.1.1. Macroeconomic Consistency Framework

There are five sectors in the model: the government (g); the central bank(c); the rest of the banking system (b); the non-financial private sector (p) and the rest of the world or foreign sector (f). There are separate markets for goods, money, bonds and credits. The model distinguishes between 17 monetary and financial assets and one physical asset (physical capital). This disaggregation of the sectors, markets and financial assets is consistent with the data availability, the structure of the Pakistan economy and the relevant question to be addressed. A brief description of all variables is presented in Appendix-III.

The accounting identities are introduced for each sector, ensuring consistency in the data. The government's current revenue consists of its factor income, direct and indirect tax revenue less

subsidy, current transfer from the foreign sector and profit and loss transferred from the central bank, interest receipts on deposits, bond holdings and credit. Revenues are used to finance interest payments on domestic and foreign instruments, current transfer to private sector, public consumption and savings (equation-1). The latter, together with the increase in indebtedness (domestic and foreign), are used for the government's gross investment, changes in deposits, bond holding and credit to other sectors (equation-2).

Current revenue of the central bank includes interest receipts on its domestic credit, bonds, and deposits. Its current revenue finances interest payments on deposits, profit and loss transferred to the government and savings (equation-3). In the capital account (equation-4) the change in net worth, the increase in monetary base finances the acquisition of foreign assets and domestic asset creation.

For the banking system, the sources of current revenue are the interest receipts on its credit, deposits, and bonds. Current expenditure consists of interest payments on credits, deposits, and bonds and distributed profit and loss transferred to the private sector (equation-5). The creations of assets are financed by savings, deposits, credits and bonds issued (equation-6).

The current revenue of the foreign sector is just the current payments abroad of the domestic economic sectors. It consists of imports of goods and non-factor services and interest receipts on credit, deposits and bonds. Similarly, the current expenditures of the rest of the world (ROW) are equal to exports, interest payments on deposits, credits and bonds, and current transfers to the government and private sector. The balancing item in the current account is foreign savings, which is equivalent to current account deficit (equation-7). The capital account of the balance of payments states that foreign savings (the current account deficit) plus changes in deposits and credits is equal to the flow of foreign credit, deposits, and bonds (equation-8).

The private sector's current revenue consists of its own factor income plus interest receipts on domestic credit, deposits, bonds and current transfers from the government and foreign sector and distributed profit and loss transferred from the banking system. They are use to finance direct tax payments to the government, interest on domestic and foreign private debt, and private consumption. The balancing item is private savings (equation-9). In the capital account, total financing equals the sum of private savings, credit from other sectors, and changes in bond holding by other sectors. They are used to finance private investment, the acquisition of deposits, money, bonds and the credit to other sectors (equation-10).

Although the individual accounts give a comprehensive presentation of the flows in the consistency framework, it is helpful to integrate the accounts so that they are mutually consistent. For this, a useful device is a *matrix of sources and uses of fund* for all sectors and national accounts. In appendix-I, Table-1 (a & b) presents the budget constraints following this alternative procedure.

2.1.2. Markets and Behavioral Structure

In this sub-section, we develop a simple behavioral model and append it to the consistency framework (discussed in the previous sub-section), so as to perform policy analysis. Three methods are used to project the variable in the model, depending on what is supposed to be the most appropriate for the variable in question. For private consumption, private investment, imports and money demand the behavioral equations are derived from standard macroeconomic theory, and the parameters are estimated econometrically. Some variables are assumed to maintain the same ratio to GDP or some other relevant activity variable. Finally, some variables are supposed to be determined residually or exogenously.

In the goods market, for simplicity it is assumed that domestic economy produces only one composite good that can be used for domestic consumption and investment, or sold abroad. Due to the lack of data on capital stock, it is difficult to empirically establish a complete production function. Therefore, it is assumed that the economy is operating under a fixed coefficient production function. and that capital is the constraining factor (equation-12). Thus, in our model, population level as well as growth rate of population has nothing to do with the long run growth rate. This equation (equation-12) is, however, used to determine the total investment requirement.

The consumption expenditures are split into private and public components because of the different propensities between the two. In the economic literature, private consumption expenditure has been under rigorous theoretical and empirical investigation. Several hypotheses about private consumption behavior have been suggested for developed and developing countries (see Mikesell and Zinser 1973). However, Song (1981) found that the standard Keynesian model gives better results for a developing country. Thus, in formulating a model of private consumption behavior for this study, it is expected that income would have a dominant influence, in the light of the consumption hypothesis. Following Song (1981) and Khan (1987), a lagged real consumption (cp_{t-1}) is also included for habit persistence (equation-17). For government consumption, conceptually it is very difficult to predict its level, since it does not conform to any particular stable relationship. Therefore, following Serven (1990) it is assumed as residual to bring equilibrium in the goods market (equation-11).

Investment behavior at both the micro and macro level has been a subject of intense theoretical and empirical controversy.[5] Empirical studies of investment in developing countries show that changes in output are the most important determinant of private investment. It is also found that government investment in infrastructure is complementary with private investment (see Blejer and Khan 1984). Green and Villanueva (1991) analyzed the effects of several policy and other macroeconomic variables on the ratio of private investment to GDP in developing countries during 1975-87. They found that the rate of private investment is positively related to real GDP growth, level of per capita GDP, and the rate of public sector investment, and negatively related to real interest rates, domestic inflation, debt

service ratio, and the ratio of debt to GDP.[6] Thus, based on these studies, private investment in this study is related to lag value of output and private investment itself. A lagged value of government investment is also included to infer about *crowding in* or *crowding out* phenomenon (equation-19). Since there is no clear-cut rule by which to define government investment expenditure, the government investment in this model will have to adjust in order for the total investment requirement to meet (equation-12).

The import demand is assumed as a function of real exchange rate and real income (equation-20). In the estimation of the import function, two particular assumptions are made. First, it is assumed that there is no possibility of disequilibrium behavior. Second, it is assumed that the supply of imports is infinitely elastic with respect to the price, so that the world price of import is treated as exogenous.[7] Exports are assumed to be exogenous in the model.

In the money market, the money demand determines the supply of money. Thus, it is assumed that the central bank is efficient enough to adjust money supply to money demand within the same period. The demand for money is estimated using a real partial adjustment model, in which the actual money holding is partially adjusted to the desired level. Thus, the demand for money is made a function of real income and expected rate of inflation (equation-21).[8]

In the bonds markets, government, banking system, private and foreign bonds are available. Government bonds (mostly treasury bills and other) are the last source of financing for the government, and central bank holding of government bonds is the residual that adjusts to the supply and demand for government bonds. In the credit markets, all sectors give credit to each other. In the foreign credit market, the credit to the government is determined residually.

The model identifies several kinds of deflators such as consumption, investment, and GDP deflators. The world price of exports and imports are treated as exogenous in accordance with the small country assumption. There are different domestic and foreign interest rates for deposits, bonds, and loans. However, all interest rates on domestic and foreign assets are determined exogenously. Equilibrium conditions identified in the model consists of equilibrium conditions in the goods, money, credit, and bonds markets. The savings investment balance requires that total nominal investment, which consists of fixed investment and inventory investment, is equal to total savings. Total savings is the sum of all sectors savings and foreign savings. Since the model satisfies Walras' law, the savings-investment balance is redundant and is not shown in the model.

The model keeps track of financial asset stocks by adding each period flows to the previous period's stock. Interest payments on domestic and foreign liabilities are projected as the product of the previous period stock liability and the applicable nominal interest rate. The current model uses five indicators (equations-187-191) to keep a close watch on the sustainability of public debt and creditworthiness. Most of the equations in the model are self-explanatory, therefore, detailed explanation is omitted.

Typically, macroeconomic models contain a complete set of econometrically estimated structural equations for the supply and demand sides of all markets. These equations are functions of prices and quantities and allow the simultaneous solution of the model. However, the construction of such a model requires reliable data and stable estimated parameters, which are quite resource intensive. Even in the case of Pakistan, the long time series data on financial variables are still limited and frequent changes in policy regimes over the past decades make it difficult to find stable parameters. Therefore, the current model is essentially recursive and markets are closed with quantities and, hence, are either supply or demand determined.[9] Thus, within recursive solution, there are different types of experiment for which the model can be used. Two easily identified closure rules are normative closure and positive closure.

In normative closure, the target values of real GDP growth rate (gy), inflation rate (gp), and the real exchange rate depreciation (ge) are set. Given the fixed targets and the technology available to the economy in the form of the ICOR parameter, the model endogenously computes investment, savings and the borrowing needs of the whole economy. From the total level of investment needed in the economy, and given the level of private investment, it follows how much the government needs to invest. The difference between government investment and savings represent the financing need of the government or the Public Sector Borrowing Requirement (PSBR). If the level of domestic and foreign borrowing is not enough to cover the total PSBR, the government will issue bonds to the Central bank to meet the total borrowing requirement. On the other hand, under positive closure, a set of resources is selected and its effects on the target values are found.

For the case of Pakistan, the normative closure seems more appropriate which is in accord with the current financing practice in the country and given the question in hand.[10] Therefore, we utilize only this closure for simulation analysis in this study. Basically, we are interested to find out the values of fiscal policy variables, public sector financing variables, and monetary policy variables, which are required to achieve given macroeconomic targets.

2.2. Data and Calibration

Almost all data for this study are taken from published sources. The model is mainly based on the flow of funds data recently published by the State Bank of Pakistan (see State Bank of Pakistan 2003). The stock data for central bank and banking system are obtained from their balance sheets. The balance of payments data are from the *Annual Report* (State Bank of Pakistan 2002-03), the national accounts and fiscal balance data are from *Economic Survey* (Government of Pakistan 2002-03). The external debt data are form *Global Development Finance* (World Bank 2003) and some price and interest rate data are from *International Financial Statistics* (International Monetary Funds 2002).

The sample period for estimation of structural equations is from 1980 to 2002 in principle, though some early years during the above period have been omitted for some equations due to the lack of

Table-2: Regression Results of the Structural Equations of the Model

Private Consumption   Sample Period: 1981-2002

$Ln(cp) = 0.62 + 0.406\ ln(yd) + 0.542\ ln(c_{p-1})$

 t-stat.   2.029   2.922   3.621

 Prob.   0.06   0.01   0.00

 Adj-R^2 = 0.99, F-stat.= 883.28, D.W. stat. = 2.25,

 Serial Correlation Lagrange Multiplier test: Observation*R^2 = 0.916 (Prob. = 0.339)

 Private Investment   Sample Period: 1982-2002

$Ln(i_{Tp}) = -1.966 + 0.484\ ln(y_{-1}) + 0.181\ ln(i_{Tg-1}) + 0.411\ ln(i_{Tp-1})$

   t-stat.   -2.326   2.279   2.105   2.175

   Prob.   0.03   0.04   0.05   0.04

   Adj-R^2 = 0.98, F-stat. = 311.07, D. W. stat. = 1.87,

   Serial Correlation Lagrange Multiplier test: Observation*R^2 = 0.195 (Prob. = 0.195)

Aggregate Imports   Sample Period: 1981-2002

$Ln(mgnfs) = 1.172 - 0.844\ ln(e) + 0.787\ ln(y)$

   t-stat.   1.311   -3.922   11.324

   Prob.   0.21   0.00   0.00

   Adj-R^2 = 0.89, F-stat. = 87.08, D. W. stat. = 1.54,

   Serial Correlation Lagrange Multiplier test: Observation*R^2 = 1.335 (Prob. = 0.248)

Money Demand   Sample Period: 1980-2002

$Ln(md) = -1.635 + 0.657\ ln(y) - 0.037\ ln(gp) + 0.438\ ln(md_{-1})$

   t-stat.   -2.157   2.947   -2.250   2.399

   Prob   0.04   0.01   0.04   0.03

   Adj-R^2 = 0.99, F-stat. = 903.8, D. Wstat. = 1.74,

   Serial Correlation Lagrange Multiplier test: Observation*R^2 = 0.318 (Prob = 0.573)

Source: Author.

available data. The least squares technique is used to estimate the parameters of different structural equations. A very simple approach to econometric estimation is justifiable due to shorter length of data available.[11]

A closer look at the model estimation results (see Table-2) shows that all estimated structural parameters have expected sign and the estimated equations in general do not suffer from standard econometric problems, which usually arise when time series data are used. The estimation results reveal that all equations have good fits (indicated by adjusted R^2), reasonable Durbin Watson statistics, and the majority of the estimated coefficients are statistically sgnificant at 5 percent level or less. In the presence of lagged endogenous variables the Durbin-Watson test is not valid. Therefore, the Serial Correlation Lagrange Multiplier test[12] was used to test the serial correlation in the partial adustment models. The test confirmed no serial correlation in any model.

3. Pakistan's Medium Term Prospects

In this section, we discuss the medium term prospects for Pakistan economy, focusing on public external debt. The model is first solved for the 'baseline' in which we set the targets for real GDP growth rate, inflation rate and real exchange rate, according to actual development during 2001 to 2003, and in line with the Ten Year Perspective Development Plan, for the period 2004 to 2008. In the 'policy base' scenario, alternative assumptions are made to infer the impact of different policies. In these policy simulations, the ramifications for the sources of financing for the public sector will be observed very closely.

3.1. Baseline Simulation

To provide a point of reference we start the analysis with a baseline case-where it is assumed that the historical values of various parameters remain relevant for the next few years. The base period for projection is chosen to be 1999-00 (i.e. 2000 hereafter). The base run simulation is made for the period 2000 to 2008 (to provide guideline for the next five year plan). In the baseline, in most of the cases, the values of the exogenous variables were selected on the basis of their past five year growth. In some other cases, they were assumed to be the same at their base year level to get reasonable projections. Similarly base year data up to 2003 were, in particular, chosen with a view incorporating already known development, to ensure smooth transition to medium-term paths. The model is solved using the Gauss-Sidel iterative technique.[13] The main real aggregates, monetary aggregates, public sector debt stock and interest payments and debt sustainability indicators are reported in Table-3.

The growth rate target set out in the baseline simulation looks optimistic but may not be difficult to achieve, keeping in view the past experience. The investment and savings requirements would be lower and so will the need for external finance, if the productivity of investment could be raised and the ICOR gradually reduced over the forecast period. Such a structural transformation might be achieved, in part, by privatizing *sick* public enterprises, subjecting them to hard budget constraint, setting export targets for them, and linking employee compensation to profitability.

The results of dynamic simulation[14] indicates that both public bond finance and loan finance will increase in the simulation period. The public external debt and interest payments will also increase over time. This shows that the burden of Pakistan's external debt will remain even under the optimistic targets of GDP growth and export growth set by the Planning Commission. Thus, there is high need to reduce the level of external debt and improve the external debt sustainability, without sacrificing economic growth. This is discussed in the following section.

Table-3: Behavior of Public External Debt in Pakistan: Baseline Simulation Results

	2000	2001	2002	2003	2004	2005	2006	2007	2008
NATIONAL ACCOUNTS	(Constant Prices –Rupees Million)								
GDP	699928	715326	739647	777369	818570	861954	907637	964818	1025602
Consumption: Private	523345	524751	533108	549288	570692	595617	623182	655299	691097
Public	76517	129744	103241	67482	73710	83594	92703	74395	86493
Investment: Private	45442	51666	37616	48082	60159	67795	73112	77814	87195
Public	62867	7586	55969	97068	98377	99143	102674	142213	146694
Exports	98647	110317	121349	131542	136540	141729	147115	152705	158508
Imports	106891	108737	111636	116093	120909	125924	131147	137607	144385
Saving: Private	414288	495052	588245	709532	828933	948825	1075350	1246544	1428597
Public	60907	-197076	-60288	138586	131683	103469	76025	216835	177667
Foreign	10852	-41757	-96238	-145047	-167026	-189252	-211656	-226595	-239986
GDP growth (%) #	4.19	2.2	3.4	5.1	5.3	5.3	5.3	6.3	6.3
Export growth (%) #	21.9	11.8	10.0	8.4	3.8	3.8	3.8	3.8	3.8
Direct Tax rate (%) #	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Indirect Tax rate (%) #	9.32	9.32	9.32	9.32	9.32	9.32	9.32	9.32	9.32
PRICES	(Base=1981=1)								
GDP deflator	4.5	4.69	4.86	5.01	5.21	5.42	5.63	5.86	6.09
Consumption	4.6	4.8	4.95	5.1	5.3	5.51	5.73	5.95	6.19
Investment	4.65	4.85	5.02	5.18	5.38	5.6	5.82	6.06	6.3
Imports	5.7	5.95	6.16	6.35	6.6	6.86	7.14	7.42	7.72
Exports	5.02	5.25	5.43	5.6	5.82	6.05	6.3	6.55	6.81
Inflation (%) #	2.80	4.40	3.50	3.10	4.00	4.00	4.00	4.00	4.00
EXCHANGERATE									
Nominal (Rs/US$)	51.8	54	55.9	57.7	60	62.4	64.9	67.5	70.2
Real (Base=1981=1)	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Depreciation (%) #	13	0	0	0	0	0	0	0	0
MONETARY AGGREGATES	(Rupees Million, Percent)								
Currency	373670	399550	433316	475853	524570	582331	648667	727739	819238
Deposits of Banking System	1233756	1323171	1438151	1581617	1745803	1939653	2161846	2425491	2729765
Money Demand	1607456	1700014	1824184	1983062	2163153	2376459	2618953	2908140	3239992
Money Multiplier	3.69	3.65	3.61	3.57	3.53	3.49	3.46	3.42	3.39
Required Reserve ratio #	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Domestic Deposit rate #	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Domestic Lending rate #	14	14	14	14	14	14	14	14	14
Domestic Bond rate #	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Bank rate #	13	13	13	13	13	13	13	13	13

Note: 1) # denotes that the values of the variables are determined outside the model.
2) The value of ICOR is choosen to be 3.85.
Source: Author.

Table-3 (Cont.): Behavior of Public External Debt in Pakistan: Baseline Simulation Results

PUBLIC DOMESTIC & FOREIGN DEBT	(Rupees Million)								
Loan of: Central Bank	24240	27437	31056	35151	39787	45034	50973	57696	65305
Banking System	156668	161372	168683	175738	179880	180601	175168	161514	133446
ROW (US $M.)	28148	29274	31654	33453	34476	35056	35299	35478	34949
Bond held by: Central Bank	558351	667995	815292	1010348	1262496	1589199	2009551	2554296	3257857
Banking System	316325	339251	368730	405514	447610	497312	554280	621876	699890
Private Sector	575148	608265	652693	709540	773976	850297	937061	1040532	1159269
ROW (US $M.) #	5288	5354	5420.7	5488.4	5556.8	5626.1	5696.3	5767.4	5839.3
PUBLIC INTEREST PAYMENTS	(Rupees Million)								
On Loan: Central Bank	991.1	3151.2	3566.8	4037.2	4569.7	5172.3	5854.5	6626.5	7500.5
Banking System	13918	21181	21817	22806	23760	24320	24417	23683	21837
ROW	29053	29581	32119	35945	39166	41978	44391	46487	48592
On Bond: Central Bank	22157	33724	40347	49244	61025	76255	95988	121377	154280
Banking System	25067	19106	20491	22271	24493	27036	30038	33479	37561
Private Sector	29530	34739	36739	39423	42856	46748	51358	56599	62848
ROW	15377	16535	17478	18315	19118	20131	21198	22321	23503
DEBT SUSTAINABILITY INDICATORS	(Percent)								
External Debt/GDP ratio	55	55.7	57.7	57.7	56.3	54.3	52	49.2	45.8
External Debt/Export ratio	349.2	323.4	314.8	305	302.1	295.8	287.1	278.3	265.1
External Interest Payment/GDP ratio	1.41	1.37	1.38	1.39	1.37	1.33	1.28	1.22	1.15
External Interest Payment/Export ratio	8.96	7.97	7.53	7.37	7.33	7.24	7.08	6.88	6.68
Domestic Debt/GDP ratio	58.9	60.9	63.7	66.9	70.1	74.2	79.1	84.5	90.8

Note: 1) # denotes that the values of the variables are determined outside the model.
2) The World Bank critical limit for External Debt/GDP ratio is 50% and for External
Debt/Export ratio is 275%, see World Bank 2002: 131).
Source: Author

3.2. Simulations for Debt Reduction

It is very clear that the debt problem arises due to policy failure on a broad front, and there is no quick fix for debt reduction. The satisfactory resolution of the debt problem will take both time and aggressive policies. Moreover, the reduction of debt to sustainable levels cannot be the only economic goal. There is also an urgent need to have sustained economic growth, as slowdown in economic growth compounds the debt problem by adversely affecting the debt servicing capacity. Alternative scenarios under different assumptions are estimated and discussed below to draw some policy inference. We have dealt with only one policy measure at a time, which will enable us to assess the effectiveness of each policy in isolation.

3.2.1. Trade Policy Simulation

One of the persistent problems with Pakistan's exports is the lack of diversification, both commodity-wise and market-wise. For years, cotton and cotton-based products have been contributing almost 60% of total merchandise exports. This has kept the export regime highly vulnerable to the

production of cotton crop. This needs to be replaced by a more diversified and less vulnerable pattern of exports. Export-friendly exchange rate policy, liberal tax incentive for exporters, and creation of export processing zones could be helpful to boost export growth. High export growth is an important condition for gaining advantage from foreign borrowing and avoiding debt rescheduling and a crisis in confidence.

Scenario-1 measures the effects of two percent sustained increase in exports from 2004. The proposed export promotion measure could increase government savings by 58 percent by 2008. This policy has significant effect on external debt, which could be reduced by 11.2 percent by 2008. The resultant decline in foreign interest payments (by 7.16%) and improvement in debt sustainability indicators would be substantial. Thus, this policy seems to be very effective in reducing the external debt and moving towards a self-reliant economy.

3.2.2. Exchange Rate Policy Simulation

It is important to keep exchange rate at an appropriate level and prevent it from wide fluctuations in order to maintain competitiveness. Under Scenario-2, 10% devaluation in exchange rate is proposed in 2004. One central chain effect is that devaluation of the real exchange rate leads to falling imports (by 7.73%, not shown in the table). Since fewer commodities are imported, less external finance is required to maintain the balance of payments, so external borrowing by the government is reduced. Second, the lower quantities of imports also lead to smaller total supply of commodities. Consequently, real government consumption has to be adjusted downwards (reduced by 16 %) to maintain the material balance. This improves the government budget or, equivalently, decreases its borrowing requirement and external debt (external debt stock decreases by 23.9 %). One more effect is also clear. A reduced government external debt leads to lower interest payments (by 13%) with a lag of one period, which constitute an additional improvement in public sector finances. Thus, this policy could improve the debt sustainability indicators and increase creditworthiness.

3.2.3. Monetary Policy Simulations

The major objective of monetary and credit policy is to promote monetary and financial stability and foster a sound and dynamic financial system so as to achieve targeted economic growth. The objective of monetary policy is also to reduce the cost of borrowing. Unfortunately, the real cost of government borrowing rose sharply over the past few years due to the combined effect of slowdown of both domestic and international inflation, while nominal interest rates on borrowing declined a little.

In Scenario-3, the bank rate is reduced by two percentage point from the baseline levels for the period 2004 to 2008. This expansionary monetary policy increases the lending capcity of the banking system, which results in a 6.4 percent increase in lending to the government and also a 1.54 percent reduction in the issuance of bonds by the government to the Central bank. However, this policy is not

Table-4a: Behavior of Public External Debt in Pakistan-Simulations for Debt Retirement (% change over base run)

	Scenario-1		Scenario-2		Scenario-3		Scenario-4	
	2004	2008	2004	2008	2004	2008	2004	2008
NATIONAL ACCOUNTS								
Consumption: Private	0	0.011	0.16	0.39	0.001	-0.019	0	-0.02
Public	-3.6	-18.4	-13.9	-16	-0.01	0.15	0	0.16
Saving: Private	0.15	0.67	4.43	3.41	0.01	-0.065	0	-0.05
Public	10.7	58	47.7	56.2	0.56	0.68	0	-0.33
Foreign	9.2	46.9	52.7	52.9	0	0.57	0	0.38
PUBLIC DOMESTIC & FOREIGN DEBT								
Loan of: Banking System	0	0	0.4	-1.6	0.6	6.4	1.4	4.44
ROW	-0.7	-11.2	-13.3	-23.9	0.25	1.49	0.49	0.84
Bond held by: Central Bank	0	0	0.57	0.24	-0.55	-1.54	-1.38	-1
Banking System	0	0	0.079	0.059	0	0	1.05	1.05
PUBLIC INTEREST PAYMENTS								
On Loan: Central Bank	0	0	0	0	-15.4	-15.4	0	0
Banking System	0	0	0	-0.75	0	3.7	0	2.99
ROW	-0.68	-7.16	0	-13	0	1.11	0	0.72
On Bond: Central Bank	0	0	0	0.3	0	-1.44	0	-1.1
Banking System	0	0	0	0.064	0	0	0	1.05
DEBT SUSTAINABILITY INDICATORS								
External Debt/GDP ratio	-0.59	-9.59	-2.6	-12.5	0.22	1.28	0.43	0.72
External Debt/Export ratio	-2.5	-17.8	-11.4	-20.5	0.22	1.28	0.43	0.72
External Interest Payment/GDP ratio	0	-4.82	0	-5.49	0	0.75	0	0.49
External Interest Payment/Export ratio	-1.9	-13.5	-9.1	-14.1	0	0.75	0	0.49
Domestic Debt/GDP ratio	0	0	1.39	0.83	-0.2	-0.74	-0.43	-0.34

Source: Author.

effective in increasing public savings because government can save little on interest payments to the central bank as government's central bank debt (in the form of loan) is small. This policy could worsen the external debt indicators and slightly improves the domestic debt to GDP ratio.

In Scenario-4, the required reserve ratio is reduced by one percentage point from baseline level for the period 2004 to 2008. This policy also increases the lending capacity of the banking system. Banking system lending to government increases by 4.44 percent. The external debt indicators worsen slightly, and domestic debt to GDP ratio improves a little. Thus, the two monetary policy measures seem to be not effective in reducing the level of external debt and in the improvement of external debt sustainability indicators.

3.2.4. Fiscal Policy Simulation

Pakistan's fiscal situation is characterized by continuously growing expenditure, inelastic revenue generation, losses in public sector enterprises and large fiscal deficit persisting over the last several years. The tax structure, despite concerted efforts, remains narrowly based, and this is coupled with

the tenacious trend of evasion and avoidance of taxation. Pakistan's tax to GDP ratio has been stagnant and current tax rate is too low to meet the needs for the high priority expenditure and fiscal adjustment. The system is required to generate a sustained two percentage point increase in the direct tax rate during the next five years as proposed in Scenario-5. The efforts to broaden the tax base and widen the tax net through documentation of the economy, better collection of taxes and administrative reforms will help to attain this target.

The effects of Scenario-5 are straightforward. An increase in the tax rate will result in an increase in savings in the public sector (by 23.7%). Although private savings decline (by 3.65%) to the extent that the disposable income in the private sector is reduced, the net effect of increasing the tax rate on national savings is positive. The increase in national savings in turn reduces the pressure for external borrowing to meet the investment expenditure necessary for maintaining the GDP growth rate. This policy could reduce the external debt (by 9.45%), external interest payments (by 7.92%) and improve the sustainability of external debt by substantial amount. Thus, increasing the tax rate is seem to be an effective policy to ease the external imbalance and reduce the debt burden.

3.2.5. Financial Sector Reforms Simulations

Years of state ownership, over-regulation of financial activities, and under regulation of financial soundness have resulted in inefficiencies, uncompetitiveness and vulnerabilities in the financial market in Pakistan. The existence of a high 'spread' in the financial market proves this statement. Spread basically covers the operating cost, risk, and the size of the nominal profit of the banking system. Therefore, an increase in the spread may, on the one hand, reflect increase in the profitability of the banking system; but, on the other hand, it may mean a rising incidence of inefficiency in the banking system. Thus, in order to increase the efficiency of the banking system there is a need to decrease the spread over time. This is also possible by reducing the lending rate or the bond rate. This will also reduce the cost of borrowing. These scenarios are discussed in the following paragraphs.

Currently government is following a policy of continuous reduction in domestic deposit rate (in turn increasing the spread) in the country. In order to assess the usefulness of this policy, one percent reduction in the domestic deposit rate is proposed under Scenario-6. The results show that this policy has negative effects on national savings and external debt sustainability. This also reflects that keeping a high spread is not a prudent policy option.

Under Scenario-7, a 2 percent reduction in domestic lending rate (that is, reduction in spread) will increase the public savings by 10.9 perecent. This has positive effect on both reduction in domestic and external debt of the government. A lower lending rate will result in lower interest payments and this in turn, via the government budget constraint, reduces both domestic and external borrowings in subsequent years. The proposed policy will reduce the domestic debt by 15.4 percent and external debt by 2.17. The public domestic interest payments will reduce by 23.1 percent and external interest

payment by 1.61 percent, resulting in an improvement in debt sustainability indicatiors. Thus, decrease in lending rate proved to be a very effective policy to ease the external and internal imbalances, and reducing the domestic and foreign debt burden.

Under Scenario-8, a 2 percent reduction in domestic bond rate will increase the public savings by 51.5%. This also has positive effect in reducing the domestic and external debt burden of government, and will have the same channel effects as discussed in Scenario-7. The proposed policy will reduce the government domestic debt of banking system by 3.85 percent and external debt by 4.93 percent. This also results in a reduction in the issuances of treasury bills (bonds) by the government to the central bank by 6.12 percent. The public domestic and foreign interest payments will decrease by a substantial amount, making a large improvement in the debt sustainability indicators. Thus, decrease in domestic bond rate is more effective than decrease in lending rate to ease the external and internal imbalance, and to reduce the domestic and foreign debt burden.

Thus, successful financial reforms will raise the domestic savings and avoid the problem of debt overhang. These reforms should include the privatization of state owned financial institutions, easy

Table-4b: Behavior of Public External Debt in Pakistan-Simulations for Debt Retirement (% change over base run)
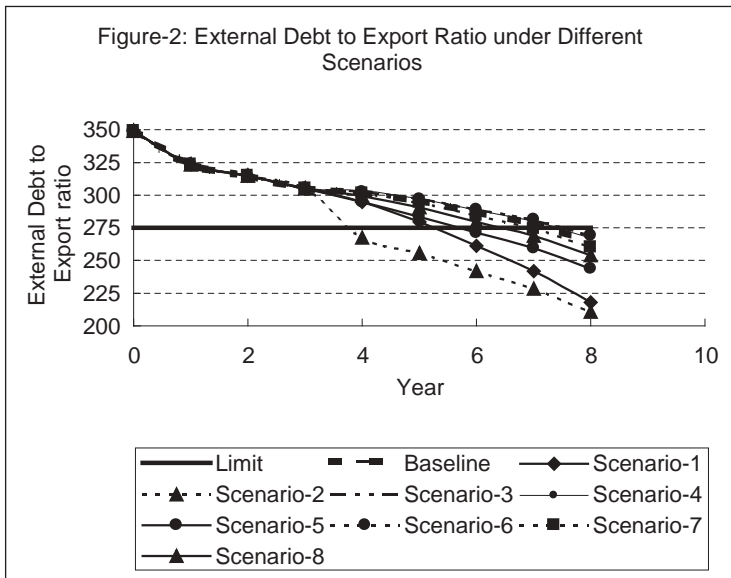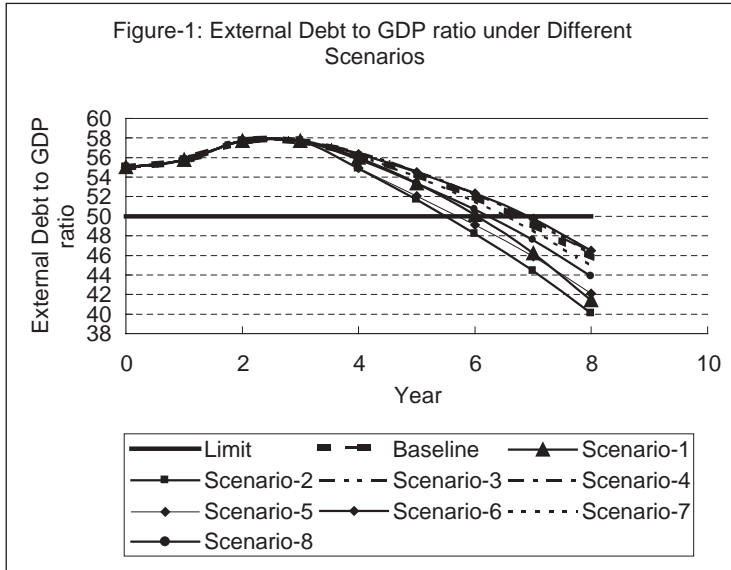
	Scenario-5		Scenario-6		Scenario-7		Scenario-8	
NATIONAL ACCOUNTS	**2004**	**2008**	**2004**	**2008**	**2004**	**2008**	**2004**	**2008**
Consumption: Private	-0.9	-2.03	-0.15	-0.4	0.17	0.32	-0.11	-0.19
Public	7	16.2	1.14	3.19	-1.31	-2.59	0.81	1.5
Saving: Private	-6.99	-3.65	-1.14	-0.83	1.32	0.47	-0.82	-0.27
Public	44	23.7	-4.7	-12.5	6.4	10.9	34.4	51.5
Foreign	0	-4.17	0.57	1.15	0	-0.82	7.4	6.95
PUBLIC DOMESTIC & FOREIGN DEBT								
Loan of: Banking System	0	0	1.5	15.8	-1.8	-15.4	-0.37	-3.85
ROW	-2.8	-9.45	0.13	1.83	-0.25	-2.17	-1.08	-4.93
Bond held by: Central Bank	0	0	0.07	0.14	0	0	-1.76	-6.12
PUBLIC INTEREST PAYMENTS								
On Loan: Central Bank	0	0	0	0	0		0	0
Banking System	0	0	0	9.32	-14.8	-23.1	0	-2.32
ROW	0	-7.92	0	1.25	0	-1.61	0	-3.91
On Bond: Central Bank	0	0	0	0.14	0	0	-33.1	-36.7
Banking System	0	0	0	0	0	0	-33.1	-33.1
Private Sector	0	0	0	0	0	0	-33.1	-33.1
ROW	0	0	0	0	0	0	-33.1	-33.1
DEBT SUSTAINABILITY INDICATORS								
External Debt/GDP ratio	-2.41	-8.09	0.1	1.57	-0.21	-1.86	-0.93	-4.22
External Debt/Export ratio	-2.41	-8.09	0.1	1.57	-0.21	-1.86	-0.93	-4.22
External Interest Payment/GDP ratio	0	-5.34	0	0.84	0	-1.08	-10.9	-13.4
External Interest Payment/Export ratio	0	-5.34	0	0.84	0	-1.08	-10.9	-13.4
Domestic Debt/GDP ratio	0	0	0.12	0.46	-0.11	-0.36	-0.77	-3.61

Source: Author.

entry of new banks and other financial institutions, and use of open market operations to control monetary and credit aggregates in the financial market.

Thus, among the eight policy simulations, the results indicate that increase in exports, (Scenario-1) devaluation of the currency (Scenario-2), increase in taxes (Scenario-5), reduction in lending rate (Scenario-7) and reduction in bond rate (Scenario-8) appear to be very significant in reducing foreign

Figure-1: External Debt to GDP ratio under Different Scenarios

Figure-2: External Debt to Export Ratio under Different Scenarios

borrowing and bringing the external debt to sustainable levels (See Figure-1 & 2). It is also clear that further reduction in the bank rate (Scenario-3), required reserve ratio (Scenario-4) and deposit rate (Scenario-6) has less significant effects on public debt sustainability.

4. Conclusion

Resource deficits, if not checked properly, could become a serious problem for the economic future of the country. Although these deficit can be filled by public external debt, the need to service accumulated debt will undermine the future economic performance of the economy, and, in extreme cases, lead to defaults, a slump in creditworthness and a collapse of development planning.

Low saving rates have necessitated resort to foreign borrowing for financing investment expenditures, which in turn accumulated high foreign debt and deteriorated level of self reliance in Pakistan. The debt burden and debt service indicators reveal that the country has started to face the pressure of indebtedness. The problem of external debt is also becoming serious due to gradual drift towards short-term loans that needs to be paid back over a shorter period of time. Before this over-growing external debt becomes disastrous, remedial policies must aim to stem this trend and gradually retire the debt.

There are various approaches to the reduction of external debt and debt servicing burden. They include: debt rescheduling, debt buybacks, debt-equity swaps, debt write offs on the one hand, and debt moratorium and debt repudiation on the other. As a result of resorting to the first approach, the debtor economy gains breathing space to make its economy grow and generate exportable surplus. Debt moratorium and debt repudiation invite economic sanctions which may jeoparadize the politico-economic relations with the rest of the world. Thus, the only solution to the debt problem other than the measure discussed above seems to be accelerated economic growth in the country. But, what would be the effects of economic policy measures on the public external debt and debt servicing of Pakistan over the medium term? The current study and model aimed to answer this question.

The macroeconomic model has proved useful in capturing the macroecoomic policy tradeoff. It has shown that higher GDP and private consumption are possible with prudent economic policies. The diversification from heavy dependence on external debt would be attainable in the context of growing GDP and exports with overall adoption of prudent trade, exchange rate, fiscal and monetary policies. There is also need for further reforms in the financial sector by reducing the cost of borrowing and increasing the efficiency of the sector. Thus, the thrust of future economic policy should be to transfer the existing slow growth and financially constrained economy to a higher growth and relatively self reliant economy.

Evidently, one needs to remain aware that this is a first step in financial macroeconomic modeling in Pakistan. The modeling work should be continued in future. The model has to be continuously revised and adapted to the developments in the economy. Nevertheless, the present financial

macroeconomic model is now at the stage that it can be used for simulation purposes as well as forecasting. The other indebted countries of the region could benefit from this modeling experience and with minor modifications could shape the model according to their own country`s economic and institutional set up.

Endnotes

1. Among economic factors are low per capita income, tax evasion, and existence of large undocumented economy.

2. For a comparison of external debt burden and debt service indicators of South Asian countries, see Waheed 2003, p. 126.

3. For a detail review of debt burden and debt service indicators of Pakistan, see Waheed (2003).

4. The examples of such models are, Naqvi et al. (1993), Pasha et al. (1995), Government of Pakistan (1999).

5. For a comprehensive analytical overview of private investment theory and the impact of macroeconomic policies on private investment in developing countries, see Serven, L. (1993).

6. The study was based on 23 developing countries including Pakistan.

7. The aggregate import function is identical to the one used in the IMF's financial programming framework.

8. For a detail review of different theories on demand for money, see Sriram (1999, 2002).

9. For details of closure rules, see Ezaki and Sun 2000: 43.

10. This type of closure is also consistent with the IMF financial programming approach.

11. The cointegration and error correction modeling requires a larger time series or monthly/quarterly data.

12. In this test, residual is regressed on explanatory variables of the function and lag value of the residual.

13. For details of the technique, see Klein and Young 1980: 61-67.

14. The dynamic simulation means to solve the model for each period by using the estimated values of lagged endogenous variables (see Ezaki, 1975: 171).

References

Bacha, E. L. 1990. A Three Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries. *Journal of Development Economics.* 32(3): 279 - 296.

Beaugrand, P., Loko, B. and Mlachila, M. 2002. The Choice between External and Domestic Debt in Financing Budget Deficits: The Case of Central and West African Countries. *IMF Working Paper* WP/02/79.

Blejer, M. and Khan, M. 1984. Government Policy and Private Investment in Developing Countries. *IMF Staff Papers.* 31(2): 379-403.

Chenery, H. and Strout, A.M. 1966. Foreign Assistance and Economic Development. *The American Economic Review.* 56(4): 679-733.

Crouch, R. L. 1973. Economic Development, Foreign Aid, and Neoclassical Growth. *Journal of Development Studies.* 9(3): 353-364.

Eatzaz, A. 1997. Dynamics of Foreign and Domestic Borrowings and Debts. *Journal of Economic Cooperation among Islamic Countries*. 18(3): 71-113.

Ezaki, M. and Lin Sun. 2000. Trade Liberalization and the Economy of China: A Dynamic CGE Analysis, 1997-2010. *Journal of Applied Input-Output Analysis*. 6. 37-78.

Ezaki, M. 1975. Econometric Growth Model and Forecasting Simulations for Post War Japan: 1952-1980. *The Economic Studies Quarterly*. 26(3): 161-183.

Government of Pakistan. 2002-03. *Economic Survey*. Finance Division. Islamabad. Pakistan.

Government of Pakistan. 2001. Ten Year Perspective Development Plan 2001-11 and Three Year Development Program 2001-4. Planning and Development Division. Islamabad. Pakistan.

Government of Pakistan. 1999. Ninth Five Year Plan (1998-2003). Report of the Working Group on Modeling. Planning Commission, Islamabad. Pakistan.

Greene, J. and Villanueva, D. 1991. Private Investment in Developing Countries: An Empirical Analysis. *IMF Staff Papers*. 38(1): 33-58.

Griffin, Keith. 1970. Foreign Capital, Domestic Savings and Economic Development. *Bulletin of the Oxford University Institute for Economics and Statistics*. 32(2): 99 - 112.

Griffin, K. B. and Enos, J. L. 1970. Foreign Assistance; Objectives and Consequences. *Economic Development and Cultural Change*. 18(3): 313-327.

International Monetary Fund. 2002. International Financial Statistics: Year Book. Washington D. C. : The International Monetary Fund.

Khan, A. H. 1987. Aggregate Consumption Function and Income Distribution Effects: Some Evidence from Developing Countries. *World Development*. 15(10/11): 1369 - 1394.

Klein, L. R. and Young, R. M. 1980. *An Introduction to Econometric Forecasting and Forecasting Models*. Lexington: Lexington Books.

Mikesell, R. F. and Zinser, J. E. 1973. The Nature of the Savings Function in Developing Countries: A Survey of the Theoretical and Empirical Literature. *Journal of Economic Literature*. 11(1): 1-26.

Naqvi, S.N.H. , Khan, A. H. and Ahmed, A. M. 1993. *The Macroeconomic Framework for the Eighth Five-Year Plan*. Pakistan Institute of Development Economics. Islamabad, Pakistan.

Pasha, H. A. et al. 1995. Integrated Social Policy and Macro Economic Planning Model for Pakistan. Social Policy Development Center. Karachi. Pakistan.

Samuelson, P. A. 1958. An Exact Consumption-Loan Model with or wilhout the Social Contrivance of Money. Journal of Political Economy. 66(6): 467-482.

Serven, L. 1993. Private Investment and Macroeconomic Adjustment: A Survey. In Luis Serven and Andres Solimano (ed). *Striving for Growth after Adjustment: The Role of Capital Formation*, World Bank Regional & Sectoral Studies-12530. Washington D.C.: The World Bank: 11 - 30.

Serven, L. 1990. A RMSM-X Model for Chile. Policy, Research , and External Affairs Working Papers No. 508. Washington D.C.: The World Bank.

Song, B. N. 1981. Empirical Research on Consumption Behavior: Evidence from Rich and Poor LDCs. *Economic Development and Cultural Change*. 29(3): 597-611.

Sriram, S. S. 1999. Survey of Literature on Demand for Money: Theoretical and Empirical Work with Special reference to Error-Correction Models. IMF Working Paper No. WP/99/64.

Sriram, S. S. 2002. Theory of Demand for Money: A Survey of Literature. *The Indian Economic Journal*. 49(1): 103-115.

State Bank of Pakistan. 2002-03. *Annual Report*. Karachi, Pakistan.

State Bank of Pakistan. 2003. Pakistan's Flow of Funds Accounts and Statistical Analysis. State Bank of Pakistan. Karachi, Pakistan.

Tarp, F. and Peter Brixen. 1996. *The South African Economy: Macroeconomic Prospects for the Medium Term*. London: Routledge.

Waheed, A. 2004a. Foreign Capital Inflows and Economic Growth of Developing Countries: A Critical Survey of Selected Empirical Studies. *Journal of Economic Cooperation among Islamic Countries*. 25(1): 1-36.

Waheed, A. 2005. Foreign Capital Inflows and Economic Growth of Developing Countries: A Survey of Theoretical Literature. Forthcoming paper.

Waheed, A. 2003. Risk Analysis on External Indebtedness of Pakistan. *Journal of Economic Cooperation among Islamic Countries*. 24(2): 113-136.

Waheed, A. 2004b. Aid-Savings Nexus: Cointegration, Causality and Error Correction Modeling Approach. Journal of International Development Studies. 13(2): 15-29.

White H. 1992. The Macroeconomic Impact of Development Aid: A Critical Survey. *The Journal of Development Studies*. 28(2): 163-240.

World Bank. 1998, 2001, 2002. Global Development Finance, Analysis & Summary Tables. Washington D.C.: The World Bank.

World Bank. 2003. Global Development Finance, Summary and Country Tables. Washington D.C.: The World Bank.

Appendix-I:

Table-1a: Current Account-Sources and Uses of Funds Matrix

	National Accounts	Government Sector	Central Bank	Banking System	Private Sector	Foreign Sector	Total Sources
National Accounts		Cg Sg	Sc	Sb	Cp Sp	Sf	
Government Sector	FYg TI SUB(-)		PNLcg	IPDbg IPCbg IPBbg	TDpg IPCpg IPBpg	IPDfg IPCfg IPBfg E.TRfg*	
Central Bank		IPCgc IPBgc		IPCbc IPBbc	IPCpc	IPDfc IPBfc	
Banking System		IPCgb IPBgb IPDgb			IPCpb IPBpb	IPDfb IPCfb IPBfb	
Private Sector	FYp	IPBgp IPDgp IPCgp TRgp	IPDcp	IPDbp IPBbp IPCbp PNLbp		IPCfp IPBfp E.TRfp*	
Foreign Sector	MGNFS XGNFS(-)	IPCgf IPBgf	IPDcf	IPDbf IPCbf IPBbf	IPCpf IPBpf		
Total Uses							

Source: Author

Table-1b: Capital Account-Sources and Uses of Funds Matrix

	National Accounts	Government Sector	Central Bank	Banking System	Private Sector	Foreign Sector	Total Sources
National Accounts		Ig	Ic	Ib	Ip		
Government Sector	Sg		Δ CUcg Δ CRcg Δ Bcg	Δ CRbg Δ Bbg Δ DEPbg	Δ CUpg Δ Bpg Δ CRpg Δ DEPpg	Δ CRfg Δ Bfg	
Central Bank	Sc	Δ CUgc Δ DEPgc		Δ CUbc ΔTDEPbc	Δ CUpc Δ DEPpc	Δ DEPfc	
Banking System	Sb	Δ DEPgb Δ Bgb Δ CRgb	Δ CRcb Δ Bcb		Δ DEPpb Δ Bpb Δ CRpb	Δ DEPfb Δ CRfb Δ Bfb	
Private Sector	Sp	Δ CRgp Δ Bgp	Δ CRcp	Δ CRbp Δ Bbp		Δ CRfp Δ Bfp	
Foreign Sector	Sf	Δ DEPgf Δ CRgf Δ Bgf	Δ DEPcf Δ Bcf	Δ DEPbf Δ CUbf Δ CRbf Δ Bbf	Δ CRpf Δ Bpf		
Total Uses							

Source: Author

Appendix-II: Fianancial Macroeconomic Model of Pakistan*

Budget Constraints
The Government

(1) $FYg + TI \; SUB + TDpg + \overline{PNLcg} + E. \; \overline{TRfg}* + IPDbg + IPDfg + IPCbg + IPCpg + IPCfg$
$+ IPBbg + IPBpg + IPBfg = IPDgb + IPDgp + IPCgc + IPCgb + IPCgp + IPCgf + IPBgc$
$+ IPBgb + IPBgp + IPBgf + \overline{TRgp} + Cg + Sg$ $\qquad\qquad (Sg)$

(2) $Sg + \; CUcg + \; CUpg + \; DEPbg + \; DEPpg + \; CRcg + \; CRbg + \; CRpg + \; CRfg + \; Bxg$
$= Ig + \; CUgc + \; DEPgc + \; DEPgb + \; DEPgf + \; CRgb + \; CRgp + \; CRgf + \; Bgb + \; Bgp$
$+ \; Bgf + \; ONg$ $\qquad\qquad (\; Bxg)$

The Central Bank

(3) $IPDfc + IPCgc + IPCbc + IPCpc + IPBgc + IPBbc + IPBfc = IPDcp + IPDcf + \overline{PNLcg} + Sc$ $\quad (Sc)$

(4) $Sc + \; CUgc + \; CUbc + \; CUpc + \; DEPgc + \; TDEPbc + \; DEPpc + \; DEPfc$
$= Ic + \; CUcg + \; DEPcf + \; CRcg + \; CRcb + \; CRcp + \; Bcx + \; ONc$ $\qquad\qquad (\; Bcx)$

The Banking System

(5) $IPDgb + IPDfb + IPCgb + IPCpb + IPCfb + IPBgb + IPBpb + IPBfb = IPDbg + IPDbp + IPDbf$
$+ IPCbg + IPCbc + IPCbp + IPCbf + IPBbg + IPBbc + IPBbp \, IPBbf + \overline{PNLbp} + Sb$ $\qquad (Sb)$

(6) $Sb + \; DEPgb + \; DEPpb + \; DEPfb + \; CRgb + \; CRcb + \; CRpb + \; CRfb + \; Bgb + \; Bcb$
$+ \; Bpb + \; Bfb = Ib + \; CUbc + \; CUbf + \; DEPbg + \; TDEPbc + \; DEPbf + \; CRbx + \; Bbg$
$+ \; Bbp + \; Bbf + \; ONb$ $\qquad\qquad (\; CRbx)$

The Foreign Sector

(7) $MGNFS + IPDcf + IPDbf + IPCgf + IPCbf + IPCpf + IPBgf + IPBbf + IPBpf = XGNFS + IPDfg$
$+ IPDfc + IPDfb + IPCfg + IPCfb + IPCfp + IPBfg + IPBfc + IPBfb + IPBfp + E. \; \overline{TRfg}*$
$+ E. \; \overline{TRfp}* + Sf$ $\qquad\qquad (Sf)$

(8) $Sf + \; CUbf + \; DEPgf + \; DEPcf + \; DEPbf + \; CRgf + \; CRbf + \; CRpf + \; Bgf + \; Bcf + \; Bbf$
$+ \; Bpf = DEPfc + \; DEPfb + \; CRfx + \; Bfg + \; Bfb + \; Bfp + \; ONf$ $\qquad\qquad (\; CRfx)$

The Private Sector

(9) $FYp + IPDgp + IPDcp + IPDbp + IPCgp + IPCbp + IPCfp + IPBgp + IPBbp + IPBfp + \overline{TRgp}$
$+ E. \; \overline{TRfp}* + \overline{PNLpb} = TDpg + IPCpg + IPCpc + IPCpb + IPCpf + IPBpg + IPBpb + IPBpf$
$+ Cp + Sp$ $\qquad\qquad (Sp)$

The variables in parenthesis are the variables that are determine by the corresponding left hand side equations.

(10) $Sp + CRgp + CRcp + CRbp + CRfp + Bgp + Bbp + Bfp = Ip + CUpg + CUpc$
    $+ DEPpg + DEPpc + DEPpb + Bpg + Bpb + Bpf + CRpx + ONp$ $\qquad$ ($CRpx$)

The Goods Markets

(11) $y + mgnfs = c_g + c_p + i_{Tg} + i_{Tp} + \overline{xgnfs}$ $\qquad$ (cg)

(12) $y = y_{-1} + (i_T / k)$ $\qquad$ (i_T)

(13) $i_T = i_{Tp} + i_{Tg}$ $\qquad$ (i_{Tg})

(14) $i_{Tp} = i_b + i_p$ $\qquad$ (i_p)

(15) $i_b = {}_b\, itp$ $\qquad$ (i_b)

(16) $i_{Tg} = ig + \overline{ic}$ $\qquad$ (i_g)

(17) $c_p = {}_0 + {}_1\, yd + {}_2\, c_{p\,-1} + {}_1$ $\qquad$ (c_p)

(18) $yd = [(FYp + IPDgp + IPDcp + IPDbp + IPCgp + IPCbp + IPCfp + IPBgp + IPBbp + IPBfp$
    $+ \overline{TRgp} + E.\overline{TRfp^*} + \overline{PNLbp}) \quad (TDpg + IPCpg + IPCpc + IPCpb + IPCpf + IPBpg$
    $+ IPBpb + IPBpf)] / P$ $\qquad$ (yd)

(19) $i_{Tp} = d_0 + d_1\, y_{-1} + d_2\, i_{Tg\,-1} + d_3\, i_{Tp\,-1} + {}_2$ $\qquad$ (i_{TP})

(20) $mgnfs = q_0 + q_1\, e + q_2\, y + {}_3$ $\qquad$ ($mgnfs$)

The Money Market

(21) $md = l_0 + l_1\, y + l_2\, \overline{gp} + l_3\, md_{-1} + {}_4$ $\qquad$ (md)

(22) $MS = MD$ $\qquad$ (Ms)

(23) $H = CUxc + RR$ $\qquad$ (H)

(24) $CUxc = \overline{CUgc} + \overline{CUbc} + CUpc$ $\qquad$ ($CUxc$)

(25) $CUpc = {}_{cm}MS$ $\qquad$ ($CUpc$)

(26) $RR = .(DEPxb)$ $\qquad$ (RR)

(27) $DEPxb = \overline{DEPgb} + DEPpb + E.\overline{DEPfb^*}$ $\qquad$ ($DEPxb$)

(28) $DEPpb = {}_{dm}MS$ $\qquad$ ($DEPpb$)

(29) $TDEPbc = \overline{DEPbc} + RR$ $\qquad$ ($TDEPbc$)

(30) $MS = m.H$ $\qquad$ (m)

The Bond Markets
Government

(31) $Bxg = Bcg + Bbg + Bpg + E.\overline{Bfg^*}$ $\qquad$ (Bcg)

(32) $Bbg = {}_{bg}.(1 \quad) DEPxb$ $\qquad$ (Bbg)

(33) $Bpg = {}_{pg}.MS$ $\qquad$ (Bpg)

Banking System

$$(34)\quad Bxb = \overline{Bgb} + \overline{Bcb} + Bpb + E.\overline{Bfb^*} \qquad (Bxb)$$

$$(35)\quad Bpb = {}_{pb}.MS \qquad (Bpb)$$

Private Sector

$$(36)\quad Bxp = \overline{Bgp} + Bbp + E.\overline{Bfp^*} \qquad (Bxp)$$

$$(37)\quad Bbp = {}_{bp}.(1\quad)\,DEPxb \qquad (Bbp)$$

Foreign Sector

$$(38)\quad Bxf = \overline{Bgf^*} + \overline{Bcf^*} + \overline{Bbf^*} + \overline{Bpf^*} \qquad (Bxf\ )$$

The Credit Markets
Government

$$(39)\quad \overline{CRgx} = CRgb + CRgp + CRgf \qquad (CRgf)$$

$$(40)\quad CRgb = {}_{gb}.CRgx \qquad (CRgb)$$

$$(41)\quad CRgp = {}_{gp}.CRgx \qquad (CRgp)$$

Central Bank

$$(42)\quad CRcx = CRcg + CRcb + CRcp \qquad (CRcg)$$

$$(43)\quad CRcb = {}_{cb}.CRcx \qquad (CRcb)$$

$$(44)\quad CRcp = {}_{cp}.CRcx \qquad (CRcp)$$

Banking System

$$(45)\quad CRbx = CRbg + CRbp + CRbf \qquad (CRbg)$$

$$(46)\quad CRbp = {}_{bp}.CRbx \qquad (CRbp)$$

$$(47)\quad CRbf = {}_{bf}.CRbx \qquad (CRbf)$$

Private Sector

$$(48)\quad CRpx = \overline{CRpg} + \overline{CRpb} + CRpf \qquad (CRpf)$$

Foreign Sector

$$(49)\quad CRfx = CRfg + CRfb + CRfp \qquad (CRfg\ )$$

$$(50)\quad CRfb = {}_{fb}.(1\quad).DEPxb/E \qquad (CRfb\ )$$

$$(51)\quad CRfp = {}_{fp}.Y/E \qquad (CRfp\ )$$

Prices, Exchange Rate and Other Variables

Prices

(52) $Pm = E . \overline{Pm^*}$ (Pm)

(53) $Px = E . \overline{Px^*}$ (Px)

(54) $Pi = P . (E . \overline{Pm^*})$ [1]   (Pi)

(55) $Pc = (Cp + Cg)/(cp + cg)$ (Pc)

Exchange Rate

(56) $e = E . \overline{Pm^*} / P$ (E)

Others

(57) $FYg = \quad . Y$ (FYg)

(58) $FYp = Y \quad TI + SUB \quad FYg$ (FYp)

(59) $TDpg = \quad . Y$ (TDpg)

(60) $TI = \quad . Y$ (TI)

(61) $SUB = \quad . Y$ (SUB)

(62) $CUxg = \overline{CUcg} + \overline{CUpg}$ (CUxg)

(63) $CUxf = \overline{CUbf^*}$ (CUxf)

(64) $DEPxg = \overline{DEPbg} + \overline{DEPpg}$ (DEPxg)

(65) $DEPxc = \overline{DEPgc} + TDEPbc + E . \overline{DEPfc^*}$ (DEPxc)

(66) $DEPxf = \overline{DEPgf^*} + \overline{DEPcf^*} + \overline{DEPbf^*}$ (DEPxf)

Projecting Value Variables

(67) $Y + MGNFS = XGNFS + Cp + Cg + I_T p + I_T g$ (Cp)

(68) $Y = P . y$ (Y)

(69) $Cg = Pc . c_g$ (Cg)

(70) $I_T p = Ib + Ip$ (Ip)

(71) $I_T p = Pi . i_{Tp}$ $(I_T p)$

(72) $Ib = Pi . i_b$ (Ib)

(73) $I_T g = Ig + Ic$ (Ig)

(74) $I_T g = Pi . i_{Tg}$ $(I_T g)$

(75) $Ic = Pi . \overline{ic}$ (Ic)

(76) $XGNFS = Px . \overline{xgnfs}$ (XGNFS)

(77) $MGNFS = Pm . mgnfs$ (MGNFS)

(78) $MD = P . md$ (MD)

Domestic and Foreign Interest Payments

(79-118) $IPC_{jk} = r. CR_{kj, 1}$, $IPB_{jk} = r . B_{kj, 1}$, $IPD_{jk} = i CR_{kj, 1}$

Stock and Flow Accounting

(119-183) $X_{jk} = X_{jk, 1} + X_{jk}$ Where X = CR, B, DEP, CU or ON.

Target Variables

(184) $y_t = y_{t 1} (1 + \overline{gy})$ (yt)

(185) $P = P_{1} (1 + \overline{gp})$ (P)

(186) $e = e_{1} (1 + \overline{ge})$ (e)

Debt Sustainability Indicators

(187) $EDYR = (E \quad CRfg + E \quad Bfg)/Y \quad 100$ $(EDYR)$

(188) $EDXR = (E \quad CRfg + E \quad Bfg)/XGNFS \quad 100$ $(EDXR)$

(189) $EIPYR = (IPCgf + IPBgf)/Y \quad 100$ $(EIPYR)$

(190) $EIPXR = (IPCgf + IPBgf)/XGNFS \quad 100$ $(EIPYR)$

(191) $DDYR = (Bxg + CRcg + CRbg + CRpg)/Y \quad 100$ $(DDYR)$

Appendix-III: Financial Macroeconomic Model of Pakistan- Variables

Symbol	Description
B	Bonds
C	Consumption
CU	Currency
CR	Credits/Loans
DEP	Deposits
DDYR	Ratio of domestic debt to GDP
E	Average nominal exchange rate (rupees per US$)
EDYR	Ratio of external debt to GDP
EDXR	Ratio of external debt to export
EIPYR	Ratio of external interest payments to GDP
EIPXR	Ratio of external interest payments to export
FY	Factor income
g_y	Growth rate of real GDP
g_e	Rate of real exchange rate depreciation
g_p	Rate of inflation
H	Stock of base money
I	Investment (gross)
IP_i	Interest payments on credit (C), Bond (B) and deposits (D)
MGNFS	Imports of goods and non-factor services
MD	Money demand
MS	Money supply
m	Money multiplier
ON	Other net
P	GDP deflator
Pc	Consumption deflator
Pi	Investment deflator
Px*	World Price of Exports
Pm*	World Price of Imports
PNL	Distributed Profit and Loss
RR	Required reserve
rd_i	Domestic nominal interest rate on deposit(d), bond (b) and lending (l).
r_{fi}	Foreign nominal interest rate on deposit(d), bond (b) and lending to government (lg), and other (lx).
r_{br}	Bank rate
r_{Lf}	Rate of Interest on foreign lending
S	Savings (gross)
SUB	Government subsidies
TD	Direct taxes
TI	Indirect taxes
TR	Transfer Payments
TDEP	Total Deposits
XGNFS	Exports of goods and non-factor services
X	Rest of the sectors
Y	Gross Domestic Product at market price
Yd	Disposable income

Note to Appendix III:

(i) Where applicable, lowercase letters denote the constant price value of the corresponding uppercase variables.

(ii) A superscript asterisk indicates foreign currency denominated variables.

(iii) Sector specific variables and inter-sectoral flows are represented by the sub-indices, in which the first subscript shows the paying sector and second as receiving sector. In the bond holding, the first subscript shows the holding sector and second as issuing sector. Sum of all sectors is represented by 'x'.

Appendix-IV: Financial Macroeconomic Model of Pakistan- Parameters

Symbol	Description
a_i	Parameters of private consumption function. i = 0, 1, 2
d_i	Parameters of private investment function. i = 0, 1, 2, 3
q_i	Parameters of import function. i = 0, 1, 2
l_i	Parameters of money demand function. i = 0, 1, 2, 3
v_i	Disturbance term. i = 1, 2, 3,4
α_{ij}	Ratio of bond holding by sector i of sector j to money supply/free assets of banking system.
β_{ij}	Ratio of credit from sector i to sector j to total credit supply/free assets of banking system/GDP.
δ	Share of domestic goods price in investment deflator
γ	Ratio of direct taxes to GDP
λ	Ratio of indirect taxes to GDP
Φ	Ratio of factor income of government to GDP
ψ_b	Ratio of Banking system investment to total private investment
k	Incremental capital output ratio
σ	Required reserve ratio
ζ	Ratio of subsidy to GDP
Ω_{cm}	Private sector currency to money ratio
Ω_{dm}	Private sector deposit to money ratio