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Are Australian and New Zealand Markets Integrated? Evidence from RIP Tests

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Abstract

This paper presents some empirical evidence, based on testing real interest parity, supporting the proposition that the implementation of CER and the deregulation of financial markets have contributed to achieving a higher degree of integration between goods and financial markets in Australia and New Zealand. The evidence is derived from a finding of real interest linkages in the post-CER period. Although perfect integration, as implied by a strict equality of real interest rates, is far from being the case, there is some indication that CER and the liberalization of financial markets have enhanced the move in this direction.

I. Introduction

The Closer Economic Relations Agreement (CER) between Australia and New Zealand was implemented on January 1, 1983, replacing the New

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Zealand-Australia Free Trade Agreement (NAFTA) which had been in operation since 1966. The Agreement aims at enhancing economic relations and eliminating trade barriers between Australia and New Zealand.[1] Meanwhile, financial markets in both Australia and New Zealand have experienced some measures of deregulation and liberalization, starting with the removal of capital controls on foreign exchange transactions in the first half of the 1980s. These measures are believed to have contributed to a greater degree of capital mobility and financial market integration.

Market integration is an empirical observation that can be measured using some criteria, such as the international parity conditions.[2] It is interesting, therefore, to use these criteria to measure the degree of (goods and financial) market integration between Australia and New Zealand, and to find out if the implementation of the CER and the simultaneous deregulation of financial markets have made any impact in this direction. In this paper, real interest parity (RIP) is used as a criterion for two related reasons: (1) this condition can be used as a measure of integration of both goods and capital markets; and (2) other parity conditions are necessary for RIP to hold which makes them implicitly implied by the latter.[3] In order to reach some conclusion on the contribution of CER and financial deregulation to market integration, the RIP hypothesis is tested over the pre- and post-CER periods. For the same purpose, the relationship is tested between Australia and New Zealand and the results are compared with those obtained from testing the same relationship between each of the two countries and the U.S. Furthermore, tests of structural stability are used to find out if the CER and financial deregulation have introduced a structural break into the relationship. In order to find out whether or not the extent of market integration has increased, we test RIP in a time-varying parameter framework. Finally,

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1. Free trade in commodities was achieved on July 1, 1990 with the elimination of tariffs, import licensing and other trade restrictions between the two countries.
2. Covered interest parity (CIP) and uncovered interest parity (CIP) are used to measure financial market integration and capital mobility, ex ante purchasing power parity (PPP) is used to measure goods market integration, while real interest parity is used to measure the degree of integration in both markets.
3. It is shown in Section II that RIP is derived by assuming the validity of UIP (which in turn is based on CIP and the unbiasedness hypothesis) and ex ante PPP.

the extent of financial and goods market integration is examined separately by splitting the real interest differential into two components: the covered interest differential and the real forward premium (discount). These two components measure the extent of financial markets and goods markets integration respectively.

II. Theory and Model Specification

Real interest parity can be used as a criterion to measure market integration because the real interest rate is the cost of capital, and because this international parity condition requires efficiency in the goods market (via ex ante purchasing power parity) and efficiency in the capital (or money) market (via uncovered interest parity). Thus, the extent of deviation from RIP is a measure of (the lack of) goods and financial market integration. This can be seen more clearly by deriving the RIP condition from its components. For this purpose, we start with the Fisher equations for two countries, the domestic country and the foreign (or reference) country. These equations are written in an approximate form as

$$r_{t+1}^{e} = i_t - \Delta p_{t+1}^{e} \tag{1}$$

and

$$r_{t+1}^{*e} = i_t^{*} - \Delta p_{t+1}^{*e} \tag{2}$$

where r is the real interest rate, i is the nominal interest rate, p is the (logarithm of) price level (so that Δp is the inflation rate), the superscript e indicates the expected value of the underlying variable, and the asterisk denotes foreign variables. If the Fisher equations (1) and (2) are jointly valid then

$$r_{t+1}^{e} - r_{t+1}^{*e} = (i_t - i_t^{*}) - (\Delta p_{t+1}^{e} - \Delta p_{t+1}^{*e}) \tag{3}$$

Ex ante purchasing power parity and uncovered interest parity are respectively given by

$$s_{t+1}^{e} - s_t = \Delta p_{t+1}^{e} - \Delta p_{t+1}^{*e} \tag{4}$$

and

$$s_{t+1}^{e} - s_t = i_t - i_t^{*} \tag{5}$$

where s is the (logarithm of) spot exchange rate measured as the number of units of the domestic currency per one unit of the foreign currency. Combining equations (3), (4) and (5), we obtain

$$r^e_{t+1} = r^{*e}_{t+1} \tag{6}$$

Under the assumption that expectations are formed rationally across countries, the actual (ex post) real interest rate realized at time $t+1$ will differ from the ex ante real interest rate by a random term orthogonal to past information. This is given by

$$r_{t+1} = r^e_{t+1} + u_{t+1} \tag{7}$$

and

$$r^*_{t+1} = r^{*e}_{t+1} + u^*_{t+1} \tag{8}$$

Substituting equations (7) and (8) into equation (6), we obtain

$$r_{t+1} - r^*_{t+1} = v_{t+1} \tag{9}$$

where $v_{t+1} = u_{t+1} - u^*_{t+1}$. By applying the backward shift operator to equation (9) we obtain

$$r_t - r^*_t = v_t \tag{10}$$

Equation (10) can be used to test RIP in a univariate framework which amounts to imposing the cointegrating vector (0, 1) a priori and testing for the stationarity of the error term v_t. This procedure is effectively testing for mean reversion in the real interest differential. Alternatively, we may test RIP in a bivariate framework by assuming a general cointegrating vector (b_0, b_1), and then testing the coefficient restriction $(b_0, b_1) = (0, 1)$. In this case the RIP model is specified as

$$r_t = b_0 + b_1 r^*_t + w_t \tag{11}$$

It must be pointed out at the start that what we are interested in here is whether or not RIP holds as a long-run relationship, which means that short-run deviations are allowed. This is because RIP (unlike CIP) is conceived to be a general relationship that encompasses financial as well as real capital, and so it is difficult to envisage this relationship to hold in the short run (at every point in time). In technical terms, we are looking for a finding of cointegration (or otherwise) between real interest rates as an evidence and a necessary condition for market integration. If the necessary condition of cointegration is satisfied, the extent of market integration is then measured by the coefficients of the cointegrating regression (vector), b_0 and b_1, such that a perfect integration is indicated by the coefficient restriction $(b_0, b_1) = (0, 1)$.[4] Therefore, the closer the values of the estimated coefficients b_0 and b_1 to zero and 1 respectively, the greater will be the extent of market integration. Furthermore, if the values of the coefficients move with the passage of time towards 0 and 1, this is indicative of a progressively enhanced level of integration. We do not, however, anticipate RIP to hold with a cointegrating vector (0,1). What we look for in support of the hypothesis that CER and financial deregulation have enhanced market integration (as opposed to achieving perfect integration) is a finding of real interest rate linkages (as opposed to equality) such that there is a movement towards a cointegrating vector of (0,1) with the passage of time.[5]

The reason why RIP can be used as a criterion for financial and goods market integration can also be demonstrated by splitting the real interest differential, $r - r^*$, to obtain

$$\begin{aligned} r - r^* &= (i - \pi^e) - (i^* - \pi^{*e}) \\ &= (i - i^* - f) + (f - \Delta s^e) + (\Delta s^e - \pi^e - \pi^{*e}) \end{aligned} \tag{12}$$

where f is the forward discount (premium). The term $(i - i^* - f)$ is the covered interest differential which Frankel and MacArthur [1988] advocate as a measure of capital market integration (or capital mobility), while the terms $(f - \Delta s^e)$ and $(\Delta s^e - \pi^e - \pi^{*e})$ are respectively the exchange risk premium and the expected real depreciation. While the first term pertains to the political jurisdiction, the second and third terms pertain to the underlying currency whose value is influenced by exchange rate volatility. The second

4. If $(b_0, b) = (0, 1)$ this indicates an absolute (long-run) equality between real interest rates.

5. A finding of cointegration is sometimes interpreted to imply that RIP holds in its weak form, or that it is the necessary, but not sufficient, condition for RIP to hold in a strong form. The sufficient condition is a cointegrating vector of (0, 1).

and third terms represent foreign exchange market efficiency and goods market efficiency respectively. Alternatively, the real interest rate differential can be split as

$$r - r^{*} = (i - i^{*} - f) + (f - \pi^{e} + \pi^{*e}) \tag{13}$$

where the second term is the real forward discount which encompasses factors pertaining to the currency, reflecting the efficiency of the goods and foreign exchange markets. Equation (12) will be used later to examine the extent of financial and goods markets integration separately.

III. Data, Econometric Methodology and Empirical Results

The RIP hypothesis as represented by equation (11) is tested using quarterly data covering the period 1974:1-1993:3 for three countries: Australia, New Zealand and the U.S.[6] The interest rate used is the three-month treasury bill rate, while prices are measured by the wholesale price index.[7] For a reason mentioned earlier, the sample is split into two sub-samples with the breakpoint being the fourth quarter of 1982, prior to the implementation of the CER and measures of financial deregulation. Thus, the period 1974-82 is the pre-CER period, while the period 1983-93 is the post-CER period. All series were obtained from Datastream.[8]

Table 1 reports the results of unit root testing using the Dickey-Fuller [1979] τ_{μ} test on the levels and first differences of the real interest rates in the two periods. The results show that the real interest rates are $I(1)$. Having obtained this result, we may now test RIP as represented by equation

6. The use of quarterly (as opposed to monthly) data ensures that the problem of overlapping observations does not arise. This is the case here because the maturity of the underlying financial asset (Treasury bill) is identical to the frequency of the data. Otherwise the problem would arise, causing the error term in equation (11) to follow a two-period moving average process.

7. The use of Treasury bill rates is preferable to using eurocurrency rates in this kind of test. For a strong argument see Frankel and MacArthur [1988, p 1088].

8. Treasury bill rates of Australia and the U.S. were obtained from the national government statistics, and for New Zealand from the OECD statistics. Wholesale prices for the three countries were obtained from the IMF series (International Financial Statistics, line 63..F).

Table 1
Unit Root Tests of Real Interest Rates (τ_μ)

		1974-82	1983-93
Levels	Australia	–1.53	–2.50
	New Zealand	–1.83	–2.67
	U.S.	–0.81	–2.29
First Differences	Australia	–5.73*	–4.15*
	New Zealand	–4.05*	–4.99*
	U.S.	–5.50*	–5.51*

Note: *: significant at the 5% level.

(11) for cointegration and coefficient restrictions (the necessary and sufficient conditions for RIP to hold in its strong form). For the necessary condition of cointegration to be satisfied, the residual-based tests require the residuals of the cointegrating regression to be stationary, *i.e.* $w_t \sim I(0)$, and for this purpose three unit root tests are applied to the residuals of the cointegrating regression (11): the Dickey-Fuller [1979] ADF test and the $\hat{Z}_\alpha$ and $\hat{Z}_t$ proposed by Phillips [1987] and Phillips and Ouliaris [1990].[9]

The problem here is that since real interest rates are nonstationary, it is not appropriate to test the coefficient restrictions on the basis of the conventional OLS standard errors. This is because although the OLS estimates are super-consistent if the underlying variables are cointegrated – as demonstrated by Stock [1987] – they are not fully efficient and their standard errors do not have a limiting normal distribution. Therefore, these standard errors and the corresponding t statistics cannot be used to derive inference about the values of the coefficients. One way to circumvent this problem is to apply the procedure proposed by West [1988] to correct the standard errors and make them asymptotically normal. The restrictions $b_0 = 0$ and $b_1 = 1$ will, hence, be tested on the basis of the corrected t statistics, t^*, which are calculated from the corrected standard errors. The West procedure may, however, be prob-

9. The ADF test is based on the τ_μ statistic used to test for unit root in the real interest rates, except that the auxiliary regression does not include a constant term. In both cases, the number of the augmentation terms is fixed at the smallest number necessary to remove serial correlation.

Table 2
Cointegration and Coefficient Restriction Tests (1974-82)

		Australia-New Zealand	Australia-U.S.	New Zealand-U.S.
Residual-Based	b_0	–0.001	–0.004	–0.006
		(0.0038)	(0.0019)	(0.0045)
	b_1	0.290	0.616	0.247
		(0.2108)	(0.1138)	(0.2686)
	ADF	–2.11	–4.36*	–2.67
	$\hat{Z}_\alpha$	–12.75	–27.55*	–10.39
	$\hat{Z}_t$	–3.03	–4.47*	–2.10
	$t^*(b_0=0)$		–2.11*	
	$t^*(b_1=1)$		–3.37*	
Johansen	Max	11.89	18.15*	10.42
	Trace	19.39	25.73*	13.46
	$\chi^2(b_0=0)$		4.47*	
	$\chi^2(b_1=1)$		0.66	

Note: *; significant at the 5% level. Figures in parentheses are the West corrected standard errors.

lematical in the sense that it is more appropriate for trending data, and that it is not asymptotically optimal. For this reason, these results are supplemented by those obtained from the Johansen [1988] maximum eigenvalue and Trace tests for the existence of one cointegrating vector and the associated coefficient restriction tests which have a χ^2 distribution.[10]

The results of cointegration and coefficient restriction tests are reported in Table 2 and Table 3 for the two periods respectively. The results of the coefficient restriction tests are reported only when the necessary condition of cointegration is satisfied. In the period 1974-82, Australian and New Zealand real interest rates were not cointegrated, neither were the New Zealand and the U.S. rates as implied by all of the tests used for this pur-

10. There are other procedures which can be used to obtain efficient estimates of the coefficients, and thus derive inference from the conventional test statistics. These procedures are generally based on achieving efficiency by incorporating the necessary dynamics in the model specification. For a survey, see Campbell and Perron [1991] and Lim and Martin [1995].

Table 3
Cointegration and Coefficient Restriction Tests (1983-93)

		Australia-New Zealand	Australia-U.S.	New Zealand-U.S.
Residual-Based	b_0	0.012	0.013	0.022
		(0.0038)	(0.0033)	(0.0051)
	b_1	0.260	0.382	0.037
		(0.1440)	(0.2100)	(0.3054)
	ADF	–3.74*	–3.91*	–2.54
	$\hat{Z}_\alpha$	–38.76*	–41.97*	–15.47
	$\hat{Z}_t$	–5.69*	–6.05*	–3.01
	$t^*(b_0=0)$	3.42*	3.93*	
	$t^*(b_1=1)$	–5.14*	–3.07*	
Johansen	Max	24.36*	27.39*	14.59
	Trace	33.21*	43.15*	18.95
	$\chi^2(b_0=0)$	5.27*	3.92*	
	$\chi^2(b_1=1)$	8.22*	0.62	

Note: *: significant at the 5% level. Figures in parentheses are the West corrected standard errors.

pose. However, it can be seen from the results reported in Table 3 that the Australian and New Zealand rates became cointegrated in the post-CER period, which is not the case for the New Zealand and U.S. rates. However, the coefficient restrictions are not satisfied except the restriction $b_1=1$ in the case of the U.S. when the Johansen procedure is used. Thus, although RIP does not hold in its strong form, the finding that the real interest rates of Australia and New Zealand became cointegrated in the post-CER period requires an explanation. The change in the results between the two periods can be possibly explained on the basis of two factors. The first is the global trend in the recent period towards the removal of capital controls and the globalization of financial markets. But if this was "the" influencing factor, one would then ask why it has not influenced the relationship between the New Zealand and the U.S. rates. One explanatory factor for this is the lack of goods market integration. The second possible explanation (which pertains to goods markets integration) is the implementation of the CER, which apparently has made the Australian and New Zealand goods markets more but not fully integrated.[11]

Another method whereby the effect of CER and financial deregulation may be assessed is to examine the structural stability of the cointegrating regression (11). This can be done by estimating the cointegrating regression over the whole sample period [1974-93], with and without a dummy variable and then apply the CUSUM test which is based on the behavior of the cumulative sum of recursive residuals over time. When the cointegrating regression is estimated without a dummy variable we obtain the following results (the West corrected standard errors are given in parentheses)

$$r = 0.0037 + 0.0472r^{*}$$
$$(0.0024)\ (0.1019)$$

$R^2 = 0.375$ $\quad CRDW = 1.13$ $\quad ADF = -4.18$

$\hat{Z}_{\alpha} = -43.95$ $\quad \hat{Z}_t = -5.73$

The behavior of the cumulative sum of recursive residuals of this equation is described by Figure 1 which shows that it rises above the upper 5% critical band, implying a structural break around the time of the introduction of CER and measures of financial deregulation. Let us now introduce a dummy variable, D, which takes a value of zero over the period 1974-82 and one otherwise. When the cointegrating regression is re-estimated we obtain the following results

$$r = -0.0015 + 0.278r^{*} + 0.013D$$
$$(-0.0025)\ (0.2775)\ (0.0128)$$

$R^2 = 0.462$ $\quad CRDW = 1.277$ $\quad ADF = -4.74$

$\hat{Z}_{\alpha} = -52.74$ $\quad \hat{Z}_t = -6.27$

11. This, however, is not the only possible interpretation of the results of cointegration tests. Cointegration between Australian and New Zealand real interest rates in the post-CER period may be due to business cycle coherency through policy co-ordination. This alternative interpretation must be borne in mind and makes it imperative to present further, more clear-cut evidence for the role of CER and financial deregulation. There is also another plausible interpretation for the finding that Australian were cointegrated with the U.S. rates but not with the New Zealand rates. It could be the case that with Australia having a larger economy than that of New Zealand, or for other reasons, it had to pursue a more cooperative policy than New Zealand with the U.S.

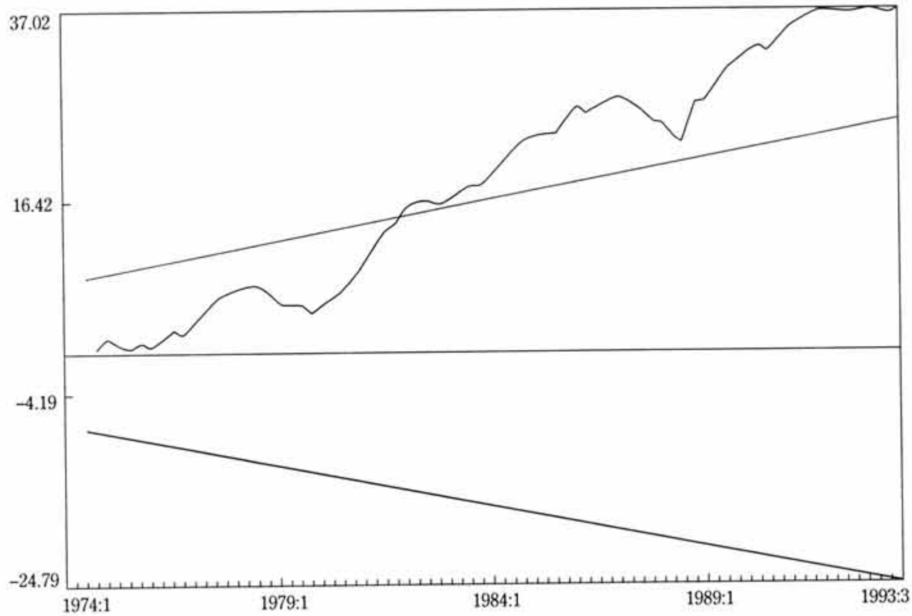

Figure 1
The Cumulative Sum of Recursive Residuals
(Equation 10 without Dummy)

The significance of D in itself implies structural instability. The behavior of the sum of recursive residuals now looks as shown in Figure 2, exhibiting no structural instability because this is now reflected by the dummy variable.[12]

In order to form an idea about the move, or otherwise, towards perfect equality of real interest rates of Australia and New Zealand (and therefore perfect market integration), we estimate equation (11) in a time-varying parameter (TVP) framework. In this case the coefficients b_0 and b_1 are not assumed to be fixed as in OLS but to change over time according to a particular generating process which may be a random walk. In order to illustrate the technique we may write equation (11) in a general form as

$$R(t) = R^{*}(t)B(t)+u(t) \tag{14}$$

12. The same conclusion can be reached by applying the Chow test to the cointegrating regression with a break point at the fourth quarter of 1982. The relevant test statistics are $\chi^2(2) = 12.28$ and $F(2,75) = 6.14$, both of which are statistically significant.

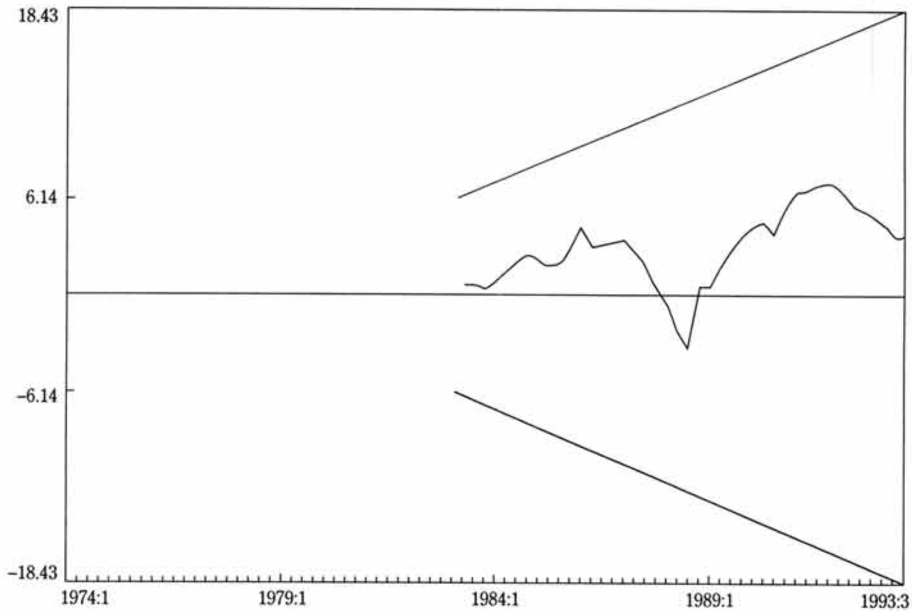

Figure 2
The Cumulative Sum of Recursive Residuals
(Equation 10 with Dummy)

where $B(t)$ is a vector of time-varying parameters and $u(t)$ is normally distributed with $E[u(t)] = 0$ and $\sigma^2[u(t)] = V$. A common specification of the parameter variation is

$$B(t) = AB(t-1) + w(t) \tag{15}$$

where $w(t)$ is a vector random variable with $E[w(t)] = 0$ and $\sigma^2[w(t)] = W$. A is a diagonal matrix given by

$$A = \begin{bmatrix} a_{11} & 0 & \cdots & 0 \\ 0 & a_{22} & \cdots & 0 \\ \vdots & \cdots & a_{n-1,\,n-1} & 0 \\ 0 & \cdots & 0 & a_{m} \end{bmatrix} \tag{16}$$

such that $0 < a_{ii} < 1$, $i = 1, 2, \ldots, n$.[13] The random walk model can be obtained

13. This restriction on the values of the elements of A is necessary to guarantee the stability of the generating process.

by setting $A = I$, *i.e.* $a_{ii} = 1\ \forall i$. The estimation of the vector $B(t)$ can be carried out recursively using the Kalman filter technique.[14] This is because equations (14) and (15) form the state space representation of the system, in which equation (14) is the measurement equation and equation (15) is the transition equation which allows for systematically varying parameters. The state of the system $B(t)$ is not directly observable but can be observed through $R(t)$. Let

$$E[B(t) \mid R(t-1)] = B(t \mid t-1) \tag{17}$$

and

$$E[B(t)-B(t \mid t-1)][B(t)-B(t \mid t-1)]' = \sigma^2(t \mid t-1) \tag{18}$$

The Kalman filter equations are given by

$$B(t \mid t-1) = AB(t-1 \mid t-1) \tag{19}$$

$$\sigma^2(t \mid t-1) = A\sigma^2(t-1 \mid t-1)A' + W \tag{20}$$

$$G(t) = \sigma^2(t \mid t-1)R^{*'}(t)[R^*(t)\sigma^2(t \mid t-1)R^{*'}(t)+V]^{-1} \tag{21}$$

$$B(t \mid t) = B(t \mid t-1) + G(t)[R(t) - R^*(t)B(t \mid t-1)] \tag{22}$$

$$\sigma^2(t \mid t) = V(t \mid t-1) - G(t)R^*(t)R^*(t)\sigma^2(t \mid t-1) \tag{23}$$

while the initial conditions are given by

$$B(0 \mid 0) = B(0) \tag{24}$$

$$\sigma^2(0 \mid 0) = \sigma^2(0) \tag{25}$$

This system of equations tells us that the optimal estimator of $B(t)$ at time t, $B(t \mid t)$ is represented by a linear combination of the previous estimator, and the current observation, $R(t)$. Equation (22) shows the recursive nature of the computation.

The smoothed time varying parameters $b_0(t)$ and $b_1(t)$ are shown in Figure 3 and Figure 4 respectively. Figure 3, which plots the value of the time varying intercept term, $b_0(t)$, shows some sort of tendency towards returning to the value of zero. Figure 4, which plots the value of the time varying

14. See, for example, Cuthbertson et al. [1992], Chapter 7.

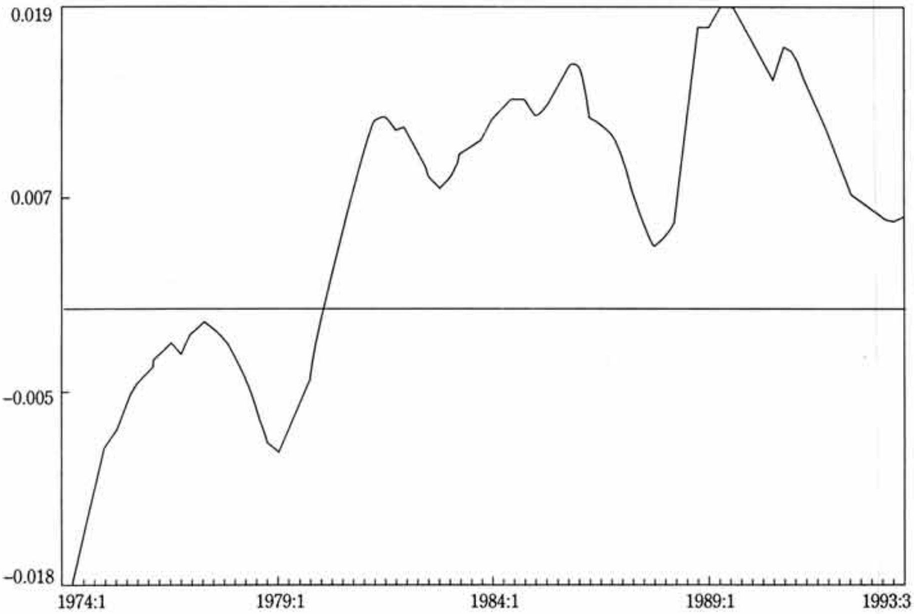

Figure 3
Smoothed Time-Varying Intercept Term

slope term, $b_1(t)$, indicates that although the value of this parameter is far away from unity, there has been an upward move towards the value of 1 starting around the time of the implementation of the CER and the liberalization of financial markets.

So far, we have examined the evidence for the joint integration of financial and goods markets. In order to examine these markets separately, we may use the procedure proposed by Frankel and MacArthur [1988] which is based on splitting the real interest differential into covered interest differential (measuring financial market integration) and the real forward discount which measures goods market integration. Unfortunately, data on the forward rate between the Australian and New Zealand dollar are only available in the post-CER period, more precisely from 1985 onwards.[15] However, this is still a useful exercise in the sense that the behavior of these two variables over time shows changes in the extent of market integration during this period.

15. Data on forward rates were obtained from Datastream, Barclays Bank series.

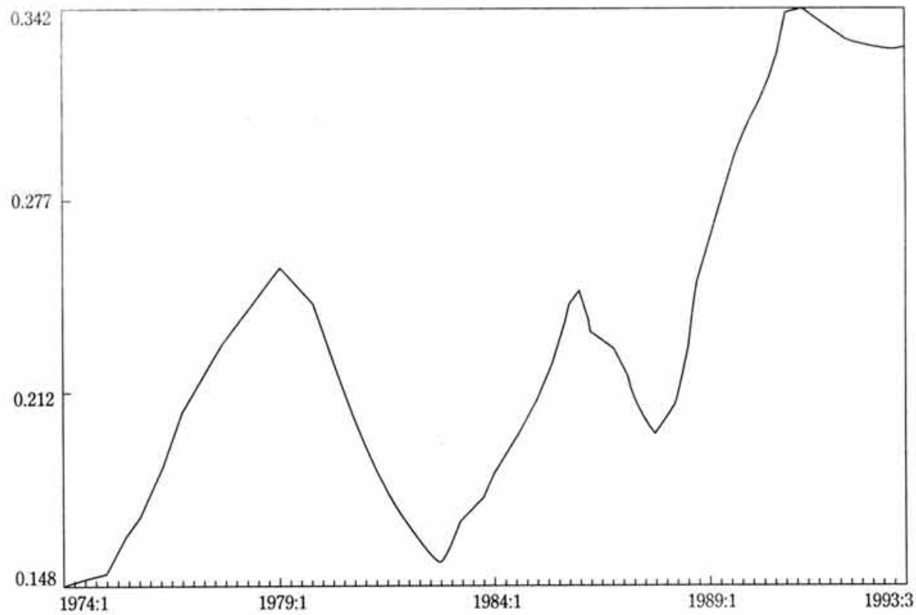

Figure 4
Smoothed Time-Varying Slope Term

The covered interest differential and real forward discount are shown in Figures 5 and 6 respectively. Figure 5 shows that while the covered interest differential was significant in the period immediately following the abolition of capital controls, it became less than what could be accounted for by transaction costs.[16] One explanation for this change in behavior is that the earlier period was characterized by the presence of political risk (the risk of re-imposing capital controls). In general, this behavior indicates an increasing degree of financial market integration. Figure 6 shows similar behavior for the real forward discount which seems to have shrunk significantly in the 1990s. One explanation for this change in behavior is that free trade in commodities was achieved on July 1, 1990 with the elimination of all forms of trade restrictions between the two countries. Furthermore, Table 4 reports the basic statistics of the absolute covered interest differential and real forward discount, indicating that financial market integration seems to have been closer than goods markets integration although CER does not have

16. Transaction costs are normally assumed to be 0.5%.

any provisions for trade in capital. Thus, it must be the effect of financial deregulation in both countries.[17]

Table 4
Basic Statistics of the Absolute Covered Differential and Real Forward Discount (1985-1993)

	Covered Differential (%)	Real Forward Discount (%)
Minimum	0.004	0.016
Maximum	3.62	4.36
Mean	0.37	1.19
Standard Deviation	0.63	1.24

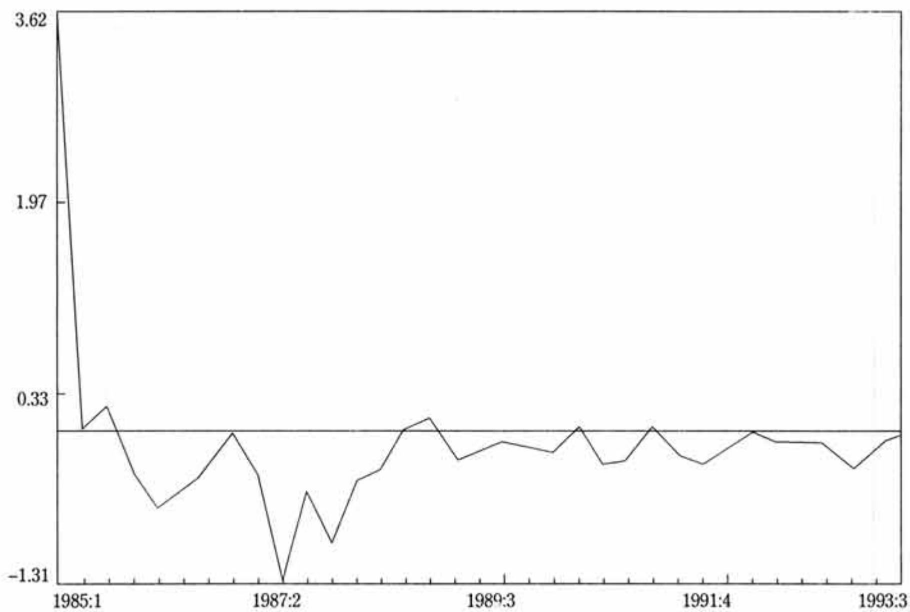

Figure 5
Covered Interest Differential (Australia-New Zealand)

17. Moosa [1995] presents a formal empirical evidence on the separate integration of Australian and New Zealand financial and goods markets. The evidence shows that both UIP and ex ante PPP hold in a weak form, implying less than perfect integration.

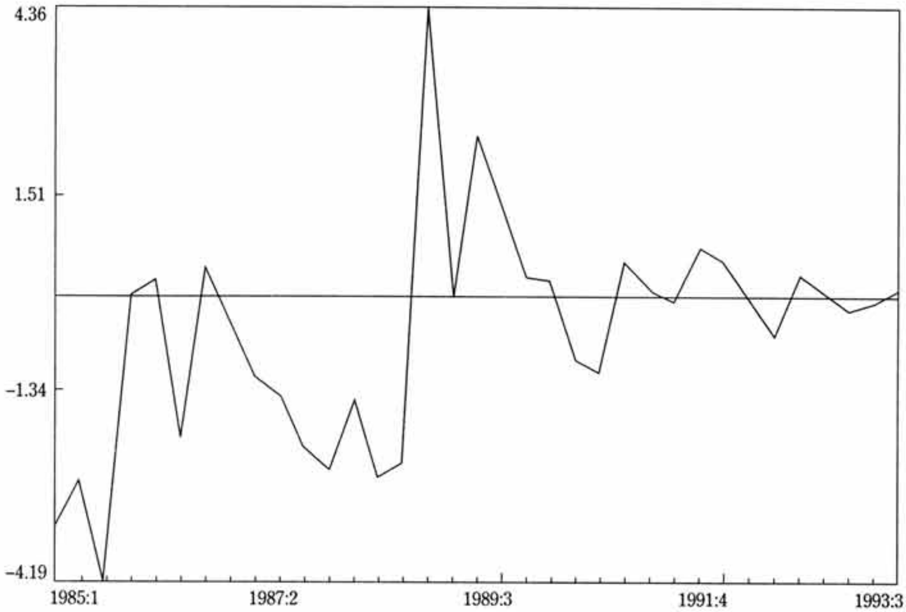

Figure 6
Real Forward Discount (Australia-New Zealand)

IV. Conclusion

This paper has used a battery of econometric tests to detect real interest rate linkages between Australia and New Zealand in order to find out whether or not the implementation of the CER and financial deregulation in the 1980s has led to the integration of financial and goods markets. The empirical findings can be summarised as follows:

(1) Australian and New Zealand real interest rates were not cointegrated in the pre-CER period but became cointegrated in the post-CER period.

(2) The New Zealand and U.S. rates were not cointegrated in either period, while the Australian and U.S. rates were cointegrated in both periods.

(3) The cointegrating regression relating Australian and New Zealand rates shows a structural break around the time of the implementation of the CER and financial deregulation. When a dummy variable for the post-CER period is included, structural instability disappears. This dummy variable turned out to be statistically significant.

(4) The cointegrating regression failed to pass the Chow test of structural stability when the breakpoint coincides with the implementation of CER.

(5) TVP estimation of the cointegrating regression shows that the coefficients have moved with time towards the values 0 and 1.

(6) The covered interest differential and real forward discount shrank in the 1990s.

We are inclined to interpret these results in favour of the proposition that the implementation of CER and financial deregulation has led to a greater degree of integration between Australian and New Zealand financial and goods markets. Although another plausible explanation is business cycle coherency through policy co-ordination, the last piece of evidence (6) tends to support the first explanation. The change in the behavior of the covered interest differential and real forward discount in the 1990s seems to be related to financial deregulation and CER respectively. It is a well-established observation that capital controls lead to deviations from CIP, which means that the abolition of capital controls should lead to insignificant deviations from CIP. So, why did these deviations become insignificant towards the 1990s (Figure 5)? The answer to this question is found in political risk as related to capital controls. It seems that it took investors on both sides of the Tasman a long time to conceive the abolition of capital control as a permanent, irreversible measure, and when that stage was reached the political risk premium declined to zero, leading to the shrinkage of the covered interest differential. On the other hand, an explanation for the shrinkage of the real forward premium in the 1990s, a long time after the implementation of the CER is that trade barriers were not removed completely until July 1990. In any case one may be able to reconcile the policy factor with this explanation by observing that Australia and New Zealand pursued similar trade liberalization and commercial policies vis-a-vis each other which enhanced the effect of CER.

We may, therefore, state our final conclusion as follows. The evidence presented in this paper can be interpreted in favour of the proposition that CER and the accompanying measures of financial deregulation have made some contribution to achieving a higher degree of integration between Australian and New Zealand goods and financial markets. Although the situation is far from one of perfect real interest equality or perfect market integration, there is some evidence that the move in this direction has been enhanced since the early 1980s.

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