

# The Polemics and Empirics of the Sustainability of Australia's Current Account Deficit - Revisited

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## Abstract

*In this paper the polemics and empirics on the sustainability of Australia's high current account deficits and foreign debt that prevailed during the period 1959q3-2007q1 is revisited. The paper contends that the forces of globalization brought about a policy regime shift culminating in the floating of the Australian dollar in 1983q4. However, the policymakers failed to abandon the static old paradigm, the Keynesian-Mundell-Fleming model, which had been rendered obsolete by the policy regime shift. The policymakers continued to distill their activist policies to reduce the high current account deficits from an outmoded paradigm. The proponents of the rival new paradigm argued that the current account imbalances were the residual outcome of rational optimizing decisions of private sector agents and therefore the use of activist policies to target the reduction of the current account deficits as proposed by the adherents of the old paradigm were misconceived. The ensuing clash between the proponents of rival paradigms fuelled the policy polemics during almost a decade after the paradigm shift that occurred at the same time as the floating of the exchange rate. The activist policies failed to halt the rise in the current account deficits and foreign debt and the predicted dire economic consequences from the failure to rein in the current account deficit never materialized. Today, the current deficits and the foreign debt are at record high levels by historical standards, but they do not seem to grab the attention of the policymakers or make media headlines as in the past. The empirical results offer qualified support for prevalence of consumption smoothing during both the pre and post-float periods. The finding in favour of consumption-smoothing during the pre-float era is at odds with the findings of other studies. There appears to be evidence supporting the hypothesis that a regime-shift due to globalization and it occurred at the same time as the float and was reflected in an increase in consumption-tilting. Post-float and during the entire study period Australia, appears to have satisfied the intertemporal budget constraint and remained solvent. Furthermore, both over the whole sample period and post float period Australia appears to have engaged in effective consumption-smoothing notwithstanding the polemics and some empirics to the contrary. The solvency and consumption smoothing dynamics observed for Australia during the study period supports the new paradigm's non-activist policy stance towards high current account deficits. However, it should be noted that this passive policy stance that is intertemporally optimal for achieving current account sustainability in Australia may not be applicable in other countries with high current account deficits because they may idiosyncratic features that differ widely from those prevalent in Australia.*

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**THE POLEMICS AND EMPIRICS OF THE SUSTAINABILITY OF  
AUSTRALIA'S CURRENT ACCOUNT DEFICIT – REVISITED\***

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## Abstract

In this paper the polemics and empirics on the sustainability of Australia's high current account deficits and foreign debt that prevailed during the period 1959q3-2007q1 is revisited. The paper contends that the forces of globalization brought about a policy regime shift culminating in the floating of the Australian dollar in 1983q4. However, the policymakers failed to abandon the static old paradigm, the Keynesian-Mundell-Fleming model, which had been rendered obsolete by the policy regime shift. The policymakers continued to distill their activist policies to reduce the high current account deficits from an outmoded paradigm. The proponents of the rival new paradigm argued that the current account imbalances were the residual outcome of rational optimizing decisions of private sector agents and therefore the use of activist policies to target the reduction of the current account deficits as proposed by the adherents of the old paradigm were misconceived. The ensuing clash between the proponents of rival paradigms fuelled the policy polemics during almost a decade after the paradigm shift that occurred at the same time as the floating of the exchange rate. The activist policies failed to halt the rise in the current account deficits and foreign debt and the predicted dire economic consequences from the failure to rein in the current account deficit never materialized. Today, the current deficits and the foreign debt are at record high levels by historical standards, but they do not seem to grab the attention of the policymakers or make media headlines as in the past. The empirical results offer qualified support for prevalence of consumption smoothing during both the pre and post-float periods. The finding in favour of consumption-smoothing during the pre-float era is at odds with the findings of other studies. There appears to be evidence supporting the hypothesis that a regime-shift due to globalization and it occurred at the same time as the float and was reflected in an increase in consumption-tilting. Post-float and during the entire study period Australia, appears to have satisfied the intertemporal budget constraint and remained solvent. Furthermore, both over the whole sample period and post float period Australia appears to have engaged in effective consumption-smoothing notwithstanding the polemics and some empirics to the contrary. The solvency and consumption smoothing dynamics observed for Australia during the study period supports the new paradigm's non-activist policy stance towards high current account deficits. However, it should be noted that this passive policy stance that is intertemporally optimal for achieving current account sustainability in Australia may not be applicable in other countries with high current account deficits because they may idiosyncratic features that differ widely from those prevalent in Australia.

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## 1. Introduction

The current account deficit as a ratio of GDP is currently cycling around 6 percent and the foreign debt as ratio of GDP is hovering around 60 percent and these are at record high levels. In the mid-1980s when the current account deficit reached 5 percent as a ratio of GDP, double the historical average there was pandemonium. The Treasurer declared that Australia was ‘turning into a banana republic’ and advocated the mobilization of all arms of policy to rein in the high current account deficits and soaring foreign debt. Policymakers schooled in the static Keynesian-Mundell-Fleming (KMF) work-horse model implemented activist policies targeting the reduction of high current account deficits.

In 1983q4 the forces of globalization forced Australia to undergo a policy regime shift by floating the Australian dollar and dismantling capital controls to avoid running into ‘the open economy trilemma’. The policy regime shift rendered the old paradigm or KMF model largely obsolete. But nonetheless policymakers and some academic scribblers schooled in the old paradigm ruled the policy roost. They continued to distill their policy prescriptions based on the defunct KMF paradigm and implemented them with gusto for nearly two decades following the float in 1983q4. The proponents of a rival new paradigm that argued that the policy targeting of high current account deficits were misplaced were derided as snake oil merchants. But neither the high current account deficit nor the soaring foreign debt responded to activists policies. The grim warning that high current account deficits would end up in economic chaos has failed to materialize. Only 2003, after nearly two decades the policymakers that rule the policy roost finally acknowledged that all accepted the holy grail of the new paradigm that high current account deficits should not be a matter for policy concern. This has resulted in a dramatic policy *volte face* and explains why despite the record levels of high current account deficits and burgeoning foreign do not appear to grab the attention of either the policymakers or make media headlines as in the past

The paper has implemented empirical tests to test the effectiveness of consumption-smoothing dynamics that is at heart of the new intertemporal optimization paradigm that provides the theoretical rationale for the pursuit of non-activist policies in relation to the sustainability of current deficits. We have used a battery of unit root and cointegration techniques to determine whether the data generation processes (Dips) used in this paper are engaged in consumption-smoothing by performing tests of Granger causality and nonlinear test restrictions on VAR coefficients. These tests verify whether the optimality conditions for current account sustainability as predicted by the new paradigm have been met by the Australian data during the pre- and post-float eras. Empirical results indicate that a policy regime-shift has occurred in Australia causing a change in consumption tilting or the preference for future consumption over current consumption. Besides, post-float the empirical results provide support for the hypothesis that the current began to act as a buffer to temporary shocks delivering effective consumption-smoothing in an effective manner in the post-float era than during the pre-float era. The paper concludes that whilst the pursuit of non-activist policies in relation to the sustainability of high current account deficits can be justified on the basis of idiosyncratic factors in the context

of Australia. These factors that have imparted resilience to crisis contagion and bolstered the economy's magnetism to lure foreign capital inflows. The Australian experience appears to be unique and its non activist policies in managing the sustainability of high current account deficits cannot be generalized to other countries suffering high current account deficits.

This paper aims to complement the past empirical studies by: First, testing the consumption-smoothing hypothesis using a larger quarterly time-series sample that covers both the pre and post-float subsamples in a more comprehensive manner than before. Second, it attempts to explain that the heated debate that occupied the center stage of Australia's macroeconomic policy debate for nearly two decades even after a policy regime shift that was heralded by the floating of the Australian dollar was the upshot of the fetish policymakers to an outmoded paradigm. Third, the paper provides an algebraic expose of the intertemporal optimization framework that underpins the policy prescription of the new paradigm based activist policies that target the reduction of the current account deficit and foreign debt are misplaced in a post-globalization world of floating exchange rates. Fourth, the paper uses alternative unit root and cointegration techniques to check the nonstationarity of data generation processes of interest and conduct Granger causality and nonlinear restriction tests on VAR parameters to check the effectiveness of the consumption smoothing hypothesis underpinning the new paradigm during the pre and post-float eras. Fifth, using Hansen-Gregory (1996) the study empirically detects the breakpoint date endogenously on which Australia experienced a regime shift due to change in consumption tilting as a consequence of financial deregulation that occurred due to globalization. Finally, the study highlights the idiosyncratic features that render the Australia resilient to crisis contagion which has increased the vulnerability of other emergent market economies and advanced countries use activist policies to rein in unsustainable current account deficits and rising foreign debt.

The rest of the paper is organized as follows: Section 2 critically reviews the clash of the proponents of rival paradigms of policy activism that generated the heated polemics of current account sustainability that prevailed for nearly during most of the study period covered in this paper. Section 3 outlines an algebraic expose of the new paradigm or the intertemporal optimization model and explains how the current account imbalances act as a buffer to temporary shocks to macroeconomic fundamentals facilitating consumption-smoothing as predicted by the new paradigm. Section 4 reviews the empirical results of the testing of the consumption-smoothing hypothesis implicit in the new paradigm during the pre and post-float periods covered in the paper. Section 5 explains how the floating of the exchange rate was accompanied by a regime shift due to consumption-tilting or changing the preference for future consumption over current consumption, galvanizing further the consumption-smoothing dynamics predicted by the new paradigm during the post-float period. Section 6 concludes the paper by underscoring that the advocacy of non-activist policies by the new paradigm whilst warranted in the Australian context may not be applicable to other countries suffering high current account deficits because they do not have the institutional factors and policy credibility that supports the consumption-smoothing dynamics as predicted by the new paradigm.

## 2. The clash of the rival paradigms

The old paradigm that advocated activist policies to rein in high current account deficits and foreign debt was based on the Keynesian-Mundell-Fleming (KMF) framework (Corden 1997, Horne 2001) in the hey-days of the Bretton Woods system's pegged exchange rates and capital controls. The old paradigm flashed a red light when current account deficits increased as they had to be financed by running down foreign exchange reserves. The depletion of foreign exchange reserves could signal and impending devaluation or trigger a speculative attack causing the collapse of the exchange rate peg. Therefore, to avoid sudden stops of capital flows preemptive policy action to reduce high current account deficits were justified under the old paradigm. The old paradigm was based on *ad hoc* assumptions and lacked firm micro-foundations and had no metric to evaluate the welfare effects of adopting different policies it was based on static expectations and assumed nominal price rigidity. But nonetheless it provide pragmatic policy guidelines to safeguard the exchange rate peg and it was widely believed that when the current account deficit as a ratio of GDP reached 5 percent it flashed a red light justifying the adoption of activist policies to prevent insolvency and high adjustment costs following the collapse of the exchange rate peg (Milesi-Ferreti and Razin 1996).

The new paradigm which asserted that the use of activist polices to reduce high current account deficits were misconceived, was based on the intertemporal optimization model derived from 'new open economy macroeconomics' which was based on solid microeconomic foundations (Obstfeld and Rogoff 1996). The proponents of the new paradigm postulated that high current account deficits were the residual outcome of rational optimizing decisions of private sector agents (savers and investors). Therefore, if there was any role for government policy intervention it would only be to remove the market failures that impeded rational optimizing decision-making by the private sector. The proponents of the new paradigm (Corden 1977,1991; Makin 1988, 1989; Pitchford 1989, 1990), were echoing vestiges of the 'Lawson doctrine' which had become fashionable in UK ( Nigel Lawson was the Chancellor of the Exchequer in UK) about the same time.

However, during most of the study period (1959q3-2007q1) covered by this paper the proponents of the old KMF paradigm ruled the policy roost in the Reserve Bank of Australia, The Treasury, and The Commonwealth Government. A large number of academics were extremely skeptical about the advocacy of 'hands policy to manage the sustainability of high current account deficits (Argy1990, Arndt 1989, Moore 1989, Nugyen 1990). Some of the advocates of activist policies to achieve current account sustainability derided the proponents of the new paradigm as snake oil salesman and even compared them to frogs in a boiling pot that were blissfully impervious to the doom that awaited them (Macquarie Bank 1989).

It needs to be noted that the forces of globalization had brought about a policy regime shift in Australia that culminated in the floating of the Australian dollar in 1983q4 . The policy regime shift was not be design but an attempt to overcome the 'open economy trilemma' that Australia was facing because of hyper mobility of capital with the

acceleration of the pace of economic globalization. The policy regime shift was not accompanied by a paradigm shift and proponents of the old paradigm continued to distill their policy prescriptions from and old paradigm that had been rendered obsolete by the forces of globalization. In mid-1986 the Australian current account deficit as ratio of GDP reached 5%, double the historical average. The proponents of the old paradigm went into a panic and the Treasurer declared that Australia was turning into a ‘banana republic’ (Keating 1986) and directed the mobilization of all policy arms to rein in the high current account deficit and sky rocketing foreign debt (Keating 1986). Accordingly activist policies in the form of fiscal consolidation was implemented premised on the twin-deficits hypothesis and has returned the budget to recurrent surpluses. Tight monetary policy was implemented on the basis of a check-list approach which replaced monetary targeting, by targeting the reduction of the current account deficit as one of the key indicators. These activist policies were vigorously implemented for nearly two decades after the banana republic jitters. But they failed to make a dent in either the rising current account deficit or foreign debt.

The new paradigm was based on the tenets of ‘new open economy macroeconomics’ that provided micro-foundations, relaxes nominal price rigidities and provides welfare metric to evaluate the effects of policy regime shifts. The new paradigm is encapsulated the Intertemporal Optimization Model (IOM) or a theoretical framework evolved by researchers (Sachs 1982, Campbell 1987, Sheffrin and Woo 1990, Ghosh 1995, Obstfeld and Rogoff 1996) and tested in the context of both advanced countries using the net present value approach pioneered by Campbell and Shiller (1987) and tested for a number of advanced countries (Agenor et al. 1999, Otto 1992, Ghosh 1995, Kim et al. 2002) and for developing countries (Ghosh and Ostry 1995) with mixed results. In the Australian context the new paradigm has been tested and the findings vary with the sample period, frequency, definitions of variables, testing techniques and concepts of sustainability. The tabulation below lists some of the major studies using the new paradigm undertaken in the Australian context.:

**Table 1.** Australian studies that perform Net Present Value tests of the new paradigm or tests for consumption smoothing.

Authors	Year	Study period	Frequency	Conclusion
1. Otto & Milbourne	1992	1959q3-1989q1	Quarterly	Reject
2. Cashin & McDermott	1998	1961-1989	Annual	Reject
3. Guest & McDonald	1998	1961-1995	Annual	Reject
3. Bergin and Sheffrin	2000	1961q4-1996q2	Quarterly	Do not reject
4. Otto	2002	1960-200	Annual	Do not reject
5. Belkar et al.	2007	1984-2005	Annual	Do not reject

The new paradigm is based on an extension of the consumption-smoothing logic implicit in permanent income hypothesis (Friedman 1957) to an open economy as foreshadowed by Campbell (1987). The new paradigm exhibited two motives according to Sachs (1982): First, the *consumption-tilting* motive, whereby an open economy exhibits a preference for current consumption over future consumption, if the subjective discount rate was less than the world discount rate because then it would be worthwhile to borrow in the global market to boost current consumption. Second, the *consumption-smoothing* motive that enables an open economy to borrow and lend in the global capital market by

incurring current account deficits or surpluses and smoothing-out consumption in the face of temporary shocks to macroeconomic fundamentals. The current account acts as a buffer against temporary shocks smoothing out consumption according to the intertemporal optimization model.

Before I outline an algebraic exposition of the new paradigm or the intertemporal optimization model. it needs to be noted that all the policymaking bodies that were skeptics of the old paradigm are now firm believers in the new paradigm. The Reserve Bank of Australia declared that reducing high current account deficits would not be an objective of monetary policy (Stevens 2004). After nearly two decades of trenchant opposition to the new paradigm or the CPM thesis, the institutions that rule the policy roost have all embraced the CMP thesis or the ‘consenting adults’ view of the current account deficits (Belkar et al. 2000, Gruen and Sayegh 2005). The predictions of gloom and doom of high current account deficits by the adherents of the old paradigm have failed to materialize. At the same time the proponents of the new paradigm emboldened by the success of their non-activist policy stance have ventured to highlight that high current account deficits rather than being a predictor of impending doom is a harbinger of prosperity. Makin (2006) has demonstrated that high current account deficits have widened Australia’s capital base and growth and enhanced welfare (Makin 2006).

### 3. Intertemporal optimization – the new paradigm

A current imbalance has been defined to be sustainable if it does not generate negative feedback effects from either domestic or global sources to alter its trajectory (Mann 2002:143). The concept of solvency differs from sustainability in that the former refers to a country’s ability to repay its debt without default. In this paper we define current account imbalances as sustainable if they are consistent with the consumption-smoothing path generated by the intertemporal optimization model or the new paradigm.

The optimal consumption-smoothing path traversed by a small open economy is captured by current account imbalances as it acts as a buffer against temporary shocks. The small open economy can be analogized by a representative agent that attempts to maximize expected lifetime utility over an infinite time horizon as defined by the time separable utility function given below:

$$\sum_{s=0}^{\infty} \beta^s E_t [u(C_{t+s})] \quad (1)$$

where,  $0 < \beta < 1$  is the subjective discount factor.  $C_t$ : private consumption.  $E_t$ : conditional expectations operator based on the information set available at time  $t$ . The period utility function ( $u(C_t)$ ) is twice differentiable and is strictly increasing in consumption.

The small open economy of the representative agent maximizes the lifetime utility function (1) subject to the expected value of the intertemporal budget constraint that can be derived from the one-period current account identity as specified below, where all variables are in real terms:

$$CA_t = \Delta B_{t+1} = B_{t+1} - B_t = Y_t + rB_t - C_t - I_t - G_t = TB_t + rB_t \quad (2)$$



$Y_t$ : GDP.  $B_t$ : Net stock of foreign assets or foreign debt if negative.  $I_t$ : Private investment.  $G_t$ : Government spending.  $TB_t = Y_t - C_t - I_t - G_t$ : Trade balance.  $CA_t = TB_t + rB_t$ : Current account balance.  $r$ : Fixed world real interest rate

Equation (2) postulates that the current account imbalance is equal to the change in the value of the economy's foreign debt, which in turn is equal the national cash flow ( $Z_t = Y_t - C_t - I_t$ ) plus net factor payments on its outstanding stock of foreign debt ( $rB_t$ ), which in turn is equal to the trade balance ( $TB_t$ ) plus net factor payments ( $rB_t$ ). Here we are dealing with a small open economy that is an interest rate taker in the global capital market. Therefore, Fisherian separability prevails and investment and output can be determined independently of the optimal consumption-smooth path traversed by the economy (Cooper and Sachs 1985).

### *Solvency*

Before analyzing the optimal current account balances derived from the intertemporal optimization model, we clarify a measure of solvency or the ability of the economy to repay its debt and interest pays without defaulting. The solvency condition can be derived from the intertemporal budget constraint (2) as the ratio of trade surplus to GDP ratio ( $TB_t/Y_t$ ) is required to achieve a predetermined ratio of foreign debt to GDP ( $B_t/Y_t$ ), given the growth rate of GDP ( $g$ ) and the world real interest rate ( $r$ ). The required solvency condition is therefore:

$$TB_t/Y_t = (g-r)B_t/Y_t \quad (3)$$

Based on current figures, given Australia's foreign debt to GDP ratio,  $B_t/Y_t = 60\%$ , and growth rate of GDP,  $g = 4\%$ , the world real interest rate  $r = 6\%$ , the trade surplus to GDP,  $TB_t/Y_t = 1.2\%$ , to remain solvent. These estimates are consistent with similar estimates made by Gruen and Syegh (2005). Alternative measures of solvency based on the scaling by exports of goods and services rather than by  $GDP_t$  have also been made by Moore (1990). These solvency ratios are widely used by rating agencies to assess a country's default risk. But they are static measures bereft of any behavioural content and fail to provide policy insights on the adjustment costs that may be involved if there is insolvency. A more informative measure of intertemporal solvency measure can be ascertained by examining whether the difference between the national cash flow plus net factor payments ( $Z_t + rB_t$ ) and consumption ( $C_t$ ) derived from the constraint (2) exhibit a long-run equilibrium relationship or are cointegrated (see Table 4 and Table 5) indicating that consumption expenditure does not deviate from the available resources ( $Z_t + rB_t$ ) as suggested by Hakkio and Rush (1991) and Trehan and Walsh (1991).

An intertemporal optimization model related sustainability condition for the current account imbalances can be derived from the intertemporal budget constraint (2), through recursive substitution for next period's foreign debt, after imposition of the no-Ponzi-game (NPG) yielding the following constraint:

$$\sum_{s=t}^{\infty} (1+r)^{-(s-t)} E_t TB_s = -(1+r)B_t, \quad (3)$$

The above constraint (3) postulates that a small open economy is intertemporally solvent or runs a sustainable current account deficit as long as the expected present value of future trade balances can repay the economy's initial foreign debt and interest dues. The above intertemporal solvency condition has been derived on the assumption that the NPG condition, which precludes the economy of playing the Ponzi game of borrowing just to rollover its foreign debts without ever repaying its creditors.

When the NPG condition, the discounted present value of expected future stock of foreign debt converges to zero as the time horizon  $T$ , converges to infinity as indicated below:

$$\lim_{T \rightarrow \infty} (1+r)^{-T} {}_t B_{t+T+1} = 0 \quad (4)$$

#### *The intertemporal optimization model*

In order to operationalise the intertemporal optimization model empirically we assume that utility function (1) is linear quadratic in consumption as defined below:

$$u(C_t) = C_t - a_0 C_t^2 / 2, \quad \text{where } a_0 > 0, \quad (5)$$

Substituting the above utility function in the intertemporal budget constraint we can derive from the first order conditions Euler equation:  $u'(C_t) = (1+r)\beta E_t [u'(C_{t+1})]$ . When the subjective discount rate equals the world interest rate,  $\beta = 1/(1+r)$  we obtain from (5) the proposition that consumption follows a random walk (Hall 1978) as shown below:

$$E_t C_{t+1} = C_t \quad (6)$$

When the above random walk Euler equation holds the expected value of the intertemporal budget constraint holds with probability one and after rearrangement yields:

$$E_t \left[ \sum_{s=t}^{\infty} (1+r)^{-(s-t)} C_s \right] = E_t \left[ (1+r)B_t + \sum_{s=t}^{\infty} (1+r)^{-(s-t)} Z_t \right] \quad (7)$$

where the national cash flow:  $Z_t = (Y_t - C_t - G_t)$ . We can derive from the above equation the optimal path of consumption path as follows:

$$C_t^* = (r/\theta) [B_t + \sum_{s=t}^{\infty} E_t (1+r)^{-(s-t)} Z_t] \quad (8)$$

where the consumption-tilt parameter  $\theta = [\beta(1+r)r] / [\beta(1+r)^2 - 1]$

The optimal path of consumption  $C_t^*$  occurs when the subjective discount rate equals the market discount rate,  $\beta = 1/(1+r)$  which rules out any consumption tilting effects when  $\theta$

=1, giving only the optimal consumption smoothing current account as indicated in equation (9) below. Here if we have estimated the current account smoothing component  $CA_t^S$  as the residual of the cointegration regression of  $Z_t + rB_t$  and  $C_t$  each of which are I(1) and  $CA_t^S$  is I(0) giving:

$$CA_t^S = Z_t + rB_t - \theta C_t \quad (9)$$

By substituting equation (8) in (9), after re-arranging, yields the stochastic version of the intertemporal optimization model which postulates that the optimal consumption smoothing current account balance is linked to changes in the expected present value of changes in national cash flow is indicated below:

$$CA_t^S = - [\sum_{s=t+1}^{\infty} (1+r)^{-(s-t)} E_s \Delta Z_s], \text{ where } \Delta Z_s = Z_s - Z_{s-1} \quad (10).$$

where : r: real interest rate,  $Z_s = Y_s - I_s - G_s$  : national cash flow , where  $Y_s$ : GDP,  $I_s$ : investment,  $G_s$ : government spending. According to the above fundamental equation of the current account imbalances postulates that permanent shocks that have no affect on changes in the national cash flow, leave the consumption-smoothing component of the current account unchanged. Only temporary shocks that change components of the national cash flow will cause the current account to act as a buffer to smooth consumption.

In order to test the consumption-smoothing embodied in the equation (10) , the net present value of expected changes in national cash flow can be estimated by using the vector autoregression (VAR) methodology proposed by Campbell and Shiller (1987) which postulates that the changes in the national cash flow  $\Delta Z_t$  can be predicted better using not just its past history but information from the present and past current account balances ( $CA_t$ ) as indicated below:

$$\begin{aligned} |\Delta Z_s| &= |\Psi_{11} \ \Psi_{12}| |\Delta Z_{s-1}| + |\epsilon_{1s}| \\ |CA_s^S| &= |\Psi_{21} \ \Psi_{22}| |CA_{s-1}^S| + |\epsilon_{2s}| \end{aligned} \quad (11)$$

Where  $\epsilon_{1s}$  and  $\epsilon_{2s}$  stochastic error terms with conditional means of zero and  $\Delta Z$  and  $CA_s^S$  are deviations from the unconditional means.

We can obtain two empirical tests of the consumption-smoothing hypothesis from the above VAR by estimating the future expected changes in the net cash flow from the VAR estimate as follows:

$$E_t \Delta Z_s = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} \Psi_{11} & \Psi_{12} \\ \Psi_{21} & \Psi_{22} \end{bmatrix}^{s-t} \begin{bmatrix} \Delta Z_t \\ CA_t^S \end{bmatrix} \quad (12)$$

If  $\Psi$  is the transition matrix  $[\Psi_{ij}]$  and I is 2x2 identity matrix, the optimal consumption-smoothing current account can also be estimated by substituting equation (12) into equation (10) and obtaining:

$$\hat{C}^S A_t^S = - [1 \ 0] [(1+r)^{-1}\Psi] [I - [(1+r)^{-1}\Psi]]^{-1} \begin{vmatrix} \Delta Z_t \\ CA_t^S \end{vmatrix} = [ \Phi_{\Delta Z} \quad \Phi_{CA} ] \begin{vmatrix} \Delta Z_t \\ CA_t^S \end{vmatrix} \quad (13)$$

The two tests of the consumption-smoothing hypothesis are :

First, an F- test of the null hypothesis of no Granger causality of the current account by changes in the national cash flow as implicit in equation (10) and in the VAR equation (11). Rejection of the no causality null hypothesis favours the consumption-smoothing hypothesis. The second test of the consumption-smoothing null hypothesis is obtained from equation (13) the joint test of the nonlinear restrictions embodied in the null hypothesis  $H_0: \Phi_{\Delta Z} = 0, \Phi_{CA} = 1$ . The non-rejection of the null hypothesis based on a Wald F-test favours the consumption-smoothing hypothesis which requires the changes in the national cash flow be close to zero and the consumption-smoothing component of the current account must be close to unity.

It has been observed that the nonlinear restrictions on the VAR parameters testing the consumption-smoothing null is unreliable because the delta method used to estimate the Wald F statistic is vitiated by the near singularity of the Jacobean of the matrix that is inverted (Mercurial and Minion 2006, Kasha 2004). Therefore, we would take account of these findings when interpreting the Wald F-tests on the nonlinear restrictions on the VAR parameters relating to the consumption-smoothing null hypothesis.

#### 4. Empirical results

The database used to test the intertemporal optimization model in the Australian context for the study period 1959q3-2007q1 has been sourced from the International Monetary Fund online database and the Australian Bureau of Statistics. The database comprises of seasonally adjusted quarterly variables expressed in per capita real terms in billions of Australian dollars after diving by the implicit GDP price deflator and population (See Appendix A).

The database for the full sample period was dichotomized into the subsample I covering the pre-float period and subsample II covering the post-float period based on the floating date 1983q4. This dichotomization has also been supported subsequently by the detection of a structural break in the presence of cointegration by the Gregory-Hansen (1996) cointegration test.

A battery of unit root tests (ADF, Phillips-Perron, KPSS) indicated that all the series of interest were nonstationary processes . Only the ADF unit root tests for  $C_t$  are reported in Table 2 below:

Table 2 ADF Unit root tests on  $C_t$

Sample	Level AIC(k)	Difference AIC(k)	McKinnon CV (%)
Sub sample I	-3.84(0)	-6.91(9)	-3.46(1%)
Sub sample II	-3.34(0)	-11.07(0)	-2.87(5%)
Full sample	-2.46(0)	-10.47(0)	-2.57(10%)

(Full results of unit root tests are not reported only results for  $C_t$  are reported above).

Since, the forces of globalization could result in structural breaks in the series of interest and render nonstationary series stationary as suggested by Perron (1989). It was worthwhile to check whether the structural breaks converted the nonstationary series to stationary series or I(0) series to I(1) series by applying the Andrew-Zivot (AZ)(1992) breakpoint test to important series that specify the intertemporal optimization model. The AZ test identify the presence of mean and slope break points for the major DGPs used in the empirical testing of the intertemporal optimization model). The ZA tests fail to reject the nonstationarity null for both  $ZRB_t$  and  $C_t$  despite the presence of mean and slope breakpoints during the full sample period and both pre and post-float subsamples as reported in the Table 3 below:

**Table 3.** Zivot-Andrew break tests

Variable	Full sample	Quarter	Sub sample I	Quarter	Sub sample II	Quarter		
Intercept	Mean(k) t-test		Mean(k) t-test		Mean(k) t-test		CV5%	CV 1%
$C_t$	3.15(3)	1984:4	-2.13(0)	1971:4	-1.99(0)	2000:3	-4.80	-5.34
$ZRB_t$	-2.44(2)	1995:1	-5.21	1969:1	-4.52(0)	2000:3	-4.80	-5.34
Slope	Trend(k)		Trend(k)					
$C_t$	0.15(3)	1967:1	-2.41	1972:2	-2.55(3)	1972:2	-4.93	-4.42
$ZRB_t$	-4.60 (0)	1989:3	-4.94	1975:2	-4.53	1972:2	-4.93	-4.42

Notes: CV: critical value. k: (in brackets) denotes the optimal number of lags in the modified unit root tests selected on the basis of the minimum AIC.

(See Appendix II for explanatory notes on the ZA methodology).

The mean and slope breakpoints in the DGPs of interest have been caused by the various reform processes triggered by globalization that gathered momentum during the study period. These break points could be caused by the processed of trade liberalization, financial deregulation, microeconomic reform, prudential regulation of the banking system, etc. No attempt has been made here to link the break points to the globalization forces that may act on a standalone basis or in a symbiotic fashion to bring about the break points in  $C_t$  and  $Z_t + rB_t$  as reported above. We note that the above DGPs have remained nonstationary despite the structural breaks.

Next we report the results of the Johansen-Juselius LR tests which identifies the presence of cointegration between the major series of interest during the full- sample period and the subperiods relating to pre and post float eras, respectively. The Johansen-Juselius maximum likelihood ratio tests for cointegration between  $ZRB_t$  and  $C_t$  are reported in the Table 4 below:

**Table 4.** Johansen LR Cointegration tests on the cointegration between  $Z+rB$  and  $C$ .

$\lambda$ : maximal Eigen Value &  $\lambda$ -trace: stochastic Trace Matrix

(restricted intercepts and no trends) Var =2

Null Ho	Sub- I	Sub-II	CV	CV	Full- sample	CV
	$\lambda$ -max	$\lambda$ -max	95%	90%	$\lambda$ -max	95%
$R = 0$	20.94	28.73	15.87	13.81	14.92	14.88
$R \leq 1$	10.42	4.93	9.16	7.53	1.65	8.07
	$\lambda$ -trace	$\lambda$ -trace			$\lambda$ -trace	

R = 0	31.36	33.66	20.18	17.88	16.7	17.86
R ≤ 1	10.41	4.93	9.16	7.53	1.65	8.07

n: sample size. R: number of cointegrating vectors. CV: Critical Values.

The Johansen-Juselius  $\lambda$ -max and  $\lambda$ -trace statistics fail to reject the null of no cointegration between  $ZRB_t$  and  $C_t$  for the pre-float subsample I, but reject the null of no cointegration null for the post-float subsample II and the full-sample at both 95% and 90% level critical values. The above ML cointegration test results are re-confirmed by the Engle-Granger two-step cointegration test procedure which tests for the stationarity of the residuals of the cointegration regression of  $ZRB_t$  on  $C_t$ . The residuals for pre-float sub-period I were I(1), while for the post-float subperiod II and the full period were I(0) ( see Table 5 ). These results confirm cointegration results of the Johansen-Juselius ML tests.

**Table 5.** Engle-Granger two-step cointegration test procedure.

ADF tests on residuals of cointegration regression between  $ZRB_t$  and  $C_t$

Sample	Period	Parameter $\theta$	se( $\theta$ )	ADF (k)	%CV(k)	Order Integration
Sub-sample I	1959q3-1983q4	0.8971	0.0043	-3.27(0)	-3.50(1)	I(1)
Sub-sample II	1984q1-2007q1	0.8936	0.0116	-2.91(2)	-2.89(5)	I(0)
Full-sample	1959q3-2007q1	0.9248	0.0109	-2.79(2)	-2.58(10)	I(0)

ADF: Augmented Dickey Fuller test on residuals. k: optimal lag length for determining minimum AIC. CV: critical value.

### Granger causality tests on consumption smoothing hypothesis

A direct test of the consumption-smoothing hypothesis implicit in the intertemporal optimization model (IOM) embodied in equation (10) can be performed via two test procedures as outlined in Section 3. First, we can test whether the current account Granger causes changes in the national cash flows and thereby engages in optimal consumption-smoothing as predicted by the IOM. Second, we can test whether the nonlinear cross equation restrictions required to satisfy the consumption-smoothing are met by the VAR parameters linking the actual consumption-smoothing current account and the optimal consumption-smoothing current account.

The results of the F-tests of the null hypothesis of Granger non-causality of the changes in the national cash flow by the current account for VAR(1), VAR(2) and VAR(3) are rejected for the pre-float subsample I, post-float subsample II and the full sample period are reported in Table 6 below. These results indicate that the Australian economy was engaged in consumption-smoothing as predicted by the IOM during pre and post-float periods and over the full sample period. These results are consistent with the findings of other studies in relation to the post-float period as reported by Otto and Milbourne (1992) and Cashin and McDermott (1998a) using quarterly data and by Belkar et al. 2007 using annual data. However, the results are at odds with the finding in these studies that consumption-smoothing did not occur during the pre-float era because of the liquidity constraints arising from the imposition of capital controls under the pegged exchange

rate regime. The null of Granger non-causality of changes in national cash flow by the current account is rejected by VARs with lag lengths of  $k= 1, 2$  and  $3$  for both pre and post float subsamples and for the full sample period.. Furthermore, there is evidence of reverse causality that changes in national cash flow affected the current account over the full sample period. But no such two-way causation was observed for the pre and post-float subsamples. It should be noted that all the tests of the Granger non-causality null of F-tests were performed after incorporating the error correction mechanism (ecm).

**Table 6.** Granger non-causality F- tests & Non-linear restriction Wald-F tests

Test	Subsample I	VAR(1)		VAR(2)		VAR(3)	
		$\Delta Z_t$	$CA^S_t$	$\Delta Z_t$	$CA^S_t$	$\Delta Z_t$	$CA^S_t$
Causality-F	$CA^S_{t-i} \forall_i \geq 1$	18.93**		9.48**		8.94**	
Causality-F	$\Delta Z_{t-i} \forall_i \geq 1$		1.09		1.23		2.39*
Wald-F	$H_0: \Phi_i = 0$ for $\forall_i$ except $H_0: \Phi_1 = 1$	9.76#		12.34#		14.12#	
Test	Subsample II	$\Delta Z_t$	$CA^S_t$	$\Delta Z_t$	$CA^S_t$	$\Delta Z_t$	$CA^S_t$
Causality-F	$CA^S_{t-i} \forall_i \geq 1$	19.24**		6.40**		3.76**	
Causality-F	$\Delta Z_{t-i} \forall_i \geq 1$		2.07		1.90		1.58
Wald-F	$H_0: \Phi_i = 0$ for $\forall_i$ except $H_0: \Phi_1 = 1$	5.50		7.25		5.44	
Test	Full-sample	$\Delta Z_t$	$CA^S_t$	$\Delta Z_t$	$CA^S_t$	$\Delta Z_t$	$CA^S_t$
Causality-F	$CA^S_{t-i} \forall_i \geq 1$	33.75**		11.14**		7.14**	
Causality-F	$\Delta Z_{t-i} \forall_i \geq 1$		3.60*		2.83*		2.23*
Wald-F	$H_0: \Phi_i = 0$ for $\forall_i$ except $H_0: \Phi_1 = 1$	9.54#		16.86#		8.00#	
Level of	Significance:	** : 1%	* 5%	# 10%			

Granger causality F-test including the error correction mechanism (elm).

Nonlinear restrictions on VAR :Wald- test:  $H_0: \Phi_i = 0$  for  $\forall_i$  except  $\Phi_{ICA} = 1$   
(after Whites' correction for heteroscedasticity)

### Wald-F test for nonlinear restrictions on the VAR parameters

The Wald-F tests of nonlinear restrictions of 0 and 1 in the VAR parameters according to the Campbell-Schiller methodology have been determined after White's correction for heteroscedasticity. The F-tests fail to reject the consumption-smoothing null during any of the sample periods and broadly lend support to the test results obtained from the Granger non-causality tests reported above. As discussed in Section 4 the reliability of the Wald-F tests are regarded as unreliable because of the near-singularity problem in the delta method used in these tests (Mercereau and Miniane 2004).

Our overall conclusion is that empirical test results indicate that changes in the current account imbalances were consistent with the predictions of consumption-smoothing by the IOM during the pre and post-float subsamples I and II and over the full sample period. Therefore, over all the sample periods, despite the operation of capital controls, the current account deficits engaged in consumption-smoothing and did not face any

major issues of current account sustainability, notwithstanding the policy polemics and rhetoric to the contrary.

### 5. Regime shift.

Next we use the Gregory Hansen (1996) cointegration methodology to determine the presence of cointegration under possible regime shifts. The Gregory- Hansen (GH) methodology provides for the possibility of a general type of cointegration, when the cointegration vector is allowed to change at a single unknown time during the study period. A structural change would be reflected in the changes in the intercept  $\mu$  and the slope coefficient  $\alpha$  as modeled below:

GH Model I: level shift (C)

$$y_{1t} = \mu_1 + \mu_2\phi_{tT} + \alpha^T y_{2t} + \varepsilon_{1t}, \quad t = 1, \dots, T$$

In the above equation the intercept  $\mu_1$  represents the intercept before the shift, and  $\mu_2$  represents the change in the intercept at the time of the shift. The values  $y_{1t} = ZRB_t$  national cash flow plus net factor payments and  $y_{2t} = C_t$ : consumption spending. The dummy variable  $\phi_{tT}$  takes values 0 and 1 as specified below:

$\phi_{tT} = 0$  if  $t \leq [\eta T]$  and  $\phi_{tT} = 1$  if  $t > [\eta T]$ , where the unknown parameter  $T \in (0,1)$  denotes the relative timing of the change point, and  $[\ ]$  denote the integer part.

The empirical analysis reported in this paper is based on Gregory Hansen (GH) Model I and the GH Model II and GH Model III have not been examined at this stage..

Model II: Level shift with trend (C/T)

$$y_{1t} = \mu_1 + \mu_2\phi_{tT} + \beta t + \alpha^T y_{2t} + \varepsilon_{1t}, \quad t = 1, \dots, T$$

t: denotes the time trend.

Model III: Regime shift with trend (C/S)

$$y_{1t} = \mu_1 + \mu_2\phi_{tT} + \alpha_1^T y_{2t} + \alpha_2^T y_{2t} \phi_{2t} + \varepsilon_{1t}, \quad t = 1, \dots, T$$

$\alpha_1$ : denotes cointegrating slope coefficients before the regime shift and  $\alpha_2$  denotes the change in the slope coefficients.

**Table 7** Gregory-Hansen cointegration tests (minimum ADF(t)-statistics)

Model	Full sample	Break point	CV5%	CV1%
C	-4.63*	1983q4	-4.61	-5.13
C/T	-4.67	1971q3	-4.99	-5.45
C/S	-4.61	1983q4	-4.95	-5.47



The no cointegration null is rejected for the full sample as the minimum ADF(t) statistic exceeds the 5 percent critical value of -4.61. The endogenously determined breakpoint in the cointegration vector between ZRB and C according to the Gregory-Hansen (GH) test occurred at 1983q4. It is noteworthy that this breakpoint coincides with quarter in which the Australian dollar was floated. Therefore, we expect that the consumption tilting parameter to differ in the subsample before and after the breakpoint in 1983q4 .

The cointegration between the national cash flow plus net factor payments  $ZRB_t$  and consumption  $C_t$ , allowing for a structural break is validated to examine whether there has been one-time shift in the cointegrating relationship. The OLS results with a shift dummy variable  $\phi_{tT}$  at the structural break corresponding to a regime shift occurs at the point 1983q4 . The OLS results for the cointegration regression incorporating a one time shift dummy for the full-sample period 1959q3-2007q1, with standard errors in parenthesis are reported below:

Full-sample

$$ZRB_t = 0.00 + 0.92C_t + 0.010\phi_{tT}$$

(se) (0.001) (0.002) (0.001)

The above equation indicates that that the consumption tilting parameter  $\theta$  is significantly less than unity, both before and after the regime-shift or structural break in 1983q4. These empirics indicate that Australia was consuming more than its permanent cash flow thereby increasing its foreign debt by increasing its external liabilities or reducing its external assets. It is noteworthy, the preference for current consumption over future consumption has become less pronounced after 1983q4. The tilting parameter has increased by nearly 0.01 or 1% of GDP after the structural break and it was 0.92 before the break or regime shift.

The upward shift in the tilting parameter by about one percent of GDP in 1983q4, after the removal of capital controls and floating of the exchange rate as it appears to have increased Australia's appetite for current over future consumption. The increase in the preference for current consumption over future consumption appears to have been affected by the switch from bond to equity financing of the high current account deficits in the 1990s according to Cashin and McDermott (1998) but not according to Sarno and Taylor (1999).

## 6. Concluding comments

This paper revisits the polemics and empirics of the sustainability of Australia's recurrent current account deficits and burgeoning foreign debt during the period 1983q4-2007q1. The above study period can be dichotomized into the pre-float period sub sample I and the post-float period sub sample II on the basis of the policy regime shift that occurred with the floating of the Australian dollar in 1983q4.

During sub sample I when the Australian dollar was pegged to the US dollar and then made a crawling peg where the exchange rate was determined on the weighted average of currency basket on a daily basis. During sub sample II the exchange was determined by a managed float. The activist policies advocated to reduce the high current account deficit to sustainable levels were rationalized on the basis of policy prescriptions distilled out of the static Keynesian-Mendel-Fleming (KMF) paradigm or the old paradigm. The use of activist policies to target the reduction of high current account deficits by policymakers could be justified on the grounds that high current account deficits had to be financed by depleting foreign exchange reserves. The depletion of foreign exchange reserves signaled an impending devaluation, insolvency or triggered a speculative attack resulting in the cost of the exchange rate peg. Foreign investors spooked by high current account deficits could reverse capital flows or inflict sudden stops causing financial crises and serious adjustment costs. Despite the concerns about the high current account deficit which reached a fever pitch during mid-1986 period of banana republic jitters, Australia was not on the verge of insolvency or risking default on its foreign debt.

The heated policy debate and frenzied rhetoric relating to the dangers of unsustainable current account deficits occurred mainly after the policy regime shift that occurred almost at the same time as the float of the exchange rate and dismantling of capital controls. These developments had rendered obsolete the old KMF paradigm, but yet policymakers that ruled the policy roost continued to distill their policy prescriptions and frenzy from a paradigm that had been rendered obsolete by the forces of globalization.

The policy concerns about the unsustainable current account deficits and high foreign debt could contributed to the pursuit of prudent fiscal policies and monetary policies and the establishment of a sound financial and banking institutions based on prudential supervision, and good governance by a adopting best practice legal and accounting standards. These institutional advances not only imparted resilience to the Australian economy to crisis contagion but also increased Australia's attractiveness as a safe haven for potential investors.

The dire predictions of the adherents of the old paradigm about costly adjustment costs, capital flight, 'sudden stops' never materialized. Australia during the whole study period satisfied the intertemporal budget constraint and was not at any stage in danger of defaulting on its debts due to insolvency.

The policy regime shift that occurred after the float of the exchange rate brought about a paradigm shift. The predictions of the new paradigm that current account imbalances are optimal responses to temporary shocks to macroeconomic fundamentals as a small open economy borrows and lends in the global capital market place to achieve smooth consumption path appears to have been more effective in the post-float period than in the pre-float period.

Around 2003 there has been widespread acceptance by policymakers and their mentors of the new paradigm and its policy message that activist policies should not target the reduction of high current account deficits and foreign debt. Therefore, high current

deficits and foreign debt no longer take the center stage in the macroeconomic policy debate and they do not grab the media headlines as in the past.

It should be noted that the non-activist policy stance in relations to high current account deficits and foreign debt are justified by special institutional and idiosyncratic factors that are germane to Australia. The passive policy stance on high current account deficits derived from the new paradigm may be inappropriate in the context of other countries that are saddled with high current account deficits and soaring foreign debts.

Much of the heated polemics on the unsustainability of high current account deficits and the case for activist policies that was advocated from almost two decades after the float in 1983q4 was due to policymakers being stubbornly locked into the defunct old paradigm. Only in 2003 that policymakers that rule the policy roost (RBA, Treasury, and Commonwealth Government) became converts to the new paradigm and its holy grail that high current account deficits should not be a matter for policy concern. Today there is a widespread acceptance of the passive policy stance towards the high current account deficits and foreign debt. Therefore, although the current account deficit is at record levels by historical standards their size and sustainability are no longer concerns of policymakers.

## References

- Agenor, P.R., Bismut, P. Cashin, P., McDermott C.J. (1999) "Consumption Smoothing and the Current Account: Evidence from France, 1970-1996" *Journal of International Money and Finance* 18:1-12
- Ahmed, S. and Rogers, J.H. (1996) "Government Budget Deficits and Trade Deficits: Are Present Value Constraints Satisfied in Long-term Data?" *Journal of Monetary Economics* 36:351-74
- Arndt, H. W. (1989) "Australia's Current Account and Debt Problem: A Sceptical View Of the Pitchford Thesis", CEPR Discussion Paper No. 219, Centre for Economic Policy Research. Canberra.
- Belkar, R. Cockerell, L. and Kent, C. (2007) Current Account Deficits: The Australian Debate. *Research Discussion Paper 2007-02*. Reserve Bank of Australia.
- Bergin, P.R. and Sheffrin, S.M. (2000) "Interest Rates, Exchange Rates and Present Value Models of the Current Account", *The Economic Journal* 110:535-558.
- Campbell, J. and Shiller, R. (1987) "Cointegration Tests of Present Value Models," *Journal of Political Economy* 95:1062-1088.
- Campbell, J. Y. (1987) "Does Saving Anticipate Declining Labor Income ? An Alternative Test of the Permanent Income Hypothesis," *Econometrica* 55:1249-73.
- Cashin, P.C. and McDermott, J.C. (1998a) " Are Australian Current Account Deficits Excessive?" *The Economic Record* 74(227):346-361
- Cashin, P.C. and McDermott, J.C. (1998b) " Are Australian Current Account Deficits Excessive ?" *The Economic Record* 74(227):346-361
- Cooper. and Sachs, J. (1985) "Borrowing Abroad: The Debtor's Perspective." in *International Debt and Developing Countries* (J. T. Codrington ed.) World Bank
- Corden, W. M. (1991) "Does the Current Account Matter ? The Old View and the New", *Economic Papers*, 10: 1-19.
- Corden, W.M. (1977) *Inflation, Exchange Rates and the World Economy*, University of Chicago Press. Chicago.
- Corden, W.M. (1997) *The Road to Reform, Essays in Australian Economic Policy*, Addison Wesley Longman, Melbourne: 252-269.
- Dickey, D. A. and Fuller, W.A. (1981) " Likelihood Ratio Statistics for Autoregression Time-series with a Unit root", *Econometrica* 49:1057-72.
- Friedman, M. (1957) *A Theory of the Consumption Function*. Princeton University Press. Princeton.
- Ghosh, A. R. and Ostry, J. (1995) " The Current Account in Developing Countries: A Perspective From the Consumption Smoothing Approach". *World Bank Economic Review* 9: 305-33.
- Gosh, A. R. (1995) "International Capital Mobility Amongst the Major Industrialised Countries: Too Little or Too Much ?" *Economic Journal* 105: 107-28
- Gregory, A. and Hansen, B. (1996) "Residual-based tests for cointegration in models with regime shifts", *Journal of Econometrics*, 70: 99-126.
- Gruber, J. (2004) "A Present Value Test of Habits and the Current Account," *Journal of Monetary Economics* (forthcoming).
- Gruen, D. and Sayegh, A. (2005) "The Evolution of Fiscal Policy in Australia." Treasury Working Paper No. 2005-04.
- Guest, R. and McDonald, I. M. (1998) " The Socially Optimal Level of Saving in Australia, 1960-61 to 1994-95: *Australian Economic Papers* 37(3): 213-235.
- Hall, R. (1978) "Stochastic Implications of the Life-Cycle-Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy* 86:971-88.

- Horne, J.(2001) The Current Account Debate in Australia: Changing Policy Perspectives. Macquarie Economics Research Papers. No. 11/ 2001. Department of Economics, Macquarie University.
- Johansen, S. and Juselius, K. (1990) Maximum likelihood estimation and inference on cointegration with application to the demand for money”. *Oxford Bulletin of Economics and Statistics*, 52: 169-210.
- Kasa, K. (2004) “Testing Present Value Models of the Current Account: A Cautionary Note.” *Journal of International Money and Finance* (forthcoming).
- Keating, P. (1986) quoted in Paul Kelly (1992) *The End of Certainty*, Allen & Unwin, Sydney: 211.
- Kim, K. and Buckle, B and Hall, V. (2006) “Consumption Smoothing in a Small Cyclically Volatile Open Economy: Evidence from New Zealand,” *Journal of International Money and Finance* (forthcoming)..
- Macquarie Bank (1989) *A Boiling Frog: Australia’s Economic Challenge*. Quoted by Gruen and Sayeg (2005):13
- Makin, A. J. (1988) “Targeting Australia’s Current Account: A New Mercantilism ?” *Economic Analysis and Policy* 18(2):199-212.
- Makin, A. J. (1989) “Is the Current Account Deficit Sustainable ?”, *Australian Economic Review* 86:29-33.
- Makin, T. (2006) “ Has Foreign Capital Made us Richer ?” *Agenda* 13(3): 225-237.
- Mercereau, B. and Miniane, J. (2004) “Challenging the Empirical Evidence from Present Value Models of the Current Account,” International Monetary Fund Working Paper, 106.
- Milbourne, R. and Otto, G. (1992) “Consumption Smoothing and the Current Account”, *Australian Economic Papers* 31: 369-384
- Milbourne, R. and Otto, G. (1992) “Consumption Smoothing and the Current Account”, *Australian Economic Papers* 31: 389-83
- Milesi-Ferreti, G.M. and Razin, A. (1996) *Current Account Sustainability*. Princeton Studies in International Finance No. 81. International Finance Section. Department of Economics. Princeton University.
- Moore, D. (1990) “Debt – Is it Still a Problem ?” *Australian Economic Review* 87: 17-32.
- Nguyen, D.T. (1990) “Fiscal Policy and the Current Account” in *Background Papers on External Debt*. Office of Economic Planning Advisory Council, Australian Government Publishing Service, Canberra: 5-24.
- Obstfeld, M. and Rogoff, K. (1995) “Intertemporal Approach to the Current Account”, in G.M. Grossman and Rogoff, K. eds. *Handbook of International Economics* Vol.3 Elsevier Science, Amsterdam: 1731-1799.
- Obstfeld, M. and Rogoff, K. (1996) *Foundations of International Macroeconomics*, MIT Press, Cambridge.
- Obstfeld, M. and Rogoff, K. (2000) “The Six Major Puzzles in International M Macroeconomics: Is there a Common Cause ?” Working Paper 7777 National Bureau of Economic Research.
- Otto, G. (1992) “Testing a Present Value Model of the Current Account: Evidence from US and Canadian Time Series”, *Journal of International Money and Finance* 11:
- Otto, G. (2003) “Can an Intertemporal Model Explain Australia’s Current Account Deficit.” *The Australian Economic Review* 36(3):350-9.
- Perron, P. (1989) “The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis,” *Econometrica* 57(6): 1361-1401.
- Pitchford, J (1989) “Does Australia Really Have A Current Account Problem ?” *Economic Papers* 8:25-32.
- Pitchford, J. (1989) “A Skeptical View of Australia’s Current Account and Debt Problem “, *The Australian Economic Review* 86: 5-14. 414-30.
- Pitchford, J. (1990) *Australia’s Foreign Debt: Myths and Realities*. Allen and Unwin, Sydney.

- Sachs, J. (1981), "The Current Account and Macroeconomic Adjustment in the 1970s," *Brookings Papers on Economic Activity* 1:201-68..
- Sachs, J. (1982) "The Current Account and the Macroeconomic Adjustment Process', *Scandinavian Journal of Economics* 84: 147-59.
- Sarno, L. and Taylor, M.P. (1999) "Moral Hazard, Asset Bubbles, Capital Flows, and the East Asian Crisis: The First Tests," *Journal of International Money and Finance* 18:637-657
- Sheffrin, S.M. and Woo, W.T. (1990) "Present Value Tests on the Intertemporal Model of the Current Account" *Journal of International Economics* 29: 237-53.
- Shiller, R. (1981) "Do stock prices move too much to be justified by subsequent changes dividends", *American Economic Review* 71: 421-35
- Stevens .G.R. (2004) "Economic and Financial Conditions December 2004. Speech to Australian Business Economists and Economic Society of Australia (NSW Branch) D 14 December.
- Trehan, B. and Walsh, C. E. (1991) "Testing Intertemporal Constraints: Theory and Applications to U.S. Federal Budget and Current Account Deficits," *Journal of Money, Credit and Banking* 23(2):266-223.
- Zivot, E. and Andrews, D.W.K (1992) " Further evidence on the great crash, the oil price shock, and the unit root hypothesis", *Journal of Business and Economic Statistics*, 251-70.

## Appendix I Database

### Variables, Transformations, Sources

Variable	Transformation	Unit	Source	
$C_t$ : consumption	$C_t = C_t/P_t * N_t$	AUD bn.	IFS	c line 96f
$Y_t$ : GDP	$Y_t = Y_t/P_t * N_t$	AUD bn.	IFS	g line 99b
$YRB_t$ : GNP	$(Y_t + rB_t)/P_t * N$	AUD bn.	IFS	gnp: line99a
$G_t$ govt. spending	$G_t/P_t * N_t$	AUD bn.	IFS	g line 9
$I_t$ : investment	$I_t = (I_t + S_t)/P_t * N_t$	AUD bn.	IFS	i:lines 93e+93i
$RB_t$ : net factor payments	$Y_t - YRB_t$	AUD bn	IFS	
$CA_t$ : current a/c balance	$(Y_t - C_t - I_t - G_t)/P_t * N_t$	AUD bn.	IFS	
$P_t$ : implicit price deflator	2000=100	2000=100	IFS	p: line 99bi
r: world interest rate	5 percent	r=1.05	Model	assumption
$N_t$ : Population	$N_t$	no. bn	ABS	Cat.3105.0

Notes: All variables are seasonally adjusted quarterly data expressed in billions of Australian dollars(AUD). The variables are converted to real per capita terms by dividing by the GDP price deflator x population.

$N$  : population is given in billions of persons and sourced from ABS sources.

P: Implicit price deflator a price index, base 100-2000.

IFS: International Financial Statistics online published by IMF.

ABS: Australian Bureau Statistics

## Appendix II Notes on Econometric tests

### Zivot-Andrews (1992) breakpoint tests

The Zivot-Andrews unit root tests uses endogenous methods to determine structural breaks rather than imposing subjective procedure to determine the breakpoints as in the case of Perron unit root tests (Perron 1999). The Zivot-Andrews tests aim to detect the presence of structural mean and slope structural breaks using the following equations, where Y refers to ZRB and C respectively.:

$$Y_t = m + aDU_t(\lambda) + bTime + cY_{t-1} + \sum_{i=1}^q d_i \Delta Y_{t-i} + v_t \quad (1) \text{ mean break}$$

where  $DU_t(\lambda) = 1$  if  $t > T\lambda$ , 0 otherwise.

$$Y_t = m + aDU_t(\lambda) + bTime + cY_{t-1} + \sum_{i=1}^q d_i \Delta Y_{t-i} + v_t \quad (2) \text{ slope break}$$

where  $DU_t(\lambda) = t - T\lambda$  if  $t > \lambda$ , 0 otherwise, and  $\lambda$  is defined as the fraction

$T_B/T$ , with  $T_B$  being the break point.

Equation (1) detects the presence of a possible mean break and equation (2) the presence of a slope break.

The above equations are estimated by the OLS method over the period covering  $t=2$  to  $t=T-1$ . For each value of  $\lambda$  the t-statistic was derived for testing the null hypothesis that  $c=1$ . The break quarter corresponds to the minimum t-statistic over all T-2 regressions.

The above equations were estimated for the full-sample and sub-samples I and II each time using appropriate dummy variable DU or DT. The results reported in Table , indicate the minimum t-statistic and the corresponding time breaks. These minimum t-statistics indicate the occurrence of mean breaks at and slope breaks at .

The above results confirm that despite the existence of endogenously determined structural breaks in the series of interest the tests do not reject the results of the unit root null in favour of trend stationary alternatives as predicted by Perron (1998).