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Financial Systems and Economic Growth: Empirical Evidence from Australia

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ABSTRACT This paper examines the dynamic impact of both bank- and market-based financial development on economic growth in Australia during the period from 1980 to 2012. The study uses the autoregressive distributed lag (ARDL) bounds testing approach to examine this linkage. Unlike certain previous studies, this study uses both bank- and market-based financial development indices to measure the level of financial sector development in Australia. These indices were computed using the means-removed average method. The empirical results of this study show that while bank-based financial development has a short-run positive impact on economic growth in Australia, market-based financial development has no significant impact on economic growth, both in the short run and in the long run. These results imply that, in Australia, it is of paramount importance to concentrate on pro-banking sector policies, at least in the short run, to stimulate growth.

KEY WORDS: Australia, bank-based financial development, market-based financial development, economic growth

JEL Classification: G10, G20, O16

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Introduction

Although there is rich literature on the finance-growth nexus, the bulk of such literature is on the relationship between bank-based financial development and economic growth. Only a handful of studies provide coverage on the relationship between market-based financial development and economic growth. However, even in studies that have explored the economic growth impact of market-based financial development, the conclusions are far from conclusive.

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In the finance-growth literature, there is evidence in support of a positive relationship between financial development and economic growth (Akinlo & Akinlo, 2009; Adu, Marbuah, & Mensah, 2013; Bernard & Austin, 2011; Goldsmith, 1969; Hassan, Sanchez, & Yu, 2011; Kargbo & Adamu, 2009; King & Levine, 1993; Levine & Zervos, 1996; Odedokun, 1996). Despite such overwhelming evidence, some studies conclude that bank-based and market-based financial development have a negative impact on economic growth (Adu *et al.*, 2013; Bernard and Austin, 2011; Buffie, 1984; De Gregorio and Guidotti, 1995; Ujunwa and Salami, 2010; Van Wijnbergen, 1983). In addition to these two contrasting groups of empirical evidence,

there is a third group that concludes that financial development has no significant impact on economic growth (Andersen & Tarp, 2003; Lucas, 1988; Ram, 1999; Stern, 1989).

In this context, the current study aims to examine the impact of bank-based and market-based financial development on economic growth using data for Australia over the period from 1980 to 2012. The study period was dictated by the availability of the stock market data. This study differs fundamentally from most of the previous studies on the finance-growth nexus in a number of ways. Firstly, it splits financial development into bank- and market-based components, and it focuses on the impact of each component on economic growth. Secondly, the study uses the indices of bank- and market-based financial development, which are created from a wide range of bank- and market-based financial development indicators. The use of these indices ensures that the financial landscape of the studied country is captured as accurately as possible, unlike in most other studies in which one or two bank-based financial development indicators are used to capture a whole financial system. Thirdly, this study uses the recently developed autoregressive distributed lag (ARDL) bounds approach to cointegration, which is appropriate even when a sample size is too small (see also Odhiambo, 2008). Finally, contrary to the bulk of the previous studies that have over-relied on cross-sectional data, which may not have adequately addressed country-specific issues, this study uses time-series data analysis methods to address country-specific issues (see also Ghirmay, 2004; Odhiambo, 2009).

The study focuses on Australia because the country has not received much individual coverage in terms of the finance-growth nexus research in recent years. Australia also makes an interesting case study because of its recent visibility as one of the leading economies and its distinguished resilience in the context of the recent global financial crises. Australia has one of the best-developed financial systems in the world. Both the bank- and the market-based financial segments of the financial sector are equally well developed.

At the top of the Australian financial system is the Reserve Bank of Australia, which is the country's central bank. The Reserve Bank of Australia is responsible for monetary policy and related matters, and it ensures that the Australian financial fundamentals are in order (Reserve Bank of Australia, 2013). The Australian banking sector is stable, and its banks are well capitalized in the context of a sound and effective supervisory environment (Bologna (2010). From the market-based financial side, the Australian stock market is made up of three stock exchanges, namely, the Australian Securities Exchange Group, the National Stock Exchange of Australia, and the Asian Pacific Stock Exchange. These stock exchanges were born out of a string of stock exchanges that merged over time. Of the three, the Australian Securities Exchange Group is the largest.

As with any other financial sector, over the years, the Australian financial sector has undergone a wide range of reforms. According to Perkins (1989), the financial reform period can be divided into three phases: (i) A fully regulated era, which lasted into the late 1960s; (ii) a phase of attempted reform during the 1970s; and (iii) a reformed era, which began during the 1980s and continues into the present. In the banking sector, these reforms concentrated on improving legal, judiciary, regulatory and supervisory environments, promoting financial liberalization, rehabilitating financial infrastructure, restoring bank soundness and improving financial services for consumer protection. From the stock market perspective, the reforms focused on addressing the legal, regulatory, judiciary and supervisory aspects of the market, as well as the transformation of the trading environment. These wide-ranging reforms resulted in a well-developed financial sector, which is competitive and globally recognized.

The remainder of the article is set forth as follows. The next section provides a review of the related literature. The data, variable descriptions and model specifications are covered in section three. The results are set forth and discussed in section four, and some concluding remarks are drawn in section five.

Review of the Related Literature

Although the relationship between financial development and economic growth has received widespread attention in the modern history of economics, the conclusions have been far from conclusive. The finance-growth nexus debate can be traced to the work of Schumpeter (1911) during the early 20th Century. The thrust of the debate has been whether financial development has any impact on economic growth, and, if it has, whether the impact is positive or negative.

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Table 1. Studies Showing the Nature of Impact of Bank and Market-based Financial Development on Economic Growth

Author(s)	Region/Country	Results
Panel 1: Bank-Based Financial Development and Economic Growth		
De Gregorio & Guidotti, 1995	A large number of countries	Positive impact (in a large cross-country sample)
Odedokun, 1996	LDCs - 71 developing countries	Positive impact (in 85% of the 71 countries)
Ahmed & Ansari, 1998	India, Pakistan and Sri Lanka	Positive impact
Allen & Ndikumana, 2000	8 countries in Southern Africa – Botswana, Lesotho, Mauritius, Malawi, Swaziland, South Africa, Zambia and Zimbabwe	Positive impact
Güryay et al., 2007	Northern Cyprus	Positive impact (though negligible)
Kargbo & Adamu, 2009	Sierra Leone	Positive impact
Hassan et al., 2011	Low- and middle-income countries	Positive impact
Adu et al., 2013	Ghana	Positive impact (when credit to the private sector as ratio to GDP and total domestic credit are used as proxies of financial development)
De Gregorio & Guidotti, 1995	A large number of countries	Negative impact (in Latin America)
Odedokun, 1996	LDCs - 71 developing countries	Negative impact (in 15% of the 71 countries)
Adu et al., 2013	Ghana	Negative impact (when broad money stock to GDP ratio is used as proxies of financial development)
Ram, 1999	95 countries	No impact
Andersen & Tarp, 2003	74 countries	No impact
Panel 2: Market-Based Financial Development and Economic Growth		
Levine & Zervos, 1996	41 countries	Positive impact
Caporale et al., 2003	Four developing countries (Chile, Korea, Malaysia and the Philippines)	Positive impact
Bekaert et al., 2005	A large number of countries	Positive impact
Adjasi & Biekpe, 2006	14 African countries	Positive impact
Nurudeen, 2009	Nigeria	Positive impact
Akinlo & Akinlo, 2009	Seven countries in sub-Saharan Africa	Positive impact
Ujunwa & Salami, 2010	Nigeria	Positive impact (when stock market development is proxied by stock market size and turnover ratios)
Bernard & Austin, 2011	Nigeria	Positive impact (when stock market development is proxied by turnover ratio)
Ujunwa & Salami, 2010	Nigeria	Negative impact (when stock market development is proxied by total value of shares traded)
Bernard & Austin, 2011	Nigeria	Negative impact (when stock market development is proxied by market capitalization and value traded ratios)

Table 2. Variable Description

Variable	Description
y	Growth rate of real gross domestic product. It is a proxy for economic growth.
BD	An index of bank-based financial development, calculated as a means-removed average of M2, M3 and credit provided to the private sector by financial intermediaries. It is a proxy for bank-based financial development (see also Demirguc-Kunt and Levine, 1996)
MD	An index of market-based financial development, which is a means-removed average of stock market capitalization, stock market traded value and stock market turnover. It is a proxy for market-based financial development (see also Demirguc-Kunt and Levine, 1996)
IN	Investment, calculated as gross fixed capital formation as a percentage of GDP.
SA	Gross savings as a percentage of GDP
TO	Trade openness, which is the sum of the share of total imports in GDP and the share of total exports in GDP

To date, the overwhelming empirical evidence has been in favor of Schumpeter's (1911) notion that financial development has a positive impact on economic growth. From the bank-based financial development perspective, Odedokun (1996), Ahmed and Ansari (1998), Christopoulos and Tsionas (2004), Güryay, Şafakli, & Tüzel, (2007), Kargbo and Adamu (2009), Yonezawa and Azeez (2010), Hassan *et al.* (2011), and Adu *et al.* (2013), among other studies, have found evidence in support of the positive impact of bank-based financial development on economic growth in various countries. From the market-based financial development perspective, Levine and Zervos (1996), Caporale, Howells, & Soliman (2003), Bekaert, Harvey, & Lundblad, (2005), Adjasi and Biekpe (2006), Nurudeen (2009), Akinlo and Akinlo (2009), Ujunwa and Salami (2010) and Bernard and Austin (2011), among others studies, have reinforced the argument that market-based financial development has a positive impact on economic growth.

Despite overwhelming evidence that bank-based and market-based financial development have a positive impact on economic growth, alternative views still exist. There are a number of studies that provide evidence in support of the negative impact of financial development on economic growth. De Gregorio and Guidotti (1995), Bolbol, Fatheldina, & Omranb (2005) and Adu *et al.* (2013) found evidence of a negative relationship between bank-based financial development and economic growth in certain isolated instances, while Ujunwa and Salami (2010) and Bernard and Austin (2011) provide evidence that market-based financial development has a negative impact on economic growth in certain countries.

In addition to the strong view that there is a relationship between financial development (both bank- and market-based) and economic growth, irrespective of whether this relationship is positive or negative, there have been a few studies that suggest that financial development, whether bank- or market-based, has no impact on economic growth. These studies provide evidence in support of the notion that financial development and economic growth are not related, and they are two different phenomena that are independent of one another. Such studies include Ram (1999) and Andersen and Tarp (2003).

Table 1 summarizes the empirical studies on the impact of bank-based and market-based financial development on economic growth. Panel 1 shows studies on bank-based financial development and economic growth, while Panel 2 presents a summary of studies on market-based financial development and economic growth.

Data, Variable Description and Model Specification

Data

The annual time series data that are utilized in this study cover the period from 1980 to 2012; and were

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obtained from the World Bank Economic Indicators and the International Financial Statistics Year Books (IFS, various issues).

Variable Description

The description of the variables that are used in this study is given in Table 2.

The annual growth rate of real GDP is used as a proxy for economic growth (y). This proxy has been used extensively in the literature (Majid, 2008; Odedokun, 1996; Shan & Jianhong, 2006; Wood, 1993). Financial development, on the other hand, is proxied by bank-based and market-based financial indicators. In the modern literature, bank-based financial development is proxied by various indicators, as is market-based financial development. Thus, to produce an assessment of the overall level of "bank development" and "stock market development" within a country, an index was developed that averages the information that is contained in the individual indicators.

To this end, financial development is proxied by bank-based and market-based financial indicators. Bank-based financial development is proxied by a bank-based financial development index (BD), which is constructed from three bank-based financial development variables – namely M2 to nominal GDP (M2), M3 to nominal GDP (M3), and domestic credit to private sector divided by nominal GDP (C).

Market-based financial development, on the other hand, is proxied by a market-based financial development index (MD). This index was constructed from three market-based financial development variables, namely, stock market capitalization (CAP), the total value of stocks traded (TV) and turnover ratio (TOR). To compute a conglomerate index of bank-based financial development, the means-removed values of the three indicators of bank development were averaged in a two-step procedure (see also Demirguc-Kunt and Levine, 1996). Firstly, the means-removed values of M2 to nominal GDP (M2), M3 to nominal GDP (M3) and domestic credit to private sectors to nominal GDP (C) were computed. The means-removed value of variable X is defined as Xm = [X – mean (X)] / [ABS (mean (X))], where ABS (z) refers to the absolute value of z. For the mean (X), the average value of X over the 1980-2012 period was used.

Secondly, a simple average of the means-removed M2 to nominal GDP, M3 to nominal GDP and domestic credit to private sectors to nominal GDP, was taken to obtain an overall index of bank-based financial development (BD). The conglomerate index of market-based financial development (MD) was constructed in the same way.

In addition to the real GDP growth rate (y) and the financial development indicators (BD and MD), three other variables were introduced in the model. These additional variables comprise: the share of investment in GDP (IN), the share of savings in GDP (SA), and trade openness (TO). These three variables were included in the above model to fully specify the model. According to growth theory, the three additional variables exert a positive impact on economic growth; hence, their coefficients are also expected to be positive.

The Model

The empirical model that is used in this study to test the impact of bank-based and market-based financial development on economic growth is specified as follows:

$$y_t = \alpha_0 + \alpha_1 BD_t + \alpha_2 MD_t + \alpha_3 IN_t + \alpha_4 SA_t + \alpha_5 TO_t + \varepsilon_t \quad \text{(i)}$$

Where α_0 is a constant, α_1 - α_5 are respective regression coefficients and ε_t is the error term.

The ARDL model based on the specified empirical model in equation (i) is expressed as follows:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta BD_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta MD_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta IN_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta SA_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta TO_{t-i} + \Phi_1 y_{t-1} + \Phi_2 BD_{t-1} + \Phi_3 MD_{t-1} + \Phi_4 IN_{t-1} + \Phi_5 SA_{t-1} + \Phi_6 TO_{t-1} + \mu_{1t} \quad (ii)$$

Where: α_0 is a constant, α_1 - α_6 and Φ_1 - Φ_6 are respective regression coefficients; Δ is the difference operator; n is the lag length; and μ_t is the white noise error term.

The associated ARDL-based error correction model is specified as follows:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta BD_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta MD_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta IN_{t-i} + \sum_{i=0}^{n} \alpha_{5i} \Delta SA_{t-i} + \sum_{i=0}^{n} \alpha_{6i} \Delta TO_{t-i} + \delta ECM_{t-1} + \mu_t \quad (iii)$$

Table 3. Unit Root Tests for all Variables

Phillips-Perron (PP)				
Variable	Stationarity of all Variables in Levels		Stationarity of all variables in First Difference	
	Without Trend	With Trend	Without Trend	With Trend
y	-5.173***	-5.034***	–	–
BD	0.571	-2.672	-6.952***	-7.958***
MD	-1.285	-2.685	-6.479***	-6.460***
IN	-1.934	-1.874	-5.067***	-8.661***
SA	-1.786	-0.946	-4.448***	-6.297***
TO	-0.624	-3.257*	-7.439***	-7.167***
Perron, 1997 (PPURoot)				
Variable	Stationarity of all Variables in Levels		Stationarity of all variables in First Difference	
	Without Trend	With Trend	Without Trend	With Trend
y	-4.186	-4.247	-8.019***	-8.223***
BD	-5.983	-5.035	-6.998***	-7.307***
MD	-3.994	-4.171	-6.700***	-7.024***
IN	-4.839	-5.012	-5.542**	-5.771**
SA	-4.102	-4.032	-6.036***	-5.958**
TO	-4.284	-4.131	-6.652***	-6.548***

Note:*, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively

Unit Roots, Cointegration and Impact Analysis

Unit Root Tests

The variables were first subjected to unit root tests using the Phillips-Perron (PP) unit root test. To allow for possible structural breaks in data, the Perron (1997) unit root test (PPURoot) was also utilized. The detailed results of the unit root tests for all of the variables are presented in Table 3.

After being differenced once, the results that are reported in Table 3 show that all of the variables became conclusively stationary. Although the ARDL technique does not require that variables be pre-tested for unit roots, the stationarity test provides guidance as to whether the ARDL analysis is suitable because it is only applicable for the analysis of variables that are integrated of order zero or one. In this case, all of the variables are integrated of either order zero or one. As a result, the ARDL bounds testing method can be used in the estimation of the model.

ARDL Bounds-Testing Approach

The cointegration analysis in this study is based on the fairly newly developed ARDL bounds testing approach because of the numerous advantages that it offers over other alternative empirical analysis methods. First, the ARDL test has superior small sample properties when compared to the other conventional methods of testing cointegration (Pesaran and Shin, 1999). Thus, the ARDL test is suitable even when the sample size is small. Second, the ARDL method employs only a sin-

Table 4. Bounds F-Test for Cointegration

Dependent Variable	Function		F-statistic		Cointegration Status	
y	F(y|BD, MD, IN, SA, TO)		5.760***		Cointegrated	
			Asymptotic Critical Values			
Pesaran et al. (2001), p.300, Table CI(iii) Case III	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	3.41	4.68	2.62	3.79	2.26	3.35

Note: *** denotes statistical significance at 1% level

gle reduced-form equation, unlike the conventional cointegration methods that estimate the long-run relationships within a context of a system of equations (see also Duasa, 2007). Third, the technique provides unbiased estimates of the long-run model and valid t statistics even when some of the regressors are endogenous (see also Odhiambo, 2008). Finally, this technique can be employed regardless of whether the regressors are integrated of the same order or not, as long as they are integrated of an order of not more than one. Therefore, the ARDL approach is considered to be well-suited for the analysis of the impact of bank- and market-based financial development on economic growth in this paper. The method has also been increasingly used in recent empirical research.

Bounds F-Test for Cointegration

This section examines the long-run relationship between the variables in the specified model using the ARDL bounds testing approach. First, the order of lags on the first differenced variables in equation (ii) was determined. Finally, a bounds F-test was applied to equation (ii) to establish the existence of a long-run relationship between the variables under study. The results of the bounds F-test are displayed in Table 4.

The results of the ARDL bounds test for cointegration, which are displayed in Table 4, show that the calculated F-statistic of 5.760 is higher than the critical values that were reported by Pesaran, Shin, & Smith (2001) in Table CI(iii) Case III at a 1% significance level. Hence, it can be concluded that the variables in the specified empirical model are cointegrated.

Impact Analysis

Because y, BD, MD, IN, SA and TO are cointegrated, the ARDL procedure is used in the estimation of the model. The optimal lag-length for the specified model was determined using the Akaike information criterion (AIC) or the Bayesian information criterion (BIC). The optimal lag-length that was selected based on BIC was ARDL(1,1,0,1,0,0). The BIC-based model was chosen because it was more parsimonious than the AIC-based model. The long-run and short-run results of the selected model are reported in Table 5 Panel 1 and Panel 2, respectively.

The empirical results that are reported in Table 5 reveal that, in Australia, the impact of bank-based financial development on economic growth is time variant; while it is positive in the short run, it is negative in the long run. The positive impact is confirmed by the bank-based financial development coefficient in Panel 2, which is positive and statistically significant, as expected, while the negative impact is supported by the bank-based financial development coefficient in Panel 1, which is statistically significant but negative. Although the long-run bank-based financial development coefficient for Australia has an unexpected sign, it is not unique to this study. Several other studies have shown evidence of a negative association between the two (Adu *et al.*, 2013; De Gregorio & Guidotti, 1995).

Further, the results that are displayed in Table 5 show that market-based financial development has no significant impact on economic growth in Australia, irrespective of whether the model is estimated in the long run or in the short run. This finding is confirmed by the coef-

Table 5. Empirical Results of the Estimated ARDL Model

Panel 1: Long-Run Results	**Dependent variable is y**			
Regressor	Co-efficient	Standard Error	T-Ratio	Probability
C	9.14	10.18	0.90	0.380
BD	-0.11**	0.04	-2.66	0.014
MD	0.02	0.02	1.03	0.316
IN	-0.60	0.43	-1.40	0.178
SA	0.49*	0.28	1.75	0.096
TO	-0.02	1.17	-0.13	0.897
Panel 2: Short-Run Results	**Dependent variable is Δy**			
Regressor	Co-efficient	Standard Error	T-Ratio	Probability
ΔBD	0.14**	0.06	2.44	0.023
ΔMD	0.02	0.02	1.12	0.277
ΔIN	0.24	0.37	0.65	0.523
ΔSA	0.48**	0.22	2.13	0.045
ΔTO	-0.02	0.16	-0.13	0.895
ecm(-1)	-0.97***	0.18	-5.33	0.000
R-Squared	0.815	R-Bar-Squared	0.731	
SE of Regression	1.160	F-Stat F(6,24)	12.550[0.000]	
Residual Sum of Squares	26.923	DW statistic	1.816	
Akaike Info. Criterion	-50.945	Schwarz Bayesian Criterion	-57.951	

Notes: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively; Δ=first difference operator.

Table 6. Diagnostic Tests

LM Test Statistic	**Results [Probability]**
Serial Correlation: CHSQ(1)	0.560[0.454]
Heteroscedasticity: CHSQ (1)	2.488[0.115]
Normality: CHSQ (2)	4.240[0.086]
Functional Form: CHSQ(1)	0.967[0.326]

ficient of market-based financial development in Panels 1 and 2, which is insignificant. Thus, from these results, it can be concluded that, in Australia, it is bank-based financial development rather than market-based financial development that propels the real sector.

Other results reveal that, in Australia, savings have a positive impact on economic growth, both in the long run and in the short run. However, the long-run and short-run coefficients of investment and trade openness have been found to be insignificant. The results also reveal that the coefficient of ECM (-1) is negative and statistically significant, as expected.

The regression of the underlying ARDL model fits well, as is indicated by an R-squared of 81.5%. The

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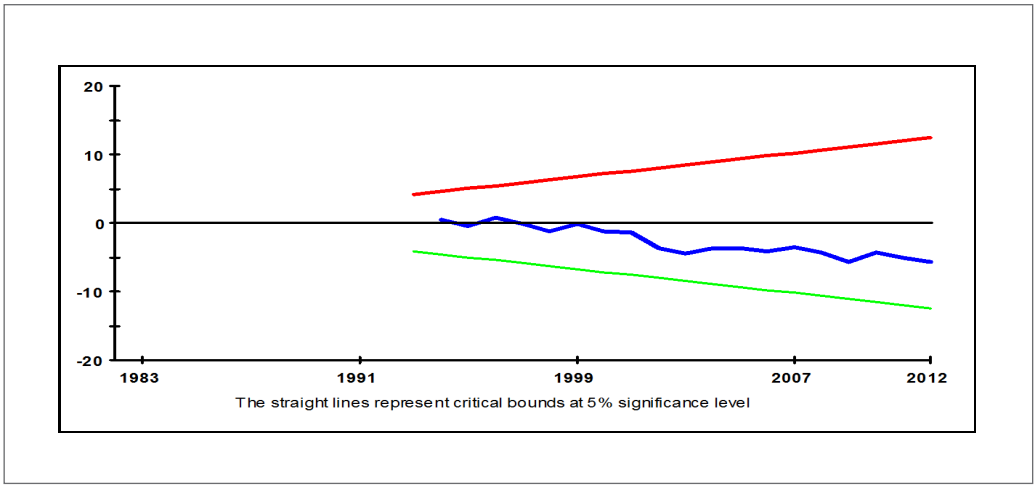

Figure 1. Plot of Cumulative Sum of Recursive Residuals

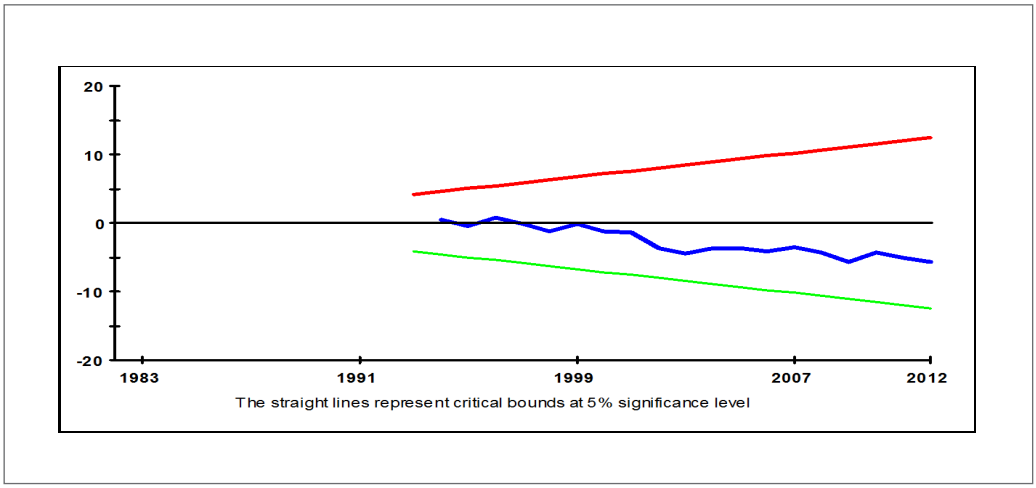

Figure 2. Plot of Cumulative Sum of Squares of Recursive Residuals

results of the diagnostic tests that were performed for serial correlation, functional form, normality and heteroscedasticity are displayed in Table 6, and they show that the model passed all of the tests except normality. However, an inspection of the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) graphs in Figures 1 and 2, respectively, shows that there is stability, and there is no systematic change identified in the coefficients at a 5% significance level over the study period. The CUSUM and CUSUMSQ graphs, therefore, confirm that the parameters in this model are stable over the sample period.

Concluding Remarks

This paper examined the impact of bank- and market-based financial development on economic growth in Australia during the period from 1980 to 2012 using the

ARDL bounds testing approach. Unlike some previous studies, the paper used bank-based and market-based financial development indices to measure the level of bank-based and market-based financial development. These indices were constructed using the means-removed average method. The empirical results show that, in Australia, bank-based financial development only has a positive impact on economic growth in the short run. In the long run, its impact on economic growth is largely negative. These results imply that, in order to stimulate growth in Australia, it is of paramount importance to concentrate more on the pro-banking sector policies, at least in the short run. These results also show that the relationship between financial development (whether bank-based or market-based) and economic growth is not clear-cut; as it is proxy-dependent and time-variant. Hence, the notion that both bank- and market-based financial development have a positive impact on economic growth calls for further scrutiny.

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