

Did the Current Account Matter? The Case of Korea

By

David Deok-Ki Kim*
School of Economics and Political Science
University of Sydney
Australia

Abstract

This paper examines whether the current account deficits in Korea in the period before the Asian financial crisis were excessive from the consumption smoothing perspective. A vector autoregression (VAR) model is estimated to derive the optimal path implied in an intertemporal model of the current account and then the theoretical restrictions implied by the theory are tested against data. This would help to answer the question of whether the persistent current account deficits should have been taken as an 'early-warning indicator' for the crisis. This paper finds evidence that the current account prior to the crisis was broadly consistent with the theoretical current account and was hardly a matter of serious concern.

JEL Classification: E21, F32.

Keywords: Current account, Present value model, Vector autoregression, the Asian financial crisis.

First submitted: May, 2003

Revised: November, 2003

* David Deok-Ki Kim, School of Economics and Political Science, The University of Sydney, Sydney 2006, Australia. E-mail: d.kim@econ.usyd.edu.au, Tel: +61 2 9351 6606, Fax: +61 2 9351 4341. I wish to thank Glenn Otto and Jeffrey Sheen for helpful discussions. I also wish to thank an anonymous referee for useful comments. All errors are my own.

1. Introduction

A number of East Asian and Latin American countries were experiencing substantial capital inflows in the early 1990s along with an unprecedented pace of financial market liberalization. This was, however, accompanied by large and persistent current account deficits, which were seen as a potentially serious matter of concern (see, for a general discussion, Milesi-Ferreti and Razin, 1996). With the Asian financial crisis occurring unexpectedly in 1997, there emerged a view among a number of economists that the current account deficits in the countries affected were reflective of some serious macroeconomic imbalances. For example, Corsetti et al. (1999) advanced the view that the crisis was triggered by fundamental macroeconomic imbalances in the afflicted countries, which showed up in the form of high short-term external liabilities, persistent trade deficits, and falling profitability in corporate investments, and so on. Korea was no exception to this view. The mounting current account deficits that slowly began in the late 1980s and rapidly escalated in 1996 were used as a piece of anecdotal evidence in favour of this view. While the persistent current account deficits have never been regarded as an explanation of the fundamental causes of the crisis, economists pointed their fingers at them as an important symptom that had been largely neglected by policymakers. Even prior to the crisis, some leading economists such as Lawrence Summers (1995) stated that “close attention should be paid to any current account deficit in excess of 5% of GDP, particularly if it is financed in a way that could lead to rapid reversals”. Edwards (2001) also concludes in his empirical study that “an increase in the deficit raises the probability of a crisis”. Korea’s current account deficit just exceeded this critical level in 1996 requiring “close attention”. Notwithstanding these views on the

indicative role of the current account, they have not been subjected to formal empirical scrutiny to date.¹ This paper aims to fill this gap from an intertemporal perspective.

The intertemporal model of the current account, based on the permanent income hypothesis shown by Sachs (1981, 1982), implies that the current account simply reflects the present value of a nation's future cash flows. In plain terms, if a nation expects a decline in its future income, the nation should raise its saving today by running a current account surplus for "a rainy day". Equivalently, running a current account deficit should reflect an anticipated future rise in income, leading to an increase in the nation's consumption today. A number of authors formally tested the empirical implications of the theory mostly to a number of industrialized countries. Sheffrin and Woo (1990), Otto (1992), Otto and Milbourne (1993) and Ghosh (1995) all tested the present value relationship of the current account to countries such as the United States, Canada, the United Kingdom, and Australia. For developing countries, Ghosh and Ostry (1995) tested the validity of the present value model of the current account in a cross section of developing countries.² Using annual data, they find that for a majority of developing countries, the hypothesis of consumption smoothing cannot be rejected over the post-war period to the late 1980s. While these studies seem to be largely inconclusive about the

¹ While Park (1993) examines Korea's external debt and current account theoretically it uses a very different theoretical framework and differs from this paper in terms of its scope and objectives of investigation.

² They took a sample of 45 developing countries; 13 from Africa, 11 from Asia, 5 from Middle East, and 16 from Latin America. Korea was included among the eleven countries from Asia.

empirical validity of the theory³, their findings seem to be sensitive to two features of data, *ceteris paribus*. First, it seems to be much harder to reject the theory using annual data rather than the usual quarterly data, as shown by Ghosh and Ostry (1995) and Otto (2003). One obvious reason for this would be that the quarterly current account series are more variable than the annual ones and hence harder to be explained by the theory. To check the sensitivity of results to the data frequency, both quarterly and annual data are used in this study unlike the previous studies which relied only on a particular data frequency. Second, the explanatory ability of the theory tends to be pronounced with an increasing degree of international capital mobility. This is easy to understand as the theory assumes perfect capital mobility and intertemporal borrowing and lending. As an extension in line with these authors, this paper also draws on the present value model of the current account, which assumes the intertemporal utility maximization by a representative national agent, and examines the extent to which the Korean data can be explained by this theory. Testing this theory against data can be used to help answer a number of important questions. First, it can be tested whether or not the current account behaviour in Korea was optimal as required by the theory. Second, the test result has an important implication for sustainability of the current account deficit in the country. Third, we can assess, to some extent, whether the data can provide some insight into understanding the periods surrounding the Asian financial crisis.

³ A recent work by Bergin and Sheffrin (2000) extends the test equation by using the world real interest rate data and incorporating nontraded goods and finds that their extended model explains Australian and Canadian data quite well while rejecting for the UK data.

Campbell and Shiller (1987) and Campbell (1987) proposed a test of models described by the present value relationships. The test they proposed makes full use of the model's structure and derives testable hypotheses using formal econometric methods. Using their methodology, this paper not only formally examines the abovementioned view concerning the crisis, but also tests whether there was any discernible change in the behaviour of the current account following the crisis due to massive changes in the foreign capital flow. This second question of interest is important in assessing whether the fuller openness of the Korean economy after the crisis improved the nation's intertemporal behaviour towards the optimal level.

This paper is organised as follows. In section 2, the underlying economic theory is presented. Section 3 describes how the theory can be econometrically evaluated and the econometric framework implemented in this paper. Section 4 describes the data used and discusses the test results. Section 5 concludes the paper.

2. Theory

This section presents a stochastic dynamic model of the current account.⁴ This model forms the basis of econometric tests performed in section 3. Consider the following definition of the current account (CA) based on the national income accounting.

$$CA_t = B_{t+1} - B_t = Y_t + r^* B_t - C_t - G_t - I_t \quad (1)$$

where B is the net foreign asset (denominated in domestic currency), and assume that the world real interest rate r^* is constant. The variables Y , C , G and I denote gross domestic

⁴ There is now a textbook treatment at the graduate level. See Obstfeld and Rogoff (1996).

product (GDP), consumption, government expenditure and gross investment (including inventories) respectively, while gross national product (GNP) equals $Y_t + r^* B_t$ or $C_t + I_t + G_t + CA_t$.

Letting $V \equiv Y - C - I - G$, we can write (1) as

$$B_{t+1} = (1 + r^*) B_t + V_t \quad (2)$$

Solve this equation forward to obtain⁵

$$B_t = -(1 + r^*)^{-1} \sum_{i=0}^{\infty} (1 + r^*)^{-i} E_t V_{t+i}$$

or

$$B_t = -(1 + r^*)^{-1} \sum_{i=0}^{\infty} (1 + r^*)^{-i} E_t (Y_{t+i} - C_{t+i} - I_{t+i} - G_{t+i}) \quad (3)$$

Re-arranging (3), we get

$$\begin{aligned} \sum_{i=0}^{\infty} (1 + r^*)^{-i} E_t C_{t+i} &= (1 + r^*) B_t + \sum_{i=0}^{\infty} (1 + r^*)^{-i} E_t (Y_{t+i} - I_{t+i} - G_{t+i}) \\ &= W_t \end{aligned} \quad (4)$$

by defining the right hand side of equation (4) as national wealth, W_t .

We can also write down the annuity value of its total discounted wealth net of government spending and investment as⁶

$$C_t^p = \left(\frac{r^*}{1 + r^*} \right) W_t$$

⁵ We rule out 'bubbles' and hence the complementary part in the general solution is omitted. This is necessary to ensure that B_t remains stationary after a finite number of times of differencing.

⁶ See Obstfeld and Rogoff (1996) for further details.

$$= \left(\frac{r^*}{1+r^*} \right) \left[(1+r^*)B_t + \sum_{i=0}^{\infty} (1+r^*)^{-1} E_t(Y_{t+i} - I_{t+i} - G_{t+i}) \right] \quad (5)$$

, which can be interpreted as permanent consumption (C^p) according to Hall (1978), whose work is based on Friedman's permanent income hypothesis.⁷

In general, we can define the permanent level of variable X , \tilde{X} , on date t by

$$\sum_{t=i}^{\infty} (1+r)^{-i} \tilde{X}_t = \sum_{t=i}^{\infty} (1+r)^{-i} X_t$$

such that⁸

$$\tilde{X}_t = \left(\frac{r}{1+r} \right) \sum_{t=i}^{\infty} (1+r)^{-i} X_t$$

Substituting (5) into (1) and making use of the above definition of a 'permanent' variable, we obtain a fundamental equation for the current account⁹

$$CA_t = (Y_t - \tilde{Y}_t) - (I - \tilde{I}_t) - (G - \tilde{G}_t) \quad (6)$$

where the variables with circumflex represent permanent levels.

In a stochastic setting, (6) can be written as

$$CA_t = (Y_t - E_t \tilde{Y}_t) - (I - E_t \tilde{I}_t) - (G - E_t \tilde{G}_t) \quad (6)^*$$

⁷ Note that in this formulation the marginal propensity to consume out of permanent income is assumed to be unity.

⁸ Here, the permanent level of X is its annuity value at the interest rate r (assumed to be constant) with the same present value as the variable itself.

⁹ While one may also be interested in singling out the consumption tilting component, this paper will not consider this component as it is not required for the purpose of investigation at hand.

Defining $Z \equiv Y - G - I$, such that $CA_t = Z_t - E_t \tilde{Z}_t$, and using the forward operator, the following equation of the current account can be obtained.

$$CA_t = - \sum_{i=1}^{\infty} \left(\frac{1}{1+r^*} \right)^i E_t \Delta Z_{t+i} \quad (7)$$

Equation (7) states that the current account at time t equals minus the present discounted value of expected future changes in a country's net cash flow, Z

3. Econometric Framework

Using an unrestricted vector autoregression (VAR) model, it is possible to derive the optimal path implied in the present value model of the current account. Consider the following first-order vector autoregressive (VAR) system for ΔZ and CA .

$$\begin{bmatrix} \Delta Z_t \\ CA_t \end{bmatrix} = \begin{bmatrix} a(L) & b(L) \\ c(L) & d(L) \end{bmatrix} \begin{bmatrix} \Delta Z_{t-1} \\ CA_{t-1} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ v_{2t} \end{bmatrix} \quad (8)$$

where $a(L)$'s are the lag polynomials of order p .

Re-writing (8) to form a first-order system as follows, we have

$$\begin{bmatrix} \Delta Z_t \\ \vdots \\ \Delta Z_{t-p+1} \\ CA_t \\ \vdots \\ CA_{t-p+1} \end{bmatrix} = \begin{bmatrix} a_1 & \cdots & a_p & b_1 & \cdots & b_p \\ 1 & & \ddots & & & \\ & & 1 & & & \\ c_1 & \cdots & c_p & d_1 & \cdots & d_p \\ & & & 1 & \ddots & \\ & & & & 1 & \end{bmatrix} \begin{bmatrix} \Delta Z_{t-1} \\ \vdots \\ \Delta Z_{t-p} \\ CA_{t-1} \\ \vdots \\ CA_{t-p} \end{bmatrix} + \begin{bmatrix} v_{1t} \\ 0 \\ \vdots \\ v_{2t} \\ 0 \\ \vdots \end{bmatrix} \quad (9)$$

, which can be written in a simple matrix form as

$$Y_t = AY_{t-1} + v_t$$

The matrix A is the companion matrix of the VAR. For all i , note that

$$E(Y_{t+i} | H_t) = A^i Y_t$$

, which is the forecast of Y_{t+i} conditional on the information at t , H_t , containing current and lagged values of ΔX_t and CA_t .

Projecting equation (7) onto the information set H_t , we get

$$E[CA_t | H_t] = -\sum_{i=1}^{\infty} \left(\frac{1}{1+r^*} \right)^i (E_t \Delta Z_{t+i} | H_t) \quad (10)$$

Campbell (1987) shows that the following set of restrictions on the VAR companion matrix A can be obtained

$$g' = -\sum_{i=1}^{\infty} \left(\frac{1}{1+r^*} \right)^{-i} h' A^i \quad (11)$$

where g and h are column vectors with $2p$ elements, all of which are zero except for the $p+1^{\text{st}}$ element of g and the 1^{st} element of h which are unity, such that

$$CA_t = g' Y_t \text{ and } \Delta Z_t = h' Y_t$$

If the variables CA_t and ΔZ_t are stationary, the infinite sum on the right hand side of (11) converges to

$$g' = -h' \phi A [I - \phi A]^{-1} \quad (11)^*$$

where $\phi \equiv \frac{1}{1+r^*}$ and $I - \phi A$ is a non-singular matrix.

Using equations (7), (11) and recognizing $\Delta Z_t = h' Y_t$ and $CA_t = g' Y_t$, it is possible to compute

$$\widetilde{CA}_t = -\sum_{i=1}^{\infty} \phi^i h' A^i Y_t$$

or

$$\widetilde{CA}_t = -h'\phi A [I - \phi A]^{-1} Y_t \quad (12)$$

, which is a VAR forecast of the present value of future changes in the national cash flow (ΔZ_t) by using the estimated coefficients from the unrestricted VAR as in equation (8).

This current account variable, \widetilde{CA}_t , then reflects the optimal current account implied in the theory.

Orthogonality Restriction

Equation (11)* implies the following econometrically testable restriction. To see this, post-multiply both sides of (11)* by $[I - \phi A]$ to yield

$$g' [I - \phi A] = -h' \phi A \quad (13)$$

It can be shown that by writing out the restrictions on individual coefficients of the companion matrix A, the restrictions implied by (12) state that $CA_{t+1} - \Delta Z_{t+1} - (1+r)CA_t$ should be unpredictable given lagged ΔZ_t and CA_t .

To test the orthogonality restriction implied in the model, form a variable

$$x_t \equiv CA_t - \Delta Z_t - (1+r)CA_{t-1}$$

and run the following regression

$$x_t \equiv \alpha + \sum_{k=1}^p \delta_{1,k} CA_{t-k} + \sum_{k=1}^p \delta_{2,k} \Delta Z_{t-k} + v_t \quad (14)$$

and test the null hypothesis $\delta_{1,k} = \delta_{2,k} = \dots = 0$ for all $k > 0$.

Granger Causality

A simple but complementary test of equation (7) is that if the model is true, the current account should help to predict future changes in $Z \equiv Y - G - I$. Consider the ΔZ_t equation in the above VAR system (8);

$$\Delta Z_t = \sum_{k=1}^p a_k \Delta Z_{t-k} + \sum_{k=1}^p b_k CA_{t-k} + \varepsilon_{1t} \quad (15)$$

The Granger causality test can then be performed where the null hypothesis is $H_0: b_1 = \dots = b_p = 0$, using a Wald-type test.

4. Data and Results

To implement the test procedures outlined above, both quarterly and annual series of Korean national accounts are taken from the *International Financial Statistics* on CD-ROM. The full sample period spans 1980 – 2001 and the sub-sample period is 1980 – 1997. All data are real in the Korean Won, seasonally adjusted and in per capita terms.

*** Place Figure 1 approximately here ***

Figure 1 shows Korea's current account as a percentage of GDP since 1980. The figure displays an initial current account deficit of about 10 percent of GDP in 1980. For most part of the 1980s, the current account was improving continually, showing a surplus of almost 10 percent of the nation's GDP by 1989. The large surplus recorded in the later half of the 1980s coincides with the so called 'three low' period, characterized by low general prices as measured by the inflation rate, low price of domestic currency relative to the US dollar and the Japanese Yen, and the low oil prices, all of which worked

favourably to boost Korea's external competitiveness. However, the current account then quickly showed its downward trend into substantial deficits and remained so until the Asian financial crisis swamped the economy in 1997. In particular, the current account worsened sharply in 1995 and remained at about (and even exceeding) 5 percent of GDP for most of 1996. Following the Asian financial crisis, the current account showed a dramatic escalation to a surplus of almost 15 percent of GDP in the period between late 1997 and early 1998, henceforth referred to as the crisis period in this paper, before it stabilized in 1999. Interestingly, the current account was improving for most of the 1980s while it was deteriorating in the 1990s prior to the crisis.

In an empirical examination of the intertemporal behaviour of the current account, one of the first testable hypotheses of the intertemporal theory of current account outlined in Section 2 is whether the current account helps to predict future changes in the national cash flow, $Z \equiv Y - G - I$.¹⁰

*** Place Table 1 approximately here ***

¹⁰ Unit-root tests were performed to check the stationarity of the CA and ΔZ series. The augmented Dickey-Fuller test shows that ΔZ is stationary at 5% level of significance. Both augmented Dickey-Fuller test and the test suggested by Kwiatkowski et al. (1992) with the null of stationarity indicate that the CA series is stationary at 10% for the whole sample. While the unit root test results for a shorter sample are somewhat mixed for the CA series, it should be noted that the unit-root tests lack the power to reject the null hypothesis as the sample size decreases.

Table 1 shows the test results for both quarterly and annual series. For the full sample period with the quarterly series, the null hypothesis of Granger non-causality cannot be rejected at all levels of significance regardless of the lag length in the VAR.¹¹ However, there is some evidence that the current account helps to predict future changes in the national cash flow at the 5 percent level of significance with 3 lags in the VAR and at about the 10 percent with 5 lags in the pre-crisis period. For annual data, where one lag was chosen in the VAR model, the test results are more consistent with the theory for both sample periods.

*** Place Table 2 approximately here ***

*** Place Table 3 approximately here ***

Tables 2 and 3 report the unrestricted VAR estimates for quarterly and annual data respectively while Table 4 reports test results for the orthogonality restriction implied in the theory.¹² For quarterly data, the orthogonality restriction is strongly rejected even at the 1 percent level of significance for each sample period. However, evidence from annual data in the pre-crisis period shows some support for the theory with the

¹¹ Both VAR(3) and VAR(5) are considered here for the Granger causality test, based on a set of the conventional lag length tests. For subsequent analysis in the paper, the results from the VAR(5) are reported as the results tend to largely invariant between two alternative lag lengths in the VAR. The choice of lag lengths was guided by the LR and AIC tests.

¹² In testing the theory, a constant real interest rate was assumed at 5% per annum. The results were found to be insensitive to changes in the real interest rate assumed within a plausible range.

probability value of 0.302, implying that the stringent orthogonality restriction cannot be rejected.

*** Place Table 4 approximately here ***

Thus, both the Granger-causality and the orthogonality test results show that the behaviour of the current account is much closer to the theoretical prediction before the crisis than over the whole sample period. Moreover, the annual data appear to be more consistent with the theory, which is consistent with the previous studies. These results imply that the impact of the Asian financial crisis on the current account behaviour is unlikely to be explained by a simple model like the neoclassical intertemporal theory, and hence consumption smoothing in the presence of such a large unexpected shock would not be optimal as required by the theory.¹³

*** Place Figure 2 approximately here ***

However, a more intuitive and econometrically less stringent test is to compare the predicted path of the optimal current account under the theory with that of the actual current account. Figure 2 plots actual and optimal current accounts using a VAR(5) model estimated for the sample period 1980:1 – 1997:2. The ups and downs of the optimal current account appear to be consistent with the actual current account for most

¹³ However, this might be due to a small sample problem. As more observations are available covering many years after the crisis, the problem might be less significant.

of the period. In particular, it is interesting to notice that the optimal current account deficits suggested by the theory are often larger than those in the actual data especially from the late 1980s to the early 1997. That is, if one were interested in testing whether the current account imbalances in the period before the crisis were excessive and went about testing for it, the result would be, as shown in Figure 1, that the current account deficits were hardly a matter of serious concern to policymakers.

*** Place Figure 3 approximately here ***

Figure 3 shows what the optimal current account deficits could have been if one were to use the same VAR estimates to derive the optimal paths in the post crisis period. Surprisingly, the theory also predicts highly volatile current accounts around the times of the crisis just like the actual current accounts.

*** Place Figure 4 approximately here ***

However, if one estimates the VAR parameters by also including the crisis period observations and derives the optimal current account path, the size of optimal current account imbalances is much less than that of the actual current account imbalances, as shown in Figure 4. The most plausible interpretation to reconcile this sensitivity in results is that the parameter estimates obtained for the whole sample are unstable due to the inclusion of the outliers at the time of the crisis, and hence any inference on the optimality of the current account using the post crisis data could be misleading.

Referring back to the parameter estimates reported in Table 2, one would notice that there was possibly a structural break due to the crisis, which is confirmed by appropriate tests performed.¹⁴

*** Place Figure 5 approximately here ***

The optimal paths of the current account obtained using the annual data are also shown in Figures 5 through 7. Figure 5 shows that the optimal current account implied by the theory moves closely with the actual current account. Consistent with the quarterly data for the same period, the actual current account deficits in the 1990s before the crisis were less than the optimal level and hence the hypothesis that the current account deficits were excessive in the pre-crisis period is not supported. Figure 6 is the annual analogue of Figure 3, which shows that when pre-crisis estimates are used to derive the optimal path, the largely excessive current account surplus associated with the crisis appears to roughly conform to the theory.

*** Place Figure 6 approximately here ***

*** Place Figure 7 approximately here ***

¹⁴ Both Chow's Type 1 and Type 2 tests of structural break in the parameters estimated were also employed and both tests strongly reject the null hypothesis of parameter constancy over the whole sample but not for the pre-crisis sample. The test results, which are unreported here, are available upon request.

Figure 7 shows that, as comparable with Figure 4, the inclusion of the post-crisis sample in the VAR estimates leads to a poorer model prediction of the actual current account. Consistent with quarterly data, this implies that the parameters estimated using the full sample gives a poorer prediction and that the parameters obtained using the pre-crisis sample in terms of yielding theoretical current accounts closer to the actual data.

To see if there is any other variable that helps to explain the large volatility of the current account during the crisis period, the exchange rate is used as the primary variable of suspect. To examine the effects of the exchange rate shock to the current account, we regress the difference between the observed current accounts and the optimal current accounts implied by the theory on the exchange rate between the Korean Won and the US dollar.

*** Place Table 5 approximately here ***

Table 5 reports the regression results for both the pre-crisis and the full data period, respectively. For the pre-crisis sample, the coefficient of the exchange rate variable appears to be not only small in size but statistically insignificant, implying the negligible role of the exchange rate on the current account. However, once the crisis period is included in the regression, the estimated coefficient becomes statistically significant even at the 1 percent level of significance. This result implies that the standard intertemporal theory of the current account cannot explain the behaviour of the current account during the crisis period unless the exchange rate variation is explicitly taken into account in the

theory, reflecting the unique and unpredictable nature of the crisis based on the current account behaviour alone.

5. Conclusion

This paper asked two important and related questions, “Was the current account excessive before the Asian financial crisis?” and “To what extent can an intertemporal theory of the current account help us deepen our understanding of Korea’s current account behaviour?” It sought to answer these questions using a formal econometric test based on the present value model of the current account. The findings are as follows. As stated earlier in the paper and partially consistent with previous work on the present value model of the current account, the results reported in this paper appear to be sensitive to two features of data. The theory favours annual data while quarterly data strongly reject the restrictions implied in the theory. It is also found that the theory cannot adequately explain the post-crisis behaviour of the current account even if the sample included in the estimation is extended. Rather, the model implied current account, based on parameter estimates using the pre-crisis period, turned out to be closer to the actual current account behaviour in the post crisis period. This paper interprets it as follows. First, any regression estimate obtained using the crisis period is likely to be contaminated due to the large shocks occurring during the crisis, and hence might lead to misleading results.

Two implications are drawn from the results found in this paper. First, the evidence from annual data shows that Korea’s current account deficits before the crisis were not excessive at all, and were close to the theoretical current account deficits. Second, the standard intertemporal theory of the current account is unlikely to explain the current

account behaviour in times where large shocks such as the exchange rate collapses were prevailing in the economy. This would require future theoretical work to explicitly consider the role of stochastic shifts in these exogenous variables.

REFERENCES

- Bergin, P. and Sheffrin, S., "Interest rates, exchange rates and present value models of the current account", *Economic Journal*, 110, 2000, 535-558.
- Campbell, J., "Does saving anticipate declining labour income? An alternative test of the permanent income hypothesis", *Econometrica*, 55, 1987, 1249-73.
- Campbell, J. and Shiller, R., "Cointegration and tests of present value models", *Journal of Political Economy*, 95, 1987, 1062-88.
- Corsetti, G., Pesenti, P. and Roubini, N., "What Caused the Asian Currency and Financial Crisis?", *Japan and the World Economy*, September, 1999.
- Edwards, S., "Does the current account matter?", *National Bureau of Economic Research Working Paper 8275*, Cambridge, MA, 2001.
- Ghosh, A., "International Capital Mobility among the Major Industrialised Countries", *Economic Journal*, 105, 1995, 107-128.
- Ghosh, A. and Ostry, J., "The current account in developing countries: A perspective from the consumption-smoothing approach", *World Bank Economic Review*, 9, 1995, 305-33.
- Hall, R.J., "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence", *Journal of Political Economy*, 86, 1978, 971-987.

- Milbourne, R. and Otto, G., "Consumption smoothing and the current account", *Australian Economic Papers*, 31, 1992, 369-83.
- Milesi-Ferretti, G. and Razin, A., "Current account sustainability: Selected East Asian and Latin American experiences", *Princeton Studies in International Finance*, No. 81, New Jersey, Princeton University Press, October, 1996.
- Obstfeld, M. and Rogoff, K., *Foundations of International Macroeconomics*, MIT Press, Cambridge, Massachusetts, MIT Press, 1996.
- Otto, G., "Testing a present-value model of the current account: Evidence from US and Canadian time series", *Journal of International Money and Finance*, 11, 1992, 414-430.
- Otto, G., "Can an intertemporal model explain Australia's current account deficit?" mimeo, University of New South Wales, 2003.
- Park, W., "Optimal current account and the external debt for Korea", *Seoul Journal of Economics*, 6, 1993, 201-21.
- Sachs, J., "The current account and macroeconomic adjustment in 1970s", *Brookings Papers on Economic Activity*, 12, 1981, 201-268.
- Sachs, J., "The current account in the macroeconomic adjustment process", *Scandinavian Journal of Economics*, 84, 1982, 147-164.
- Summers, L., "Ten lessons to learn", *The Economist*, Vol. 337, 1995, 46-48.
- White, H., "A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity", *Econometrica*, 48, 1980, 817-838.

Table 1. Granger Causality Tests

Quarterly Data	1980:1 - 2001:4	1980:1 - 1997:2
VAR(3)		
Null Hypothesis:	Probability	Probability
<i>CAPC does not Granger Cause DZSA</i>	0.42652	0.03296
VAR(5)		
Null Hypothesis:	Probability	Probability
<i>CAPC does not Granger Cause DZSA</i>	0.12472	0.10415
Annual Data	1980 - 2001	1980 - 1997
VAR(1)		
Null Hypothesis:	Probability	Probability
<i>CAPC does not Granger Cause DZSA</i>	0.03026	0.01547

Table 2. VAR estimates - Quarterly data¹⁵

(a) Pre-crisis sample: 1980:1 – 1997:2

$$\begin{aligned} \Delta Z_t = & -0.479 \Delta Z_{t-1} - 0.464 \Delta Z_{t-2} - 0.219 \Delta Z_{t-3} + 0.098 \Delta Z_{t-4} + 0.196 \Delta Z_{t-5} \\ & (-2.63) \quad (-2.40) \quad (-1.11) \quad (0.53) \quad (1.32) \\ & - 0.075 CA_{t-1} + 0.294 CA_{t-2} - 0.512 CA_{t-3} + 0.053 CA_{t-4} - 0.050 CA_{t-5} + 21.58 \\ & (-0.36) \quad (1.36) \quad (-2.08) \quad (0.22) \quad (-0.26) \quad (2.56) \end{aligned}$$

$$\begin{aligned} CA_t = & -0.041 \Delta Z_{t-1} - 0.137 \Delta Z_{t-2} - 0.133 \Delta Z_{t-3} - 0.261 \Delta Z_{t-4} - 0.023 \Delta Z_{t-5} \\ & (-0.36) \quad (-0.91) \quad (-1.02) \quad (-1.41) \quad (-0.21) \\ & + 0.744 CA_{t-1} + 0.257 CA_{t-2} - 0.194 CA_{t-3} + 0.666 CA_{t-4} - 0.664 CA_{t-5} + 5.51 \\ & (4.58) \quad (1.41) \quad (-1.00) \quad (3.88) \quad (-3.31) \quad (0.88) \end{aligned}$$

$$\bar{R}_{\Delta Z}^2 = 0.23 \quad \bar{R}_{CA}^2 = 0.72$$

¹⁵ The numbers in parentheses are White's (1980) t-statistics. The lag length was chosen by the AIC and LR tests. For quarterly series, the tests indicate that the optimal lag length is 3 or 5 but are inconclusive between them. As the estimation results appeared to be insensitive to these alternative lag lengths, the results obtained from the VAR (5) are reported. For annual series, the lag length selected is one.

(b) Full-sample: 1980:1 – 2001:4

$$\begin{aligned} \Delta Z_t = & -0.309 \Delta Z_{t-1} - 0.139 \Delta Z_{t-2} - 0.008 \Delta Z_{t-3} + 0.519 \Delta Z_{t-4} + 0.208 \Delta Z_{t-5} \\ & (-2.01) \quad (-0.95) \quad (-0.05) \quad (2.87) \quad (1.51) \\ & -0.028 CA_{t-1} - 0.034 CA_{t-2} - 0.011 CA_{t-3} - 0.230 CA_{t-4} + 0.221 CA_{t-5} + 12.69 \\ & (-0.21) \quad (-0.20) \quad (-0.09) \quad (-1.89) \quad (2.78) \quad (1.81) \end{aligned}$$

$$\begin{aligned} CA_t = & 0.009 \Delta Z_{t-1} + 0.405 \Delta Z_{t-2} + 0.304 \Delta Z_{t-3} + 0.526 \Delta Z_{t-4} + 0.198 \Delta Z_{t-5} \\ & (0.06) \quad (1.92) \quad (1.20) \quad (1.79) \quad (0.79) \\ & + 0.958 CA_{t-1} - 0.310 CA_{t-2} + 0.167 CA_{t-3} - 0.185 CA_{t-4} + 0.124 CA_{t-5} - 14.57 \\ & (4.55) \quad (-0.97) \quad (0.81) \quad (-0.75) \quad (0.72) \quad (-1.49) \end{aligned}$$

$$\bar{R}_{\Delta Z}^2 = 0.15 \quad \bar{R}_{CA}^2 = 0.75$$

Table 3. VAR estimates - Annual data

(a) Pre-crisis sample: 1980 – 1997

$$\begin{aligned} \Delta Z_t = & 0.398 \Delta Z_{t-1} - 0.364 CA_{t-1} + 122.21 \\ & (1.49) \quad (-2.76) \quad (2.27) \end{aligned}$$

$$\begin{aligned} CA_t = & 0.132 \Delta Z_{t-1} + 0.688 CA_{t-1} - 26.14 \\ & (0.35) \quad (3.73) \quad (-0.35) \end{aligned}$$

$$\bar{R}_{\Delta Z}^2 = 0.28 \quad \bar{R}_{CA}^2 = 0.46$$

(b) Full sample: 1980 – 2001

$$\begin{aligned} \Delta Z_t = & 0.498 \Delta Z_{t-1} - 0.250 CA_{t-1} + 137.32 \\ & (2.32) \quad (-2.40) \quad (2.56) \end{aligned}$$

$$\begin{aligned} CA_t = & 1.065 \Delta Z_{t-1} + 0.237 CA_{t-1} - 164.33 \\ & (2.68) \quad (1.23) \quad (-1.66) \end{aligned}$$

$$\bar{R}_{\Delta Z}^2 = 0.22 \quad \bar{R}_{CA}^2 = 0.39$$

Table 4. Orthogonality Restriction Tests

Test Regression:

$$x_t \equiv CA_t - \Delta Z_t - (1+r)CA_{t-1} = \alpha + \sum_{k=1}^p \delta_{1,k} CA_{t-k} + \sum_{k=1}^p \delta_{2,k} \Delta Z_{t-k} + v_t$$

Null Hypothesis: $\delta_{1,k} = \delta_{2,k} = \dots = 0$

(1) *Quarterly Data*

Sample: 1980:1 – 2001:4

For VAR(3): χ^2 test for joint significance of lags: p-value = 0.000.

For VAR(5): χ^2 test for joint significance of lags: p-value = 0.005.

Sample: 1980:1 – 1997:2

For VAR(3): χ^2 test for joint significance of lags: p-value = 0.001

For VAR(5): χ^2 test for joint significance of lags: p-value = 0.000.

(2) *Annual Data*

Sample: 1980 – 2001

$$x_t \equiv CA_t - \Delta Z_t - (1+r)CA_{t-1} = -288.04 + 0.53 \Delta Z_{t-1} - 0.57 CA_{t-1} + \hat{v}_t$$

(-3.86) (1.09) (-2.92)

χ^2 test for joint significance of lags: p-value = 0.000.

Sample: 1980 – 1997

$$x_t \equiv CA_t - \Delta Z_t - (1+r)CA_{t-1} = -134.31 - 0.33 \Delta Z_{t-1} - 0.02 CA_{t-1} + \hat{v}_t$$

(-3.46) (-1.37) (-0.06)

χ^2 test for joint significance of lags: p-value = 0.302

Table 5. Regression of the excess current accounts on the exchange rate

$$\begin{aligned} 1980:1 - 1997:2 \quad (CA - \widetilde{CA}_t) &= \alpha + \beta ER_t + \varepsilon_t \\ &= -5.44 + 0.038 ER_t \\ &\quad (1.20) \end{aligned}$$

$$\begin{aligned} 1980:1 - 2001:4 \quad (CA - \widetilde{CA}_t) &= \alpha + \beta ER_t + \varepsilon_t \\ &= -198.24 + 0.29 ER_t \\ &\quad (7.41) \end{aligned}$$

Figure 1. Korea's Current Account as a percentage of GDP

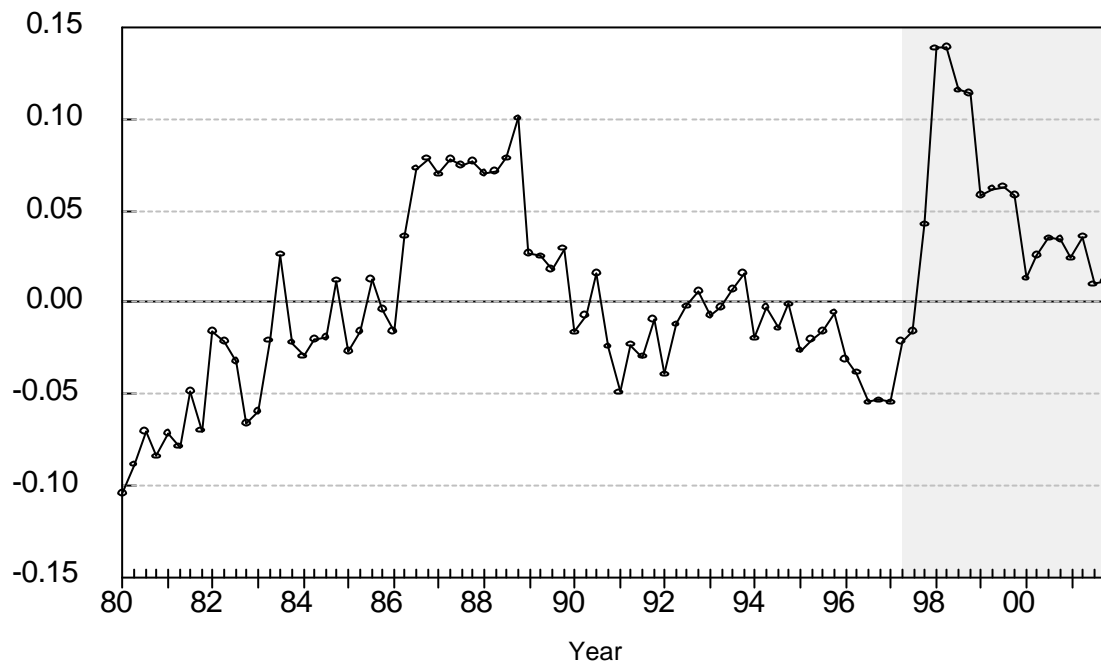


Figure 2. Pre-crisis sample and optimal CA for quarterly data

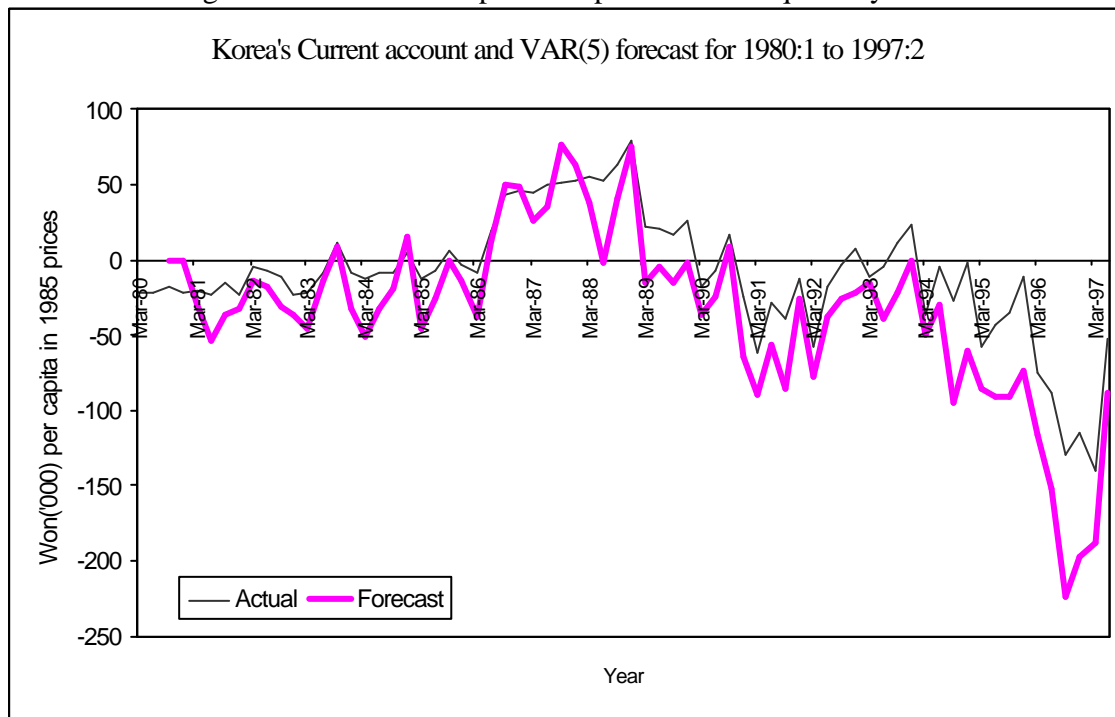


Figure 3. Post-crisis optimal CA using the pre-crisis quarterly VAR estimates

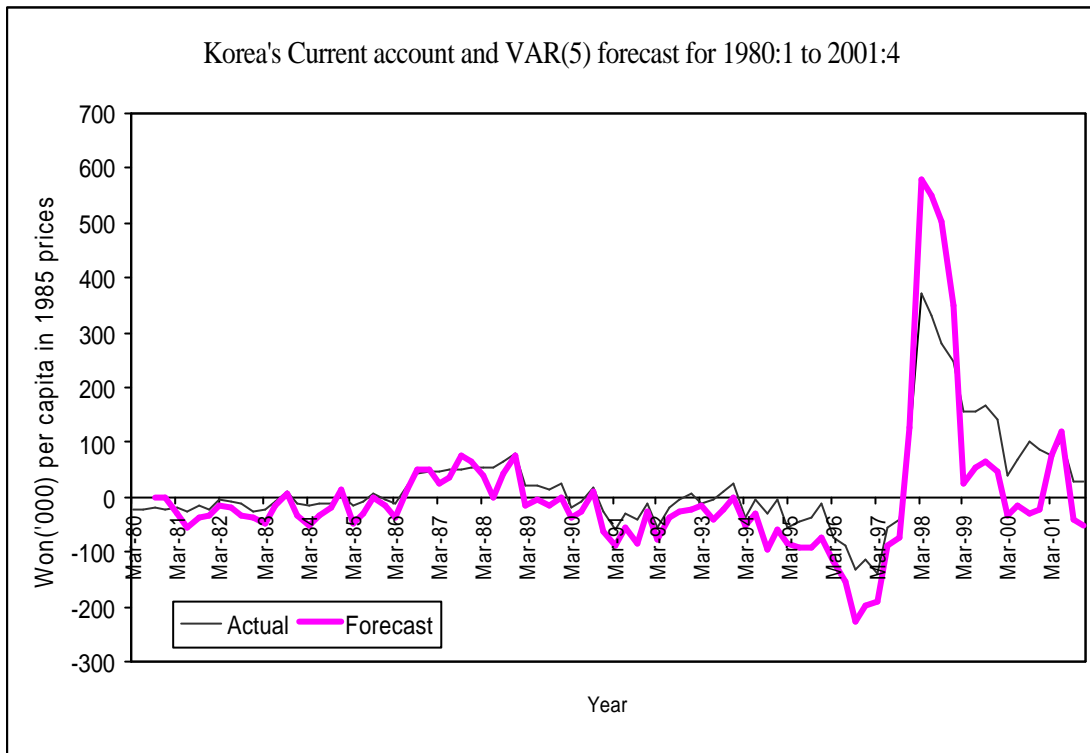


Figure 4. Whole sample and model predictions for quarterly data

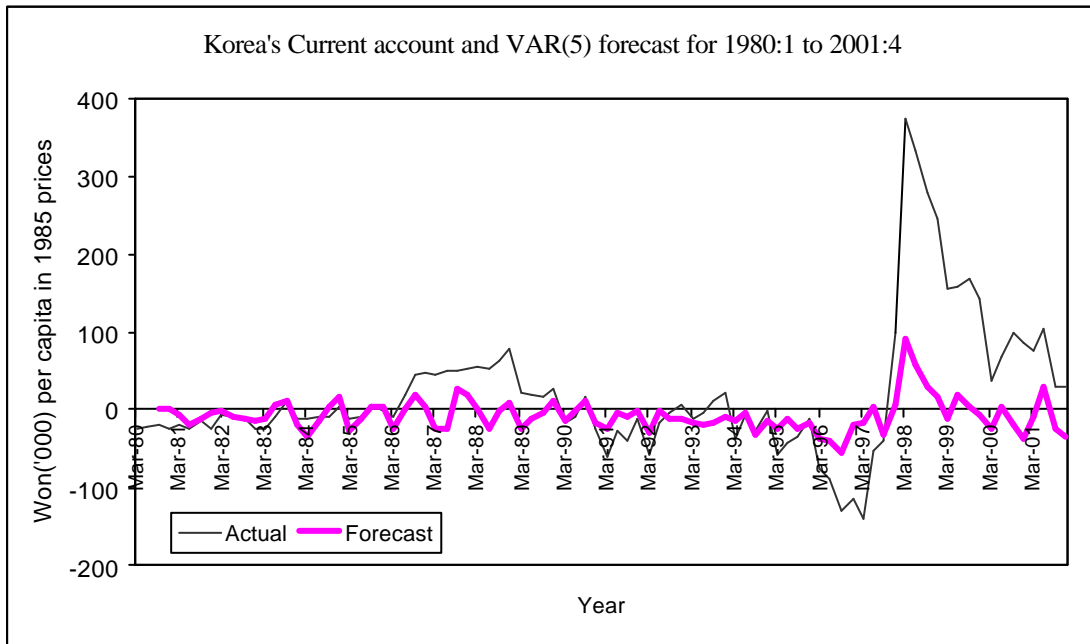


Figure 5. Pre-crisis sample and predictions for annual data

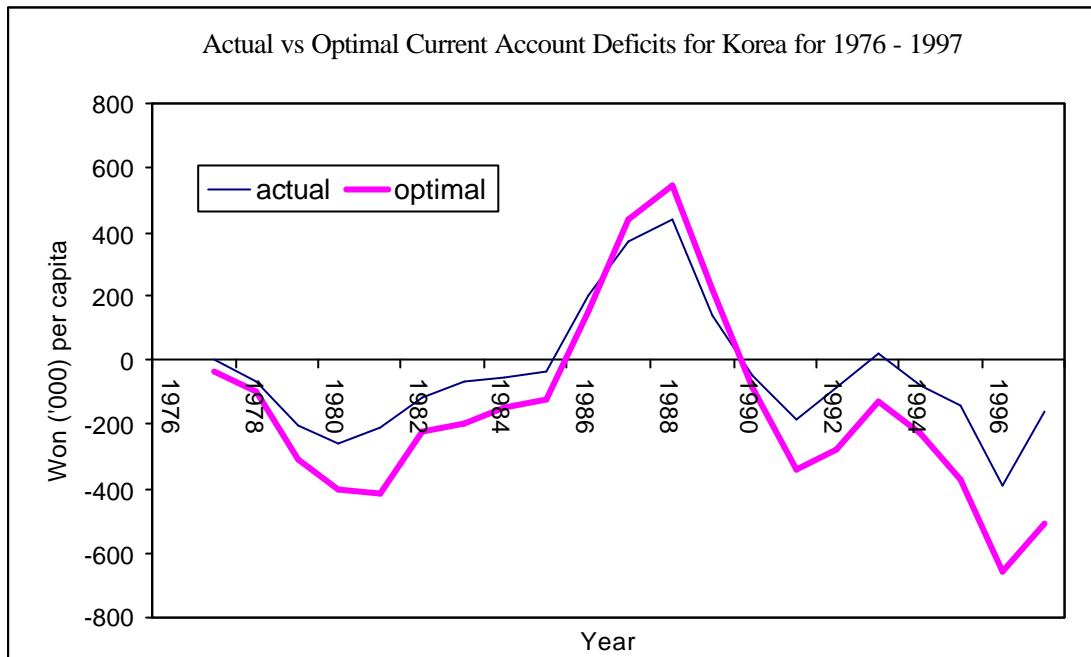


Figure 6. Post-crisis predictions using the pre-crisis annual VAR estimates

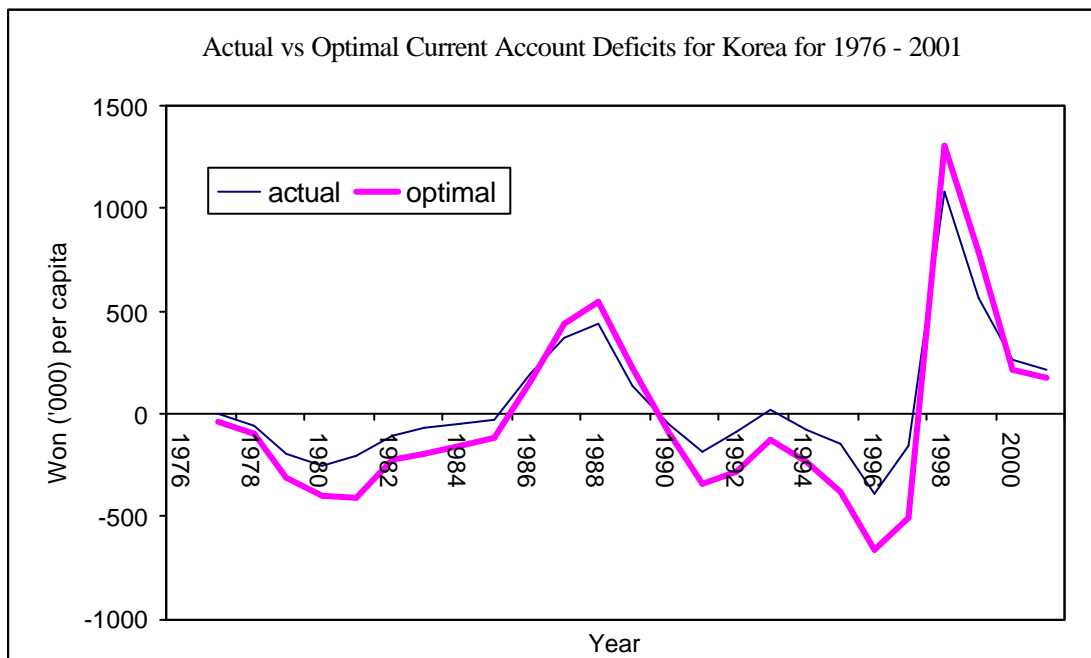


Figure 7. Whole sample and model predictions for annual data

