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Trade openness, foreign aid and economic growth in post-liberalisation Ghana: An application of ARDL bounds test

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The extent to which trade openness and foreign aid impacts on economic growth, has for years been an issue of global debate. Being one of the forerunners to adopt liberalisation policies in sub-Saharan Africa, Ghana's post-liberalisation economic growth performance has received commendations from international institutions. This has increased government commitment in recent years to open the economy to international competition. Moreover, foreign aid inflow over the period has been relatively large. This paper employs the ARDL bounds testing approach to cointegration, to investigate the extent to which trade openness and the inflow of foreign aid, impact on economic growth in post-liberalisation Ghana. The paper finds that this effect is positive and statistically significant in both the short-run and the long run, although reduced by their interaction.

Key words: Trade openness, foreign aid, economic growth, Ghana, ARDL.

INTRODUCTION

At year's end, statistics are compiled for all countries of the world showing their relative rates of economic growth. Does it really matter if a country's national output rises or falls over time? For the many developing countries faced with poverty and growth problems the answer may be obvious. "Aggregate growth is probably the single most important factor affecting individual levels of income" (Barro and Sala-i-Martin, 2004). It has important implications for the welfare of individuals, most importantly the plight of the poor, making it widely considered a necessary (though not sufficient) condition for poverty alleviation (Oosterbaan and Van Der Windt, 2000). These statements reflect the recognition that the difference between prosperity and poverty for a country depends on how fast it grows. In view of the importance and the central role that economic growth has assumed in the development process of modern economies (more importantly in developing countries) it is imperative that its nature and determinants are well understood for each country.

Ghana prior to the adoption of liberalisation policies in 1983 witnessed poor economic growth performance.

Although the highest economic growth performance (after independence in March 1957 and before liberalisation policies in 1983) of 7.2% occurred in 1970, economic growth performance for most periods was poor. For example, the years 1964 to 1966, 1968, 1972 to 1973, 1975 to 1976, and 1979 to 1983, saw Ghana with negative real GDP per capita growth with the lowest of -14.5% occurring in 1975 (Figure 1). This result was mainly due to the adoption of import substitution industrialisation (ISI) policies coupled with successive political instability, disinvestment, total factor productivity slowdown, and the deep economic crisis that occurred in the mid-1970s. Moreover, there were conflicts in policy objectives and a number of trade control regimes and instruments (high tariffs, stringent quota restrictions, export restrictions, foreign-exchange restrictions, and high black-market premium) that resulted in exchange rate and balance of payment problems. For instance, it was expected that a policy to expand the manufacturing base through ISI would automatically be accompanied by an increase in manufactured exports (and therefore a diversification of export) supported by an effective export promotion package (Aryeetey et al., 2000). Unfortunately, the export incentive package was ineffective resulting in drastic decline in export performance. The conclusion we can draw from the poor performance of the economy
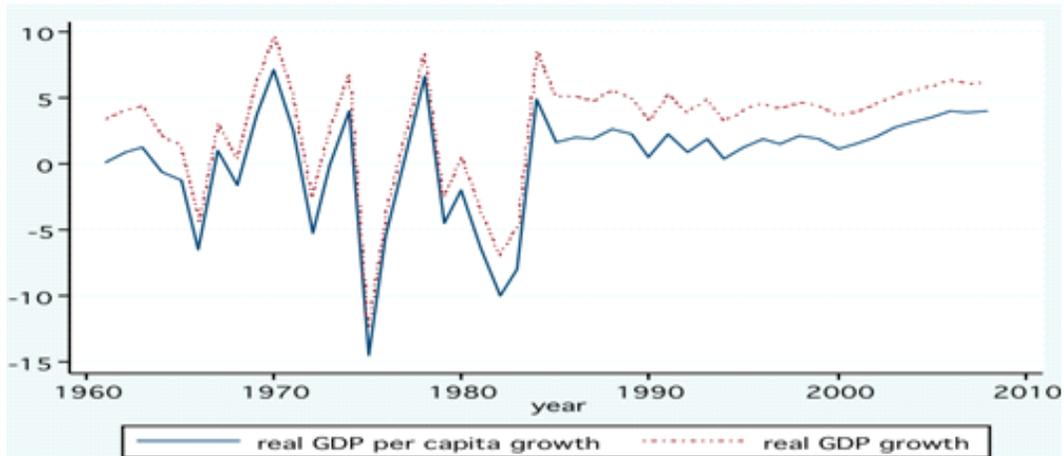
Figure 1. Trend in real GDP/real GDP per capita growth (annual %), 1961 to 2008. Source: Data from African Development Indicators (2010).
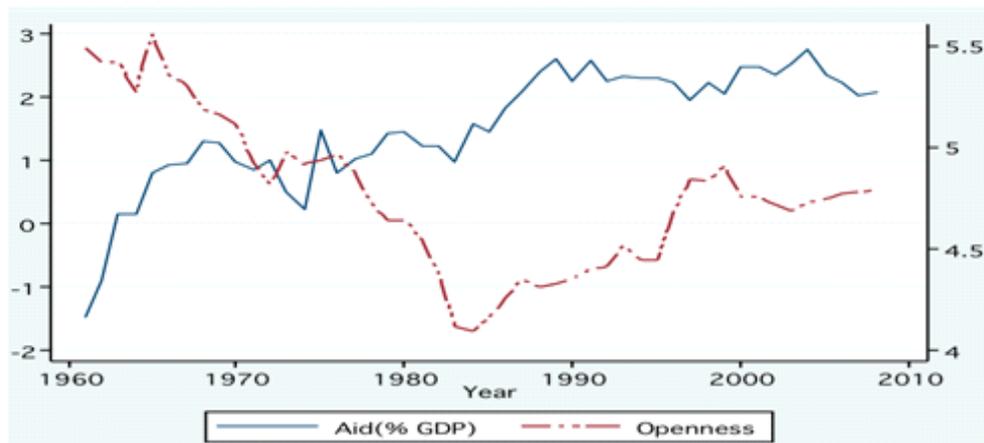

Figure 2. Trends in trade openness and foreign aid (% of GDP), 1961 to 2008. Source: Data from African Development Indicators (2010).

during the greater part of the pre-liberalisation period is that, the policies that were implemented were inappropriate and inadequate.

The need for alternative policies that could turn the economy of Ghana around became evident, as in particular the ability of developing countries to receive financial assistance from the World Bank, IMF and other bilateral and multilateral institutions routinely became conditional upon the adoption of liberalisation policies (Edwards, 1993; World Bank, 1998; Remmer, 2004). For these reasons, Ghana undertook a broad range of economic reforms (Rodrik, 1999) launched on the basis of liberalised policy regime that began with the World Bank and IMF sponsored Structural Adjustment Programme in 1983. It initially focused on removing

distortions in the foreign exchange market, trade restrictions and then corrected for structural and macro-economic imbalances that were believed to have caused the economic decline. The government believes that, because the domestic market is small in general, economic growth must necessarily come from international trade. For this reason, the government has in recent years been committed towards trading partnerships and agreements, international trading rules, as well as participation in negotiations in multilateral trading. Moreover, we observe (Figure 2) that foreign aid (left y-axis) increased significantly in the 1960s, but was almost stable in the 1970s (the 1960s and 1970s also saw Ghana with declining degree of trade openness (right y-axis)). On the contrary, we observe increases in both

trade openness and foreign aid after 1983. It is not surprising that post-liberalisation growth performance has been encouraging with the highest real GDP growth of 8.6% in 1984, the first year after liberalisation (Figure 1). To a much greater extent the reforms combined with inflow of foreign aid have helped Ghana recover from a prolonged period of economic decline.

However, it was expected that real GDP growth could accelerate from the 8.6% rate achieved in 1984, but unfortunately the country has since not exceeded this rate. In particular, in 1993, under its Vision 2020 programme, Ghana set for itself a target aimed to move from a low-income country to an upper middle-income country by the year 2020. The economy was expected to grow at an average of 8% between 1995 and 2020. More ambitiously, and in order to achieve the Millennium Development Goals (MDGs) by 2015, the Vision 2020 policy document was amended and it is now aimed at 2015 (that is, Ghana Vision 2015).

In spite of these policy efforts, the average real GDP growth in the country from 1990 to 2000 was only 4.3% while from 2000 to 2005, it increased only to 5.1% (African Development Indicators, 2010).

The rate in terms of real GDP per capita growth is even lower. For this reason, government commitment to trade openness, in particular, has not been shared by all, as the country has since 1984 made only modest progress towards the 8% growth target. Pessimists argue that, in spite of the many efforts of government towards trade openness, the recent growth record is still inadequate. To them, although the recent growth achievement is commendable, it is not unique as similar growth records were achieved under different policies in the early post-independence period (Aryeetey et al., 2000).

The impact of reform policies and foreign aid inflows is deemed much lower than expected, if Ghana aims to achieve its 8% growth target. This raises a number of questions on the extent to which trade openness and foreign aid inflows have contributed to economic growth in Ghana, over the post-liberalisation period.

The present paper employs the Autoregressive Distributed Lag bounds testing approach to cointegration (henceforth, ARDL bounds test) proposed by Pesaran et al. (2001) to investigate whether there is a level long run equilibrium relationship between trade openness, foreign aid and economic growth in Ghana over the 1984 to 2007 period.

The main results suggest that while the labour force, gross domestic investment and government expenditure have no short-run and long run statistically significant positive impact on growth, trade openness and foreign aid have statistically significant short-run and long run positive impact on growth, although the total effect is reduced by their interaction.

Moreover, the political system predicts both short and long run positive impact on growth, although not significant in the short-run.

RELATED LITERATURE

Trade openness, foreign aid and economic growth: Theory and empirical evidence. Two influential theoretical growth theories (neoclassical and endogenous) provide alternative explanation to economic growth in both developed and developing countries. Neoclassical growth theories highlight technological progress as the engine of economic growth. They provide a means to measure productivity growth and assume that capital accumulation only drives productivity in the short-run (as capital suffers from diminishing returns in the long run). This makes productivity growth in the long run solely the result of exogenous technical progress meant to provide a vehicle for explaining the rate of growth of output over time (Zipfel, 2004).

Although neoclassical growth made significant contribution to the understanding of growth, they did lack empirical relevance and explanatory power, as for example, their ability to predict growth in the long run. For this reason, macroeconomic research for about 15 years focused on short-run fluctuations when active research on growth theory effectively died by the early 1970s (Barro and Sala-i-Martin, 2004). Endogenous growth theories, on the other hand, provide additional explanation of sustained productivity and output growth, and most importantly of the openness-growth nexus. They provide "enough theoretical support for the positive relationship between trade openness and economic growth" (Edwards, 1998) and economic explanation for why capital might in the long run not suffer from diminishing returns (Romer, 2001). They depart from treating technological progress as exogenous and assume rather that, technological progress results from the allocation of resources to the creation of new ideas. This makes improvement in technology and the process of economic growth itself understood, as an endogenous outcome of the economy.

Trade openness is seen as one of the engines that would foster the needed technological progress, highlighted in neoclassical and endogenous growth theories. It makes it possible for poor countries access intermediate inputs and technology transfer from more advanced countries, promotes exports by reducing anti-export bias, generates positive spillovers through exploiting scale economies, and encourages competitiveness and efficiency in both domestic and international markets (Balassa, 1978; Feder, 1982; Grossman and Helpman, 1991; Rodrik, 1999; Manning, 2005; Kaplan and Aslan, 2006). For a developing country such as Ghana, greater openness to trade may bring about the upgrading of skills through the importation of superior technology and innovation (Aryeetey, 2005). These ideas stimulated the unprecedented wave for unilateral trade reforms in the 1980s, for many developing countries (Greenaway et al., 2002) because greater openness plays a vital role in shaping the economic and social performance and

prosperity of countries (UNCTAD, 2005). For this reason, the empirical results have generally indicated a positive relationship between trade openness and economic growth.

However, the strength of the link has greatly depended on whether the specification uses time series, cross-section or panel data techniques, and on problems of data, and the measurement and potential endogeneity of trade openness itself (Sachs and Warner, 1995; Harrison, 1996; Dalley and Kraay, 2001; Kaplan and Aslan, 2006). Moreover, although neoclassical and endogenous growth theories predict that, higher trade can increase growth globally, a subset may experience slower growth depending on their initial condition and level of technological progress, making the openness-growth debate still an empirical question. Lee et al. (2004) used identification through heteroskedasticity to address potential endogeneity of trade openness for 100 countries over the 1961 to 2000 period and concluded that trade openness have a positive impact on growth, although this effect is small in magnitude. The present paper recognises these estimation problems and agrees with earlier researchers that openness measures are not free from methodological problems. This is important because different openness measures capture different aspects of openness. However, Harrison (1996) argues that, regardless of the many openness measures that exist in the literature, the simplest ones are those based on actual trade flows, such as the sum of exports and imports (% of GDP). We use this measure as a proxy for trade openness. Foreign aid, on the other hand, is seen as another important variable that should complement trade openness boost technological progress and domestic investment, and hence long run growth. The argument for foreign aid is evident in the standard theoretical "two-gap" model of Chenery and Strout (1966), the empirical work of Papanek (1972, 1973) and the emergence of the twin peak phenomenon (Quah, 1997; Sachs, 2005; Sala-i-Martin, 2006). As noted in the "two-gap" model, developing countries face two fundamental financing gaps: the investment – saving and the import – foreign exchange gaps that foreign aid is to fill (Papanek, 1973; Easterly, 2003). It supplements insufficient domestic saving by providing foreign income for the importation of desired capital goods to augment the level of capital stock used for domestic production (Hudson, 2004). It is believed that an aid-financed imports and investment would be growth enhancing for the many developing countries constrained with saving and foreign exchange earnings. This phenomenon has led many developing countries become highly dependent on foreign aid, and it is not surprising that following the Monterrey consensus in 2002 (based on the need to help achieve the MDGs by 2015) developed countries pledged massive inflow of foreign aid to developing countries. In spite of the theoretical support for foreign aid to developing countries as a growth enhancing policy

variable, the empirical evidence is one that has received divergent views over the past few decades. The views have often focused on whether foreign aid has significant positive impact on growth or not, and/or whether certain conditions are required by foreign aid donors and the recipient country's government for aid to have significant positive impact on growth.

Foreign aid optimist argues for a positive relationship between foreign aid and economic growth. For example, Gomanee et al. (2005) in a sample of 25 sub-Saharan African countries for the 1970 to 1997 period argued that, foreign aid has a significant positive impact on growth and for that matter, the poor economic growth performance of many African countries should not be attributed to aid ineffectiveness. Nonetheless, the argument of other optimist has been more "conditional". Whilst proponents like (Burnside and Dollar, 2000; Collier and Dollar, 2002) have argued that foreign aid appears to be effective but only in countries with good economic policies and institutional environment, others like Collier and Dehn (2001); Guillaumont and Chauvet (2001); Dalgaard et al. (2004) argues that foreign aid is rather effective conditional on countries with more vulnerable economic conditions and/or outside the tropics (that is, export prices shocks, terms of trade volatility and geographical considerations). For example, Burnside and Dollar (2000) argues that "aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies but has little effect in the presence of poor policies" for a sample covering the 1970 to 1993 period. For this reason, if foreign aid is allocated optimally and combined with good policies should have positive impact on growth. In addition, foreign aid though can have positive short-run impact on growth, may have detrimental long run growth effect, as it may be subject to decreasing marginal returns over the long-term (Lensink and White, 2001; Clemens et al., 2004). For instance, Clemens et al. (2004) argues that, foreign aid does not have robust long run effect on growth, although in the short-run some types of aid may be growth enhancing. This may be the result of aid being volatile and the possibility that overreliance on aid undermines innovative ways of increasing domestic tax revenue and/or encouraging exports when aid is not forthcoming.

Foreign aid pessimist, on the other hand, argues that aid does not have a positive robust effect on growth. Neither does good policy environment a necessary condition for aid to be effective as advocated in (Burnside and Dollar, 2000). For example, Boone (1996) found that, foreign aid does not increase investment (and hence economic growth) as suggested by the "two-gap" model, but rather finance consumption. Easterly (2003) considered both alternative definitions of "aid", "policies" and "growth" for the same sample period and an expanded sample covering the 1970 to 1997 period, but same definition of variable as in (Burnside and Dollar, 2000). Easterly concluded that in both cases, good policy

is not a necessary condition for aid to have positive impact on growth. In a comprehensive empirical investigation, Rajan and Subramanian (2005) used both cross-section and panel data techniques, over different time periods and considered different kinds of foreign aid. They concluded that no evidence exists to support the argument that, foreign aid works better in good policy, institutional and/or geographical environment or that the kind of foreign aid matter for growth. In addition, Roodman (2007) investigated the robustness of the results of seven foreign aid and economic growth papers and concluded that, the results on whether aid is effective under good policies, vulnerable economic conditions, subject to diminishing returns, and/or works better outside the tropics but not in them among others are only fragile when the sample size is extended.

The discussion on the relationship between trade openness, foreign aid and economic growth, though inconclusive does not mean the factors identified in the literature, may not have effect on aid effectiveness and the impact that trade openness have on economic growth. For example, the results on the relationship between foreign aid and economic growth rather indicates that, a strong coordination and partnership is required between both foreign aid donors and recipient country's government on the best institutional framework under which foreign aid could be effective, in order to impact positively on long-term growth, as the effect of these conditions may differ from country to country. For this reason, that country-level study on whether trade openness and foreign aid inflows impact positive on long-term growth becomes particularly important.

ESTIMATION METHOD AND THE DATA

We specify an empirical growth model that introduces trade openness, foreign aid and their interaction as additional explanatory variables to labour force growth, gross domestic investment, government expenditure, political system and labour force participation rate as:

$$
\begin{aligned}
RGDPPCG_t &= \alpha_0 + \beta_1 LABFG_t + \beta_2 \ln GDI_t + \beta_3 \ln OPEN_t \\
&+ \beta_4 \ln AID_t + \beta_5 (\ln OPEN * \ln AID)_t + \beta_6 \ln GEXP \\
&+ \beta_7 PSYSTEM + \beta_8 \ln LFPR + e_t
\end{aligned}
\tag{1}
$$

where RGDPPCG is the growth rate of real GDP per capita, LABFG is the growth rate of the labour force, GDI is the capital stock, which is proxied by the share of gross domestic investment in GDP, OPEN measures trade openness (that is, the share of export plus import in GDP), AID is the share of foreign aid in GDP, GEXP is the share of government expenditure in GDP, PSYSTEM measures the political system, LFPR is the labour force participation rate, 'ln' is the natural logarithmic operator, α and βs are respectively constant and parameters to be estimated, and e is the error term with zero mean and constant variance. The data for PSYSTEM is polity2 score obtained from Polity IV project (Marshall and Jaggers, 2009). PSYSTEM is a combine measure of the extent to which a country is autocratic or democratic and it ranges from -10 (strongly autocratic) to +10 (strongly democratic). All data are obtained from African Development Indicators (2010). The Appendix provides additional information on the data.

The ARDL bounds test

The building of dynamic economic models often entails detailed analysis of the characteristics of the individual time series variables involved (Lutkepohl and Kratzig, 2004). When these characteristics are ignored, and the set of series modelled jointly, the regression results obtained may exhibit a high level of correlation between the variables. Nonetheless, "the existence of a high degree of correlation between two variables does not automatically imply the existence of a causal relationship between the variables concerned" (Holden and Thomson, 1992). This correlation may be "spurious". However, if two or more variables are cointegrated then the cointegration relationship among the variables rules out the possibility of the estimated relationship being "spurious" (Engle and Granger, 1987). Cointegration tests such as the Engle-Granger two-step (Engle and Granger, 1987), Johansen maximum likelihood (Johansen and Juselius, 1990), Phillips and Hansen (Phillips and Hansen, 1990) among others rely on strictly I(1) stationary variables. The reason being that, if all the variables are I(1) stationary, then there are special cases where a linear combination result in an I(0) stationary variable and hence cointegration (Asterius and Hall, 2007). However, the requirement of I(1) variables often makes estimates of these cointegration test subject to biases. This is the case as the order of integration of a variable often depends on the type of unit root test, the choice of optimal lag length and whether a constant and/or trend is included in the underlying unit root test.

The present paper overcomes some of these problems by employing the ARDL bounds test. The method allows the estimation of the long run level relationship between variables and its choice is motivated by key benefits it has over strictly I(1) stationary variables dependent cointegration test. Firstly, the method yields valid results irrespective of whether the underlying variables are I(0), I(1), or a combination of both. This is important when it becomes difficult to treat a variable as either I(0) or I(1) stationary, although it may not necessarily be I(2) stationary. Secondly, the method is asymptotically efficient in finite and small sample study and applicable even in the case where the regressors are endogenous. This is appropriate for the present paper with only 24 observations, and the fact that some of our explanatory variables may be plagued by the endogeneity problem. Thirdly, the method allows the introduction of optimal lags of both the dependent and independent variables. Thus, different variables are allowed to have their optimal speed of adjustment to equilibrium. Last but not the least, OLS is easily employed to estimate the cointegration relationship.

In what follows, we outline the procedure involved in the ARDL bounds test. Based on Equation 1 the general ARDL representation of conditional error correction model (ecm) gives:

$$
\begin{aligned}
\Delta RGDPPCG_t &= \alpha_0 + \sum_{i=1}^{p} \gamma_i \Delta RGDPPCG_{t-i} + \sum_{i=0}^{p1} \beta_i \Delta LABFG_{t-i} \\
&+ \sum_{i=0}^{p2} \delta_i \Delta \ln GDI_{t-1} + \sum_{i=0}^{p3} \lambda_i \Delta \ln OPEN_{t-i} + \sum_{i=0}^{p4} \theta_i \Delta \ln AID_{t-i} \\
&+ \sum_{i=0}^{p5} \rho_i \Delta (\ln OPEN * \ln AID)_{t-i} + \sum_{i=0}^{p6} \vartheta_i \Delta \ln GEXP_{t-i} \\
&+ \sum_{i=0}^{p7} \psi_i \Delta PSYSTEM_{t-i} + \sum_{i=0}^{p8} \omega_i \Delta \ln LFPR_{t-i} \\
&+ \phi_1 RGDPPCG_{t-i} + \phi_2 LABFG_{t-1} + \phi_3 \ln GDI_{t-1} \\
&+ \phi_4 \ln OPEN_{t-1} + \phi_5 \ln AID_{t-1} + \phi_6 (\ln OPEN * \ln AID)_{t-i} \\
&+ \phi_7 \ln GEXP_{t-1} + \phi_8 PSYSTEM_{t-1} + \phi_9 \ln LFPR_{t-1} + e_t
\end{aligned}
\tag{2}
$$

where all variables are as previously defined. Next, we choose the maximum lag (p=1) for the ARDL model selection. This is reasonable given the annual series in our sample and the short time span considered. However, in selecting the optimum lag structure for the ARDL (p, p1, p2, p3, p4, p5, p6, p7, p8) model we use the Schwarz Information Criterion (SIC). We then compute the F-statistic to trace the presence of cointegration by testing the null hypothesis of no cointegration restricting the coefficients of the lagged level variables equal to zero (H0: $\phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = \phi_6 = \phi_7 = \phi_8 = \phi_9 = 0$) against the alternative hypothesis that H1: $\phi_1 \neq \phi_2 \neq \phi_3 \neq \phi_4 \neq \phi_5 \neq \phi_6 \neq \phi_7 \neq \phi_8 \neq \phi_9 \neq 0$) by estimating Equation 2 by OLS. The approach involved in computing the F-statistic (Pesaran and Pesaran, 2009) first estimate:

$$\Delta RGDPPCG_t = \alpha_0 + \sum_{i=1}^{p}\gamma_i \Delta RGDPPCG_{t-i} + \sum_{i=0}^{p1}\beta_i \Delta LABFG_{t-}$$
$$+ \sum_{i=0}^{p2}\delta_i \Delta \ln GDI_{t-1} + \sum_{i=0}^{p3}\lambda_i \Delta \ln OPEN_{t-i} + \sum_{i=0}^{p4}\theta_i \Delta \ln AID_{t-i}$$
$$+ \sum_{i=0}^{p5}\rho_i \Delta(\ln OPEN * \ln AID)_{t-i} + \sum_{i=0}^{p6}\vartheta_i \Delta \ln GEXP_{t-i}$$
$$+ \sum_{i=0}^{p7}\psi_i \Delta PSYSTEM_{t-i} + \sum_{i=0}^{p8}\omega_i \Delta \ln LFPR_{t-i}$$

(3)

by OLS. A variable addition test is then applied to Equation 3 by including the lagged level variables φ1RGDPPCGt-1, ☐2LABFGt-1, φ3lnGDIt-1, φ4lnOPENt-1, φ5lnAIDt1, φ6(lnOPEN*lnAID)t-1, φ7lnGEXPt-1, φ8PSYSTEMt-1, φ9lnLFPRt-1. Microfit 5.0 provide the F-statistic for the selected ARDL model with two sets of asymptotic critical values bounds, based on whether all variables are I(0) for the lower bound or I(1) for the upper bound. We report the 90 and 95% critical value bounds provided by Microfit 5.0.

The null hypothesis of no cointegration is rejected if the computed F-statistic is greater than the upper bound critical value. On the other hand, we cannot reject the null of no cointegration if the computed F-statistic is less than the lower bound critical value. However, if it happens that the computed F-statistic falls within these two bounds then the results will be inconclusive and additional information will be required before a conclusive inference can be made (Pesaran et al., 2001).

The asymptotic distribution of the critical values bounds, are non-standard under the null hypothesis of no cointegration relationship in levels and are computed by stochastic simulations.

Once, the existence of a long run level cointegration relationship is confirmed, we estimate the long and short-run model parameters. For the long run model parameters, we estimate:

$$RGDPPCG_t = \alpha_0 + \sum_{i=1}^{p}\phi_1 RGDPPCG_{t-i} + \sum_{i=0}^{p1}\phi_2 LABFG_{t-i}$$
$$+ \sum_{i=0}^{p2}\phi_3 \ln GDI_{t-i} + \sum_{i=0}^{p3}\phi_4 \ln OPEN_{t-i} + \sum_{i=0}^{p4}\phi_5 \ln AID_{t-i}$$
$$+ \sum_{i=0}^{p5}\phi_6 (\ln OPEN * \ln AID)_{t-i} + \sum_{i=0}^{p6}\phi_7 \ln GEXP_{t-i}$$
$$+ \sum_{i=0}^{p7}\phi_8 PSYSTEM_{t-i} + \sum_{i=0}^{p8}\phi_9 \ln LFPR_{t-i}$$

(4)

where ϕ_s define the long run model parameters. For the short-run model parameters we estimate the ecm:

$$\Delta RGDPPCG_t = \alpha_0 + \sum_{i=1}^{p}\gamma_i \Delta RGDPPCG_{t-i} + \sum_{i=0}^{p1}\beta_i \Delta LABFG_{t-i}$$
$$+ \sum_{i=0}^{p2}\delta_i \Delta \ln GDI_{t-1} + \sum_{i=0}^{p3}\lambda_i \Delta \ln OPEN_{t-i} + \sum_{i=0}^{p4}\theta_i \Delta \ln AID_{t-i}$$
$$+ \sum_{i=0}^{p5}\rho_i \Delta(\ln OPEN * \ln AID)_{t-i} + \sum_{i=0}^{p6}\vartheta_i \Delta \ln GEXP_{t-i}$$
$$_i + \sum_{i=0}^{p7}\psi_i \Delta PSYSTEM_{t-i} \sum_{i=0}^{p8}\omega_i \Delta \ln LFPR_{t-i} + \eta ecm_{t-1}.$$

(5)

where γ, β, δ, λ, θ, ρ, ϑ, ψ, and ω denotes the short-run impact multiplies, and η the speed of adjustment to equilibrium or the extent of disequilibrium correction.

EMPIRICAL RESULTS AND DISCUSSION

The empirical results from the estimated ARDL models needed for discussion are presented in Tables 1 to 4. For all tables, we report in column [2] the results for Equation 2. In columns [1], [3], [4] and [5] we respectively report the result for Equation 2 without lnLFPR, the result for Equation 2 without LABFG, the result for Equation 2 without lnGDI, and the result for Equation 2 without both LABFG and lnGDI. The ARDL (1, 0, 0, 1, 1, 0, 0, 1), ARDL (1, 0, 0, 1, 1, 0, 0, 1, 0), ARDL (1, 0, 1, 1, 0, 0, 1, 0), ARDL (1, 0, 1, 1, 0, 0, 1, 0) and ARDL (1, 1, 1, 0, 0, 1, 0) models are respectively selected by SIC. The results for the computed F-statistic reported in Table 1 reveals that [1], [2], [4] and [5] are significant at the 5% error level while that for [3] is significant at the 10% error level. Based on this result, we conclude that a level long run cointegration relationship exists for all estimated ARDL models. Tables 2 to 4 respectively report the result of the long run coefficients, the short-run dynamic coefficients and the model diagnostic and stability tests.

In line with the neoclassical growth theory, LABFG enters with the correct sign (negative) but insignificant at the conventional error level in both the short-run and the long run as in [1], [2] and [4]. However, lnLFPR enters negative and statistically significant in both the short and the long run in [2]-[5]. The estimated long run and short-run coefficient on lnGDI enters positive in [1] and negative in [2]-[3], but they are all statistically insignificant at the conventional error level. The estimated long run and short-run coefficients on lnGEXP enters negative and statistically significant in both the short-run and the long run for all estimated models. The result indicates that while LABFG and lnGDI does not have statistically significant short and long run impact on RGDPPCG, lnLFPR and lnGEXP have detrimental short and long run effect on RGDPPCG. Although the results on lnGEXP,

Table 1. ARDL bounds test for cointegration relationship.

[1]	[2]	[3]	[4]	[5]
5.2602**	6.1355**	4.8347*	6.1462**	5.4613**

Note: **(*) indicates rejection of the null hypothesis of no cointegration at 5%(10%) significance level. The critical value bounds reported with the ARDL model in columns [1], [3] and [4] for the 95% and 90% lower and upper bounds are 3.1917 to 5.0286 and 2.5759 to 4.0936 respectively. The critical value bounds reported with the ARDL model in column [2] for the 95 and 90% lower and upper bounds are 3.1665 to 5.0260 and 2.5261 to 4.1011 respectively. The critical value bounds reported with the ARDL model in column [5] for the 95% and 90% lower and upper bounds are 3.2981 to 4.9675 and 2.6485 to 4.0603 respectively. The critical value bounds are computed by stochastic simulation using 20000 replications.

Table 2. Estimated long run coefficients using the ARDL approach.

Regressor	[1]	[2]	[3]	[4]	[5]
LABFG	-0.245	-0.118		-0.122	
	[0.625]	[0.433]		[0.402]	
lnGDI	0.073	-0.047	-0.112		
	[1.588]	[1.033]	[0.982]		
lnOPEN	28.827**	18.510**	18.875**	18.486**	18.850**
	[12.672]	[7.603]	[7.348]	[7.224]	[7.034]
lnAID	79.510**	42.652*	43.555**	42.673**	43.693**
	[31.319]	[19.247]	[18.612]	[17.808]	[17.808]
lnOPEN*lnAID	-17.855**	-9.827**	-10.017**	-9.835**	-10.055**
	[7.011]	[4.311]	[4.174]	[4.106]	[3.991]
lnGEXP	-6.152*	-6.734**	-7.032***	-6.760***	-7.125***
	[3.205]	[2.146]	[1.820]	[1.975]	[1.566]
PSYSTEM	0.689**	0.504***	0.525***	0.503***	0.524***
	[0.238]	[0.142]	[0.118]	[0.132]	[0.112]
lnLFPR		-102.487**	-105.275***	-102.344**	-105.188***
		[36.057]	[33.765]	[34.227]	[32.341]
CON	-109.765*	380.047**	390.846**	379.513**	390.561**
	[52.132]	[162.223]	[153.357]	[154.182]	[146.916]

Note: Dependent variable RGDPPCG; ***(**)[*] indicates rejection of the null hypothesis at 1% (5%)[10%] significance level. Standard errors in parenthesis

lnGDI are quite surprising (as we would have expected them to have statistically significant positive impact on RGDPPCG), the result on lnLFPR is not surprising, considering the quality of labour force, frequent industrial actions and the way the labour market is regulated. Moreover, the labour market is mostly characterised by labour intensive agriculture and petty trading with limited employment benefits. The combined effect of the characteristics of the labour market, and the possibility of diminishing marginal returns to capital may explain to some extent why LABFG, lnLFPR and lnGDI does not have statistically significant positive impact on RGDPPCG.

On the contrary, the estimated long and short-run coefficient on PSYSTEM is positive and significant in the long run (although not significant in the short-run). The result indicates that, the political system although enters positive but statistically insignificant in the short-run have

Table 3. Error correction representation of the selected ARDL models.

	[1]	[2]	[3]	[4]	[5]
ΔLABFG	-0.129	-0.077		-0.080	
	[0.359]	[0.288]		[0.268]	
ΔlnGDI	0.039	-0.031	-0.071		
	[0.840]	[0.674]	[0.628]		
ΔlnOPEN	22.341***	17.298***	17.208***	17.310***	17.227***
	[4.734]	[4.239]	[4.043]	[4.035]	[3.870]
ΔlnAID	44.845***	31.017***	31.085***	31.054***	31.178***
	[10.586]	[9.942]	[9.510]	[9.449]	[9.074]
Δ(lnOPEN*lnAID)	-9.431***	-6.411***	-6.405***	-6.421***	-6.429***
	[2.356]	[2.201]	[2.106]	[2.089]	[2.008]
ΔlnGEXP	-3.249**	-4.393***	-4.496***	-4.413***	-4.555***
	[1.414]	[1.212]	[1.098]	[1.077]	[0.928]
ΔPSTSTEM	0.132	0.092	0.097	0.092	0.096
	[0.112]	[0.091]	[0.085]	[0.086]	[0.0816]
ΔlnLFPR		-66.860**	-67.316**	-66.815**	-67.252**
		[25.054]	[23.916]	[23.873]	[22.905]
ecm(-1)	-0.528***	-0.652***	-0.639***	-0.653***	-0.639***
	[0.114]	[0.125]	[0.110]	[0.119]	[0.106]
R-bar2	0.813	0.880	0.891	0.891	0.900
F-Stat	13.396***	19.326***	23.738***	23.911***	29.560***
DW-Stat	2.227	2.523	2.489	2.519	2.476

Note: Dependent variable RGDPPCG; ***(**) indicates rejection of the null hypothesis at 1% (5%) significance level. Standard errors in parenthesis.

Table 4. Diagnostic test statistics (LM version) and stability test for selected ARDL models.

	[1]	[2]	[3]	[4]	[5]
Serial correlation $\chi^2(1)$	0.614	2.541	1.847	2.403	1.737
	[0.433]	[0.111]	[0.174]	[0.121]	[0.188]
Functional form $\chi^2(1)$	0.018	0.480	0.211	0.409	0.223
	[0.893]	[0.488]	[0.646]	[0.523]	[0.637]
Normality $\chi^2(2)$	0.983	2.227	1.789	2.273	1.832
	[0.612]	[0.328]	[0.409]	[0.321]	[0.400]
Heteroscedasticity $\chi^2(1)$	0.224	0.467	0.398	0.484	0.511
	[0.636]	[0.494]	[0.528]	[0.486]	[0.431]
CUSUM	Stable	Stable	Stable	Stable	Stable
CUSUMQ	Stable	Stable	Stable	Stable	Stable

Note: Probability values in parenthesis

statistically significant positive long run impact on RGDPPCG. This result may provide further support for a positive impact of democracy on growth as for a greater part of the period considered (1993 to 2007) Ghana has enjoyed peaceful democratic governance. The estimated long and short run coefficients on lnOPEN and lnAID are positive and statistically significant while that on their interaction term lnOPEN*lnAID is negative and statistically significant. The result indicates that both lnOPEN and lnAID have positive and statistically significant long

and short-run impact on RGDPPCG. However, the total effect that lnOPEN and/or lnAID have on RGDPPCG is reduced by their interaction term lnOPEN*lnAID in both the long run and the short-run. The result of the positive impact that both trade openness and foreign aid have on economic growth provide further support for the theoretical predictions of positive impact, that these two policy variables have on long-term growth, although this effect may not necessarily be evident in all aid receiving developing countries, that for the past few decades have adopted liberalisation policies aimed at increasing growth.

The ecm results suggest satisfactory statistical fit and adequacy of the estimated models to the data. This is supported by the following statistical tests. The F-statistics are highly significant (at the 1% error level). The R-bar2 of approximately 0.90 is reasonably high and indicates that, the included explanatory variables are capable of explaining approximately 90% of the short-run variations in RGDPPCG. The results are not "spurious" as the DW-statistic of approximately 2.50 is greater than their corresponding R-bar2. The coefficient on ecm of approximately 0.53 or more (associated with the long run relationship) is negative, considerably high in absolute magnitude and highly significant (at the 1% error level). This provides further evidence on the existence of stable long run level cointegration relationship. The negative and statistically significant coefficient of ecm means that, there is no problem of adjustment in the long run in case of shocks in the short-run (that is, a considerable high speed of adjustment to long run equilibrium every year after a short-run shock). In addition, the model diagnostic test statistics fulfil the conditions of no specification errors, structural stability, normality of residuals and homoskedasticity. The stability tests further confirm the stability of the estimated coefficients.

Conclusion

The "stylized facts" about economic growth is that, it is a function of many variables that for many developing countries trade openness and foreign aid becomes particularly important. This paper investigated the level long run cointegration relationship between trade open-ness, foreign aid and economic growth in Ghana for the 1984 to 2007 period, using the ARDL bounds test. The empirical results suggest that, although the total short and long run positive impact that, trade openness and foreign aid have on economic growth is reduced by their interaction term, both trade openness and foreign aid have been beneficial to economic growth in Ghana, since the adoption of liberalisation policies in 1983. The result is not surprising as Ghana is currently named among the star performers in efforts to reach the MDGs by 2015. The result further reveals that, there are long run growth benefits of the political system currently operating in Ghana. However, due to the negative and statistically

significant short and long run impact that both labour force participation rate and the share of govern-ment expenditure in GDP have on economic growth, it is recommended that, the government pay particular attention to its expenditure and the labour market, if Ghana aims to achieve an upper middle-income status by the year 2015.

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APPENDIX: DATA DEFINITION AND SOURCES

RGDPPCG: Real GDP per capita growth (annual %); African Development Indicators (2010)

LABFG: Labour force growth (annual %); African Development Indicators (2010)

GDI: Gross Domestic Investment (% of GDP); African

OPEN: Trade Openness; African Development Indicators (2010) AID: Net ODA from all donors (% of recipient's GDP); Development Indicators (2010)

African Development Indicators (2010)

GEXP: General government final consumption expenditure (% of GDP); African Development Indicators (2010)

PSYSTEM: Political System (polity2); Polity IV Project, Marshall and Jaggers (2009)

LFPR: Labour force participation rate, total (% of total population ages 15-64); African Development Indicators (2010).