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**Australia and New Zealand CER Agreement and
Breakpoints in Bilateral Trade: An Application of the
Wald-type Test**

Kankesu Jayanthakumaran

and

Mosayeb Pahlavani

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Kankesu Jayanthakumaran* and Mosayeb Pahlavani

Abstract

This paper investigates the impact of the Australia-New Zealand Closer Economic Relations (CER) Trade Agreement on bilateral trade of each member country by using historical time series data before and after the implementation of the CER. We determined the existence of endogenously determined structural breaks over the last 30 years. The Vogelsang (1997) Wald-type testing procedure is then used to test for the existence of a break at an unknown time in the trend function of the dynamic time series. The advantage of this model is that the procedure does not impose any restriction on the nature of the data since it allows for either trending or unit root series, or both, in the model. Using a Wald-type test for detecting breaks in the trend function of a univariate time series, we found that a significant trend break detected in New Zealand in 1988 coincided with the extensive review of the CER in 1988.

JEL classification numbers: C12, C22, C52, F13

Key words: Trend breaks, Wald-type testing, Australia - New Zealand integration

1. Closer Economic Relations (CER) Agreement – Background

The 1983 Closer Economic Relations (CER) Agreement between Australia and New Zealand committed to the gradual elimination of tariffs and non tariff barriers and the promotion of trans-Tasman trade of highly protected manufacturing products.¹ The CER agreement did not specify the common external tariffs/taxes/subsidies for the rest of the world and therefore did not reach the status of a customs union. In the absence of the above restriction, the CER member countries, i.e Australia and New Zealand were free to enhance the benefits associated with unilateral liberalization at their own pace. The CER agreement was unique among other regional trading arrangements at the time by freeing all goods and services completely and allowing free movement of residents of both countries. Hence, the CER was considered an

* Kankesu Jayanthakumaran, School of Economics and Information Systems, University of Wollongong, Wollongong NSW 2522, Australia. Mosayeb Pahlavani, Faculty of Economics and Administration Sciences, The University of Sistan & Baluchestan, Zahedan, Iran.

¹ Trans-Tasman economic relations first evolved in 1922 but were not effective because of assured access to the British market. In 1965 the New Zealand and Australia Free Trade Agreement (NZAFTRA) was signed but it applied to a limited range of goods. It was found that the agreement addressed only the forest products sector (Lloyd, 1994) and the proportion of trans-Tasman trade declined after 1965 (Bureau of Industry Economics, 1995).

example of well-advanced integration parallel to the European Community in 1992 rather than the Canada-US Free Trade agreement of 1989 (Lloyd, 1994).

In an extensive review of the CER in 1988, Australia and New Zealand abandoned import licensing outside industry plans and announced tariff reductions. It was decided to bring forward the date of free trade to 1990, five years ahead of the original schedule. The 1988 review of the CER further incorporated a Protocol on Trade in Services (liberalization of services), the abolition of anti-dumping provisions (retaining the option of imposing counter-vailing duties), elimination of government procurement preferences and limited bureaucracy in inter-governmental cooperation. Agreements were also reached on harmonizing customs procedures, avoiding industry assistance for most industries, establishing labor mobility between the countries and harmonizing business law.

The general findings of the earlier studies that associated the CER with trans-Tasman trade flows and intra-industry trade show some positive results (Bollard and Thompson, 1987; Menon, 1994; Bureau of Industry Economics, 1995). Menon (1994) found substantial increases in the shares of intra-industry trade for both total and trans-Tasman trade, and that industries that had experienced the largest reductions in protection levels (due to both unilateral and regional liberalization) had increased their shares of intra-industry trade. Lloyd (1994) concluded that there was a strong case for Australia and New Zealand to form a single market by removing all impediments to trade and investment. Overall, empirical measurement of the economic impact on the CER region is in its infancy.

Unilateral liberalisation

Australia and New Zealand initiated reforms in international trade, state owned enterprises, the labour market, the waterfront and taxation (see, for example, Bureau of Industry Economics, 1995). Thus, the CER partner countries were integrated more than ever, partly due to the CER initiated by them and partly due to market forces initiated by globally oriented trade liberalisation policy. This allowed the CER partner countries to reap the positive effects of economic regionalism (Scollay, 1996) without experiencing any negative consequences associated with preferential measures.

Unilateral liberalisation measures, industry specific reforms and the microeconomic reforms taken by the CER partner countries outside the CER framework have eliminated inefficiencies and transaction costs and promoted CER trade flows since the 1980s. Both countries have the potential benefit of lower transportation cost. In Australia, the average

Effective Rate of Assistance (ERA) for the manufacturing sector has been reduced from 20 per cent in 1986 to 5 per cent in 2002. Massive tariff and non tariff reductions occurred in the automobile, textiles and clothing industries. Major tariff and non-tariff reductions in Australia occurred during 1988-1992 (Jayanthakumaran, 2002). New Zealand experienced intensive tariff reductions in the manufacturing sector during 1986-88, and the average ERA has been reduced from 37 per cent in 1986 to 26 per cent in 1988 (Table 1).

Table 1: Nominal and Effective Rates of Assistance for Australia and New Zealand

Assistance	1986	1988	1993	2002
NRA in % (Manufacturing)				
- Australia	12	11	6	3
- New Zealand**	19	14	-	-
ERA in % (Manufacturing)				
- Australia	20	19	10	5
- New Zealand*	37	26	-	<5

Notes: Australian data refers to the financial year. *Lattimore and Wooding (1996), **Lattimore (2006).

The CER agreement is supposed to raise industry assistance in both countries relative to the rest of the world. The Productivity Commission (2004) estimated the effect of the CER on industry assistance and concluded that it is likely to have increased fractionally the effective assistance to manufacturing industry on both sides of the Tasman. Fare, Grosskopf and Margaritis (2001) concluded that the Australian manufacturing sector shows a better rate of labour productivity performance while total factor productivity is estimated to be higher in New Zealand manufacturing. Australia experienced a relatively higher degree of market regulation and low capital intensity in the production process. New Zealand experienced positive technical change gains by adopting state-of-the-art technology, ignoring diffusion of technology. Black, Guy and McLellan (2003) found that total factor productivity growth of Australia and New Zealand (incorporating all sectors) has been similar for the period 1988-2002. These authors further noted that Australia tends to have had relatively high average labour productivity while New Zealand has tended to show relatively high average capital productivity growth since 1994. Trade liberalisation of the manufacturing sector has had a positive effect on trade flows in both New Zealand (Lattimore and Wooding, 1996) and Australia (Jayanthakumaran, 2002).

Bilateral trade flows

One of the expectations of the CER agreement is to promote bilateral trade flows. The CER partner countries are likely to integrate more with unilateral liberalization initiated by globally oriented trade liberalization policy and lower transportation cost.² The Australia and New Zealand CER committed to the positive aspects of regionalism without ignoring the potential benefits that arise from 'global orientation'.

The visual inspection of Figures 1 & 2 indicates a substantial acceleration in Australia's share of bi-lateral trade in terms of Australia's overall trade and GNI since 1993. Australia exhibits a trend break (TB) in 1993. Figures 1 & 2 show a slow-down in bilateral trade flows during 1990-1992 and this may be partly due to the on-going trade reform programs of 1988-1992 and the recession of the Australian economy during 1990-1991. Note that the Australian economy experienced a slowdown due to the profound effects of the very deep recession during 1990-1991. Valadkhani, Layton and Pahlavani (2005, 29) obtained trend breaks for 10 macroeconomic variables in the Australian economy during the 1990-1991 recession.

The visual inspection of Figures 3 & 4 indicates a substantial acceleration in New Zealand's share of bi-lateral trade in terms of New Zealand's overall trade and GNI since 1988. New Zealand exhibits a trend break (TB) in 1988. In an extensive review of the CER in 1988, New Zealand abandoned import licensing, announced tariff reductions and initiated further reforms of trade in services, government procurement preferences, bureaucracy, customs procedures and labor mobility.

² Santos-Paulino and Thirlwall (2004) used panel data and time series/cross section analysis to estimate the effect of trade liberalisation on the growth of imports and exports for a sample of 22 developing countries since the mid-1970s and concluded that trade liberalisation stimulated exports and imports growth.

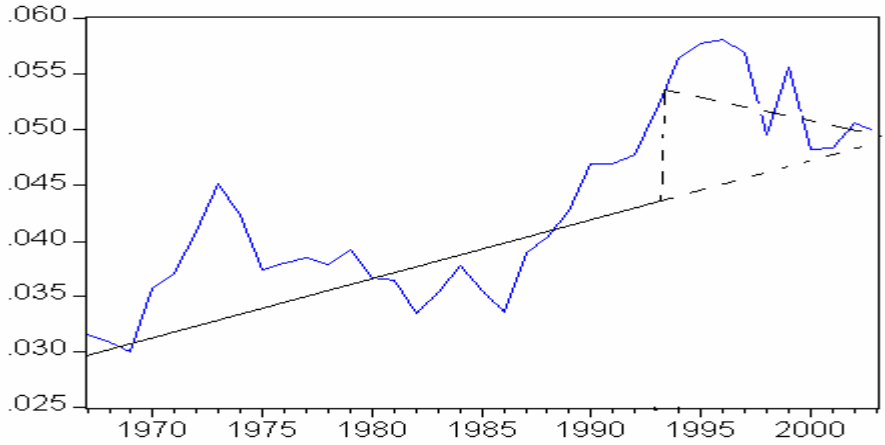


Fig. 1: Share of Aus-NZ Bilateral Trade as Proportion of Australia's Total Trade (BTAUSTT) (TB=1993)

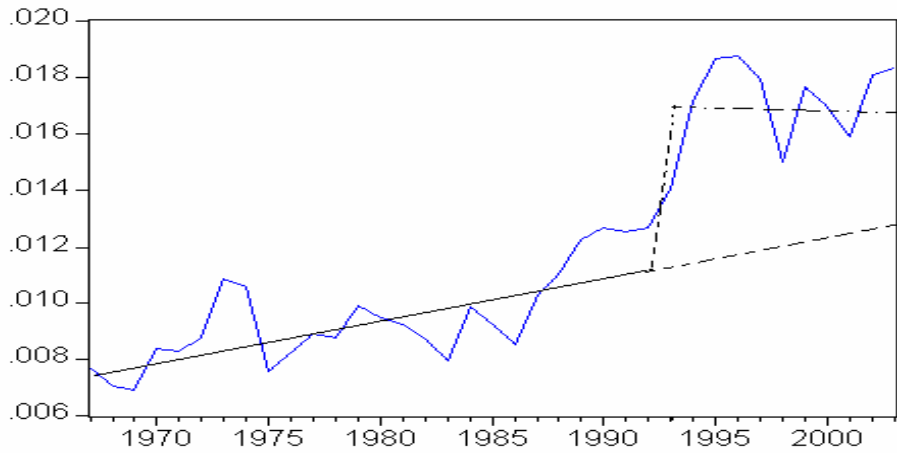


Fig. 2: Share of Bilateral Trade of Australian GNI (BTAUSGNI) (TB=1993)

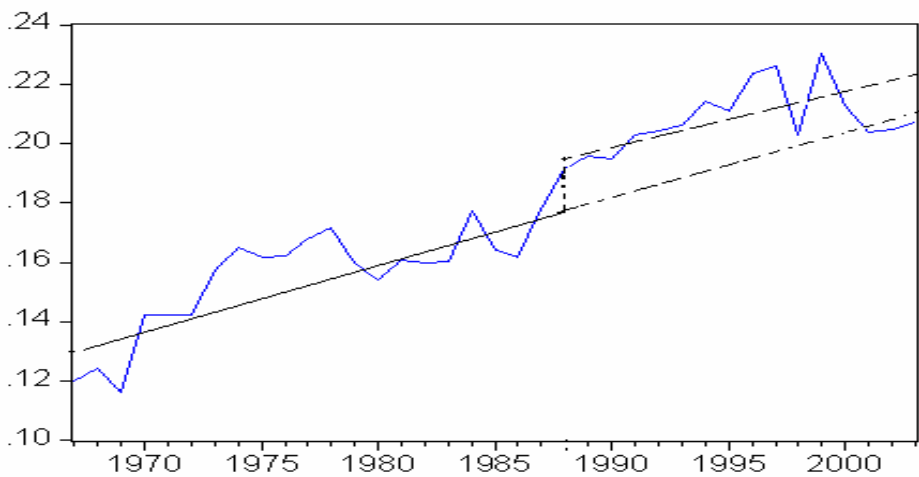


Fig. 3: Share of Aus-NZ Bilateral Trade as a Proportion of NZ's Total Trade (BTSNZTT) (TB=1988)

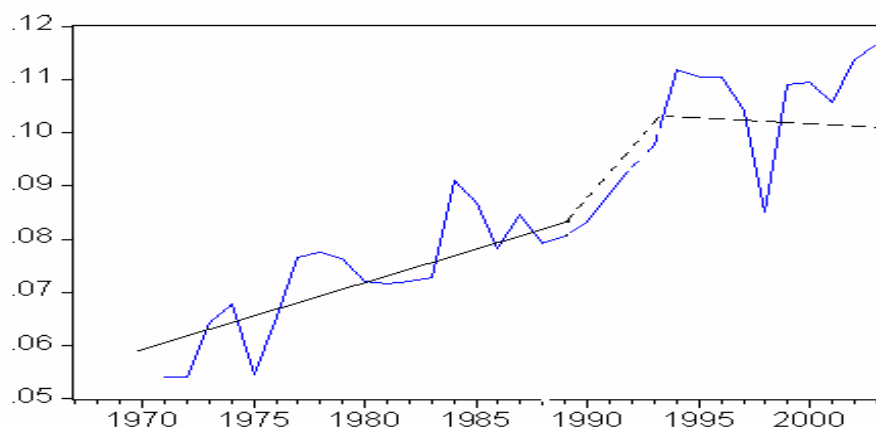


Fig. 4: Share of Bilateral Trade of NZ's GNI (BTNZGNI) (TB=1988)

Source: World Bank World Tables (2005)

Note: The endogenously determined times of structural break are shown with dashed lines in Figures 1-4.

The remainder of the paper is structured as follows. Section 2 discusses the methodology and the specification of trend breaks. Section 3 analyses the findings, and the final section provides some concluding remarks.

2. Methodology: Wald-type Test for Determining the Trend Break Function

The aim of this paper is to provide evidence about the existence or non-existence of structural breaks in the bilateral trade data of these countries due to integration. In doing so, we will attempt to shed light on the trend behavior of these series. We utilize sequential trend break tests to determine the existence of significant structural breaks in income (GNI) and bilateral trade.

By utilizing recent methodological contributions to time series data analysis, it is possible to statistically determine if and when countries have experienced structural breaks in the time path of their trade and income. Following Vogelsang (1997) and Ben David and Papell (1997), the test for endogenously determining the significance of the structural breaks in the trend function of a dynamic time series is applied. It allows for an examination of series that are stationary or contain a unit root, trending or non-trending series. In other words, this testing procedure remains valid whether the data contains the unit root or is stationary (Abubader, 2002).

As Abubader (2002) noted, early tests for detecting structural changes simply assumed the data to be either non-trending or stationary. In this paper we utilize a test developed by

Vogelsang (1997) which detects and estimates breakpoints in the trend function of a time series. As mentioned above, the major advantage of this procedure is that it allows for trending and serial correlation data, and remains valid whether or not the series is stationary.

The Wald-type test suggested by Vogelsang (1997) consists of estimating the following equation for one break:

$$I_t = \mu + \beta_1 t + \beta_2 t^2 + \theta DU_t + \gamma_1 DT_t + \gamma_2 DT2_t + \sum_{j=1}^K c_j I_{t-j} + \varepsilon_t \quad (I)$$

where I_t equals the variable to which we apply this procedure in order to endogenously determine structural breaks in its trend function. T_B denotes the time of the break, which is unknown. The break dummy variables have the following values: ($DU_t = 1$ if $t > T_B$ and zero otherwise), ($DT_t = t - T_B$ if $t > T_B$ and zero otherwise), and finally, ($DT2_t = (t - T_B)^2$ if $t > T_B$, 0 otherwise).

It is important to note that the exact specification of the test depends on what type of trend is present in the data. In fact, there are three options. If both a linear and quadratic trend is allowed, equation 1 is estimated as written (model I). For linear trending data where the quadratic trend is absent, $\beta_2 = \gamma_2 = 0$ (model II). Finally, model III is estimated for non-trending data where both linear and quadratic trends are absent ($\beta_1 = \gamma_1 = \beta_2 = \gamma_2 = 0$).

It is worth noting that the empirical literature does not indicate which of these models is most appropriate. According to Ben David and Papell (1997), if a series under investigation truly exhibits a trend (either linear or quadratic), then estimating a model like model (III) that does not have a trend variable may fail to capture some important characteristics of the data. On the other hand, if there is no upward or downward trend in the data, the test power to reject the no-break null hypothesis is reduced as the critical values increase with the inclusion of a trend variable. Therefore, prior to estimating these models we have to check the trend property of the variables under investigation. In this research, since the visual inspection of the time series data under investigation did indicate that these variables have upward or downward trends, we considered this by estimating model II of Vogelsang's Wald-type test (1997), which is more appropriate for linear trending data.

Following Vogelsang (1997) and Ben David and Papell (1997), this model is estimated sequentially for each T_b with 15 percent trimming $0.15T < T_b < 0.85T$, where T is the number

of observations. The critical values for both stationary and unit root data are as reported in Vogelsang (1997). If the calculated values of the Wald test statistic are larger than the critical values under the unit root case, the null hypothesis of no trend break will be rejected. If these values are less than the critical values of Sup Wt with a unit root but larger than those in the stationary case, we have to test for unit root. We can conclude that a breakpoint exists if we are able to reject the null hypothesis of unit root. It is important to understand that the break years are determined endogenously with no *a priori* assumptions.

The lagged values of the variables under investigation are included in equation (1) to account for serial correlation. As stated above with reference to Pahlavani et al. (2005), the truncation lag parameter or k is determined using the data-dependent method proposed by Perron (1997). That is, the choice of k depends upon whether the t -ratio of the coefficient associated with the last lag in the estimated autoregression is significant. The optimum k (or k^*) is selected such that the coefficient on the last lag in an autoregression of order k^* is significant and that the last coefficient in an autoregression of orders greater than k^* is insignificant, up to a maximum order k (Perron, 1997). Following Lumsdaine and Papell (1997) it is assumed that $k_{max} = 8$. It is very important to note that the Wald test statistic is the maximum and equals twice the standard F statistic for testing the null hypothesis of no trend break, indicated by $\theta = \gamma_1 = 0$. Our 'model I' indicates three times the standard F statistic and 'model III' shows the equal to the standard F statistic.

As Kocenda (1999) aptly noted, however, because of the way in which the SupFt statistic is computed, it is clear that not every peak within the data should be considered as some dramatic point of change. Firstly, the importance of a peak is relative to its size, but even a large peak may not necessarily coincide with the point of a true structural break. Even a number of apparently significant peaks occurring within a short period, though increasing volatility, do not necessarily indicate structural change because that is not related to the magnitude of volatility. It must also be noted, however, that in the presence of high volatility, the test may detect a break because high volatility or variance can affect the reliability of the test.

3. Empirical Results

Table 2 indicates that the null hypothesis of no breakpoints could be rejected if all series under investigation are subject to trend stationarity. However, as we are not sure about the trend stationarity of the data, we have to compare the Sup Wt with the critical values for the

I(1) case as well. By doing so we still find trend breaks in three out of four cases. In the remaining case the calculated values of the Sup W_t statistic are between the critical values of the stationary and the unit root cases and so we applied the Zivot-Andrews (1992) and ADF tests and found that this variable contains unit root. Therefore, in three cases the endogenously determined break point is statistically significant and only in the remaining one case is it not statistically significant. (The results of the ZA and ADF testing procedures are not reported here, but are available upon request from the authors).

Table 2: Sequential Trend Break Tests for Australia-New Zealand Bilateral Trade

Variable	Estimated Break Date	Sup W_t	K	Possible Cause of Break
BTSAUSTT	1993	13.417	4	?
BTSNZTT	1988	40.365	3	Review of CER
BTAUSGNI	1993	23.845	4	?
BTNZGNI	1988	19.594	8	Review of CER

Note: Critical Values at the 10, 5 and 1 percent significance level of the Sup W_t are 11.25, 13.29 and 17.51 in the stationary case and 22.29, 25.10 and 30.36 in the unit root case, respectively (Source: Vogelsang, 1997). BTSAUSTT = Share of Aus-NZ Bilateral Trade in Australia's Total Trade, BTSNZTT = Share of Aus-NZ Bilateral Trade in NZ's Total Trade, BTAUSGNI = Share of Bilateral Trade of Australian GNI, BTNZGNI = Share of Bilateral Trade of NZ GNI.

There was a substantial increase in the share of NZ bi-lateral trade in terms of New Zealand's overall trade and GNI mainly due to the extensive review of the CER in 1988. The trend breaks found in New Zealand's trade coincide with the extensive review of the CER in 1988. We did not find a similar result for Australia. In Australia, the trend break occurred in 1993. As we noted, this may be partly due to globally oriented policy changes during 1988-1992 and partly due to the slowdown in the Australian economy due to the profound effects of the very deep and prolonged 1990-1991 recession. Our results show that the share of bilateral trade fell right after the trade reforms and stabilized after the recession.

4. Conclusion

This paper examines the impact of the Australia-New Zealand Closer Economic Relations (CER) Trade Agreement on the bilateral trade of each member country by determining the existence of endogenously determined structural breaks over the last 30 years. Using a Wald-type test for detecting breaks in the trend function of a univariate time series, we found that a significant trend break was detected in New Zealand in 1988. The trend break found in New Zealand coincides with the extensive review of the CER in 1988. In other words, while there are other factors that may have influenced these time series over the sample period, major structural change occurred in the period of policy changes to the Australia-New Zealand CER

Trade Agreement. The trend breaks found in Australia were in 1993, which is unexpected. The link between regional cooperation and globally oriented policy issues deserves future investigation.

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