The Current Account Dynamics in Pakistan: An Intertemporal Optimization Perspective

Tahir Mukhtar and Aliya H.Khan[1]

Abstract: The intertemporal approach has become a basic reference in open economy macroeconomics for the theoretical understanding of the current account. Since the early 1980s there has been substantial growth in the literature using this approach to analyze the behaviour of the current account movements for different countries and time periods. The theoretical refinements in the approach have led most of the empirical studies in the literature today to apply the basic present value model of current account (PVMCA) and its extended version to examine the fluctuations in the current account balances of both developed and developing countries. Using data on Pakistan over the period 1960 to 2009 the present study finds that the basic model fails to predict the dynamics of the actual current account. However, extending the basic model to capture variations in the world real interest rate and the real exchange rate significantly improves the fit of the intertemporal model. The extended model predictions better replicate the volatility of current account data and better explain historical episodes of current account imbalance in Pakistan.

Keywords: Current account; Present value models; Consumption-based interest rate; Pakistan.
JEL Classification Codes: C32; F32; F41.

1. Introduction

Current account is a variable that is both a broad reflection of the stance of macroeconomic policies and a source of information about the behaviour of economic agents. It reflects not only changes in a country's trade flows, but also the difference between a country's saving and investment. Furthermore, the current-account balance can also be described as the addition to a country's claims on the rest of the world. Hence, movements in current account convey information about the actions and expectations of all market participants in an open economy.

The modern macroeconomic models of the open economy have emphasized that the current account is an intertemporal phenomenon. The movements in the current account are deeply intertwined and convey the information about the actions and expectations of all economic agents in an open economy. Therefore, the current account is an important macroeconomic indicator for policy decisions and the measurement of economic performance in any open economy. An array of theories has actually been developed to analyze the behavior of the current account movements during the second half of twentieth century. However, the failure of each successive theory to adequately explain the dynamic behavior of the current account in the face of rapidly changing economic conditions has led to the emergence of the intertemporal approach to current account (ICA). This approach has gained popularity since the introduction of the

[1] The authors are respectively Assistant Professor at the Department of Economics Fatima Jinnah Women University and Professor at the School of Economics, Quaid-i-Azam Islamabad.

theoretical model into the literature by Sachs (1981, 1982) that builds upon the neoclassical theory. Systematic empirical tests of the intertemporal model used the approach originally pioneered by Campbell (1987) and Campbell and Shiller (1987) to derive the optimal current account of an optimizing agent within the VAR testing principle.

Current account deficit (CAD) has been a constant feature of Pakistan's economy as in last 63 years we had current account surplus in only six years. Three of these six years have been FY 01 (1.878 billion dollars), FY 02 ($3.854 billion dollars) and FY 03 ($3.573 billion). This structural feature of the economy stems from the fact that Pakistan is one of those developing countries which neither export oil nor any other mineral. The structural tendency of current account deficit in our economy has re-asserted with a bang in 2004-05 when we had a current account deficit of $0.817 billion. The CAD of 2005-06 surpassed this figure and stood at $3.606 billion. This has raised alarm bells in Washington and in Pakistan. Both the International Monetary Fund (IMF) and the World Bank (WB) have advised the government to devalue the currency by at least 10 percent. However, the increasing trend in CAD continues and it touched the figure $ 9.26 billion in 2008 and then a decline was observed in it during 2009 when we had a CAD of $ 3.95 billion[2]. The major driver in accelerating the CAD is the widening trade imbalance in both goods and services.

Since the early 1980s there has been substantial growth in the literature using the ICA to analyze the behaviour of the current account movements for different countries and time periods. The theoretical refinements in the intertemporal approach have led most of the empirical studies in the literature today to apply the basic present value model of current account (PVMCA) and its extended versions to examine the fluctuations in the current account balances of both developed and developing countries. To date, the empirical support for the PVMCA to a certain extent is mixed. For example, Sheffrin and Woo (1990), Milbourne and Otto (1992), Otto (1992), Manteu (1997), Makrydakis (1999), Ogus and Niloufer (2006), Goh (2007) and Khundrakpam and Rajiv (2008) find evidence against the basic PVMCA which is not a surprising result for this version of the ICA [Bergin and Sheffrin, 2000; and Nason and Roger, 2006]. However, the findings of Ghosh and Ostry (1995)[3]and Agenor, et. al., (1999) reveal that the basic PVMCA conforms to the restrictions implied by the intertemporal theory quite well. Though highly stylized, the basic PVMCA has been the test bed for the entire intertemporal approach most consistently used in the literature. Formal tests of this model in most of the cases have routinely failed while the search for sources of failure goes on.

---

[2] Source: Pakistan Economic Survey (2005-06 and 2009-10).

[3] For majority of developing countries included in their sample a favourable evidence has been recorded.

Bergin and Sheffrin (2000) identify stochastic world interest rates and real exchanges rates to be incorporated in the model as they show an improved performance of the model in the presence of these variables. The authors argue that external shocks are most likely to affect the current account balance of small open economies through these variables. Gruber (2004) shows the inclusion of habit formation improves the ability of the simple PVMCA to match current account data. However, Kano (2008) argues that the PVMCA with habit formation in consumption is observationally equivalent to a PVMCA with a transitory consumption component potentially generated by stochastic (consumption-based) world real interest rates. This observation implies that the Gruber's test of the PVMCA with habit formation has no power against the alternative, i.e., the PVMCA with stochastic (consumption-based) world real interest rates. Nason and Rogers (2006) observe that the failure of the basic PVMCA is explained by the absence from time varying world real interest rates at best. For the last few years an extended PVMCA developed by Bergin and Sheffrin (2000) which allows simultaneously for time-varying world real interest rates and exchanges rates has been used by many studies. This version of the ICA performed relatively better as compared to its basic counterpart [see, for example, Adedeji, 2001; Landeau, 2002; Saksonovs, 2006; Darku (2008); and Campa and Gavilan, 2010, among others]. The aim of this study is to examine and compare the ability of the intertemporal models (basic and extended) to explain fluctuations in Pakistan's current account. In particular it examines whether the inclusion of the world interest rate and the exchange rate yield an improvement in the fit of data. The present study appears to be first in the context of Pakistan that applies the extended PVMCA developed by Bergin and Sheffrin (2000) for analyzing the behaviour of the current account balance.

The rest of this study is organized as follows: section 2 presents the analytical framework and the data; section 3 initially conducts the empirical tests of the basic model and then it proceeds to discuss the results when the model is extended to incorporate changes in the world interest rate and the exchange rate; and final section concludes the study.

2. Analytical Framework

2.1. The Basic PVMCA and Its Testable Implications

The theoretical model adopted here is based on Sachs (1981), Sheffrin and Woo (1990), Otto (1992) and Ghosh (1995). The basic PVMCA considers an infinitely lived representative household in a small open economy. This economy consumes a single good and has access to the world capital markets at an exogenously given world real interest rate. The intertemporal model is similar to the PIH [Friedman, 1957; and Hall, 1978] where the representative agent chooses an optimal consumption path to maximize the present-value of lifetime utility subject to a budget constraint. The representative agent is assumed to have rational expectations. The infinitely lived household has the expected lifetime utility function given as:

$$E_t U = E_t\left[u(C_t) + \beta u(C_{t+1}) + \beta^2 u(C_{t+2}) + \cdots\cdots\right] = E_t\left[\sum_{s=t}^{\infty} \beta^{s-t}\left\{u(C_s)\right\}\right], \tag{1}$$

where $E_t U$ is the expected utility, E_t is the conditional expectations operator based on the information set of the representative agent at period t, β is the subjective discount factor with $0 < \beta < 1$, and C represents private consumption of the single good .The period utility function $u(C)$ is continuously differentiable and it is also strictly increasing in consumption and strictly concave: $u'(C) > 0$ and $u''(C) < 0$.

In the ICA, the current account acts as a mean of smoothing consumption amidst shocks faced by the economy e.g., shocks to national output, investment and government spending. The current account expresses the evolution of the country's net foreign assets with the rest of the world and is given by:

$$CA_s = A_{s+1} - A_s = Y_s + rA_s - C_s - I_s - G_s\,, \tag{2}$$

where CA_s is the current account balance in period s, A_s represents the country's net foreign assets, r denotes the world real interest rate (assumed constant), Y_s is the gross domestic product, C_s, I_s and G_s capture aggregate consumption, government expenditures and total investment respectively.

Constraint (2) holds as an equality based on the assumption of non-satiation. By taking the expectation of (2) and by imposing the standard no-Ponzi game condition to rule out the possibility of bubbles, iterating the dynamic budget constraint in (2) gives the intertemporal budget constraint facing the representative agent as:

$$\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t} Y_s + (1+r)A_t = \sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}\left(C_s + I_s + G_s\right) \tag{3}$$

Deriving and substituting the optimal consumption level in equation (2), it can be shown that the present value relationship between the current account balance and future changes in net output (ΔNO) is given by:

$$\widehat{CA}_t = -\sum_{s=t+1}^{\infty}\left(\frac{1}{1+r}\right)^{s-t} E_t\left(\Delta NO_s\right) \tag{4}$$ [4]

[4] See Sheffrin and Woo (1990), Milbourne and Otto (1992), Otto (1992), Ghosh and Ostry (1995) and Makrydakis (1999) for derivation details.

We define net output (NO) as gross domestic output less gross investment and government expenditures i.e.,

$$NO \equiv Y - I - G. \tag{5}$$

According to equation (4), the optimal current account balance is equal to minus the present value of the expected changes in net output. For example, the representative agent will increase its current account, accumulating foreign assets, if a future decrease in income is expected and vice versa.

But problem is that equation (4) is not empirically operational because the expression requires the researcher to be knowledgeable of the full information set of consumers' expectations. Campbell and Shiller (1987) explain that information on consumers' expectations is not required since the current account contains consumers' expectations of shocks to national cash flow. We begin therefore by estimating a first- order vector autoregressive (VAR)[5] model in the changes in net output and the current account as:

$$\begin{bmatrix} \Delta NO_s \\ CA_s \end{bmatrix} = \begin{bmatrix} \phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22} \end{bmatrix} \begin{bmatrix} \Delta NO_{s-1} \\ CA_{s-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1s} \\ \varepsilon_{2s} \end{bmatrix} \tag{6}$$

where ε_{1s} and ε_{2s} are errors with conditional means of zero, ΔNO_s and CA_s are now expressed as deviations from unconditional means so that only the dynamic restrictions of the present value model of the current account are tested [see Otto, 1992; Ghosh, 1995; Adler,2002; Goh,2007; and Adedeji and Jagdish,2008].The main interest in (6) concerns the regression in which ΔNO_s is a dependent variable. It is the discounted value of all date s forecasts of this variable conditional on the agent's full set of information that will determine the optimal current account at time t.That is, according to (6), future expected changes in net output are reflected in today's current account. Then intuitively, not only will ΔNO_{s-1} be important in determining ΔNO_s but also CA_{s-1} is helpful in predicting ΔNO_s, since it may contain additional information. So, Granger causality should run from the current account to changes in net output.

Taking expectation of equation (6) we get

$$E_t \begin{bmatrix} \Delta NO_s \\ CA_s \end{bmatrix} = \begin{bmatrix} \phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22} \end{bmatrix}^{s-t} \begin{bmatrix} \Delta NO_t \\ CA_t \end{bmatrix}. \tag{7}$$

---

[5] The generalization to higher order VARs is straightforward. Given that the present study will use annual data and that the sample is relatively small, the first order VAR is sufficient to capture the time series properties.

In equation (7) we use the condition that $E_t\left(X_{t+j}\right)=\Omega^j X$ which is derived considering that expectations are formed rationally in the underlying theoretical model (Makrydakis, 1999). Ω is the 2×2 matrix of coefficients ϕ_{ij} .We can get forecast of ΔNO_s by premultiplying right hand side of equation (7) by vector $\begin{bmatrix}1 & 0\end{bmatrix}$ as:

$$E_t\Delta NO_s = \begin{bmatrix}1 & 0\end{bmatrix} \begin{bmatrix}\phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22}\end{bmatrix}^{s-t} \begin{bmatrix}\Delta NO_t \\ CA_t\end{bmatrix} \tag{8}$$

Or

$$E_t\Delta NO_s = \begin{bmatrix}1 & 0\end{bmatrix} \Omega^{s-t} \begin{bmatrix}\Delta NO_t \\ CA_t\end{bmatrix} \tag{9}$$

Let I be a 2×2 identity matrix. Substituting equation (9) into equation (4) and simplifying gives:

$$\widehat{CA}_t = -\begin{bmatrix}1 & 0\end{bmatrix} \left(\frac{1}{1+r}\Omega\right)\left(I-\frac{1}{1+r}\Omega\right)^{-1} \begin{bmatrix}\Delta NO_t \\ CA_t\end{bmatrix}$$

$$= \begin{bmatrix}\Phi_{\Delta NO} & \Phi_{CA}\end{bmatrix} \begin{bmatrix}\Delta NO_t \\ CA_t\end{bmatrix} = k\begin{bmatrix}\Delta NO_t \\ CA_t\end{bmatrix} \quad . \tag{10}$$

Equation (10) has the advantage that the optimal current account series $\widehat{CA}_t$ can be compared to the actual series CA_t . If the model is true, the two series should be identical. So, if the model is true, it follows that

$$\widehat{CA}_t = \begin{bmatrix}0 & 1\end{bmatrix} \begin{bmatrix}\Delta NO_t \\ CA_t\end{bmatrix} = CA_t\,. \tag{11}$$

There are a few testable implications of the present value relationship indicated in equation (4) noted in Otto (1992), Ghosh and Ostry (1995), Makrydakis (1999), Adedeji (2001) and others which we conduct as well. In brief they are :(i) the optimal current account $\left(\widehat{CA}_t\right)$ variable is stationary in level;(ii) the current account Granger causes changes in net output ;(iii) there is equality between the optimal and actual current account balances;(iv) there is equality of variances of the optimal and current account series; and (v) the stationarity of the optimal current account implies the stationarity of the actual current account.

2.2. Consumption Based Interest Rates and Extended Intertemporal Model of Current Account

To develop an extended intertemporal model we assume a small country which produces both traded and non-traded goods. The country can also borrow and lend in the world capital market at a time-varying real interest rate. In the model, changes in both real interest rate and real exchange rate stimulate consumption substitution between periods and therefore it generates an intertemporal effect on a country's current account. A representative household chooses a consumption path that maximizes the lifetime utility function:

$$E_t U = E_t\left[\sum_{s=t}^{\infty} \beta^{s-t}\{u(C_{Ts}, C_{Ns})\}\right], \quad u'(C) > 0 \text{ and } u''(C) < 0 \tag{12}$$

subject to the dynamic budget constraint:

$$A_{s+1} - A_s = Y_s + r_s A_s - (C_{Ts} + P_s C_{Ns}) - I_s - G_s \tag{13}$$

where C_T and C_N are consumption of traded and non-traded goods respectively. The relative price of non-traded to traded goods i.e., the real exchange rate at time s is P_s. Y_s, I_s and G_s are equivalent to those in (2). Since there is no money in this model, all variables are measured in terms of traded goods. r_s is the world real interest rate in terms of traded goods. Departing from the basic PVMCA, r_s is allowed to change over time and the relative price between tradable and non-tradable is included in the analysis. Based on the assumption that the economy has both traded and non-traded goods, the total consumption expenditure (C_s) in terms of traded goods can be expressed as $C_s = C_{Ts} + C_{Ns}$. $C^* = \lambda(C_T, C_N)$ is a linear homogenous function of C_T and C_N. This function is interpreted as an index of total consumption. We specialize this function to a Cobb-Douglas function: $C^* = C_T^{\alpha} C_N^{1-\alpha}$ and present it as:

$$u(C_{Ts}, C_{Ns}) = \frac{1}{1-\sigma}\left(C_{Ts}^{\alpha} C_{Ns}^{1-\alpha}\right)^{1-\sigma} \tag{14}$$

$$\sigma > 0, \quad \sigma \neq 1, \quad 0 < \alpha < 1$$

where σ is the coefficient of relative risk aversion which is inverse of the elasticity of intertemporal substitution (γ) and α represents the share of traded goods in total consumption index.

Under certain conditions, the evolution of the optimal consumption profile can be presented as[6]:

[6] See Bergin and Sheffrin (2000), Adedeji (2001) and Darku (2008) for exact derivation.

$$E_t c_{t+1} = \gamma E_t r_{t+1}^c, \tag{15}$$

where $\Delta c_{t+1} = \log C_{t+1} - \log C$, r^c is a consumption-based interest rate defined by:

$$r_t^c = r_t + \left[\frac{1-\gamma}{\gamma}(1-\alpha)\right]\Delta p_t + Cons\tan t \tag{16}$$

[7]

and $\Delta p_t = \log P_{t+1} - \log P$ .The optimal consumption profile is thus influenced by the world varying interest rate, r_t , and the change in the relative price of non-traded goods, Δp_t i.e., the exchange rate. In the basic intertemporal model the expected change in consumption is zero since the representative consumer always tries to smooth consumption over time by borrowing and lending. The exchange rate plays a similar role through the net impact of an intratemporal effect and an intertemporal effect. A change in the exchange rate induces an intratemporal substitution effect on consumption. When the price of traded goods is temporarily low, households substitute traded goods for non-traded goods in consumption. Given that the intratemporal rate of substitution is 1 (Cobb-Douglas), this raises the current consumption expenditure by $(1-\alpha)$.The intertemporal effect is driven by the relative price of future vs. current consumption in terms of the prices of traded goods. When the price of traded goods is temporarily high and expected to decrease, the future payment of a loan in terms of traded goods is high and also expected to decrease. This implies that this future repayment has a lower cost in terms of the full consumption bundle than in terms of traded goods alone. Thus r_t^c raises and lowers the total consumption expenditure by the elasticity $\gamma(1-\alpha)$. As long as, $\gamma > 1$ the intertemporal effect will dominate.

The solution to the maximization problem (12) requires combining (15) with the intertemporal budget constraint of the problem. After some manipulation, the latter can be written as[8]:

$$-\sum_{t=1}^{\infty} \beta^t \left[\Delta no_t - \Delta c_t\right] = no_0 - c_0 \tag{17}$$

where lower case letters represent the logs of upper case counterparts. Taking expectations in equation (17) and combining it with equation (15) one can then get that

[7] The constant term will be irrelevant for the estimation when we later demean the consumption-based real interest rate using equation (16).
[8] This intertemporal budget constraint is log-linearized around the steady state in which net foreign assets are 0, i.e. $\overline{A} = 0$ .See Bergin and Sheffrin (2000) Adedeji (2001) and Darku (2008) for more details.

$$\widehat{CA}_t = -E_t\left[\sum_{s=t+1}^{\infty}\beta^s\left(\Delta no_s - \gamma r_s^c\right)\right], \qquad CA_t \equiv no_t - c_t \tag{18}$$

Equation (18) is the more relevant equation of the model, and it clearly illustrates the consumption smoothing character of the current account. Ceteris paribus, the higher the net output expected in the future, the smaller today's current account balance. Also, ceteris paribus, the smaller the consumption based real interest rate expected in the future, the smaller the current account balance, because the representative consumer substitutes away future consumption for current consumption. An important testable implication, coming from equation (18), is that the current account should Granger cause Δno and r^c but not the other way around. Remaining testable implications of the extended model are the same which have been discussed under the basic model.

Now consider that the behaviour of the three variables of interest, Δno, $\widehat{CA}$ and r^c can be modeled according to an unrestricted VAR model of order 1 as follows:

$$\begin{bmatrix}\Delta no_t \\ CA_t \\ r_t^c\end{bmatrix} = \begin{bmatrix}\phi_{11} & \phi_{12} & \phi_{13} \\ \phi_{21} & \phi_{22} & \phi_{23} \\ \phi_{31} & \phi_{32} & \phi_{33}\end{bmatrix}\begin{bmatrix}\Delta no_{t-1} \\ CA_{t-1} \\ r_{t-1}^c\end{bmatrix} + \begin{bmatrix}\varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t}\end{bmatrix} \tag{19}$$

Using equation (19) and the conditions that $E_t\left(X_{t+j}\right) = \Omega^j X$, $E\left(\varepsilon_{1t}\right) = E\left(\varepsilon_{2t}\right) = E\left(\varepsilon_{3t}\right) = 0$ and Ω is the 3×3 matrix of coefficients ϕ_{ij}, the restrictions on equation (18) can be expressed as:

$$hy_t = -\sum_{s=t+1}^{\infty}\beta^{s-t}\left(g_1 - \gamma g_2\right)\Omega^{s-t}y_t \tag{20}$$

where $y_t = \left(\Delta no_t \quad CA_t \quad r_t^c\right)'$, $g_1 = \left[1 \quad 0 \quad 0\right]$, $g_2 = \left[0 \quad 0 \quad 1\right]$, and $h = \left[0 \quad 1 \quad 0\right]$ (Again this can also be generalized for a higher order VAR). For a given y_t, the right hand side of equation (20) can be expressed as:

$$\widehat{CA}_t = ky_t \tag{21}$$

where $k = -\left(g_1{}' - \gamma g_2{}'\right)\beta\Omega\left(I - \beta\Omega\right)^{-1} = \left[\Phi_{\Delta no} \quad \Phi_{CA} \quad \Phi_{r^c}\right] = \left[0 \quad 1 \quad 0\right]$.

Equation (21) provides the model's prediction for the current account consistent with the VAR and the restrictions of the intertemporal theory. For evaluating the extended PVMCA we have to test the hypothesis that $k = \left[0 \quad 1 \quad 0\right]$ in equation (21), so that $\widehat{CA}_t = CA_t$, by using the delta method to calculate a χ^2 statistic. In other words, we apply a Wald test of the non-linear restriction on the vector k implied by equation (21) to jointly assess the restrictions of the model.

2.3.Data Sources and Construction of Variables

The present study aims to conduct a time series analysis for Pakistan, which requires a relatively larger data set to obtain relatively more realistic results. While quarterly data would be the right choice for this empirical exercise, however, due to non-availability of quarterly data for some variables we use annual data for the period 1960 to 2009. Data sources for the present study include *International Financial Statistics* (IFS), International Monetary Fund (IMF), *Pakistan Economic Survey* (various issues), *Statistical Hand Book of State Bank of Pakistan* and World *Development Indicators* (WDI), the World Bank (WB).

With regard to the construction of variables, we begin from the variables used in testing the empirical validity of the ICA in Pakistan. In this connection, we have collected the data on private consumption, government consumption, investment (which consists of gross fixed capital formation and change in inventories) and gross domestic product (GDP). All variables are used in real per capita terms by dividing the nominal variables by the GDP deflator (2005=100) and the level of total population. Following Ghosh (1995), Bergin and Sheffrin (2000) and Adler (2002) among others, we construct current account series by subtracting private and government consumption expenditures and investment from the gross national product (GNP). The net output series (NO) is computed by subtracting government and investment expenditures from GDP. Similarly, we construct the net output inclusive of interest payment (NOR) by subtracting government and investment expenditures from GNP. Both the models of the ICA used in the study express net output and the current account in per capita terms with the aim to accommodate the data of these variables to the assumption of a representative agent.

For constructing the world real interest rate data the study follows Barro and Sala-i-Martin (1990) i.e., we use the weighted averages of the real interest rates of G-7 economies as the world real interest rates. The weight for each economy is time-varying and based on the economy's GDP share in the G-7 total. The real interest rate data for each economy are constructed by deflating the money market rates with inflation rates calculated from the economy's GDP deflator. For real exchange rate data, first, we have computed the bilateral exchange rates between Pakistan's rupee and the currencies of its ten major trading partners[9]. Then, using the calculated nominal exchange rates and the consumer price indices for Pakistan

---

[9] These include France, Germany, Hong Kong, Italy, Japan, Korea, Netherlands, Singapore, the United Kingdom and the United States which are chosen on the basis of their trade share with Pakistan.

and the relevant trading partner, the weighted average of real exchange rate of rupee vis-à-vis the currencies of its ten major trading partners is constructed. The weight assigned to a trading partner is based on the extent of trade flows between Pakistan and the relevant trading partner. The consumption-based interest rate, r^c, is given by the world interest rate adjusted for the expected change in the exchange rate.

There are three other parameter values that need to be set for implementing the PVMCA empirically: the elasticity of intertemporal substitution, γ, the share of traded goods in the total consumption index, α, and the subjective discount factor (or the preference parameter), β. Considering that various views exist in the literature regarding the value of the intertemporal elasticity parameter, it is quite difficult to provide a specific value for it. Given the fact that the present study allows for nontradable goods, we tend to support the position of Ostry and Reinhart (1992), that the intertemporal elasticity of substitution is different from zero. Hall's (1988) estimated intertemporal elasticity remains in the range of 0 to 0.1 while it ranged between 0.38 and 0.503 in a subsequent study by Ostry and Reinhart (1992). Sheffrin and Bergin (2000) used values that fell within the range from 0.022 to 1 and found that the model performs relatively better with low values of the parameter. Uribe (2002) uses a value of 0.2, Landeau (2002) and Kydland and Zarazaga (2000) use a value of 0.5 and Darku (2008) uses a value of 0.45 for the intertemporal elasticity of substitution. Following Ostry and Reinhart (1992) and Darku (2008) we use a value of 0.45 for this parameter in this study. In order to obtain the share of traded goods in the total consumption, α, Bergin and Sheffrin (2000) follow Kravis et. al., (1982) and Stockman and Tesar (1995) to compute the value of this parameter. The estimates of α by both the studies are two-thirds and one-half respectively. Bergin and Sheffrin mainly use one-half as the value of the share parameter, α, in their empirical study. They have also conducted the calculation by using the value found by Kravis et. al., (1982), where α is found to be close to two-thirds. The results are similar with both values of the share parameter, thus we choose $\alpha = 0.5$ for the present study. The discount factor, β, is derived from the world real interest rate. By obtaining the sample mean for the world real interest rate in the data set, $\bar{r}$, the discount factor is calculated as $\frac{1}{1+\bar{r}}$. The discount factor is computed to be equal to approximately 0.96 in the current study.

3. Empirical Results and Discussion

3.1. Evaluating the Performance of the Basic Present Value Model of the Current Account

3.1.1. Testing for Unit Roots

For evaluating the basic PVMCA and its variant the first step is to see whether the current account and its fundamental drivers are stationary or not. Practically the stationarity of a variable may be constrained by the presence of a unit root and the use of non-stationary time series data may lead to spurious regression. Applying the Dicky-Fuller Generalized Least Square (DF-GLS) unit root test, proposed by Elliott, Rothenberg and Stock (ERS, 1996), we find that change in net output (ΔNO_t), actual current account (CA_t) and the model's predicted or optimal current account $(\widehat{CA}_t)$ are stationary at levels while net output inclusive of interest payments (NOR_t) and private consumption (C_t) are non-stationary at levels but they become stationary at their first differences (see table1). Hence the time series ΔNO_t, CA_t and $\widehat{CA}_t$ are integrated of order zero i.e., $I(0)$, while NOR_t and C_t are integrated of order one i.e., $I(1)$. The inclusion of NOR_t and C_t in the analysis is to verify the stationarity of the actual current account series from the perspective of a long run relationship between these two time series. If both NOR_t and C_t are $I(1)$ and make a cointegrating relationship then the residual series which is the actual current series will be $I(0)$.

Table 1.Unit Root Test

			Mackinnon Critical for Rejection of Hypothesis of a Unit Root				
Variables	Level	First Differ-ence	1 %	5 %	10 %	Decision	Order of Integrat-ion
ΔNO_t	-4.91	-	-2.61	-1.94	-1.61	Stationary at level	I (0)
CA_t	-2.71	-	-2.61	-1.94	-1.61	Stationary at level	I (0)
$\widehat{CA}_t$	-3.13	-	-2.61	-1.94	-1.61	Stationary at level	I (0)
NOR_t	0.21	-6.56	-2.61	-1.94	-1.61	Nonstationary at level but stationary at first difference	I (1)
C_t	3.49	-4.66	-2.61	-1.94	-1.61	Nonstationary at level but stationary at first difference	I (1)

Cointegration between NOR_t and C_t is investigated using Johansen's maximum likelihood method[10], the results are reported in table 2. Both trace statistics (λ_{trace}) and maximal eigenvalue (λ_{max}) statistics indicate that there is at least one cointegrating vector between the two time series. We can reject the null hypothesis of no cointegrating vector in favour of one

[10] See Johansen, S. (1988) and Johansen, S. and K. Juselius (1990).

cointegrating vector under both test statistics at 5 percent level of significance. We also cannot reject the null hypothesis of at most one cointegrating vector against the alternative hypothesis of two cointegrating vectors, both for the trace and max-eigen test statistics. Consequently, we can conclude that there is only one cointegrating relationship between the variables under investigation. Thus, a long run equilibrium relationship exists between net output inclusive of interest payments and private consumption in Pakistan. At the bottom of table 2 we present the likelihood ratio test result of the hypothesis that the vector $[a,b]=[1,-1]$ belongs to the cointegrating space such that $[1,-1]\;[NOR_t, C_t]' = CA_t$ is $I(0)$. It is evident that we fail to reject the null hypothesis and hence it is confirmed that NOR_t and C_t are both not only $I(1)$ but they are also co-integrated such that CA_t is $I(0)$.

Table 2 Cointegration Test Results

Null Hypothesis	Alternative Hypothesis			Critical Values	
				95 %	P-values••
λ_{trace} rank tests		Eigen values	λ_{trace} rank value		
$H_0: r=0$	$H_1: r=1$	0.320034	22.03440**	20.26184	0.0282
$H_0: r=1$	$H_1: r=2$	0.070713	3.520220	9.164546	0.4882
$\lambda_{\max}$ rank tests			$\lambda_{\max}$ rank value		
$H_0: r=0$	$H_1: r>0$	0.320034	18.51418**	15.89210	0.0189
$H_0: r\le 1$	$H_1: r>1$	0.070713	3.520220	9.164546	0.4882
$H_o: a=1,\; b=-1$	χ^2 = 0.8632	p-value=0.3271			

** denotes rejection of the null hypothesis at the 5 percent significance level.
••MacKinnon-Haug-Michelis (1999) p-values.

The derivations in section 2.1 lead us to formulate the following expression for the validity of the basic PVMCA:

$$\widehat{CA}_t = \begin{bmatrix} 0 & 1 \end{bmatrix} \begin{bmatrix} \Delta NO_t \\ CA_t \end{bmatrix} = CA_t . \tag{22}$$

In this case both the actual and the optimal current account series are identical which implies that if the actual current account balance is $I(0)$ then the optimal current account series will also be $I(0)$. This is confirmed from the unit root test results of table 1 where both the series are $I(0)$. As this finding is in accordance with one of the implications of the basic PVMCA, therefore, it provides evidence in favor of the model.

Table 3.VAR Estimation and Tests of Restriction of the Basic PVMCA

Dependent Variable	Regressors		Diagnostic Tests: χ^2 (*p* values are in the parenthesis)			
	ΔNO_{t-1}	CA_{t-1}	S.Corr	ARCH	Heteroscedasticity	Normality
ΔNO_t	0.201 (0.146)	-0.525 (0.102)***	1.242 (0.251)	0.007 (0.987)	0.084 (0.897)	0.524 (0.444)
CA_t	0.057 (0.093)	0.654 (0.108)***	0.791 (0.328)	1.086 (0.296)	1.351 (0.249)	0.462 (0.784)

Granger Causality Test: F statistic (*p* values are in the parenthesis)	
CA does not Granger Cause ΔNO	8.517 (0.004)
ΔNO does not Granger Cause CA	1.145 (0.376)

Tests of Restrictions		
ΔNO_t	-0.131 (0.184)	$\frac{\operatorname{var}(\widehat{CA})}{\operatorname{var}(CA)}$=0.722
CA_t	0.685 (0.208)**	
	χ^2=34.486; *p*-value=0.000	$Corr(CA,\widehat{CA})$=0.651

Notes:

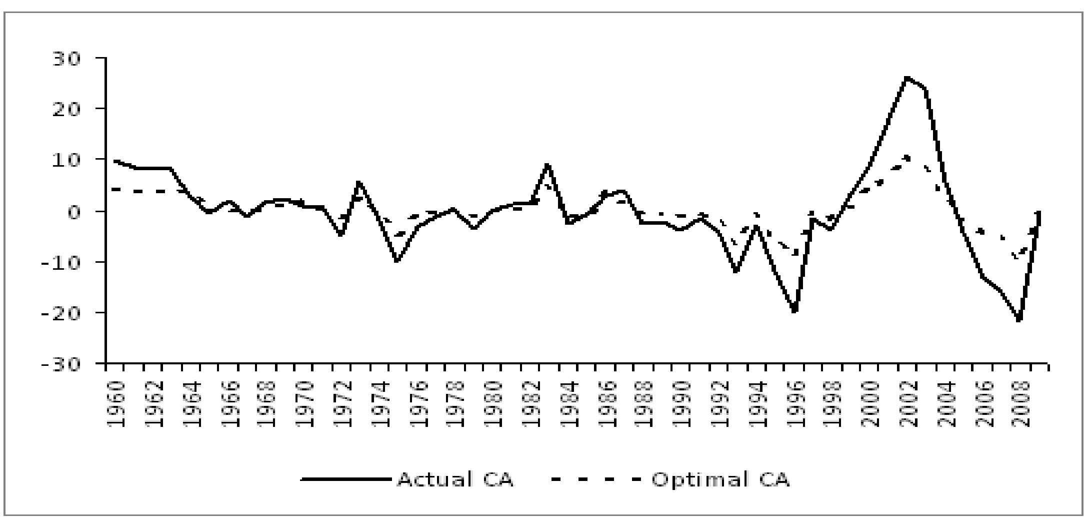
- As both the variables entering the model are expressed as deviations from their means, so, the VAR model is estimated without a constant term.
- The numbers in the parentheses are the standard errors.
- ** and *** indicate statistical significance at the 5 percent and 1 percent levels respectively.

3.1.2. Forml and Informal Tests of the Model

The applicability of the basic PVMCA to Pakistan's data are evaluated by testing some of the important implications of the model. In this regard we proceed by conducting some formal and informal tests using VAR model where we have estimated equations for ΔNO_t and CA_t by applying OLS technique. Following the standard practice both the variables are expressed as deviations from their means since we are interested in testing the dynamic restrictions of the model [see Ghosh, 1995; Manteu, 1997; Makrydakis, 1999; Adedeji, 2001; Adler, 2002; and Darku, 2008]. On the basis of the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criteria (SBC), a one lag VAR model is chosen which is not surprising for annual data. Table 3 lists the estimated coefficients, the associated standard errors and the residual diagnostic tests from the VAR model along with the computed values of the formal and informal tests of the basic PVMCA obtained for the period 1960 to 2009. Considering the discussion in section 2.1 about the testable implications of the basic PVMCA , table 3 reports the standard Granger causality test result where we reject the null hypothesis that CA_t does not Granger cause ΔNO_t which is suggestive of the fact that the representative agent has superior information. It means that the fluctuations in Pakistan's current account provide a signal about how this agent is expecting net output to change in the future. As a whole this finding constitutes weak evidence in favor of the basic PVMCA. However, we fail to reject the hypothesis that ΔNO_t does not Granger cause CA_t.

For further evidence on the relevance of the basic PVMCA to Pakistan's data we turn to figure 1 that reflects the time series graphs of the actual current account series and its optimal counterpart. Following Sheffrin and Woo (1990); Otto (1992); Obstfeld and Rogoff (1995); Makrydakis (1999); and Adler (2002) we have used an annual real world interest rate of 4 percent for discounting purposes while calculating the optimal current account series[11]. We know that if the basic PVMCA holds in Pakistan then graphically both the actual and the optimal current account series should differ only by the sampling error. In case there are significant differences in the time series plots of both the variables it will be considered as evidence against the consumption smoothing behaviour of the current account. Despite the fact that basic PVMCA is quite restrictive and simple in structure, the visual inspection of the two series in figure 1 represents a reasonably good capability of the optimal (or VAR model predicted) current account series to follow the year-to-year trends of Pakistan's actual current account balance during almost the entire period of study. Nevertheless, the actual current account series exhibits relatively more volatility as compared to its optimal counterpart, which is a very common outcome when consumption smoothing model is applied to small open economies (Adler, 2002).

Figure1.Actaul and Optimal Current Account Balances



[11] Most of the empirical computations have been carried out using 2,4,6 and 8 percent real world interest rate but they have almost the same quantitative results (Makrydakis, 1999).

Another testable implication of the model is the equality between the variances of the actual and the optimal current account series. If the variance ratio of optimal to actual current account series is equal to unity then it validates the assumption of high degree of capital mobility and the intertemporal model of current account [Ghosh, 1995; and Agenor, 1999]. In table 5.3 this ratio is 0.722, which is different from unity, and thus indicative of some degree of excessively volatile international capital flows to Pakistan in the sense of Ghosh (1995). It implies that in case of some shocks, Pakistan's consumption smoothing current account flows have been more volatile than justified by expected changes in economic fundamentals i.e., net output[12]. The problem with excessive volatility is that it raised the possibility of inappropriate utilization of foreign capital for domestic consumption (Ismail and Ahmad, 2008). As the variance of the actual current account balance is larger than its optimal counterpart, therefore in figure 1 the time series plot of the former has a larger amplitude than that of the latter. With regard to the correlation coefficient between the two current account series it is found to be moderate i.e., 0.651. The graphs of the two series in figure1 are clearly consistent with this modest relationship between them, hence the model's predicted current account series succeeds in explaining a reasonable portion of the fluctuations in the actual current account of Pakistan.

Now we come to examine the result of the formal and most stringent test of parameter restrictions imposed on estimated coefficients of ΔNO_t and CA_t. Considering that if the basic PVMCA gives a convincing representation of the actual current account fluctuations then equation 5.1 will hold; it implies that in the context of first order VAR the estimated values of $\Phi_{\Delta NO}$ and Φ_{CA} should be zero and unity respectively. Table 3 reports the result for this statistical test. The estimated values for both the variables are –0.131 and 0.685 respectively. From the perspective of individual testing we find that ΔNO_t is found not to be significantly different from its theoretical value of zero but CA_t is quite different from its theoretical value of unity. For overall testing of the model, our computed value of Wald test statistic (which is distributed as a χ^2 with two degrees of freedom) is 34.486 with *p*-value of zero, which indicates the rejection of the restrictions of the basic PVMCA on the VAR model even at 1 percent significance level. It suggests that Pakistan lacked the ability to smooth consumption through external borrowing and lending in the face of exogenous shocks during the sample period of the study.

Finally table 3 also presents results for some diagnostic tests, which involve χ^2 tests for the hypothesis that there is no serial correlation; that the residual follow the normal distribution; that there is no heteroscedasticity; and lastly that there is no autoregressive

[12] It means that capital movements are mainly dominated by speculative capital flows.

conditional heteroscedasticity. In all equations the diagnostics suggest that the residuals are Gaussian.

Thus, while the basic intertemporal model is a bit capable of tracing the peaks and troughs of the Pakistan's current account series for the period 1960 to 2009, it remains unsuccessful in capturing the full magnitude of the cyclical fluctuations of the said series. Similarly, while the informal evidence reveals adequacy of the model in Pakistan's case, the formal restrictions of the model are strongly rejected by the country's data. This outcome is supported by a number of empirical studies for other developing countries including Manteu (1997) for Portugal, Adedeji (2001) for Nigeria, Landeau (2002) for Chile, Ogus and Niloufer (2006) for Turkey, Goh (2007) for Malaysia and Lau et.al., (2007) for the Philippines and Singapore. However, our findings are in contrast with those obtained by Ghosh and Ostry (1995) for majority of developing countries in their sample, Callen and Cashin (1999) for India, Lau et.al., (2007) for Indonesia, Malaysia and Thailand and Khundrakpam and Rajiv (2008) for India. In all these cases the formal and informal tests have provided evidence in favour of the model.

3.2. Tests of the Extended Present Value Model of the Current Account

As an initial step we apply DF-GLS test for examining the stationarity of the variables entering the VAR model, which reflects the nature of the extended PVMCA. Table 4 presents the results of unit root tests for Δno_t , CA_t $\widehat{CA}_t$ and r_t^c . It is quite clear that the null hypothesis of a unit root is rejected at level for each time series. Hence, all the variables are $I(0)$ which is in accordance with the theoretical description of the extended PVMCA.

Table 4.Unit Root Test

		Mackinnon Critical Values for Rejection of Hypothesis of a Unit Root				
Variables	Level	1 %	5 %	10 %	Decision	Order of Integration
Δno_t	-5.24	-2.61	-1.94	-1.61	Stationary at level	I (0)
CA_t	-2.71	-2.61	-1.94	-1.61	Stationary at level	I (0)
$\widehat{CA}_t$	-2.97	-2.61	-1.94	-1.61	Stationary at level	I (0)
r_t^c	-7.232	-2.61	-1.94	-1.61	Stationary at level	I (0)

Before putting the extended PVMCA for formal and informal testing, it is essential to decide about the lag length to be used in the VAR model. Following the standard practice we have used the two criteria namely, the AIC and the SBC. Both the criteria suggest a lag length of one as optimal for the VAR model. The VAR model's estimated parameters and the present value tests are reported in table 5. In case of the extended PVMCA, if there exists a uni-lateral casual pattern running from the current account series to changes in net output and the consumption based interest rate it goes in favour of the model informally. From table 5, it is evident that in the equations of Δno_t and r_t^c the estimated coefficient of CA_{t-1} is only significant in the equation of Δno_t. Thus, there is only uni-directional Granger causality that runs from CA_t to Δno_t while there is no such relationship between CA_t and r_t^c. It implies that the current account lacks any short run predictability for the future consumption based interest rate. So, there is a partial support to the extended intertemporal model from Pakistan's data as far as the first informal test of Granger causality is concerned.

The next implication of the extended intertemporal model that comes under informal testing is that the time series plots of the actual and optimal current account series should differ only by sampling error. We have used the VAR model parameters given in table 5 to derive the optimal current account series. The good fit of the model is apparent from figure 2 where the model's predicted current account series very closely tracks the actual current account path and outcome is relatively better as compared to the case of the basic PVMCA. Hence, it establishes that the extended model has significant capability of predicting the general direction of the actual current balance in Pakistan. Nonetheless, the volatility of the actual current account series is still higher than that of its optimal counterpart. Hence, the higher volatility of the actual current account cannot be attributed to the exclusion of the source through which changes in external shock affect the current account balance of Pakistan. But it is noteworthy that the magnitude of the variability in the actual current account as compared to the optimal current account is lower in the extended model than in the basic model. Furthermore, the ratio of the variance of the optimal current account to the variance of the actual current account and the correlation between the two current account series, which evaluate the performance of the model informally, have shown remarkable improvement over the basic PVMCA. Table 5 shows that both these informal instruments carry the values 0.883 and 0.941 respectively, which are higher than those of the basic intertemporal model. As a result the extended model visually fits the data relatively better than its basic counterpart.

Table 4.VAR Estimation and Tests of Restriction of the Extended PVMCA

Dependent Variable	Regressors			Diagnostic Tests: χ^2 (p values are in the parenthesis)			
	Δno_{t-1}	CA_{t-1}	r^c_{t-1}	S.Corr	ARCH	Heteroscedasticity	Normality
Δno_t	0.153 (0.137)	-0.386 (0.163)**	-0.093 (0.115)	1.382 (0.244)	0.081 (0.906)	0.046 (0.937)	0.693 (0.348)
CA_t	-0.133 (0.157)	0.637 (0.106)***	-0.203 (0.173)	0.527 (0.441)	0.983 (0.303)	1.311 (0.259)	0.836 (0.322)
r^c_t	-0.141 (0.165)	-0.054 (0.113)	0.427 (0.204) **	0.664 (0.361)	0.096 (0.892)	0.701 (0.341)	0.557 (0.432)

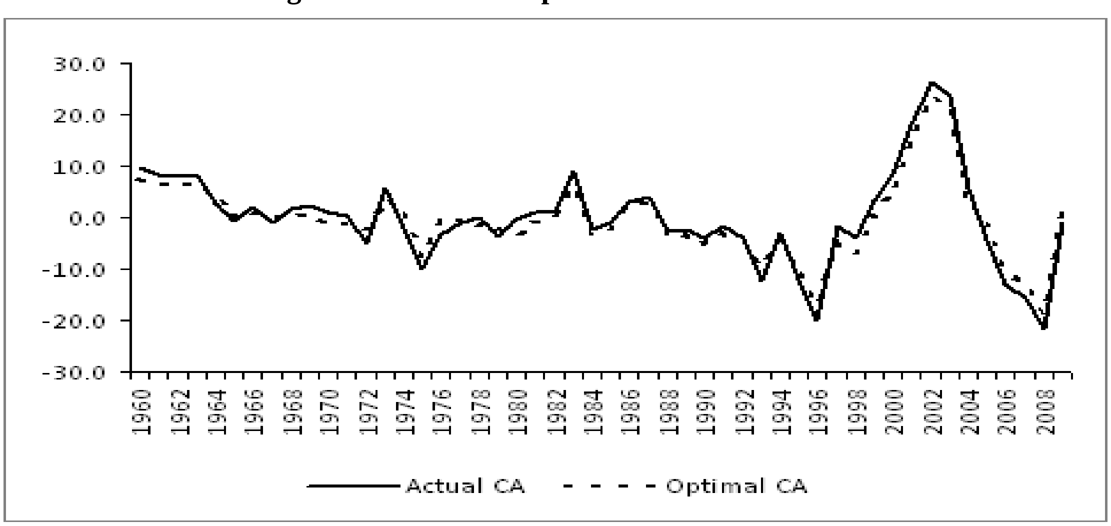
Granger Causality Test: F statistic (p values are in the parenthesis)	
CA does not Granger Cause Δno	8.517 (0.004)
Δno does not Granger Cause CA	1.145 (0.376)
CA does not Granger Cause r^c	1.229 (0.273)
r^c does not Granger Cause CA	1.554 (0.227)

Tests of Restrictions		
Δno_t	-0.068 (0.214)	$\frac{\mathrm{var}(\widehat{CA})}{\mathrm{var}(CA)}$=0.883
CA_t	0.776 (0.211)***	$Corr(CA,\widehat{CA})$=0.941
r^c_t	0.015 (0.069)	
	χ^2=2.586; p-value=0.463	

Notes:

- As all the three variables entering the model are expressed as deviations from their means, so, the VAR model is estimated without a constant term.
- The numbers in parentheses are standard errors..
- ** and *** indicate statistical significance at the 5 percent and 1 percent levels respectively.

Figure 2.Actaul and Optimal Current Account Balances



When the formal test is undertaken for judging the validity of the extended model to Pakistan's data, the findings are quite encouraging and support the evidence obtained from the informal tests. With one lag and three variables, the extended model suggests that the hypothesized κ-vector is $\begin{bmatrix}0 & 1 & 0\end{bmatrix}$. The actual κ-vector coefficients on changes in net output, the current account and consumption-based interest rate are -0.068, 0.776 and 0.015 respectively as reported in table 5. The t - statistics indicate that the coefficients on changes in net output and consumption-based interest rate are not statistically different from their hypothesized values of zero. However, the κ-vector coefficient on the current account is statistically different from its theoretically expected value of unity. With regard to the overall performance of the extended model, the Wald test statistic indicates that the model's restrictions are not rejected with a p-value of 0.463. Hence, the null hypothesis of consumption smoothing is not rejected by the data. This finding implies a vital improvement over the corresponding result for the basic model. Finally, the diagnostic tests in table 5 indicate that all the three equations in VAR model are well specified and do not violate the Gaussian assumptions.

4. Conclusion and Policy Implications

Since first introduced by Sachs (1981), the intertemporal approach has been extensively used in the literature to study the evolution of current account balances for different countries and time periods, and it has been extended along several dimensions. The present value methodology developed by Campbell (1987) and Campbell and Shiller (1987) is most widely used to examine whether the theoretical implications of the intertemporal approach are supported by the data. The present study applied the basic PVMCA and its extended version, which allows for the introduction of a time-varying world real interest rate and the real exchange rate, to examine the dynamics of the current account data of Pakistan over the period 1960 to 2009. We find that the basic intertemporal model (the version which does not allow changes in the world interest rate and the exchange rate) formally fails to fit the data in providing a statistically adequate explanation of the dynamic behavior of Pakistan's current account as the most strict restriction implied by the model are strongly rejected by the data .However, the informal test provides a little support to the intertemporal approach as it reveals some ability of the PVMCA in tracking the direction of movements of the actual current account, although the actual current account series is more volatile than the optimal series.

To explain the current account behavior of a small developing economy it may be important not only to consider shocks to domestic output but also shocks arising in the world economy in general. These external shocks will generally affect the small economy via movements in the interest rates and exchange rates. Bergin and Sheffrin (2000) identify stochastic world interest rates and real exchanges rates to be incorporated in the model as they show an improved performance of the model in the presence of these variables. When the extended intertemporal model developed by Bergin and Sheffrin (2000) is applied, the study finds a better fit of the data on the part of this model which confirms the role of newly inducted variables in the basic PVMCA in Pakistan. In other words, the external shocks are significantly transmitted to Pakistan via the real interest rate and real exchange rate which then induce an increase to the volatility of the model's predicted current account series to better match the data. Hence, the study is in full conformity with the view of Bergin and Sheffrin (2000) that amending the basic intertemporal model of the current account to include variable interest rate and exchange rates improve its fit substantially. The findings of the extended intertemporal model suggest that the government of Pakistan should continue to pursue policies aimed at integrating the Pakistan's economy into the world economy so that the current account series will continue to respond to external shocks while reflecting consumers' unconstrained optimized choices.

References

Adedeji,O.S. (2001), *Consumption-Based Interest Rate and the Present Value Model of Current Account :Evidence from Nigeria*,IMF Working Paper No.01/93.

Adedeji,O.S. and Jagdish,H.(2008), "The Size and Sustainability of the Nigerian Current Account Deficits", *The Journal of Developing Areas*, 41(2): 1-25.

Adler, J. (2002), *The Open Economy Excess Sensitivity Hypothesis, Theory and Swedish Evidence*, Working Paper in Economics No. 88, Department of Economics, Goteborg University Sweden.

Agenor, P.-R.,C.Bismut,P.Cashin and C.J.McDermott (1999), "Consumption Smoothing and the Current Account: Evidence for France, 1970-1996", *Journal of International Money and Finance*, 18:1-12.

Barro, R. J. and Sala-i-Martin, X. (1990), "World Real Interest Rates", In *NBER Macroeconomics Annual* (ed. O. J. Blanchard and S. Fischer). Cambridge, MA: MIT Press: 15-61.

Bergin, P. R. and Sheffrin, S. M. (2000), "Interest Rates, Exchange Rates and Present Value Models of the Current Account", *Economic Journal*, 110: 535−58.

Callen, T. and P. Cashin (1999), *Assessing External Sustainability in India*, IMF Working Paper No.99/181.

Campa,J.M. and A.Gavilan (2010), "Current Accounts in the Euro Area: An Intertemporal Approach", *Journal of International Money and Finance*,30:1–24.

Campbell, J. (1987), "Does Saving Anticipate Declining Labor Income? An Alternative Test of the Permanent Income Hypothesis", *Econometrica*, 55:1249-73.

Campbell**,** J. and R. Shiller (1987), "Cointegration and Tests of Present Value Models", *Journal of Political Economy*, 95: 1062-88.

Darku, A. Bilson (2008) "Consumption Smoothing, Capital controls, and the Current Account: Evidence from Ghana", *Applied Economics*,78(7): 1466-83.

Elliott, Graham, Thomas J. Rothenberg and James H. Stock (1996), "Efficient Tests for An Auto Regressive Unit Root", *Econometrica*, 64: 813-36.

Friedman, M. (1957), *A Theory of the Consumption Function*, Princeton University Press, Princeton.

Ghosh, A.R. (1995), “International Capital Mobility amongst the Major Industrialized Countries: Too Little or Too Much?”, *Economic Journal*, 105(428): 107-28.
Ghosh, A.R. and Ostry, J..D. (1995), “The Current Account in Developing Countries: A Perspective from the Consumption-Smoothing Approach”, *World Bank Economic Review*, 9(2): 305-33.
Goh, S.K. (2007), “Intertemporal Consumption Smoothing and Capital Mobility: Evidence from Malaysia.” *Journal of Business and Public Affairs,* 1(1): 21-36.
Gruber, J.W. (2004), “A Present Value Test of Habits and the Current Account”, *Journal of Monetary Economics,* 51: 1495–1507.
Hall, R.E. (1978), “Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence.” *Journal of Political Economy,* 86(6): 971- 87.
…………….(1988), “Intertemporal Substitution in Consumption”, *Journal of Political Economy,* 96(2): 339-57.
Ismail, Hamizun Bin and Ahmad Zubaidi Baharumshah (2008), “Malaysia’s Current Account Deficits: An Intertemporal Optimization Perspective”, Empirical Economics 35:569–90.
Johansen, S. (1988), “Statistical Analysis of Cointegrating Vectors”, *Journal of Economics Dynamics and Control*, 12:231–54.
Johansen, S. and K. Juselius (1990), “Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money”. *Oxford Bulletin of Economics and Statistics,* 52: 169-210.
Kano, T. (2008), “A Structural VAR Approach to the Intertemporal Model of the Current Account, *Journal of International Money and Finance*, 27(5): 757-79.
Khundrakpam, J. K. and Rajiv R.(2008), “Can an Inter-Temporal Model Explain India’s Current Account Balance?”, *Reserve Bank of India Occasional Papers*,29(1):1-18.
Kravis, I., Heston, A. and Summers, R. (1982), *World Product and Income: International Comparisons and Real GDP*, Baltimore, MD: Johns Hopkins Univeristy Press.
Kydland, Finn and Carlos Zarazaga (2000), *Argentina’s Lost Decade and Subsequent Recovery: Hits and Misses of the Neoclassical Growth Model*, unpublished manuscript.
Landeau, S.A.S.(2002), “The Intertemporal Approach to the Current Account: Evidence for Chile”, *Revista de Analisis Economico,* 17(2):95-121.
Lau, Evan, Ahmad Zubaidi Baharumshah and Muzafar Shah Habibullah (2007), *Accounting for the Current Account Behavior in ASEAN-5*, MPRA Paper No. 1322.
Makrydakis, S. (1999), “Consumption-Smoothing and the Excessiveness of Greece’s Current Account Deficits. *Empirical Economics,* 24:183-209.
Manteu,C. (1997), “Testing An Intertemporal Approach Model of the Portuguese Current Account”, *Economic Bulletin*/ Banco de Portugal :43-51.
Milbourne, Ross and Glenn Otto (1992), “Consumption Smoothing and the Current Account”, *Australian Economic Papers,* 31: 369-84.
Nason, James M. and John H. Rogers (2006), The Present-Value Model of the Current Account Has Been Rejected: Round Up the Usual Suspects, *Journal of International Economics,* 68:159–87.
Ogus,A. and Niloufer S. (2006), “On the Optimality and Sustainability of Turkey’s Current Account”, *Empirical Economics*, 35:543–68.
Otto,G. (1992) , “Testing a Present-Value Model of the Current Account: Evidence from the U.S. and Canadian Time Series”, *Journal of International Money and Finance,* 11(5): 414-30.
Obstfeld and Rogoff (1995), *The Intertemporal Approach to the Current Account,* NBER Working Paper No. 4893.
Ostry, J. D., and Reinhart. C. M.((1992) “Private Savings and Terms of Trade Shocks: Evidence from Developing Countries”, *IMF Staff Papers* 39 :495-517.
Sachs, J. (1981), “The Current Account and Macroeconomic Adjustment in the 1970s”, *Brookings Papers on Economic Activity,* 12: 201-82.

…………(1982), “The Current Account in the Macroeconomic Adjustment Process”, *Scandinavian Journal of Economics*, 84: 147-59.
Saksonovs, S.(2006), *The Intertemporal Approach to the Current Account and Currency Crises*, Darwin College Research Report No.005,United Kingdom.
Sheffrin, S.M. and Woo, W.T. (990), “Present Value Tests of an Intertemporal Model of the Current Account”, *Journal of International Economics* 29: 237-53.
Stockman, A. C. and Tesar, L. (1995), “Tastes and Technology in a Two-Country Model of the Business Cycle: Explaining International Comovements”, *American Economic Review*, 85(1): 168-85.
Uribe, Martin (2002), “The Price-Consumption Puzzle of Currency Pegs”, *Journal of Monetary Economics*, 49: 533-69.