The nexus of private sector foreign debt, unemployment, trade openness: evidence from Australia.

Isaev, Mirolim and Masih, Mansur

INCEIF, Malaysia, INCEIF, Malaysia

12 May 2017

The nexus of private sector foreign debt, unemployment, trade openness: evidence from Australia.

Mirolim Isaev[1] and Mansur Masih[2]

Abstract

There is little empirical evidence from the econometric analysis of the relationship between private sector's foreign debt servicing and social development in open economies. This paper examines the relationship between private sector share of foreign debt, the unemployment rate and trade openness with Australia as a case study over the period 1988Q4-2016Q4. We employ Autoregressive Distributed Lag (ARDL) cointegration technique to explore the presence of theoretical long-run relationship among these variables. Our empirical findings indicate the presence of long-run equilibrium among variables. Moreover, the empirical results tend to reveal that the accumulation of private sector share of foreign debt is associated with the growth in Australia's unemployment rate. We suggest for the policy makers that improvement of the private sector's foreign debt is likely to reduce the unemployment rate.

Keywords: private sector foreign debt, unemployment, trade openness, ARDL, variance decomposition

[1]Graduate student in Islamic finance at INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia.

[2] **Corresponding author**, Professor of Finance and Econometrics, INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia. Phone: +60173841464 Email: mansurmasih@inceif.org

1. Introduction

There are many countries where the available domestic resources are limited to utilize for the purpose of social and economic development. Conventional wisdom associates improvement in the rate of growth with borrowing from the world's richest countries. However, early researchers have witnessed the gradual emergence of a possible alternative view of a net inflow of foreign capital as positively inimical to growth (Ball, 1962).

Furthermore, the recent global financial crises have stimulated a significant shrinking of economic activities of highly indebted countries. Several recent studies provide support for this view (see, e.g., Radelet 1998; Barro, 2001; Reinhart, 2008; Taylor, 2009). As a consequence of recession, some of European countries still suffer from persistent and higher unemployment. The unemployment rate remains alarmingly high in Greece and Spain, and in Portugal - around 25% and more than 14% respectively (IMF 2015).

Since the 1990s, there has been a drastic increase in the amount of capital raised by private sector through stock and bond issues (Gozzi et al. 2010). Obstfeld and Taylor (2004) show that the amount of debt contracted by firms in foreign markets grew almost fourfold over the period of 1991 and 2005, approaching one trillion U.S. dollars. More importantly, nowadays most part of the debt borrowed outside the country still accounts for the private sector. As many previous empirical studies focused on foreign debt as a whole, the study of the growth of private sector's foreign debt on social development remains uninvestigated.

Hallak (2013) mentions three special features of private sector's foreign debt in terms of its ability to enhance economic processes and absorb shocks. The presence of stronger governance, creditors' monitoring power and coordination of lenders in privately owned enterprises encourages foreign investors to allocate their funds in private sector rather than public sector. Although issues which usually public entities face, such as conflict of interest with politicians, weak creditors monitoring power and absence of coordination mechanism (Sturzenegger and Zettelmeyer, 2006; Francis et al., 2009), does not exist in private sector, excessive debt borrowed by private sector may create later busts. Accordingly, Corsetti et al. (1998) documents financial and corporate sectors in East Asian countries collapsed under the excessive weight of the paper liabilities in 1997-1998.

The social impact of the financial crises was evident in several ways (Lee, 1998). One of them is that the sharp contraction in production declines the demand for labor, resulting in an increase in unemployment. Social costs of unemployment include severe financial hardship and poverty, debt, homelessness and housing stress, family tensions and breakdown (McClelland and Macdonald, 1998)

Furthermore, as prolong unpaid debt has adverse effect on the economy which causes constrains and place the economy in a state of stagnancy, the entire economy will experience low level of fund in circulation, low level of saving, low level of financing and shrinking of output which create high level of unemployment in such country (Tunde, 2016). In addition, Atique (2012) suggest that external debt amount slows down economic growth more as compared to domestic debt amount.

Taken as a whole, appealing intuition that foreign debt performs better under private sector but not empirically conclusive and investigation of private sector's foreign debt is crucial. In consideration of these observations, the contribution of this paper is to investigate empirically the long run relationship between the private sector's foreign debt, the unemployment rate and trade openness in Australia (as an example of one of most open economies) by using the time series technique known as autoregressive distributed lag (ARDL) bounds test by Pesaran, Shin, and Smith (2001).

Furthermore, this study makes a humble attempt to answer the following question: Does private sector share of foreign debt contribute to social development in Australia? The findings of the study are vital in that as knowledge of co-movement of variables is beneficial for policy makers in formalizing social development policies.

2. Literature review

The empirical literatures that examine the relationship between private sector's foreign debt and social development, in particular, the unemployment rate, are very limited. Most of them study the impact of external debt on economic growth mostly for developing countries and support that there is a positive relationship between external debt and economic growth up to a certain point (Pattilo et al., 2002; Shabbir, 2013, Ramzan et al, 2014, Siddique, 2016).

Kalonji et al (2003) and Akram (2013) are among studies evaluating the impact of the external debt on social development indicators. Kalonji et al (2003) explores the relationship between external debt and poverty in Low-income countries whereas Akram (2013) examine the effects of external debt on income inequality in Pakistan. Using the first-differenced general method of moments (GMM) estimator, he finds that once the effect of income on poverty has been taken into account, external indebtedness indicator has a limited but important impact on poverty.

Meanwhile, by Akram (2013) an empirical model to incorporate the effects of debt on income inequality was developed. Employing Autoregressive Distributed Lags (ARDL) approach, he documents that public external debt and debt servicing have a positive and significant relationship with the GINI coefficient indicating that an increase in debt will result in widening income inequality and external debt has adverse distributional impacts on the poor.

Among the few empirical studies, Ohwofasa et al (2012), Maqbool et al (2013) and Shem (2015) include external debt as a macroeconomic variable into their analysis to identify the determinants of unemployment. Ohwofasa et al (2012) employs an Ordinary Least Squares (OLS) technique to determine the influence of external debt, debt service payment, balance of payments and foreign direct investment. The OLS results reveal that impact of external debt on unemployment is positive while foreign direct investment has a negative influence on unemployment.

Furthermore, Maqbool et al (2013) and Shem (2015) employ ARDL approach to investigate empirical relationship among unemployment, gross domestic product, population, foreign direct investment and external debt. However, Shem (2015) tests the long run effects of economic determinants of youth unemployment in Kenya and he documents evidence supporting the negative relationship of foreign direct investment and external debt on youth unemployment. By contrast, in a country-specific study, Maqbool et al, (2013) finds no statistical significant effect of external debt on unemployment in Pakistan. He further notes that funds borrowed by foreign lenders were not utilized appropriately.

Departing from the aforementioned studies that have a main focus on external debt itself, Arteta and Hale (2008), Celasun and Harms (2011) and Agca and Celasun (2011) look at the effects of private sector's external debts and how it interacts with public sector external debt. Arteta

and Hale (2008) find that sovereign debt crises are systematically accompanied by a decline in foreign credit to domestic private firms, confirming this decline is large, statistically significant, and robust. Moreover, Celasun and Harms (2011) documents evidence for supporting the notion that a greater share of the private sector in total external debt is associated with a reduced likelihood of sovereign default. Meanwhile, Agca and Celasun (2011) suggests that for a given country, an exogenous increase in the private-sector share of foreign debt improves a government's creditworthiness.

Some recent studies have extended the analysis of private sector's foreign debt with financial stability measures. For instance, using three methods, namely the Two Stage-Least Squares, the Maximum Likelihood Estimator and the Generalized Method of Moments, Hallak (2013) empirically examine the effect of private sector's foreign debt on financial stability. His findings support the hypothesis that private sector debt contributes to international financial stability to a greater degree than sovereign debt only under presence of floating exchange regimes.

3. Data and Methodology

3.1 Data

Quarterly macroeconomic data for Australia from 1988Q4 to 2016Q4, the period of which is dictated by data availability, make a total of 109 observations. The quarterly data included private sector share of foreign debt, the unemployment rate and trade openness.

Private sector share of foreign debt is measured by the ratio of private sector's foreign debt to Real Gross Domestic Product (Eq. 1). Moreover, trade openness is measured by the ratio of trade (imports plus exports) to Real Gross Domestic Product (Eq. 2). Definitions and sources of all variables are reported in Table 1.

$$PGDP = \frac{Private\ sector\ foreign\ debt}{Real\ gross\ domestic\ product} \times 100 \qquad \text{Eq. (1)}$$

$$TO = \frac{Import + Export}{Real\ gross\ domestic\ product} \times 100 \qquad \text{Eq. (2)}$$

Table 1. Definitions of variables in model.

Variables	Description

Unemployment rate (UNE)	The unemployment rate is the number of unemployed people expressed as a proportion of the labor force. *Source: Tomson Reuters DataStream*
Private sector share of foreign debt (PGDP)	Ratio of private sector's foreign debt to Real Gross Domestic Product.
Private sector's net foreign debt	Net foreign debt is gross foreign debt less non-equity assets, such as foreign reserves held by the Reserve Bank, and lending by residents of Australia to non-residents. Private sector comprises private financial and non-financial corporations *Source: Australian Bureau of Statistics*
Real GDP	Real Gross Domestic Product *Source: Bloomberg Database*
Trade openness (TO)	Country openness (sum of imports and exports) as a share of Real Gross Domestic Product.
Imports and Exports	Imports and exports of goods and services *Source: Bloomberg Database*

3.2 Methodology

We estimate our model using the Autoregressive Distributed Lag (ARDL) cointegration technique suggested by Pesaran and Shin (1999) and Pesaran et al (2001) since we have a mix of I (0) and I (1) variables in the sample (Table 3). This approach is also known as a bound testing approach.

There are several advantages to select this cointegration method. First, it can be applied irrespective of whether the variables are stationary or non-stationary. Second, the ARDL does not require all the variables under study must be integrated of the same order. Moreover, the ARDL test is relatively more efficient in the case of variables has small sample properties. Finally, by employing the ARDL cointegration technique we obtain unbiased estimates of the long-run model.

Before applying ARDL cointegration technique, we investigate the stationarity of the variables whether the variables are stationary at level form I (0) or differenced form I (1). To test the stationarity of each variable, we carry out three tests: Augmented Dicky Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test.

Stationary variable, where its mean, variance, and covariance with its lags are constant. The autocorrelation coefficients die down very quickly after only 1 or 2 significant lags and shocks are transitory. Non-stationary variable, where its mean, variance, and covariance with its lags are not constant. The autocorrelation coefficients tend to be unity and shocks are permanent.

With the non-stationarity tests of the variables, we decide on which methodology to use. if the variables are all stationary I (0), OLS is used. If all variables are non-stationary in their level form and stationary after differencing once, I (1), then time series is an appropriate. If combination of I (0) and I (1), we opt for an ARDL cointegration technique.

To investigate the existence of the long-run theoretical relationship among the variables, we use F-statistic in a generalized Dicky–Fuller type regression to test the significance of lagged levels of the variables under consideration in a conditional unrestricted equilibrium correction model (ECM) (Pesaran et al, 2001). Pesaran et al (2001) present the asymptotic distributions of both statistics (Wald or F-statistic) are non-standard under the null hypothesis that there exists no relationship in levels between the included variables, irrespective of whether the regressors are purely I (0), purely I (1) or mutually cointegrated.

Two sets of critical values provide critical value bounds for all classifications of the regressors into purely I(1), purely I(0) or mutually cointegrated. If the computed F-statistic falls outside the upper critical value bounds, the null hypothesis of no cointegration can be rejected. However, if the F-statistic falls inside these bounds, inference is inconclusive (Pesaran et al, 2001).

After long-run theoretical relationship between variables has been found to be exist, we estimate the long run model by selecting the orders of ARDL model using Swartz Bayesian (SBC) or Akaike Information (AIC) criteria, and estimate an ECM which integrates the short run dynamics with long run equilibrium, without losing the long run information (Chowdhury and Masih, 2015).

More importantly, after we find our variables are co-integrated in the long run, we test Vector Error Correction Modeling (VECM), which gives us the direction of lead-lag relationship (causality) among variables. In other words, it tells us which variable is leader (exogenous/independent) and which variable is follower (endogenous/dependent). Nevertheless, VECM is unable to tell which variable is the strongest leader and which variable is the weakest follower. It can be determined by Variance Decomposition (VDC) that tell which variable is the strongest leader and which variable is the weakest follower by ranking the variables based on the degree of dependence on their own past lags. The variable that is mostly explained by its own past is found to be the most exogenous amongst the variables and vice versa. Finally, Impulse response function (IRF) is applied to find out the response of one variable to an impulse in another variable in a system. IRF uses a variable-specific shock (we shock one variable and see the impact on others) whereas Persistence profile (PP) uses a system-wide shock, where the shock comes from the external source to our cointegrating vectors, and we see the time horizon required for variables to get back to equilibrium. Both are represented by graphs.

4. Empirical results

4.1 Testing stationarity of variables

We have started our empirical research with testing the stationarity of the variables. The results of ADF, PP and KPSS tests are shown in Table 2, Table 3 and Table 4, respectively.

Table 2: Augmented Dicky Fuller (ADF) Test

	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
LEVEL FORM	LUNE	ADF(5)=AIC	174.5709	-2.9575	-3.4515	Non-Stationary
		ADF(5)=SBC	163.8424	-2.9575	-3.4515	Non-Stationary
	LPGDP	ADF(1)=AIC	198.7466	-1.1719	-3.4515	Non-Stationary
		ADF(1)=SBC	193.3823	-1.1719	-3.4515	Non-Stationary
	LTO	ADF(5)=AIC	170.2982	-1.9471	-3.4515	Non-Stationary
		ADF(5)=SBC	159.5697	-1.9471	-3.4515	Non-Stationary

	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
DIFF FORM	DUNE	ADF(5)=AIC	171.8285	-4.5515	-2.8884	Stationary
		ADF(4)=SBC	162.7531	-4.0522	-2.8884	Stationary
	DPGDP	ADF(1)=AIC	197.4159	-6.1905	-2.8884	Stationary

		ADF(1)=SBC	193.4067	-6.1905	-2.8884	Stationary
	DTO	ADF(4)=AIC	167.6957	-7.3254	-2.8884	Stationary
		ADF(4)=SBC	159.6772	-7.3254	-2.8884	Stationary

Notes: CV = 99% simulated critical value

Table 3: Phillips-Perron (PP) test

PP test					
LOG FORM	**VARIABLE**	**PP**	**T-STAT.**	**C.V.**	**RESULT**
	LUNE	PP	-2.7531	-3.4497	Non-Stationary
	LPGDP	PP	-1.6428	-3.4497	Non-Stationary
	LTO	PP	-4.7430	-3.4497	Stationary

PP test					
DIFF FORM	**VARIABLE**	**PP**	**T-STAT.**	**C.V.**	**RESULT**
	DUNE	PP	-14.0540	-2.8872	Stationary
	DPGDP	PP	-10.1820	-2.8872	Stationary
	DTO	PP	-17.5540	-2.8872	Stationary

Notes: CV = 99% simulated critical value

Table 4: Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test

KPSS test					
LOG FORM	**VARIABLE**	**KPSS**	**T-STAT.**	**C.V.**	**RESULT**
	LUNE	KPSS	.10259	.14028	Stationary
	LPGDP	KPSS	.10483	.14028	Stationary
	LTO	KPSS	.10519	.14028	Stationary

KPSS test					
LOG FORM	**VARIABLE**	**KPSS**	**T-STAT.**	**C.V.**	**RESULT**
	DUNE	KPSS	.12045	.38361	Stationary
	DPGDP	KPSS	.13803	.38361	Stationary
	DTO	KPSS	.19328	.38361	Stationary

Notes: CV = 99% simulated critical value

By unit root tests, we found mixed results in terms of stationary and non-stationary variables. It can be seen that trade openness illustrates different result from ADF, PP and KPSS tests. So, the results reveal that there is no consistency across various tests. Comparing with ADF, PP corrects autocorrelation and heteroscedasticity problems by using Newey-west test adjusted variance method. As our variables are found to be mixture of I (0) and I (1) in PP, we opt for

employing ARDL cointegration technique to test the long-run theoretical relationship among the variables.

Moreover, after the unit root test, we have attempted to determine the number of lags (Table 5) although in ARDL it is not necessary to find the VAR order. ARDL does not require all the variables must be integrated of the same order.

Table 5: Var Lag Order Selection

Order	AIC	SBC	p-Value	C.V.
4	535.2061	483.0859	[.000]	1%

Based AIC and SBC criteria, 4 lag order has been chosen. AIC focuses on predicting best of the order of lags. It focuses on large value of likelihood and less concerned on over-parameter. It tends to choose higher order of lags. SBC is more concerned on over-parameter. It tends to choose lower order of lags.

4.2. Testing for Co-integration

Table 6 below illustrates the computed F-statistics for variables. The results indicate the existence of long-run theoretical relationship.

Table 6: F-Statistics for testing the Existence of Long-Run Relationship (Variable Addition Test)

VARIABLE	F-Statistics	Lower Bound	Upper Bound	C.V.	Decision Rule
LUNE | LPGDP, LTO	8.4356	5.315	6.414	1%	Cointegration
LPGDP | LUNE, LTO	1.5421	5.315	6.414	1%	No cointegration
LTO | LUNE, LPGDP	3.7090	5.315	6.414	1%	No cointegration

The computed F-statistics for LUNE (the unemployment rate) is 8.4356 which is higher than the upper bound critical value 6.414 at the 1% significance level. This implies that the null hypothesis of no co-integrating in the long-run theoretical relationship can be rejected. From this point of view, time series differs from conventional regression where the latter assumes about the existence of the long-run theoretical relationship among the variables.

After this stage, we found out that the relationship among the variables is not spurious that every variable contains information for the prediction of the other variables but which variable is leader and which is follower has not been determined.

4.3 Estimation of the long-run coefficients based ARDL model

After finding the F-test to be significant, we estimate the long-run coefficients. The estimates of the long-run coefficients based on the SBC and the AIC model selection criteria are summarized in Table 7.

Table 7. Estimates of the long-run coefficients based on ARDL models selected by AIC and SBC criteria. (Model Unemployment (LUNE))

Long-Run coefficients	Model selection criteria	
	SBC – ARDL (5, 0, 1)	AIC – ARDL (5, 0, 6)
INPT	4.2112***	4.1372***
	[0.24560]	[0.29431]
LPGDP	-0.66874***	-0.58626***
	[0.14403]	[0.17492]
LTO	0.25147	0.14010
	[0.22076]	[0.26801]

Notes: * indicate significant at 1% level, p<0.01

Both AIC and SBC model selection criteria results suggest that there is significant long run relationship between private sector's foreign debt and the unemployment rate. The estimates obtained from both model are very similar, but the estimated standard errors obtained using the model selected by the SBC are considerably smaller as compared to the AIC.

4.4 Vector Error Correction Model

As cointegration cannot tell us the lead-lag relationship among the variables, to see which variable exogenous and endogenous, we apply vector error correction modeling technique (VECM). Table 8 and Table 9 shows the ECM's representation for the ARDL model with AIC and SBC Criteria, respectively.

Table 8: Error Correction Representation for the Selected ARDL Model ARDL selected based on Akaike Information Criterion (AIC)

ecm1(-1)	Coefficient	Standard Error	T-Ratio [Prob.]	C.V.	Result

ecm1(-1)	Coefficient	Standard Error	T-Ratio [Prob.]	C.V.	Result
dLUNE	-.14715	.032905	-4.4720[.000]	1%	Endogenous
dLPGDP	-.050058	.022924	-2.1837[.031]	1%	Exogenous
dLTO	-.082598	.039928	-2.0687[.041]	1%	Exogenous

Table 9. Error Correction Representation for the Selected ARDL Model, ARDL selected based on Schwarz Bayesian Criterion (SBC).

ecm1(-1)	Coefficient	Standard Error	T-Ratio [Prob.]	C.V.	Result
dLUNE	-.18233	.032015	-5.6953[.000]	1%	Endogenous
dLPGDP	-.050058	.022924	-2.1837[.031]	1%	Exogenous
dLTO	-.060741	.038976	-1.5584[.122]	1%	Exogenous

The result of VECM test shows that private sector share of foreign debt and trade openness are exogenous, while the unemployment rate is the endogenous. It is determined by the p-value of the ECM coefficient. If it is less than the chosen 1% significance level, this indicates that the short-run deviation from equilibrium has a significant feedback effect on the endogenous variable.

As we examine the relationship between private sector share of foreign debt and the unemployment rate, the private sector's foreign debt variable has become exogenous and the unemployment rate has become endogenous that is what we have been expecting from the beginning. When we shock private sector's foreign debt, the leader variable, while the unemployment rate is follower to it. In other words, if we shock the private sector's foreign debt variable, the follower the unemployment rate will be affected. Therefore, the policy makers have to take care about the private sector's foreign debt variable while it has an substantial effect on the Australia's economy and social development.

Although VECM tends to show the endogeneity and exogeneity of a variable but, it is unable to tell which variable is the strongest leader and which variable is the weakest follower. Therefore, we apply VDC to find the relative degree of endogeneity or exogeneity of the variables.

4.5 Variance Decomposition

In this stage, we attempt to identify the relative exogeneity or endogeneity of a variable by ranking. The relative exogeneity or endogeneity of a variable is determined by the proportion of

the variance explained by its own past (Domingos, 2000). The variable that is explained mostly by its own shocks is deemed to be the strongest leader of all.

As two options for VDCs is available, Generalized and Orthogonalized test results are shown in table 10 and table 11. Orthogonal depends on the particular ordering of the variables in the VAR. It assumes that when a particular variable is shocked, all other variables in the system are switched off. Generalized does not depend on the particular ordering of the variables in the VAR. It does not make such an assumption of all other variables switched off.

Table 10: Generalized Variance Decomposition test results

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	4	77.96%	3.40%	18.64%	2
DPGDP	4	1.66%	88.09%	10.25%	1
DTO	4	23.26%	11.64%	65.10%	3

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	8	76.39%	3.38%	20.23%	2
DPGDP	8	2.01%	87.76%	10.22%	1
DTO	8	30.16%	10.25%	59.59%	3

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	12	75.85%	3.18%	20.97%	2
DPGDP	12	2.13%	87.65%	10.22%	1
DTO	12	33.98%	9.46%	56.57%	3

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	16	75.63%	3.02%	21.35%	2
DPGDP	16	2.18%	87.59%	10.23%	1
DTO	16	36.36%	8.96%	54.68%	3

Table 11. Orhogonalized Variance Decomposition test results

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	4	89.71%	3.97%	6.32%	2
DPGDP	4	1.72%	91.06%	7.22%	1
DTO	4	2.97%	18.20%	78.83%	3

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	8	89.23%	4.02%	6.75%	2
DPGDP	8	2.09%	90.62%	7.29%	1
DTO	8	58.50%	7.82%	33.69%	3

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	12	89.33%	3.80%	6.87%	2
DPGDP	12	2.20%	90.50%	7.30%	1
DTO	12	41.29%	11.06%	47.65%	3

VARIABLE	HORIZON	DUNE	DPGDP	DTO	RANKING
DUNE	16	89.48%	3.62%	6.89%	2
DPGDP	16	2.25%	90.45%	7.30%	1
DTO	16	44.28%	10.49%	45.23%	3

There is no conflict between both VDCs test results. The results of generalized and orthogonalized VDC analysis indicate private sector share of foreign debt as the most exogenous one (the highest percentage variation explained by itself) and unemployment and trade openness are followers. The trade openness is the weakest follower as the percentage of variation attributable to its own self is the lowest.

As our data is quarterly data, to find the relative exogenity and endogeneity, we have taken 4 quarters or one year horizon, 8 quarters or 2 years horizon, 12 quarters or 3 years horizon and 16 quarters or 4 years horizon. The figures for self-dependency of each variables in the whole period, we shocked, didn't change.

The reason for being the private sector share of foreign debt as the most exoginous is that a net flow of capital, real or financial, comes into a country from external or foreign sources. Higher capital inflow will improve economic growth and social development, increasing productive capacity in business enterprises. Moreover, foreign investment may also introduce new working practices that enable to increase labour productivity. Therefore, implication for policy makers is that improvement of the private sector's foreign debt can reduce the unemployment rate

and affect country's trade openness, while augmenting the unemployment and trade openness may not necessarily further attract the foreign investment.

4.6 Impulse response function

The VDC has represented the impact of shock as numbers but impulse response functions show the analysis as a graph.
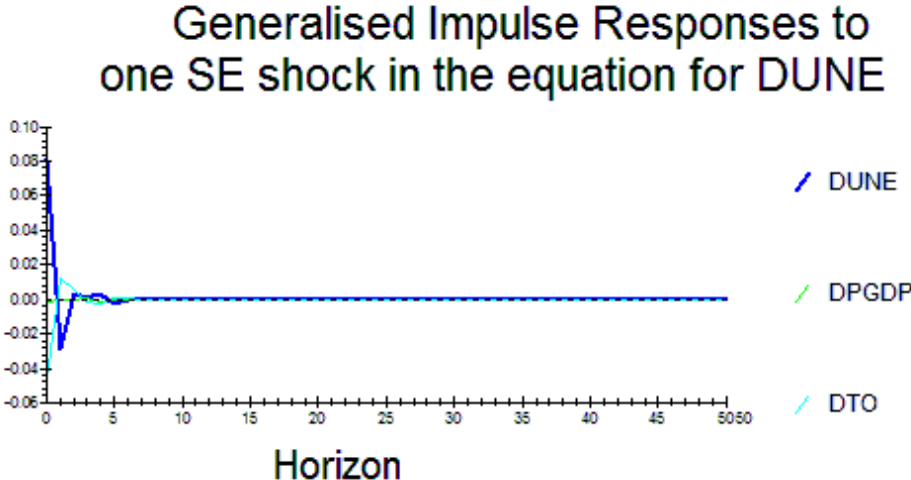
Generalised Impulse Responses to one SE shock in the equation for DPGDP
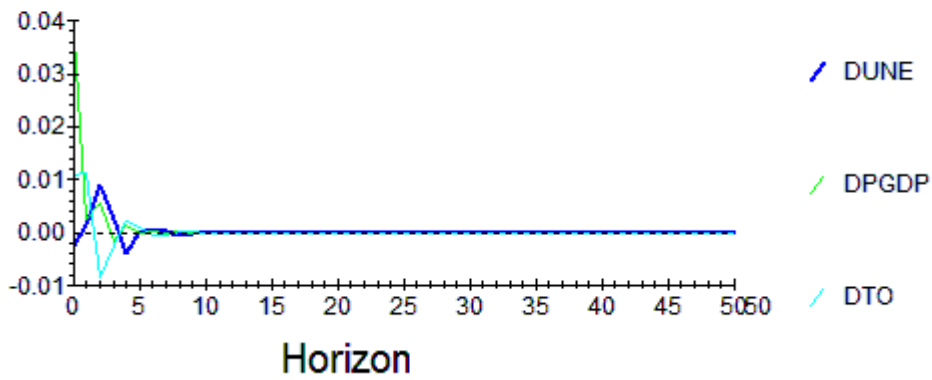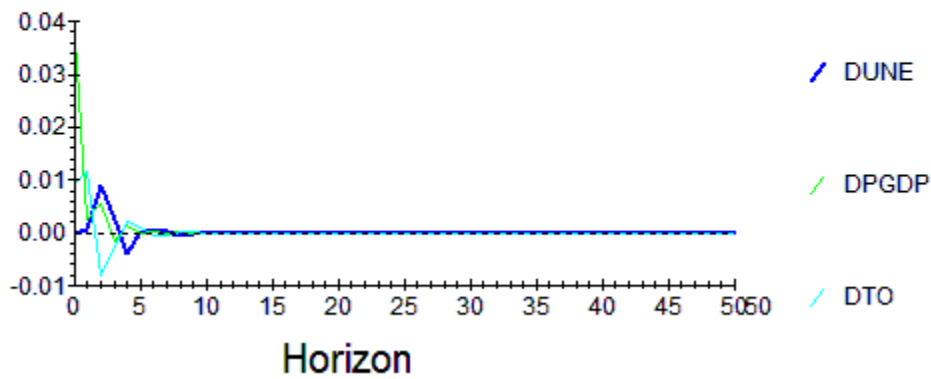

Horizon

DUNE

DPGDP

DTO

Generalised Impulse Responses to one SE shock in the equation for DTO

Horizon

DUNE

DPGDP

DTO

Orthogonalised Impulse Responses to one SE shock in the equation for DUNE
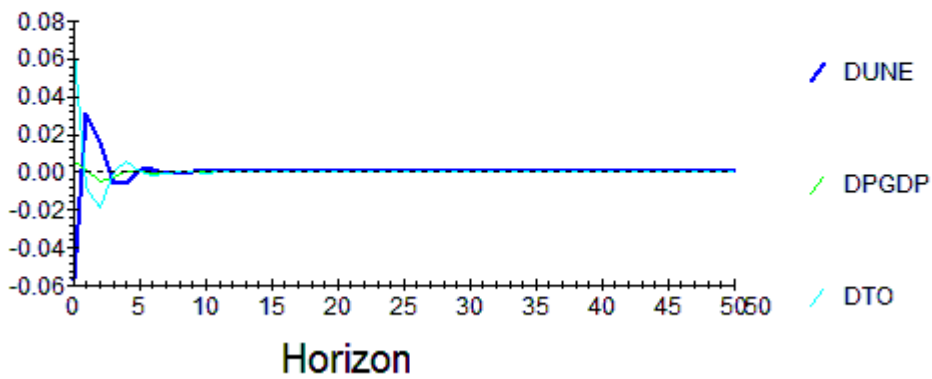
- DUNE
- DPGDP
- DTO

Orthogonalised Impulse Responses to one SE shock in the equation for DPGDP

- DUNE
- DPGDP
- DTO
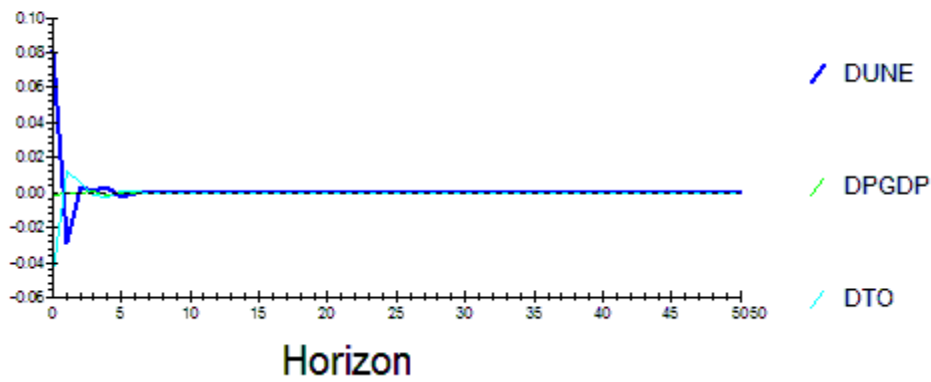
## Orthogonalised Impulse Responses to one SE shock in the equation for DTO
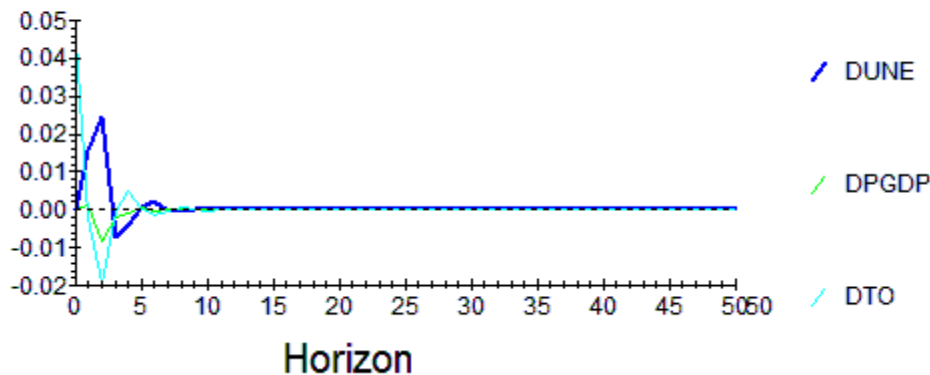
Those graphs above illustrates the results in that when we shock variables, the endogenous variables are more effected while the exogenous variable are less effected. We can see from the graphs that when unemployment receives shock, it will take 5 or 6 quarters to get back to the equilibrium, where for private sector share of foreign debt it may take couple of quarters only. This justifies the fact that private sector share of foreign debt is the most exogenous among our variables.
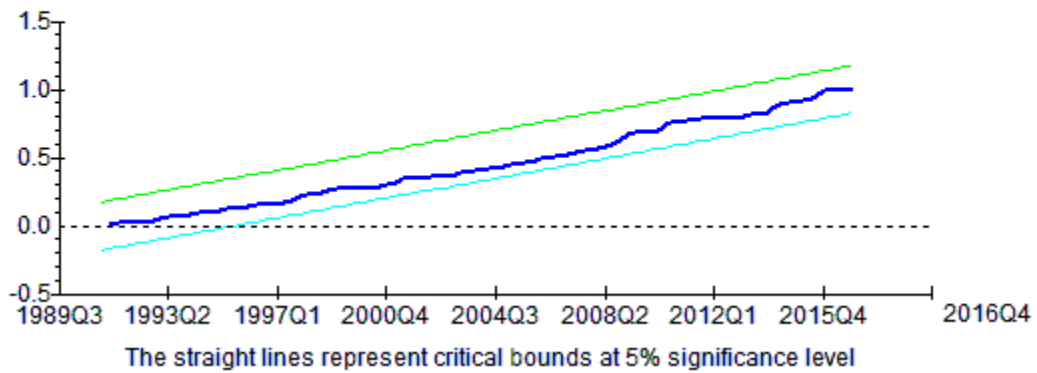
4.7 Stability tests

We have also checked the stability of the coefficients by the CUSUM and CUSUM SQUARE tests which indicates that they are stable. Both of them can identify whether the coefficient has changed over time, and when the change has occurred. CUSUM plots the sum of recursive residuals, and identify whether the sum goes outside the critical bound. CUSUM square plots the sum of squared recursive residuals, and identify whether the sum goes outside the critical bound.

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
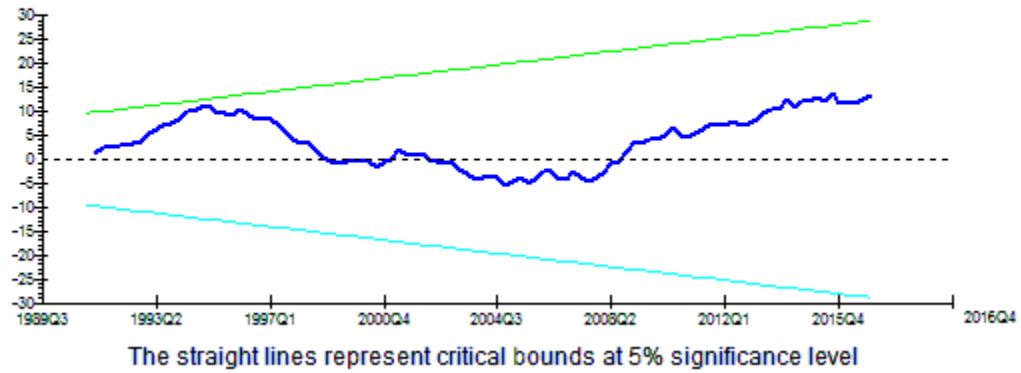
Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

5. Concluding remarks

This study made a humble attempt to explore the casual nexus between private sector share of foreign debt, the unemployment and trade openness in Australia. The empirical study of private sector share of foreign debt has not yet been investigated completely in recent years, especially on examining the theoretical long-run relationship with social development indicators such as the unemployment rate. Nevertheless, there is limited empirical evidence tracing the link between

private sector share of foreign debt and social development, particularly in highly open advanced countries like Australia.

Unemployment rate is chosen as the social development indicator due to the risk of growth in poverty and income inequality is directly associated with the increase of unemployment. The analysis in this work is based on a 109 quarters historical data on private sector's net foreign debt, unemployment rate and trade openness for Australia and for the period of 1988Q4 and 2016Q4 obtainable from the Bloomberg Database, Tomson Reuters DataStream International and Australian Bureau of Statistics.

The empirical results estimated by time series technique called ARDL suggested by Pesaran et al (2001) indicated that there is a theoretical long-run relationship among variables namely private sector share of foreign debt, the unemployment rate and trade openness. This shows the variables move together in long term and relationship among them is not spurious, in other words, not random or by chance. Each variable contains information for the prediction of other variables. More specifically, the changing of one variable may affect another.

As cointegration reveals no information about direction of causality, through VDC modeling we found that private sector share of foreign debt is strongest leader and the unemployment rate and trade openness are the followers. Information on causality is valuable for policy makers in that improvement of the private sector's foreign debt can reduce the unemployment rate, affecting country's trade openness too, while augmenting the unemployment or trade openness may not necessarily further attract the foreign investment capital flows.

We suggest that continuing the expansion of private sector share of foreign debt would be vital to reducing the unemployment rate in open economies such as Australia. If the government of Australia indent to reduce the unemployment rate, they should affect the most exogeneity variable, private sector share of foreign debt. However, as flow of capital comes into a country from external or foreign sources, they cannot control this variable. The solution is to introduce stronger governance, creditors' monitoring power and coordination of lenders in privately owned enterprises in a country which encourages foreign investors to allocate their funds in private sector. Eventually, the effect of expansion of private sector share of foreign debt will reduce the

unemployment rate, affecting country's trade openness as well and improve the social development and economic growth in a country.

6. Limitations of the study

The following limitations of this paper presents opportunities for future research. The choice of country and variables are somewhat subjective. The Australia was chosen because: - the private sector share of debt has substantially been increased in recent years; - in terms of corporate governance quality, Australia performs fairly better; - and finally Australia is one of the most open country in the world. If the various countries and variables are considered, additional or even different results may be achieved.

Reference

Agca, S., Celasun, O., 2011. How Does Public External Debt Affect the Cost of Corporate Borrowing? Evidence from Syndicated Loans in Emerging Markets. IMF Working Paper 09/266

Akram, N., 2013. External debt and income inequality in Pakistan. Pakistan business review, 15(3), 368-385

Arteta, C., Hale, G., 2008. Sovereign debt crises and credit to the private sector. Journal of International Economics 74, 53–69.

Atique, R. and Malik, K., 2012. Impact of domestic and external debt on the economic growth of Pakistan. World Applied Sciences Journal, 20(1), 120-129.

Ball, R. J., 1962. Capital imports and economic development: paradox or orthodoxy? Kyklos, 15(3), 610-623.

Barro, R.J., 2001. Economic growth in East Asia before and after the financial crisis. National Bureau of Economic Research, No. w 8330.

Celasun, O., Harms, P., 2011. Boon or burden? The effect of private sector debt on the risk of sovereign default in developing countries. Economic Inquiry 49, 70–88.

Chowdhury, M.A.F. and Masih, M., 2015. Socially responsible investment and Shariah-compliant investment compared: Can investors benefit from diversification? An ARDL approach, MPRA Paper 65828, University Library of Munich, Germany.

Corsetti, G., Pesenti, P. and Roubini, N., 1999. Paper tigers?: A model of the Asian crisis. European Economic Review, 43(7), 1211-1236.

Domingos, P., 2000. A unified bias-variance decomposition. In Proceedings of 17th International Conference on Machine Learning. Stanford CA Morgan Kaufmann (pp. 231-238).

Francis, B.B., Hasan, I. and Sun, X., 2009. Political connections and the process of going public: Evidence from China. Journal of International Money and Finance, 28(4), 696-719.

Hallak, I., 2013. Private sector share of external debt and financial stability: Evidence from bank loans. Journal of International Money and Finance, 32, 17-41.

Gozgor, G., 2014. The impact of trade openness on the unemployment rate in G7 countries. The Journal of International Trade & Economic Development, 23(7), 1018-1037.

Gozzi, J.C., Levine, R. and Schmukler, S.L., 2010. Patterns of international capital raisings. Journal of international Economics, 80(1), 45-57.

International Monetary Fund. International jobs report, January 2015

Kalonji, M.K.D., Loko, M.B., Nallari, R. and Mlachila, M.M., 2003. The Impact of External Indebtedness on Poverty in Low-Income Countries. International Monetary Fund, No. 3-61.

Lee, E., 1998. The Asian financial crisis: The challenge for social policy. International Labour Organization.

Maqbool, M.S., Sattar, T.M.A. and Bhalli, M.N., 2013. Determinants of unemployment: Empirical evidences from Pakistan. Pakistan Economic and Social Review, 51(2), 191-207.

McClelland, A. and Macdonald, F., 1998. The social consequences of unemployment. Report for the Business Council of Australia.

Obstfeld, M. and Taylor, A.M., 2004. Global capital markets: integration, crisis, and growth. Cambridge University Press.

Ohwofasa, B.O., Nana, J.U. and Adeola, K.A., 2012. External Debt Management and Macroeconomic Performance of the Nigerian Economy, 1986–2011.

Pesaran, H. and Shin, Y., 1999. An Autoregressive Distributed Lag Modelling Approach to Cointegration "chapter 11. In Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326.

Radelet, S. and Sachs, J., 1998. The onset of the East Asian financial crisis, National bureau of economic research, No. w6680.

Ramzan, M. and Ahmad, E., 2014. External debt growth nexus: Role of macroeconomic policy. Economic Modelling, 38, 204-210.

Reinhart, C.M. and Rogoff, K.S., 2008. Is the 2007 US sub-prime financial crisis so different? An international historical comparison, National Bureau of Economic Research(No. w13761).

Siddique, A., Selvanathan, E.A. and Selvanathan, S., 2016. The impact of external debt on growth: Evidence from highly indebted poor countries. Journal of Policy Modeling, 38(5), 874-894

Shabbir, S., 2013. Does external debt affect economic growth: Evidence from developing countries State Bank of Pakistan, Research Department, No 63.

Shem, S.O., 2015. Modelling Economic Determinants Of Youth Unemployment In Kenya (Doctoral dissertation, University of Nairobi).

Sturzenegger, F. and Zettelmeyer, J., 2006. Debt defaults and lessons from a decade of crises. MIT press.

Taylor, J.B., 2009. The financial crisis and the policy responses: An empirical analysis of what went wrong, National Bureau of Economic Research, No. w14631.

Tunde G.M., 2016. Intergenerational effect of external debt on performance of the Nigeria economy. NG-Journal of Social Development, 5(2), 51-65.