Financial Development, International Trade, and Economic Growth in Australia: New Evidence From Multivariate Framework Analysis

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This study investigates the relationship between financial development, international trade and economic growth for Australia over the period of 1965 to 2010. The autoregressive distributed lag (ARDL) bounds testing approach to cointegration is applied to examine the long-run relationship among the series, whereas stationarity properties of the variables are tested by applying two structural break tests. Results confirm the long-run relationship among the variables. Financial development, international trade, and capital appear as the drivers of economic growth in short and long runs. The feedback effect exists between international trade and economic growth. Financial development Granger causes economic growth validating supply-side hypothesis.

KEYWORDS Financial development, international trade, economic growth, Australia

INTRODUCTION

Financial sector and international trade are two core factors of an economic system. The financial sector provides a wide range of services to households, business, and government sectors, which have a contributory role

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to economic growth. Having an open, efficient, well-regulated, and competitive financial sector is thus in the interests of all countries including Australia. Countries with high-quality financial sectors should be able to reap the full benefits by exporting their financial services skills and experience to other countries (Australian Financial Centre [AFC], 2009). International trade, exports and imports, also plays a vital role toward economic growth. A country is always required to import raw materials, intermediate and capital goods to enlarge its production base and to foster export growth if there is a scarcity of these goods domestically. Imports of consumer goods are also required to meet the excess domestic demand. Export trade is crucial to meet the required foreign exchange gap and to increase the import capacity. An increase in import capacity boosts industrialization and overall economic activities, which, in turn, can ensure economic growth (Shahbaz & Rahman, 2010).

Over the last few decades, though studies were conducted on the export-growth relationship or financial development–growth relationship based on a specific country or a group of countries, research on trade-growth relationship and financial development-growth relationship jointly is limited. It is particularly rare for Australia. Also the effects of financial development and trade on economic growth and causal relationship among them remain unclear in the existing literature (Katircioglu, Kahyalar, & Benar, 2007). Therefore, this article aims at filling this gap. The individual case study on specific countries to examine the effects of financial development, exports, and imports on growth is crucial as the stage of development, the complexity of financial environments, and economic history are different for different countries.

The main objective of this study is to investigate the effects of financial development and trade openness (exports and imports) on economic growth in case of Australia. The causal relationships among the variables are also examined. The contribution of the article is that empirical findings will enrich the existing literature with reference to Australia by employing the autoregressive distributed lag (ARDL) bounds testing approach to cointegration. The research outcome will also help the policy makers of Australia to adopt the appropriate policies with regard to financial development, international trade, and provide a scope for policy debate.

Following the introduction, the article is organized as follows. The next section highlights the financial sector and international trade of Australia; the third section provides an analytical framework and a review of literature on financial development, trade, and economic growth; the fourth section explains modeling, methodological framework, and data; the fifth section presents and discusses the research outcomes, and conclusion; and policy implications are drawn in the last section.

THE FINANCIAL SECTOR AND INTERNATIONAL TRADE OF AUSTRALIA

It is argued that Australia has the most efficient and competitive "full- service" financial sector in Asia-Pacific region (AFC, 2009). The country has a sophisticated financial system and transparent markets. Australia's financial markets are ranked as the seventh most sophisticated in the world (World Economic Forum, 2008). In total market capitalization terms, Australia's stock market is the ninth largest in the world and the second largest in the Asia-Pacific region, just after Japan's stock market. Market capitalization has increased to 46% of gross domestic product (GDP) in 2007 from around 30% of GDP in the early 1990s. The Australian foreign exchange market is ranked seventh in the world by turnover, and the Australian dollar is the sixth most actively traded currency in the world (Department of Foreign Affairs and Trade [DFAT], 2012). The contribution of Australia's financial sector to national output, employment, economic growth, and development is notable. The sector directly contributes 7.5% of GDP and 3.6% of total employment or around 390,000 people. Indirectly, the sector employs a substantially larger number of people, by way of outsourced legal, accounting, technology, administration, processing, and other services. The main components of financial sector are commercial and investment banking, insurance, and funds (mainly superannuation funds) management (AFC, 2009).

Australia is located close to the faster growing region in the world (i.e., South East Asia: Korea, Japan, Singapore, China, etc.). High growth in income and wealth of many countries of this Asia-Pacific region, along with demographic factors, will continuously demand development of a wider range of financial services, including capital markets and insurance products, to help finance development, retirement income scheme, asset and wealth management, and their protection. Because Australia is a very open trading economy, the opportunities for leveraging off its financial services skills and expertise, in the region and beyond, are potentially huge (AFC, 2009).

The foreign trade sector of Australia constitutes an important part of its economy. The trade–GDP ratio increased to 42.09% in 2006 up from 32.90% in 1980 (Rahman, 2010). In 2011, it was 41% (World Bank, 2012). Australia's trade in goods and services grew strongly in 2010 with a $16.8 billion trade surplus. The goods and services exports of Australia in 2010 and 2011 are 21.2% and 21.1% of GDP, respectively (DFAT, 2011).

However, despite the gradual importance, this sector has been suffering from a deficit almost every year since 1980 to date (World Bank, 2012). Furthermore, the growth rate in the volume of Australian merchandise export trade is also lower compared to its major trading partners around the globe as evident in the Table 1A (Rahman 2010, 2012; World Trade Organization [WTO], 2008).

TABLE 1A The Growth Rate of Australian Merchandise Export Trade and Its Major Trading Partners for Selected Years: 2006 and 2007 (in %)

Countries/Regions	2006	2007
Australia	2.0	2.5
United States of America	10.5	7.0
China	22.0	19.5
India	11.0	11.5
Japan	10.0	9.0
Asia	13.5	11.5
World	8.5	6.0

TABLE 1B Exports, Imports and Trade Shares of Selected Countries in 2007 (% in World Exports, Imports, and Trade)

Countries	Export Share	Import Share	Trade Share
Australia	1.0	1.2	1.1
Germany	9.5	7.4	8.5
China	8.7	6.7	7.7
United States of America	8.3	14.2	11.3
Japan	5.1	4.4	4.7
Republic of Korea	2.7	2.5	2.6

Furthermore, Australia's share in world exports, imports, and trade is still very low compared to other countries including its Asian neighbors. This is shown in Table 1B (International Monetary Fund [IMF], 2007; Rahman 2010, 2012). Therefore, for the sake of healthy growth of its economy, Australia must increase its trade volume with the rest of the world. Hence the importance of this study is realized and justified.

ANALYTICAL FRAMEWORK AND A REVIEW OF LITERATURE

Theoretically a well-developed financial sector should facilitate economic growth in a country. However, the empirical findings based on cross-sectional and time- series data yield mixed results. Similarly, trade–growth nexus is also ambiguous from theoretical and empirical points of view. Details are explained below.

An economy with more developed financial markets and institutions tends to have significantly higher economic growth rate (Shahbaz & Rahman, 2010, 2012). A well-developed financial sector allows credit-constrained entrepreneurs to start their own businesses. As a result, the number of varieties of intermediate goods increases, causing an increase in demand for final goods. The financial sector's efficiency eases the cost constraint for fulfilling this increased demand.

If capital mobility is limited, then domestic savings will be an important factor in generating higher domestic investment and that in turn contributes to economic growth. This channel will be more effective if financial markets are sound and well developed. According to supply-side hypothesis, financial development stimulates and induces economic growth by channelizing limited resources from savers to investors into potential investment ventures to gain returns. This increases investment to enhance more domestic production and hence economic growth (Jung, 1986; Odhiambo, 2010; Shahbaz, Azim, & Ahmad, 2011; Shahbaz, Leitao, & Malik, 2011). Besides, direct effect of savings on capital accumulation, better savings mobilization, can improve resource allocation and boost technological innovation (Alfaro, Chanda, Kalemli-Ozcan, & Sayek, 2004; Cotton & Ramachandran, 2001; Maureen, 2001; Omran & Bolbol, 2003). Developed domestic financial sector is also helpful to increase the foreign firm's borrowing to broaden their innovative activities in the domestic economy (Omran & Bolbol, 2003).

A good number of cross-sectional studies are found in the literature that provides evidence about the importance of well-functioning financial markets to obtain positive spillovers from Foreign Direct Investment (FDI) to stimulate economic growth. The more developed domestic financial system is better; it will be able to mobilize savings, and screen and monitor investment projects, which will contribute to speed up economic growth (Hermes & Lensink, 2003; Omran & Bolbol, 2003). However, Hsu and Wu (2009) argued that cross-country evidence cannot support the growth effect of FDI through financial development. It may be inferred that economies with better-developed financial markets are not essential to obtain benefit more from FDI to accelerate their economic growth.

Some time-series studies also show the important role of financial development in developing strong positive and significant effect of FDI to economic growth. For instance, Ljunwal and Li (2007) investigated the relation between FDI and economic growth with role of financial sector in China. Time-series data set starting from 1986 up to 2003 has been used over 28 Chinese provinces. Their empirical findings seem to support the view by Hermes and Lensink (2003) and Alfaro et al. (2004). Ang (2009) investigated role of financial development on FDI and economic growth for the case of Thailand. The empirical findings reveal that financial development stimulates economic development, but FDI has a negative impact on output expansion. It is also inferred that an increased level of financial development enables Thailand's economy to obtain more from FDI. Similarly Shahbaz and Rahman (2012) argued that the impact of FDI on output growth can be improved through development of financial markets. In contrast, referring Shan, Morris, and Sun (2001), Shan and Morris (2002), and Gries, Kraft, and Meierrieks (2008) argued that a strong connection between financial development and growth cannot be identified in mature Organization for Economic Co-operation and Development (OECD) countries.

Theoretical arguments with regard to trade–growth nexus are ambiguous. There are reasons to believe that increased international competition could either accelerate productivity growth as competition increases efficiency or hinder that growth if the economy is not well prepared for competition (infant industry argument). To materialize the positive impact of trade openness accompanying policies may be useful and even necessary (Rahman, 2006). Empirical findings on the link between trade openness and growth are also mixed. Dollar (1992), Frankel and Romer (1999), and Dollar and Kaaray (2001) suggested that trade openness promotes economic development. Using data from a panel of 57 countries from 1979 to 1989, Wacziarg (1998) found that trade openness has a strong positive impact on economic growth. Similarly, using cross-country regressions, Frankel and Romer (1996) concluded that trade openness has a large, significant, and robust positive effect on income (Ahmed & Sattar, 2004). However, Greenaway and Sapsford (1994) found little support for export–growth relationship. They used a production function approach with time-series data on a sample of 19 countries. This is contradictory with most of the cross-section results.

Surveying more than 150 papers, Giles and Williams (2000) also found that there is no obvious agreement to whether the causality dictates export-led growth or growth-led exports. Bidirectional causality between exports and growth is possible (Wernerheim, 2000). Alici and Ucal (2003) used seasonally unadjusted quarterly data from 1987.1 to 2002.4 and found only unidirectional causality from exports to output for Turkey, but Dritsaki, Dritsaki, and Adamopoulos (2004) observed bidirectional causality between real GDP and real exports for Greece. Cuadros, Orts, and Alguacil (2004) conducted a study for Mexico, Brazil, and Argentina; they used seasonally adjusted quarterly data from late 1970s to 2000. Their experience is mixed; that is, they found unidirectional causalities from real exports to real GDP in Mexico and Argentina, and unidirectional causality from real GDP to real exports in Brazil. The similar results are also observed by Nasreen (2011) for selected Asian developing countries.

Using undeflated annual data from 1972 to 2001 for Pakistan, Ahmad, Alam, and Butt (2004) found unidirectional causality from exports to GDP. Export-led growth is also confirmed by Ullah, Zaman, Farooq, and Javid (2009), Shirazi and Manap (2004), and Shahbaz (2012) in case of Pakistan. On the other hand, no evidence of unidirectional causality from exports to economic growth is found in Hong Kong, South Korea, Singapore, and Taiwan in the study conducted by Darrat (1986). However, the study reveals the unidirectional causality from economic growth to exports growth for Taiwan. Chimobi (2010) examined the causal relationship among financial development, trade openness, and economic growth in Nigeria using data from 1970 to 2005; the Johansen multivariate approach to cointegration was applied but found no cointegrating relations between growth, trade openness, and financial development. The Granger-causality empirical findings suggest growth-led trade but not trade-led growth.

Imports also play a crucial role in the link between exports and economic growth. Therefore, the importance of imports, particularly when imports constitute capital and intermediate inputs, needs to draw attention as a source of economic growth (Uddin, 2004). Damooei and Tavakoli (2006) reported a positive correlation between the imported inputs and productivity growth. This was evidenced in a study of 47 sectors in the manufacturing industry in Mexico over the period 1973 to 1990. Blomstrom and Wolf (1994) also found the similar results. Import-led growth effect is also observed in Thangavelu and Rajaguru (2004) for India, Indonesia, Malaysia, the Philippines, Singapore, and Taiwan. Similar inferences are also drawn by Awokuse (2007) for Poland; Awokuse (2007) for some South American countries. On other hand, Awokuse, (2007) found the opposite results in case of Czech Republic.

Katircioglu et al. (2007) found a long-run equilibrium relation between financial development, international trade, and real income growth for India. However, bidirectional causality has been found between real income and M2 and domestic credits. Jenkins and Katircioglu (2010) also found a demand following causal relationship between growth and trade for Cyprus. Shaheen, Awan, Waqas, and Aslam (2011) also found a long-run relationship between financial development, international trade, and economic growth in case of Pakistan. Furthermore, Yucel (2009) found a negative effect of financial development but a positive effect of trade openness on growth. The research, however, shows a feedback relationship between financial development, trade openness, and growth. Hassan and Islam (2005) found no evidence of causal relationship between trade openness and growth, and financial development and growth.

In the light of the above discussion it can be argued that financial-development-growth and trade-growth relationships are not uniform, and there is need for case-by-case study in view of each country's unique characteristics.

DATA AND MODEL CONSTRUCTION

In this article, annual data are used for the period 1965 to 2011, taken from the World Development Indicators (World Bank, 2011). The variables are real GDP, real domestic credit to private sector, real exports, real imports, and real capital stock.

The following Cobb-Douglas production function is used to explore a long-run relation between financial development, trade openness, and economic growth in case of Australia:

$$G = AK^{\alpha}L^{\beta}e^{u} \tag{1}$$

where, *G* is real GDP, *K* and *L* indicate real capital and labor, respectively, *A* represents technology, and *e* is the error term assumed to be having normal distribution. The output elasticity with respect to capital and labor is α and β respectively. When Cobb-Douglas technology is constrained to $(\alpha + \beta = 1)$ we get constant returns to scale. We augment the Cobb-Douglas production function by assuming that technology can be determined by the level of financial development and international trade. Financial development accelerates the economic growth via capital formation, encouragement of FDI inflow and transfer of superior technology and managerial skills. Entrepreneurs play the pivotal role on the stage of free market. They take risk and act as the force behind innovation and technological progress. Trade helps technological advancements and its diffusion. Thus the model is constructed as follows:

$$A(t) = \phi.TR(t)^{\sigma} F(t)^{\delta} \tag{2}$$

where, ϕ is time-invariant constant, TR is indicator of trade openness, and F is financial development. Substituting Equation (2) into Equation (1) we obtain Equation (3).

$$G(t) = \phi.F(t)^{\delta} TR(t)^{\sigma} K(t)^{\alpha} L(t)^{\beta} \tag{3}$$

Following Shahbaz (2012) we divide both sides by population and get each series in per capita terms but leave the impact of labor constant. By taking log, the linearized Cobb-Douglas function is modeled as follows:

$$\ln G_t = \beta_1 + \beta_F \ln F_t + \beta_{TR} \ln TR_t + \beta_K \ln K_t + \mu_t \tag{4}$$

where, $\ln G_t$, $\ln F_t$, $\ln TR_t$, and $\ln K_t$ are the log-transform of real GDP per capita, real domestic credit to private sector per capita as a proxy for financial development, real trade openness per capita, and real capital use in per capita, respectively. In this article we use three different proxies of trade openness; real exports per capita, real imports per capita, and real trade per capita.[1] The term μ_t refers to the random error term.

ESTIMATION STRATEGY

Prior to testing for cointegration, it is standard to check for stationarity of the series. The study period taken for this study witnessed some major upheavals in the global stage, which can cause structural breaks. The Augmented Dickey-Fuller unit root test is widely used in existing empirical literature with intercept and trend to test integrating properties of the variables, but it is not appropriate in the presence of structural break in the series. Therefore, we

apply the Zivot-Andrews (1992) and Clemente, Montanes, and Reyes (1998) unit root tests, which take care of structural break. The former identifies one structural break, and latter two structural breaks in the series. The Clemente et al. test has more power compared to Zivot-Andrews test due to its power properties.

The ARDL bounds testing approach is considered superior than others due to its various advantages. First, The ARDL bounds test works regardless of whether the regressors are I(1) or I(0)/I(1). The simulation confirms the evidence of its superiority and provides consistent results for small size sample (Pesaran & Shin, 1999). Moreover, a dynamic unrestricted error correction model (UECM) can be derived from the ARDL bounds testing through a simple linear transformation. The UECM integrates the short-run dynamics with the long-run equilibrium without losing any long-run information. For estimation purposes, the ARDL model is used:

$$\Delta \ln G_t = \alpha_1 + \alpha_{DUM}DUM + \alpha_G \ln G_{t-1} + \alpha_F \ln F_{t-1} + \alpha_{TR} \ln TR_{t-1} + \alpha_K \ln K_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta \ln G_{t-i}$$
$$+ \sum_{k=0}^{r} \alpha_k \Delta \ln F_{t-k} + \sum_{l=0}^{s} \alpha_l \Delta \ln TR_{t-l} + \sum_{m=0}^{t} \alpha_m \Delta \ln K_{t-m} + \mu_t \tag{5}$$

$$\Delta \ln F_t = \alpha_1 + \alpha_{DUM}DUM + \alpha_G \ln G_{t-1} + \alpha_F \ln F_{t-1} + \alpha_{TR} \ln TR_{t-1} + \alpha_K \ln K_{t-1} + \sum_{i=1}^{p} \beta_i \Delta \ln F_{t-i}$$
$$+ \sum_{j=0}^{q} \beta_j \Delta \ln G_{t-j} + \sum_{l=0}^{s} \beta_l \Delta \ln TR_{t-l} + \sum_{m=0}^{t} \beta_m \Delta \ln K_{t-m} + \mu_t \tag{6}$$

$$\Delta \ln TR = \alpha_1 + \alpha_{DUM}DUM + \alpha_G \ln G_{t-1} + \alpha_F \ln F_{t-1} + \alpha_{TR} \ln TR_{t-1} + \alpha_K \ln K_{t-1} + \sum_{i=1}^{p} \vartheta_i \Delta \ln TR_{t-i}$$
$$+ \sum_{j=0}^{q} \vartheta_j \Delta \ln G_{t-j} + \sum_{l=0}^{s} \vartheta_l \Delta \ln F_{t-l} + \sum_{m=0}^{t} \vartheta_m \Delta \ln K_{t-m} + \mu_t \tag{7}$$

$$\Delta \ln K_t = \alpha_1 + \alpha_{DUM}DUM + \alpha_G \ln G_{t-1} + \alpha_F \ln F_{t-1} + \alpha_{TR} \ln TR_{t-1} + \alpha_K \ln K_{t-1} + \sum_{i=1}^{p} \rho_i \Delta \ln K_{t-i}$$
$$+ \sum_{j=0}^{q} \rho_j \Delta \ln G_{t-j} + \sum_{l=0}^{s} \rho_l \Delta \ln F_{t-l} + \sum_{m=0}^{t} \rho_m \Delta \ln TR_{t-m} + \mu_t \tag{8}$$

where, Δ is difference operator, α_1 is intercept, and *DUM* indicates the structural break point based on findings of Zivot-Andrews (1992) test. Test of cointegration has the property of comparing the computed F statistic with the critical bounds generated by Pesaran, Shin, and Smith (2001), that is, upper critical bound (UCB) and lower critical bound (LCB). The null hypothesis $H_0 : \alpha_G = \alpha_F = \alpha_{TR} = \alpha_K = 0$ of no cointegration is tested against

the alternative $H_a : \alpha_G \neq \alpha_F \neq \alpha_{TR} \neq \alpha_K \neq 0$ of cointegration.[2] The series are cointegrated if the computed F statistic exceeds UCB and not cointegrated if the computed F statistic lies below LCB. If computed F statistic falls between UCB and LCB, the test is uncertain.[3] We apply the critical bounds from Narayan (2005), which are more appropriate for small sample, 47 in this case, compared to Pesaran et al. (2001).[4] The parameter stability is tested by applying diagnostic tests.

For the long-run relation among the series we use the following equation:

$$\ln G_t = \theta_0 + \theta_1 \ln F_t + \theta_2 \ln TR_t + \theta_3 \ln K_t + \mu_i \tag{9}$$

where, $\theta_0 = -\beta_1/\alpha_G, \theta_1 = -\alpha_F/\beta_1, \theta_2 = -\alpha_{TR}/\beta_1, \theta_3 = -\alpha_K/\beta_1$ and μ_t are the error terms assumed to be normally distributed. Once the long-run relationship is established among the series, we test the direction of causality using the following error correction representation[5]:

$$(1 - L) \begin{bmatrix} \ln G_t \\ \ln F_t \\ \ln TR_t \\ \ln K_K \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix} + \sum_{i=1}^{p} (1 - L) \begin{bmatrix} b_{11i}b_{12i}b_{13i}b_{14i} \\ b_{21i}b_{22i}b_{23i}b_{24i} \\ b_{31i}b_{32i}b_{33i}b_{34i} \\ b_{41i}b_{42i}b_{43i}b_{44i} \end{bmatrix} \times \begin{bmatrix} \ln G_{t-1} \\ \ln F_{t-1} \\ \ln TR_{t-1} \\ \ln K_{t-1} \end{bmatrix}$$

$$+ \begin{bmatrix} \alpha \\ \beta \\ \delta \\ \phi \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix} \tag{10}$$

where, $(1 - L)$ is the lag operator and ECT_{t-1} is the lagged residual obtained from the long-run ARDL relationship; $\varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t}$ and ε_{4t} are error terms assumed to be $N(0, \sigma)$. Long-run causality requires a significant t statistic on the coefficient of ECT_{t-1}. A significant F statistic on the first differences of the variables proposes short-run causality. In addition, joint long- and short-runs causal relationship can be estimated by joint significance of ECT_{t-1} and the estimate of lagged independent variables. For instance, $b_{12,i} \neq 0 \forall_i$ indicates that financial development Granger causes economic growth whereas causality runs from economic growth to financial development is indicated by $b_{21,i} \neq 0 \forall_i$.

RESULTS AND DISCUSSIONS

As mentioned earlier, the ARDL bounds testing approach to cointegration is flexile regarding order of integration of the variables. This approach is applicable if variables are integrated at I(0) or I(1) or I(0)/I(1). The assumption of the ARDL bounds testing is that our variables are found to be stationary

at I(0) or I(1). The computation process of F test becomes invalid if any variable is integrated beyond that order of integration. So, we have used Zivot-Andrews ([1992](#)) and Clemente et al. ([1998](#)) structural break unit root test to ensure that none of any variable is integrated beyond the mentioned order of integration. Zivot-Andrews test allows having information about single structural break stemming in the series, and Clemente et al. test provides information about structural breaks occurring in the series. The results of both tests are reported in Tables 2 and 3, respectively. The results of Zivot-Andrews test unveil that all the series have unit root problem at level with intercept and trend but found stationary at I(1), and the same inference is drawn from Clemente et al. unit root test. This shows that variables have unique order of integration, that is, I(1).

This unique order of integration of the variables tends us to use the ARDL bounds testing approach to cointegration in the presence of structural break to test the existence of long-run relationship between the series. The first step is to choose appropriate lag order of the variables to compute F statistic to test whether cointegration exists. The computation of F test is very much sensitive with the selection of lag length (Ouattara, [2004](#)). We follow Akaike Information Criterion (AIC) to select maximum lag length

TABLE 2 Zivot-Andrews Structural Break Trended Unit Root Test

Variable	At Level		At 1st Difference	
	t Statistic	Time Break	t Statistic	Time Break
$\ln G_t$	−4.394 (1)	1998	−6.520 (0)*	1971
$\ln F_t$	−5.065 (1)	1985	−6.594 (1)*	1985
$\ln K_t$	−4.618 (0)	1991	−5.976 (1)*	1995
$\ln E_t$	−4.101 (0)	1996	−7.100 (0)*	2002
$\ln I_t$	−4.292 (0)	1974	−7.529 (1)*	1974
$\ln TR_t$	−4.138 (0)	1995	−5.882 (1)*	2002

Note: Lag order is shown in parenthesis.
*represents significance at 1% level.

TABLE 3 Clemente-Montanes-Reyes Detrended Structural Break Unit Root Test

Variable	Innovative Outliers				Additive Outlier			
	t Statistic	TB1	TB2	Decision	t Statistic	TB1	TB2	Decision
$\ln G_t$	−3.601 (2)	1982	1993	I (0)	−6.672 (2)*	1982	1991	I (1)
$\ln F_t$	−4.297 (3)	1983	1996	I (0)	−8.848 (3)*	1983	1988	I (1)
$\ln K_t$	−2.257 (3)	1983	2001	I (0)	−6.992 (1)*	1994	2000	I (1)
$\ln E_t$	−2.720 (1)	1983	1991	I (0)	−7.482 (1)*	1982	2000	I (1)
$\ln I_t$	−3.802 (1)	1972	1991	I (0)	−8.195 (5)*	1972	1982	I (1)
$\ln TR_t$	−2.659 (2)	1983	1991	I (0)	−7.402 (2)	1982	2000	I (1)

Note: TB = Time Break. Lag order is shown in parenthesis.
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*indicates significance at 1% level.

of the variables which is 2. The AIC criterion has superior power proper-
ties as compared to Schwarz Bayesian Criteria and provides effective and
reliable results that help in capturing the dynamic relationship between the
series (Lütkepohl, 2006). The results of the ARDL *F* test are reported in
Table 4, and *F* statistics do not seem to cross the upper critical bounds
when we use international trade and economic growth as forcing vari-
ables but found cointegration as we treat them as predicted variables. Our
computed *F* statistics cross upper critical bounds at 1% and 5% level of sig-
nificance, and the same inference can be drawn for other models where
we have used economic growth and trade indicators (exports, imports, and
trade openness) as dependent variables. This opines that there is a long-
run relationship between financial development, international trade, capital,
and economic growth in case of Australia over the period of 1965 to 2010.
The robustness of the ARDL results is investigated by applying Johansen
multivariate cointegration test. The Table 5 deals with the results of Johansen
cointegration revealing that there is one cointegration in each model. This
confirms the existence of long-run relationship between the variables. This
unveils the robustness of long-run results.

After establishing cointegration among the series we explore the long-
and short-run impacts of financial development, international trade, and
capital on economic growth in Australia. The results reported in Table 6
show that international trade (exports and imports) is positively related to
economic growth and is statistically significant at 1% level. All else con-
stant, a 1% increase in international trade (exports and imports) leads to
economic growth by 0.3001% (0.3182% and 0.1881%), suggesting that inter-
national trade (exports and imports) plays a vital role to enhance domestic
production and hence economic growth in the Australian economy. Financial
development is positively linked with economic growth and a 1% increase in
financial development enhances in economic growth by 0.0712% to 0.0976%,
all else is the same. Finally, capital stock also stimulates economic growth
and it is statistically significant. A 0.1159% to 0.1771% economic growth is
linked with 1% increase in capitalization in the case of Austrian economy.

The short-run impacts of financial development, international trade
(exports and imports), and capital on economic growth are described in
lower segment of Table 6. The negative and statistically significant estimates
for each of ECM_{t-1}, –0.2579, –0.2524 and –0.2848 (for exports, imports, and
trade models, respectively), lend support to long-run relationship among the
series in the case of Australia. The coefficients are all statistically significant
at 1% level. The short-run deviations from the long-run equilibrium are
corrected by 25.79%, 25.24%, and 28.48% toward long-run equilibrium path
each year. In short run, international trade (exports and imports) stimulates
economic growth. Financial development increases economic growth
but with a lagged effect that is, 0.0287 to 0.0604. The impact of capital
on economic growth is positive (0.1311 to 0.1604), and it is statistically
significant at 1% level.

TABLE 4 The Results of ARDL Cointegration Test

Bounds Testing to Cointegration				Diagnostic Tests			
Estimated Models	Optimal Lag Length	F Statistics	Structural Break[a]	χ^2_{NORMAL}	χ^2_{ARCH}	χ^2_{RESET}	χ^2_{SERIAL}
$F_G(G/E,F,K)$	2, 1, 1, 2	5.951**	1998	0.6979	[1]: 1.9823	[1]: 1.5081	[1]: 0.9330; [2]: 1.6206
$F_F(F/G,E,K)$	3, 2, 2, 1, 2	3.194	1985	4.2222	[1]: 1.0248	[2]: 2.1298	[1]: 0.1678; [2]: 0.4386
$F_K(K/G,E,F)$	2, 2, 1, 2, 1	1.415	1991	0.9875	[1]: 0.8641	[2]: 2.753	[1]: 1.8578; [2]: 1.0781
$F_E(E/G,F,K)$	1, 0, 1, 0, 3	5.997**	1996	0.2879	[1]: 0.6234	[1]: 0.3915	[1]: 0.1475; [2]: 2.4983
$F_G(G/I,F,K)$	2, 2, 2, 2	11.645*	1998	1.5056	[1]: 0.0759	[5]: 3.2188	[1]: 1.5680; [2]: 2.0343
$F_F(F/G,K,I)$	2, 1, 1, 2, 2	3.898	1985	4.0567	[1]: 0.0414	[4]: 3.1653	[1]: 2.1326; [2]: 1.0130
$F_K(K/G,F,I)$	2, 2, 1, 2, 1	1.563	1991	10.5194	[1]: 0.3779	[1]: 0.5778	[1]: 1.1437; [2]: 0.5957
$F_I(I/G,F,K)$	2, 2, 2, 2	9.062*	1974	0.0283	[1]: 0.6923	[2]: 2.7683	[1]: 0.1578; [2]: 1.2704
$F_G(G/F,K,TR)$	2, 2, 1, 1, 2	5.587**	1998	0.3257	[1]: 0.1944	[1]: 0.5539	[1]: 0.5633; [2]: 3.2566
$F_F(F/G,K,TR)$	3, 2, 1, 1	2.656	1985	4.1223	[1]: 1.6893	[4]: 1.8452	[1]: 0.1920; [2]: 0.1039
$F_K(K/G,F,TR)$	2, 2, 2, 2	1.120	1991	0.2671	[1]: 1.5535	[4]: 2.01163	[1]: 0.6148; [2]: 0.8465
$F_{TR}(TR/G,F,K)$	2, 2, 2, 2	6.2997**	1995	0.5594	[1]: 0.0736	[1]: 0.8912	[1]: 0.0635; [3]: 2.1557

Significant level   Critical values (T = 40)[b]

	Lower bounds $I(0)$	Upper bounds $I(1)$
1% level	6.053	7.458
5% level	4.450	5.560
10% level	3.740	4.780

Note: The optimal lag length is determined by AIC. [] is the order of diagnostic tests.

[a]Structural breaks are based on Zivot-Andrews (1992) findings.

[b]Critical values are collected from Narayan, (2005).

* and ** denote significant at 1% and 5% levels, respectively.

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TABLE 5 Results of Johansen Cointegration Test

Hypothesis	Trace Statistic	Maximum Eigen Value
$G_t = f(E_t, F_t, K_t)$		
$R = 0$	53.0950**	32.9467*
$R \leq 1$	20.1483	16.6215
$R \leq 2$	3.5267	2.8855
$R \leq 3$	0.6412	0.6412
$G_t = f(I_t, F_t, K_t)$		
$R = 0$	49.2963**	30.3975**
$R \leq 1$	18.8988	12.3933
$R \leq 2$	6.5054	5.1430
$R \leq 3$	1.3624	1.3624
$G_t = f(T_t, F_t, K_t)$		
$R = 0$	50.6211**	33.2451*
$R \leq 1$	17.3760	12.1503
$R \leq 2$	5.2257	4.2926
$R \leq 3$	0.9330	0.9330

Note: * and ** show significance at 1% and 5% level, respectively.

The short-run model meets the assumptions of classical linear regression model (CLRM) regarding normality of error term, serial correlation, autoregressive conditional heteroskedasticity (ARCH), white heteroskedasticity, and specification of short-run model. The results of short-run diagnostic tests show that error terms of short-run models are normally distributed and free of serial correlation, heteroskedasticity, and ARCH problems in all three models. The Ramsey reset test shows that functional forms for the short-run models are well specified.

The VECM Granger Causality

The presence of cointegration for long-run relationship between economic growth, international trade (exports and imports), financial development, and capital leads us to apply the VECM Granger causality approach to test the direction of casual relation between the series. The exact direction of causality between the variables helps policy-making authorities to sustain economic growth attaining fruitful impacts of international trade via sound financial development and improving the quality of capital. It is disclosed by Granger (1969) that the VECM Granger causality test is appropriate once variables are integrated at the same level of integration.

The results, that is, international trade–growth nexus (exports-growth, imports-growth, and trade-growth models) reported in Tables 7, 8, and 9 reveal that feedback hypothesis exists between international trade (exports, imports, and trade) and economic growth in the long-run. Financial development Granger causes economic growth supporting supply-side or

TABLE 6 Long- and Short-Run Results

Dependent variable $= \ln G_t$						
Variables	Coefficient	t Statistic	Coefficient	t Statistic	Coefficient	t Statistic
Long-Run Analysis						
Constant	5.4829*	17.18241	6.3084*	20.6425	5.5857*	16.5369
$\ln E_t$	0.3182*	5.8189	. . .	. . .	. . .	. . .
$\ln I_t$	. . .	. . .	0.1881*	3.3772	. . .	. . .
$\ln TR_t$	. . .	. . .	. . .	. . .	0.3001*	5.0719
$\ln F_t$	0.0712**	2.2533	0.1564*	5.3939	0.0976*	3.1363
$\ln K_t$	0.1771*	4.2294	0.1159**	2.2241	0.1296*	2.8884
Short-Run Analysis						
Constant	0.0085*	3.3522	0.0113*	3.905948	0.0098*	3.4052
$\ln E_t$	0.1042*	3.7134	. . .	. . .	. . .	. . .
$\ln I_t$	. . .	. . .	0.0574***	1.8497	. . .	. . .
$\ln TR_t$	. . .	. . .	. . .	. . .	0.1132*	4.5235
$\ln F_t$	0.0396	1.0867	0.0015	0.0443	0.0079	0.6795
$\ln F_{t-1}$	0.0287***	1.8314	0.0604***	1.7319	0.0512***	1.6561
$\ln K_t$	0.1604*	4.8283	0.1311*	3.4872	0.1314*	3.8252
ECM_{t-1}	−0.2579*	−3.9773	−0.2524*	−3.8419	−0.2848*	−6.5963
R^2	0.6390		0.6008		0.6439	
F-statistic	13.1015*		11.1377*		13.3839*	
D. W	1.6784		1.7474		1.7883	

Short-Run Diagnostic Tests						
Test	F Statistic	Prob. Value	F Statistic	Prob. Value	F Statistic	Prob. Value
$\chi^2 NORMAL$	2.1987	0.3330	3.7263	0.1551	3.0612	0.2163
$\chi^2 SERIAL$	0.4241	0.4989	0.0049	0.9441	0.7675	0.3864
$\chi^2 ARCH$	0.8034	0.3752	0.3362	0.5652	1.4194	0.2403
$\chi^2 WHITE$	1.1252	0.3709	0.7942	0.6346	1.8074	0.1088
$\chi^2 REMSAY$	2.2138	0.1235	1.7206	0.1276	1.8139	0.1479

Note: *, **, and *** show significance at 1%, 5%, and 10% level, respectively.

finance-led growth hypothesis. Financial development and capital Granger cause international trade (exports and imports) in the long run.

In short run, bidirectional causality is found between international trade (exports) and economic growth. The feedback hypothesis is validated between capital and economic growth. Capital is Granger caused by financial development and exports. Joint causality, that is, long-and-short-run causality confirms our long- run as well as short-run findings. Capital Granger causes economic growth in short span of time. Joint causality, that is, long- and short-run causality confirm our long-run as well as short-run findings.

CONCLUSION AND POLICY IMPLICATIONS

Well-developed financial sector and international trade are generally considered as essential contributory factors for economic growth. However,

TABLE 7 The VECM Granger Causality Analysis: Export as an Indicator of Trade Openness

					Direction of Causality				
	Short Run				Long Run	Joint Long- and Short-Run Causality			
Dependent Variable	$\Delta \ln G_{t-1}$	$\Delta \ln E_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln K_{t-1}$	ECT_{t-1}	$\Delta \ln G_{t-1}, ECT_{t-1}$	$\Delta \ln E_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln K_{t-1}, ECT_{t-1}$
$\Delta \ln G_t$	....	9.2973* [0.0006]	3.6341** [0.0376]	14.0453* [0.0000]	−0.2995* [−5.4767]	....	13.0659* [0.0000]	15.8140* [0.0000]	16.8047* [0.0000]
$\Delta \ln E_t$	8.8358* [0.0008]	....	1.8317 [0.1756]	2.1508 [0.1320]	−0.7387* [−5.3548]	17.4032* [0.0000]	....	9.9686* [0.0001]	16.8717* [0.0000]
$\Delta \ln F_t$	0.1914 [0.8266]	0.21977 [0.8038]	....	2.3632 [0.1090]	....	....	....	....	....
$\Delta \ln K_t$	8.1005* [0.0013]	5.9022* [0.0062]	4.7953** [0.0144]	....	....	....	....	....	....

Note: * and ** show significance at 1% and 5% levels, respectively.

TABLE 8 The VECM Granger Causality Analysis: Import as an Indicator of Trade Openness

| | Direction of Causality | | | | | | | | |
| | Short Run | | | | Long Run | Joint Long- and Short-Run Causality | | | |
Dependent Variable	$\Delta \ln G_{t-1}$	$\Delta \ln I_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln K_{t-1}$	ECT_{t-1}	$\Delta \ln G_{t-1}, ECT_{t-1}$	$\Delta \ln I_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln K_{t-1}, ECT_{t-1}$
$\Delta \ln G_t$	....	1.6652 [0.2042]	1.6844 [0.2060]	6.2597* [0.0048]	−0.2606* [−3.8704]	....	5.1471* [0.0048]	6.5557* [0.0013]	10.3502* [0.0001]
$\Delta \ln I_t$	0.9138 [0.4106]	....	0.3460 [0.7099]	1.4744 [0.2432]	−0.4816* [−3.2066]	3.3521** [0.0302]	....	3.9045** [0.0169]	4.1513** [0.0131]
$\Delta \ln F_t$	0.6751 [0.5154]	0.7795 [0.4664]	....	1.8099 [0.1787]	....	....	....	....	....
$\Delta \ln K_t$	5.7053 [0.0072]	1.9529 [0.1570]	1.4409 [0.2504]	....	....	....	....	....	....

Note: * and ** show significance at 1% and 5% levels, respectively.

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TABLE 9 The VECM Granger Causality Analysis: Trade (Exports + Imports) as an Indicator of Trade Openness

					Direction of Causality				
	Short Run				Long Run		Joint Long- and Short-Run Causality		
Dependent Variable	$\Delta \ln G_{t-1}$	$\Delta \ln TR_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln K_{t-1}$	ECT_{t-1}	$\Delta \ln G_{t-1}, ECT_{t-1}$	$\Delta \ln TR_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln K_{t-1}, ECT_{t-1}$
$\Delta \ln G_t$	·····	12.2535* [0.0001]	2.4709*** [0.0996]	7.9402* [0.0015]	−0.3068* [−8.9729]	·····	31.2420* [0.0000]	38.7400* [0.0000]	28.4662* [0.0000]
$\Delta \ln TR_t$	4.3432** [0.0409]	·····	0.7063 [0.9266]	0.3396 [0.7144]	−0.4775* [−4.0471]	6.9611* [0.0009]	·····	10.8441* [0.0000]	5.8169* [0.0025]
$\Delta \ln F_t$	0.3538 [0.7044]	0.3582 [0.7015]	·····	2.0738 [0.1409]	·····	·····	·····	·····	·····
$\Delta \ln K_t$	4.1669** [0.0248]	0.5227 [0.5075]	4.2149** [0.0229]	·····	·····	·····	·····	·····	·····

Note: *, **, and *** show significant at 1%, 5%, and 10% levels, respectively.

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the existing literature provides us with inconclusive results mainly because of country-specific factors and different methods of study. Hence country specific study supported by well developed method is worthy to pursue.

Therefore, this study deals with the relationship between financial development, international trade, and economic growth in the case of Australia over the period of 1965 to 2010. In doing so, we have applied the structural break the ARDL bounds testing approach to examine the long-run relationship between the variables. The structural break unit root tests have been used to test the integrating order of the variables and, finally, direction of causal relation is investigated by applying the VECM Granger causality approach.

The results report that the variables are cointegrated for the long-run relationship. Furthermore, international trade (exports and imports) adds in economic growth. Financial development enhances domestic production by boosting investment activities and hence raises economic growth. Capital also contributes to economic growth positively. The causality analysis reports feedback hypothesis between international trade (exports and imports) and economic growth. Financial development Granger causes economic growth supporting supply-side hypothesis. International trade (exports and imports) is Granger caused by financial development and capital.

Based on the results revealed by this research, the following policy prescriptions may be suggested: Australia should continue to patronize the development of financial sector. This sector should be as open, competitive, and efficient as possible. Attempts should be made to more actively and efficiently promote its strengths, to accelerate its development process, and to make it more transparent. Proper initiatives must be taken to increase the market size (e.g., by offshore banking units), to improve access to capital (e.g., by removing withholding tax on offshore borrowing and impediments to Islamic finance), to enhance competition and efficiency (e.g., by increasing competition in exchange trade markets and removing state insurance taxes and rationalizing regulations), to maintain best practice regulations (e.g., by a avoiding unnecessary regulations). Government-business partnership should also be strengthened, and greater financial integration with the Asia-Pacific region is required for the broader national interests.

Concerted efforts must be made to accelerate and increase Australia's international trade. Trade negotiations to reduce partner countries' all sorts of trade barriers must continue in this regard. Australia's contribution to world trade must be increased to expedite its economic growth. Proper quality of the goods and services must be maintained, and the varieties of goods and services must be increased. Import of capital goods is more desirable to increase its production and export capacity. All partner countries' propensities to export and import must be taken into account sufficiently and adequately when trade policy is set.

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NOTES

1. Trade intensity equals exports plus imports as share of GDP.

2. Pesaran et al. (2001) have computed two asymptotic critical values—one when the variables are assumed to be I(0) and the other when the variables are assumed to be I(1).

3. In such case, error correction method is appropriate method to investigate the cointegration (Bannerjee, Dolado, & Mestre, 1998). This indicates that error correction term will be a useful way of establishing cointegration between the variables.

4. The upper and lower critical bounds by Narayan (2005) are more appropriate for small sample (30 – 80). The critical bounds by Pesaran et al. (2001) are significantly smaller (Narayan & Narayan, 2005).

5. If cointegration is not detected, the causality test is performed without an error correction term (*ECT*).

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