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

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Abstract: This study investigates the relationship between financial development, international trade and economic growth in case of Australia over the period of 1965-2010. The ARDL bounds testing approach to cointegration was applied to examine the long run relationship among the series, while stationarity properties of the variables were tested by applying two structural break tests i.e. Zivot-Andrews (1992) and Clemente et al. (1998).

Our empirical evidence confirmed the long run relationship among the variables. The results showed that financial development, international trade and capital are the drivers of economic growth both in short run as well as in long run. The feedback effect exists between international trade and economic growth. Financial development Granger causes economic growth validating supply-side hypothesis in case of Australia.

Keywords: Financial Development, International Trade, Economic Growth, Australia.
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I. 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 contributory role 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 (AFC, 2009). International trade, both exports and imports, also play a vital role towards 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 and 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, et al. 2007). Therefore, our current paper aims at filling out this gap, and thus we believe it will add knowledge to the existing literature. 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 results obtained from case studies can be used to better shape of institutional structure and to better exploit the benefits of financial development, imports and exports.

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 by the 2007-08 *World Economic Forum Global Competitiveness Report*. 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 per cent of GDP in 2007 from around 30 per cent 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 (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 per cent of GDP, 3.6 per cent 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’s geographical location is close to the faster growing region in the World. 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. Since 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 per cent in 2006 from 32.90 per cent in 1980 (Rahman, 2010). In 2011, it was 41 per cent (WDI, 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 per cent 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 (WDI, 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.. For example, in 2006 and 2007, the growth rates were 2.0 percent and 2.5 percent, respectively. These figures were 10.5 percent and 7.0 percent for the USA, 22.0 percent and 19.5 percent for China, 11.0 percent and 11.5 percent for India, 10.0 percent and 9.0 percent for Japan, 13.5 percent and 11.5 percent for Asia, and 8.5 percent and 6.0 percent for the world (WTO, 2008; Rahman 2010, 2012).

Furthermore, Australia's share in world exports, imports and trade is still very low compared to other countries including its Asian neighbours. To illustrate, in 2007, Australia's export, import and trade shares in world trade were 1.0 percent, 1.2 percent and 1.1 percent, respectively. These figures were 9.5 percent, 7.4 percent and 8.5 percent for Germany, 8.7 percent, 6.7 percent and 7.7 percent for China, 8.3 percent, 14.2 percent and 11.3 percent for the USA, 5.1 percent, 4.4 percent and 4.7 percent for Japan and 2.7 percent, 2.5 percent and 2.6 percent for the Republic of Korea, (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 current study is realized and justified.

The main objective of the present study is to investigate the effects of financial development, trade openness (exports and imports) on economic growth in case of Australia. The causal relationships among the variables will also be examined. The contribution of the paper is that empirical findings will enrich the existing literature with reference to Australia by employing the 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 paper is organized as follows. Section II-provides an analytical framework and a review of literature on financial development, trade and economic growth; section-III explains modeling, methodological framework and data; section-IV presents and discusses the research outcomes, and conclusion and policy implications are drawn in section-V.

II. ANALYTICAL FRAMEWORK AND A REVIEW OF LITERATURE

An economy with more developed financial markets and institutions tends to have significantly higher economic growth rate (Shahbaz and 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 which 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 and Odhiambo, 2010, Shahbaz et al. 2011). Besides, direct effect of savings on capital accumulation, better savings mobilization can improve resource allocation and boost technological innovation [Cotton and Ramachandran, (2001); Maureen, (2001); Omran and Bolbol, (2003) and Alfro et al. (2004)]. Developed domestic financial sector is also helpful to increase the foreign firm's borrowing to broaden their innovative activities in the domestic economy (Omran and Bolbol, 2003).

A good number of cross-sectional studies are found in the literature which provides evidence about importance of well functioning of financial markets to obtain positive spillovers from FDI to stimulate economic growth. The more developed the 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 and Lensink, 2003; Omran and Bolbol, 2003). However, Hsu and Wu, (2009) argue 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) investigate 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 support the view by Hermes and Lensink, (2003) and Alfaro et al. (2004). Ang, (2009) investigates 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 have 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) argue that the impact of FDI on output growth can be improved through development of financial markets. In contrast, referring Shan et al. (2001); Shan and Morris, (2002); Gries et al. (2008) argue that a strong connection between financial development and growth cannot be identified in mature 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 or hinder that growth. 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); Dollar and Kaaray, (2001) suggest that trade openness promotes economic development. Using data from a panel of 57 countries from 1979-89; Wacziarg, (1998) finds that trade openness has a strong positive impact on economic growth. Similarly, using cross-country regressions; Frankel and Romer, (1996) conclude that trade openness has a large, significant and robust positive effect on income (Ahmed and Sattar, 2004). However, Greenaway and Sapsford, (1994) find little support for export-growth relationship. They use 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 Williums, (2000) also find 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 et al. (2004) observed bidirectional causality between real GDP and real exports for Greece. Cuadros et al. (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 et al. (2004) found unidirectional causality from exports to GDP. Export-led growth is also confirmed by Ullah et al. (2009) and, Shirazi and Manap, (2004) and Shahbaz, (2012) in case of Pakistan. On 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 1970-2005; 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) report 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 from 1973 through 1990. Blomstrom and Wolf, (1994) also find 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, (2008) for some South American countries. On other hand, Awokuse, (2007) finds 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 et al. (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.

III. DATA, MODELING AND METHODLOGICAL FRAMEWORK

Data used in the paper is annual frequency over the period of 1965-2011, taken from the World Development Indicators (WDI-CD-ROM, 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:

$$G = AK^{\alpha} L^{\beta} e^{u} \quad (1)$$

Where, G is real gross domestic product (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, its efficient use, encourages 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 following:

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

Where ϕ is time-invariant constant, TR is indicator of trade openness and F is financial development. Substituting equation-2 into equation-1:

$$G(t) = \phi.F(t)^{\delta_1} TR(t)^{\delta_2} K(t)^{\alpha} L(t)^{\beta} \quad (3)$$

Following Shahbaz, (2012) we divide the 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 following:

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

where, $\ln G_t$, $\ln F_t$, $\ln TR_t$ and $\ln K_t$ is 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 paper 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.

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 ARDL bounds test works regardless of whether or not the regressors are I(1) or I(0) / I(1), the presence of I(2) or higher order renders the F-test unreliable (See Ouattra, 2004). We check the stationarity properties using ADF with intercept and trend keeping in mind that it is not appropriate in the presence of structural break in the series. Therefore, we apply the

Zivot-Andrews (ZA) (1992) and Clemente et al. (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. (1998) test has more power compared to the ZA (1992) test due to its power properties.

The ARDL bounds testing approach is considered superior than others due to its various advantages. First, it has the characteristics of flexibility and application regardless of the order of integration. The simulation confirms the evidence of its superiority and provides consistent results for small size sample (Pesaran and 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:

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

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

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

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

Where, Δ is difference operator, T is time trend and D indicates the structural break point based on findings of ZA (1992) test. Test of cointegration has the property of comparing the computed F-statistic with the critical bounds generated by Pesaran et al. (2001) i.e. 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 alternate $H_a : \alpha_G \neq \alpha_F \neq \alpha_{TR} \neq \alpha_K \neq 0$ 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:

$$\ln G_t = \theta_0 + \theta_1 \ln F_t + \theta_2 \ln TR_t + \theta_3 \ln K_t + \mu_i \qquad (9)$$

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 is the error term 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]:

$$(1-L)\begin{bmatrix} \ln G_t \\ \ln F_t \\ \ln TR_t \\ \ln K_K \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix} + \sum_{i=1}^{p} (1-L) \begin{bmatrix} b_{11i} b_{12i} b_{13i} b_{14i} \\ b_{21i} b_{22i} b_{23i} b_{24i} \\ b_{31i} b_{32i} b_{33i} b_{34i} \\ b_{41i} b_{42i} b_{43i} b_{44i} \end{bmatrix} \times \begin{bmatrix} \ln G_{t-1} \\ \ln F_{t-1} \\ \ln TR_{t-1} \\ \ln K_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha \\ \beta \\ \delta \\ \phi \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix} \qquad (10)$$

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. Additionally, joint long-and-short runs causal relationship can be estimated by joint significance of both 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 while causality runs from economic growth to financial development is indicated by $b_{21,i} \neq 0\forall_i$.

IV. RESULTS AND DISCUSSIONS

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 mentioned order of integration. Zivot-Andrews, (1992) test allows having information about single structural break stemming in the series and Clemente et al. (1998) test provides information about structural breaks occurring in the series. The results of both tests are reported in Table 1 and 2 respectively. The results of Zivot-Andrews (1992) test unveil that all the series have unit root problem at level with intercept and trend but found stationary at I(1) and same inference is drawn from Clemente et al. (1998) unit root test. This shows that variables have unique order of integration i.e. I(1).

[Table 1 here]

[Table 2 here]

[Table 3 here]

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 or not. 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 of the variables which is 2 in our case. The AIC criterion has superior power properties as compared to SBC and provides effective and reliable results which help in capturing the dynamic relationship between the series (Lütkepohl, 2006). The results of the ARDL F-test are reported in Table-3 and F-statistics do not seem to upper critical bounds when we use international trade and economic growth as forcing variables but found cointegration as we treat them as predicted variables. Our computed F-statistics cross upper critical bounds at 5% level of significance and same inference can drawn for other models where we used exports and imports as indicators of international trade. 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 1965-2010. The robustness of the ARDL results is investigated by applying Johansen multivariate cointegration test. The Table-4 deals with the results of Johansen cointegration revealing that there is a one cointegration in each model. This confirms the existence of long run relationship between the variables. This unveils the robustness of long run results.

[Table 4 here]

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-5 show that exports are positively related to economic growth and it is statistically significant at 1 per cent level. All else constant, a 1 per cent increase in exports adds in economic growth by 0.3182 per cent, suggesting that exports play their vital role to enhance domestic production and hence economic growth in Australian. The impact of imports on economic growth is positive and it is significant at 1 per cent level. A 0.1881 per cent rise in economic growth is linked with 1 per cent increase in imports by keeping other factors constant. The relationship between international trade and economic growth is positive and statistically significant. All else is same, a 1 per cent international trade contributes in economic growth by 0.3001 per cent. Financial development is positively linked with economic growth and a 1 per cent financial development adds in economic growth by 0.0712-0.0976 per cent, all else is same. Finally, capital stock also stimulates economic growth and it is statistically significant. A 0.1159-0.1771 per cent economic growth is linked with 1 per cent increase in capitalization in case of Austrian economy.

[Table 5 here]

The short run impacts of financial development, international trade and capital on economic growth is described in lower segment of Table-5. 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 case of Australia. The coefficients are all statistically significant at 1 per cent level. The short run deviations from the long run equilibrium are corrected by 25.79, 25.24 and 28.48 per cent towards long run equilibrium path each year. In short run, exports promote economic growth. Imports add in economic growth. International trade also stimulates economic growth. Financial development increases economic growth but with a lagged effect i.e. 0.0287-0.0604. The impact of capital on economic growth is positive (0.1311-0.1604) and it is statistically significant at 1 per cent level.

The short run model meets the assumptions of classical linear regression model (CLRM) regarding normality of error term, serial correlation, 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 form for the short run models are well specified.

THE VECM GRANGER CAUSALITY

The presence of cointegration for long run relationship between economic growth, trade openness, financial development, capital and labour 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 trade openness through sound financial developing and improving the quality of human capital. It is disclosed by Granger, (1969) that the VECM Granger causality test is appropriate once variables are integrated at same level of integration.

The results i.e. exports-growth model reported in Table-6 reveal that feedback hypothesis exists between exports and economic growth in long run. Financial development Granger causes economic growth supporting supply-side or finance lead growth hypothesis. Financial development and capital Granger cause exports. In short run, bidirectional causality is found between exports and economic growth. The feedback hypothesis is validated between capital and economic growth and same inference can be drawn between capital and exports. Capital is Granger caused by financial development. Joint causality i.e. long-and-short runs causality confirm our long run as well as short run findings.

Table-7 deals with imports-growth results and reports that in long run, bidirectional causal relationship is found between imports and economic growth. Financial development and capital Granger cause imports. Capital Granger causes economic growth in short span of time. Joint causality i.e. long-and-short runs causality confirm our long run as well as short run findings.

[Table 6 here]

[Table 7 here]

[Table 8 here]

In Trade-growth model, results are reported in Table-8. The results unveil that in long run, international trade and economic growth Granger each other. Financial development and capital Granger cause economic growth and international trade. In short span of time, feedback effect exists between international trade and economic growth. Financial development Granger causes capital. The bidirectional causality is also found between capital and economic growth. Joint causality i.e. long-and-short runs causality confirm our long run as well as short run findings.

V. CONCLUSION AND POLICY IMPLICATIONS

Well developed financial sector and international trade are generally considered as essential contributory factors for economic growth. However, 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 our current study deals with the relationship between financial development, international trade and economic growth in case of Australia over the period of 1965-2010. In doing so, we have applied the structural break 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 reported that the variables are cointegrated for long run relationship. Furthermore, exports, imports and trade openness add 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 exports and growth, imports and growth and, international trade and growth. Financial development Granger causes economic growth supporting supply-side hypothesis. Exports, imports and international trade are Granger caused by financial development and capital.

Based on the results revealed by the current 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.

Footnote

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 et al. 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 and Narayan, 2005).
5. If cointegration is not detected, the causality test is performed without an error correction term (*ECT*).

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Table-1: 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: * represents significant at 1% level of significance. Lag order is shown in parenthesis.				

Table-2: 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: * indicates significant at 1% level of significance. Lag order is shown in parenthesis.								

Table-3: The Results of ARDL Cointegration Test

Bounds Testing to Cointegration				Diagnostic tests			
Estimated Models	Optimal lag length	F-statistics	Structural Break[1]	χ^2_{NORMAL}	χ^2_{ARCH}	χ^2_{RESET}	χ^2_{SERIAL}
$F_G(G/E,F,K)$	2, 1, 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

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

$F_G(G/I,F,K)$	2, 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, 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, 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, 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, 2	6.2997**	1995	0.5594	[1]: 0.0736	[1]: 0.8912	[1]: 0.0635; [3]: 2.1557
Significant level	Critical values (T= 40)#						
	Lower bounds $I(0)$	Upper bounds $I(1)$					
1 per cent level	6.053	7.458					
5 per cent level	4.450	5.560					
10 per cent level	3.740	4.780					

Note: The asterisks *, ** and *** denote the significant at 1, 5 and 10 per cent levels, respectively. The optimal lag length is determined by AIC.

[ ] is the order of diagnostic tests. # Critical values are collected from Narayan (2005).

Table-4: 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 significant at 1% and 5%level of significance respectively.		

Table-5: Long and Short Runs Results

Dependent variable = $\ln G_t$						
Long Run Analysis						
Variables	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
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						
Variables	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
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 significant at 1%, 5% and 10% level of significance respectively.						

Table-6: The VECM Granger Causality Analysis: Exports is as an indicator of Trade Openness

pendent riable	Direction of Causality								
	Short Run				Long Run	Joint Long-and-Short Run Causality			
	$\Delta \ln G_{t-1}$	$\Delta \ln E_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln K_{t-1}$	ECT_{t-1}	$\Delta \ln G_{t-1}, ECT_{t-1}$	$\Delta \ln E_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln K_{t-1}, EC$
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
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
F_t	0.1914 [0.8266]	0.21977 [0.8038]	….	2.3632 [0.1090]	….	….	….	….	….

K_t	8.1005* [0.0013]	5.9022* [0.0062]	4.7953** [0.0144]	….	….	….	….	….	….

e: * and ** show significance at 1 and 5 per cent levels respectively.

Table-7: The VECM Granger Causality Analysis: Imports is as an indicator of Trade Openness

pendent riable	Direction of Causality								
	Short Run				Long Run	Joint Long-and-Short Run Causality			
	$\Delta \ln G_{t-1}$	$\Delta \ln I_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln K_{t-1}$	ECT_{t-1}	$\Delta \ln G_{t-1}, ECT_{t-1}$	$\Delta \ln I_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln K_{t-1}, EC$
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
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
F_t	0.6751 [0.5154]	0.7795 [0.4664]	….	1.8099 [0.1787]	….	….	….	….	….
K_t	5.7053 [0.0072]	1.9529 [0.1570]	1.4409 [0.2504]	….	….	….	….	….	….

e: * and ** show significance at 1 and 5 per cent levels respectively.

Table-8: The VECM Granger Causality Analysis: Imports is as an indicator of Trade Openness

pendent riable	Direction of Causality								
	Short Run				Long Run	Joint Long-and-Short Run Causality			
	$\Delta \ln G_{t-1}$	$\Delta \ln TR_{t-1}$	$\Delta \ln F_{t-1}$	$\Delta \ln K_{t-1}$	ECT_{t-1}	$\Delta \ln G_{t-1}, ECT_{t-1}$	$\Delta \ln TR_{t-1}, ECT_{t-1}$	$\Delta \ln F_{t-1}, ECT_{t-1}$	$\Delta \ln K_{t-1}, EC$
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
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
F_t	0.3538 [0.7044]	0.3582 [0.7015]	….	2.0738 [0.1409]	….	….	….	….	….
K_t	4.1669** [0.0248]	0.5227 [0.5075]	4.2149** [0.0229]	….	….	….	….	….	….

e: *, ** and *** show significance at 1, 5 and 10 per cent levels respectively.