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Sheilla Nyasha

Nicholas M. Odhiambo

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Sheilla Nyasha
Department of Economics
University of South Africa
P.O Box 392, UNISA
0003, Pretoria
South Africa
Email: sheillanyasha@gmail.com

Nicholas M. Odhiambo
Department of Economics
University of South Africa
P.O Box 392, UNISA
0003, Pretoria
South Africa
Email: odhianm@unisa.ac.za / nmbaya99@yahoo.com

FINANCIAL SYSTEMS AND ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM AUSTRALIA

Sheilla Nyasha[1] and Nicholas M. Odhiambo

Abstract

This paper has examined the dynamic impact of both bank- and market-based financial development on economic growth in Australia – during the period 1980 to 2012. The study uses the autoregressive distributed lag bounds (ARDL) testing approach to examine this linkage. Unlike some previous studies, this study uses financial sector development indices to measure both bank- and market-based financial development. These indices were computed using the method of means-removed average. 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 or in the long run.

Keywords: Australia, Bank-Based Financial Development, Market-Based Financial Development, Economic Growth

JEL Classification Code: G10, G20, O16

1. Introduction

Although there exists rich literature on the finance-growth nexus, the bulk of this literature is on the relationship between bank-based financial development and economic growth. Only a handful of studies provide little coverage on the relationship between market-based financial development and economic growth. However, even where studies exploring the economic

[1] Corresponding author: Sheilla Nyasha, Department of Economics, University of South Africa (UNISA). Email address: sheillanyasha@gmail.com. This paper is based on the author's doctoral research at the University of South Africa (UNISA). The usual disclaimer applies.

growth impact of market-based financial development exist, the conclusions are far from being conclusive.

In the finance-growth literature, there is evidence in support of the positive relationship that exists between financial development and economic growth (see, among others, Goldsmith, 1969; King and Levine, 1993; Odedokun, 1996; Kargbo and Adamu, 2009; Hassan et al., 2011; Levine and Zervos, 1996; Akinlo and Akinlo, 2009; Bernard and Austin, 2011; and Adu et al., 2013). Despite this overwhelming evidence, there are some studies that conclude that financial development, bank- or market-based, has a negative impact on economic growth (Van Wijnbergen, 1983; Buffie, 1984; De Gregorio and Guidotti, 1995; Ujunwa and Salami, 2010; Bernard and Austin, 2011; and Adu et al., 2013). Besides these two contrasting groups of empirical evidence, there is a third group that concludes that financial development has no significant impact on economic growth (Lucas, 1988; Stern, 1989; Ram, 1999; and Andersen and Tarp, 2003; among others).

Against this background, 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 1980 to 2012. 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 created from a wide range of bank- and market-based financial development indicators. This ensures that the financial landscape of the study country is captured as accurately as possible, unlike in most other studies where one or two bank-based financial development indicators are used to capture the whole financial system. Thirdly, this study uses the recently developed autoregressive distributed lag (ARDL) bounds approach to

cointegration, which is appropriate even when the 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 to 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 capitalised, 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 biggest.

Like 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 could be

divided into three phases: (i) A fully regulated era, which stretched up to the late 1960s; (ii) a phase of attempted reform during the 1970s; and (iii) a reformed era, which started during the 1980s and onwards. In the banking sector, these reforms concentrated on improving the legal, judiciary, regulatory and supervisory environments, promoting financial liberalisation, rehabilitating the financial infrastructure, restoring bank soundness and improving the financial services for consumer protection. From the stock market side, the reforms focused on addressing the legal, regulatory, judiciary and supervisory aspects of the market, as well as the transformation of the trading environment. The result of these wide-ranging reforms was a well-developed financial sector, which is competitive and globally recognised.

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

2. Review of 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 being 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.

To date, overwhelming empirical evidence has been in favour of Schumpeter's (1911) notion that financial development has a positive impact on economic growth. From the bank-based financial development side, Odedokun (1996), Ahmed and Ansari (1998), Christopoulos and

Tsionas (2004), Güryay *et al*., (2007), Kargbo and Adamu (2009), Yonezawa Azeez (2010), Hassan *et al*. (2011), and Adu *et al*. (2013), among other studies, found evidence in support of the positive impact bank-based financial development has on economic growth in various study countries. From the market-based financial development front, Levine and Zervos (1996), Caporale *et al*. (2003), Bekaert *et al*. (2005), Adjasi and Biekpe (2006), Nurudeen (2009), Akinlo and Akinlo (2009), Ujunwa and Salami (2010) and Bernard and Austin (2011), among others studies, 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 *et al*. (2005) and Adu *et al*. (2013) found evidence of a negative relationship between bank-based financial development and economic growth in some isolated instances; while Ujunwa and Salami (2010) and Bernard and Austin (2011) provide evidence of a negative impact market-based financial development has on economic growth in some selected countries.

Besides this strong view that there exists a relationship between financial development (both bank- and market-based) and economic growth, irrespective of whether this relationship is positive or negative, there are some studies, though only a few, 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 that they are two different phenomena that are independent of each other. Such studies include Ram (1999) and Andersen and Tarp (2003).

Table 1 summarises 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.

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

Author(s)	**Region/Country**	**Results**
Panel 1: Bank-Based Financial Development and Economic Growth		
De Gregorio and 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 and Ansari, 1998	India, Pakistan and Sri Lanka	Positive association
Allen and Ndikumana, 2000	8 countries in Southern Africa – Botswana, Lesotho, Mauritius, Malawi, Swaziland, South Africa, Zambia and Zimbabwe	Positive association
Güryay *et al*., 2007	Northern Cyprus	Positive impact (though negligible)
Kargbo and 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 and 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)

Author(s)	Region/Country	Results
Ram, 1999	95 countries	No impact
Andersen and Tarp, 2003	74 countries	No impact
Panel 2: Market-Based Financial Development and Economic Growth		
Levine and 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 and Biekpe, 2006	14 African countries	Positive impact
Nurudeen, 2009	Nigeria	Positive impact
Akinlo and Akinlo, 2009	Seven countries in sub-Saharan Africa	Positive impact
Ujunwa and Salami, 2010	Nigeria	Positive impact (when stock market development is proxied by stock market size and turnover ratios)
Bernard and Austin, 2011	Nigeria	Positive impact (when stock market development is proxied by turnover ratio)
Ujunwa and Salami, 2010	Nigeria	Negative impact (when stock market development is proxied by total value of shares traded)
Bernard and Austin, 2011	Nigeria	Negative impact (when stock market development is proxied by market capitalisation and value traded ratios)

3. Data, Variable Description and Model Specification

Data

The annual time series data utilised in this study, covering the period from 1980 to 2012, were obtained from the World Bank Economic Indicators and the International Financial Statistics Year Books (IFS, various issues).

Variable Description

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

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 capitalisation, 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

The Model

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

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

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

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

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

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:

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

4. Unit Roots, Cointegration and Impact Analysis

Unit Root Tests

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

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

After being differenced once, the results reported in Table 3 show that all the variables became conclusively stationary. Although the ARDL technique does not require that variables be pre-tested for unit root, the stationarity test gives guidance as to whether or not

the ARDL analysis is suitable since it is only applicable for the analysis of variables that are integrated of order zero or one. In this case, all 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

Cointegration analysis in this study is based on the fairly newly developed ARDL bounds testing approach because of the numerous advantages it offers against 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 single 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 order not more than one. Therefore, ARDL approach is considered to be very apt for the analysing 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) is obtained using either the Akaike Information Criterion or the

Schwartz Bayesian Criterion. Finally, a bounds F-test is 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.

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

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

Impact Analysis

Since 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 is determined using the Akaike information criterion (AIC) or the Bayesian information criterion (BIC). The optimal lag-length selected based on BIC is ARDL(1,1,0,1,0,0). The BIC-based model was chosen because it was more parsimonious than 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.

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.

The empirical results 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 that is positive and statistically significant, as expected; while the negative impact is supported by the bank-based financial development coefficient in Panel 1 that 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 alone. Several other studies have shown evidence of negative association between the two (see also De Gregorio and Guidotti, 1995; Adu *et al*., 2013).

Results displayed in Table 5 further 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 is confirmed by the coefficient of market-based financial development in Panels 1 and 2, that 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 indicated by an R-squared of 81.5%. Results of the diagnostic tests performed for serial correlation, functional form, normality and heteroscedasticity, displayed in Table 6, show that the model passed all 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 that there is no systematic change identified in the coefficients at 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.

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]

Figure 1: Plot of Cumulative Sum of Recursive Residuals

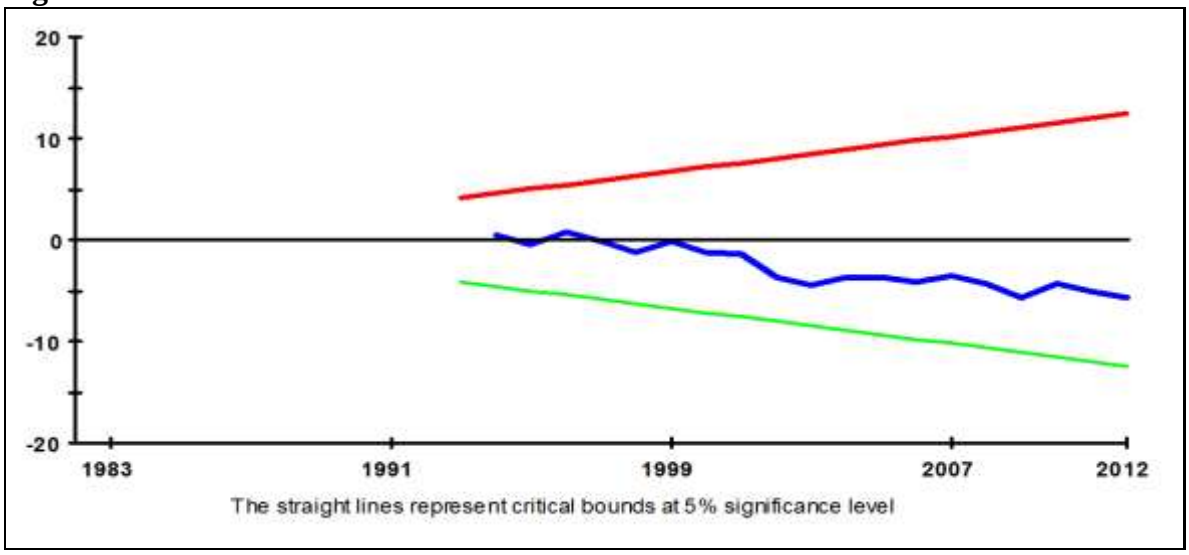
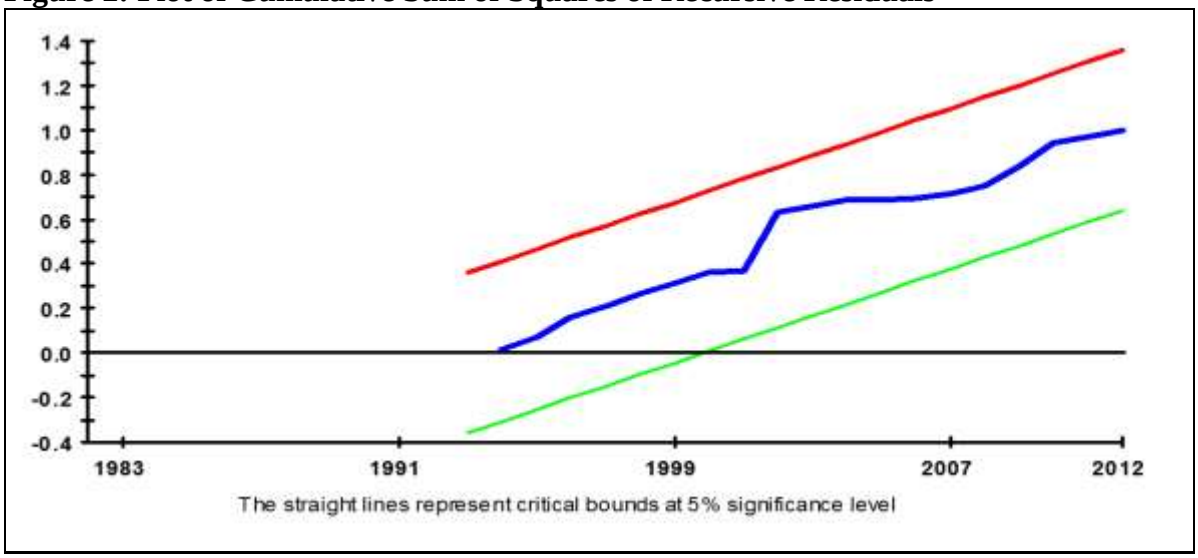


Figure 2: Plot of Cumulative Sum of Squares of Recursive Residuals



5. Concluding Remarks

This paper has examined the impact of bank- and market-based financial development on economic growth in Australia – during the period 1980 to 2012, using the ARDL bounds testing approach. Unlike some previous studies, the paper has 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 method of the means-removed average. The empirical results show that in Australia, bank-based financial development has a positive impact on economic growth, but only in the short run. However, market-based financial development has no significant impact on economic growth, regardless of whether the regression analysis is conducted in the short run or in the long run. These results imply that in Australia, it is of paramount importance to concentrate more on the pro-banking sector policies, at least in the short run, in order to stimulate growth.

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