THE BALANCE OF PAYMENTS CONSTRAINT GROWTH MODEL AND THE EFFECT OF TRADE LIBERALIZATION ON THE TRADE BALANCE AND INCOME GROWTH IN GHANA

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ABSTRACT

This paper uses the balance of payment constraint (BPC) growth model and the autoregressive distributed lag approach to cointegration to examine the major determinants of income growth in Ghana, emphasizing the importance of exports, capital inflows and relative prices. The paper also uses the model to identify the effect of trade liberalization on the trade balance and income growth in Ghana. The main empirical results suggest that increases in the growth rates of exports, capital inflows and relative prices lead to an increase in growth of income. However, the liberalization of the external sector has not improved the income growth performance in Ghana. The results from this study questions the idea that trade liberalization leads to improvement in economic welfare of countries by raising the sustainable growth rate.

1. INTRODUCTION

This paper uses a post-Keynesian demand-side model to analyze the determinants of growth, and examines the impact of trade liberalization on the trade balance and income growth in Ghana. The idea among most development economists and the major international development organizations during the late 1970s was that, trade liberalization would lead to improvement in economic welfare of countries by raising the sustainable economic growth rate. This potential link between international trade and economic growth led to a wave of trade reforms in the 1980s among developing nations, mainly sponsored by the World Bank's Structural Adjustment Loans (SALs) as policy conditionality. In 1983, Ghana embarked on an economic recovery program that was aimed at stabilizing the economy and restoring growth in income. Trade liberalization became an integral part of the overall economic recovery program in 1987. Tariffs on imports were reduced significantly, import licenses and other quantitative restrictions were gradually eliminated, and rigorous export promotion policies were pursued particularly through the promotion of the non-traditional exports sector.

JEL Classification: F13; F14; F32; F43

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The process of trade liberalization has continued to date but the growth performance has been unimpressive, though quite stabilized. The external performance of the economy is equally unimpressive. Trade deficits continue to present challenges to policy makers in Ghana.

Several studies have empirically analysed the effect of trade liberalization on economic growth and the results so far have been mixed.[4] Other studies have used export-led growth models to assess the importance of exports to the economic growth process. Balassa (1985), Alam (1991) Bhagwatti (1988), Salvatore and Hatcher (1992), Zestos and Tao (2002), Dawson and Hubbard (2004) Abual-Foul (2004), Mah (2005) and Awokuse (2006) have found a positive relationship between exports and economic growth for both developed and developing economies. These studies have put forward three separate explanations for the link between exports and economic growth. First, exports lead to an increase in investment in the sectors that enjoy comparative advantage (the most efficient sectors). Specialization in these sectors leads to an increase in productivity and growth. Second, as the export sector expands through specialization and efficiency, production for the domestic market also increases and the economy enjoys economies of scale. Third, the exposure of the export sector to international competition increases the pressure on the exports sector to innovate and keep cost of production low. This eventually leads to an increase in productivity and growth in the exports sector and through positive externality, to the other sectors of the economy. However, Singer and Gray (1988), Tyler (1981) and Buffie (1992) have found that the positive relationship between exports and growth for developing countries does not exist during periods of decline in world demand.

All the studies discussed above have mainly used supply side neoclassical growth model which focuses on factors of production and productivity. This paper uses a post-Keynesian demand side model and a cointegration technique to analyse the determinants of income growth and examine the impact of trade liberalization on the balance of trade and income growth in Ghana over the 1960-2006 period. This demand oriented approach, first put forward by Thirlwall (1979), explains economic growth in an open economy in terms of the growth rate of the major components of autonomous demand. It shows how the balance of payment position of a country is the main constraint on economic growth because it imposes a limit on demand to which supply can respond to. This balance of payment constraint growth model (the BPC growth model) postulates that no open economy can grow in the long run more than what is consistent with current account equilibrium, unless it can finance increasing deficits. In his empirical analysis, Thirlwall (1979) used a dynamic analogue of the Harrod trade multiplier (Harrod, 1933) to show that the post-World War II actual growth experience of most developed countries equals the rate of growth of real exports divided by the income elasticity of demand for imports.[5] This basic BPC growth model (hereafter, the basic model) assumes no capital flows and constant real exchange rate (relative prices measured in a common currency).

Hussain (1999) compared the demand side approach to income growth with the neoclassical supply side approach and offered a justification for the demand side approach. He argued that it is the demand side of the economy that determines the amount of resource inputs available and utilized.

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[4] See the World Bank (1994), Onafowora (1998), Harrigan and Mosley (1991) Greenaway and Sapsford (1994), Greenaway et al. (1997), Sachs and Warner (1995), Edwards (1998), Frankel and Romer (1999) and Rodriquez and Rodrik (1999) for empirical evidence.

[5] The BPC growth model has been criticized by McGregor and Swales (1985 and 1986), who claim that the model is overwhelmingly rejected by the data. These criticisms have been responded to by Thirlwall (1986) and McCombie (1992).

Hence, the strength of demand for resources such as capital and labour makes a difference to their supply, significant enough to generate differences in income growth between countries. Thirlwall and Hussain (1982) extended the BPC growth model to incorporate two factors that can make a country's growth rate differ from the rate predicted by the basic model, namely, capital flows and changes in relative prices (hereafter, the extended model). Testing the extended model on developing countries they found that capital flows have enabled the countries to grow slightly faster than the basic model predicts. They also concluded that changes in relative prices have constrained growth. The few studies that have applied the basic model to developed countries have, in general, supported the model (Bairam and Demster, 1991; Anderson, 1993; and Atesoglu, 1993). However, studies that applied the model to developing countries have yielded mixed results. Perraton (1990, 2003) and Hussain (1999) have applied the basic and the extended models to data on developing countries and concluded that the models give a good fit for only a fraction of the countries studied. Recent studies by Santos-Paulino and Thirlwall (2004), Pacheco-Lopez (2005), and Pacheco-Lopez and Thirlwall (2006, 2007) have used the basic model to analyze the effect of trade liberalization on growth in Latin American countries. The results indicate that, whereas some countries have grown faster post-liberalization than pre-liberalization, others have experienced the opposite.

This paper argues that the studies on the effect of trade liberalization on growth in Latin America may have ignored other important determinants of growth in the developing world, such as capital flows and changes in relative prices. It is well known that most developing countries are able to build up ever increasing current account deficits, financed by international borrowing/capital inflow that allows them to grow permanently faster than would otherwise be the case. In most cases, the accumulated debt is eventually written off.[6] In addition, the excessive reliance of most developing countries on exports of a few primary commodities for the much needed foreign exchange makes them susceptible to changes in relative prices. The change in the relative prices could be external, caused by changes in demand and supply conditions in the world market or could be caused by domestic inflation. In this case, income growth in developing countries ultimately becomes constrained by the growth in capital flows and changes in the relative prices. Hence, the basic model will likely fail to predict long run income growth. Therefore, whether growth in income depends only on export growth or also on the growth of capital flows and the relative prices is an empirical question that we intend to analyse carefully.

The objective of this paper, therefore, is to use the cointegration technique to test the validity of the prediction of the extended model, and examine the impact of trade liberalization on the trade balance and income growth in Ghana. Some earlier studies using the BPC growth model such as McCombie (1999), Hieke (1997), Atesoglu (1997) and Moreno-Bond (1999) have used either the Engel and Granger (1987) or the Johansen and Juselius (1990) cointegration approach to test the validity of the BPC model. However, none of these studies applied the cointegration analysis to the final prediction of the model either in its basic form or the extended form. As a contribution to the literature, this paper uses the autoregressive distributed lag (ARDL) approach to cointegration to examine the long run relationship among the growth rates of output, exports, capital flows and relative prices, and test the validity of the predictions of the extended BPC growth model.

[6] A typical example is when Ghana benefited from significant debt forgiveness from her major creditors after joining the enhanced Highly Indebted Poor Countries (HIPC) program in 2001. The national debt, which mainly resulted from years of increasing balance of payments deficits, had become unsustainably high.

We use the ARDL approach to cointegration because it has several advantages over the Engel and Granger (EG) and the Johansen and Juselius (JJ) approaches.[7]

The main results are summarized as follows. First, there exist a long run relationship among the growth rates of income, exports, capital flows, and relative prices. An increase in the growth rates of exports, capital flows and relative prices lead to an increase in the growth of income. A test of the validity of the model based on the McCombie (1989) procedure concluded that the extended model gives good estimates of the actual growth rates in income. However, trade liberalization has not significantly improved the growth performance in Ghana. Second, trade liberalization has led to an increase in export growth but raised import growth by more. Consequently, the trade balance has worsened after the trade liberalization.

The rest of the paper is organized as follows. Section 2 outlines a brief overview of trade and external policies in Ghana before and after the trade policy reforms in 1987. Section 3 presents a detailed theoretical derivation of the BPC growth model. Section 4 discusses the ARDL approach to cointegration and outlines its advantages over other cointegration techniques. Section 5 conducts the empirical analysis of the impact of trade liberalization on trade balance and growth in Ghana and uses various test procedures to determine the validity of the extended model. Section 6 concludes the paper and offers some policy recommendations.

2. OVERVIEW OF TRADE AND EXTERNAL POLICIES IN GAHANA

At independence in 1957, Ghana inherited a liberal trade regime, huge external reserves, and a fixed exchange rate system. After experiencing balance of payments problems almost immediately after independence, the government ushered in a controlled regime by introducing exchange controls as a policy package to control and conserve foreign exchange. In 1961 the exchange controls were extended and an import licence scheme was introduced to solve the increasing balance of payments problems. The control system failed and subsequently, there was an attempt to liberalize the trade regime between 1966 and 1969. The military government that took power in 1972 returned the economy to a control regime by imposing stiffer imports and payments controls. These controls were further stiffened in subsequent years so as to reduce the economy's dependence on external resources. The Cedi was revalued by 42% so that the extent of the massive devaluation of the Cedi in 1971 was reduced from 44% to 26%. The manufacturing sector of the economy suffered considerably from the import controls. Manufacturing output declined by 5.69% in 1974, then increased by 9.25% in 1975, only to fall by 4.52% in 1976. In response, the government tried to liberalize the economy between 1978 and 1980. These efforts were half-hearted and proved to be unsuccessful since the government hesitated to completely remove the controls, citing balance of payments implications as a reason. In addition, the government refused to devalue the currency. The manufacturing sector output continued to fall by 3.51% and 16.84% in 1978 and 1979 respectively. Further declines of 19.2 and 20.47 occurred in 1981 and 1982 respectively. Though the decline in the manufacturing sector output between 1974 and 1982 signaled the breakdown of the control regime, the policies continued till early 1983.

In response to the economic problems facing the economy, the government introduced in April 1983 an austerity budget that contained a program of reforms known as the Economic Recovery Program (ERP) aimed at stabilizing the economy.

[7] This is explained later in this paper.

These reforms included fiscal, monetary and exchange rate policies which were designed to stimulate domestic aggregate supply by realigning relative prices in favour of the productive sectors. The government also embarked on comprehensive trade policy reforms which can be grouped into three different trade and payments regimes. These are the attempted liberalization regime of 1983-86; the import liberalization regime of 1987-89; and the liberal trade regime of 1990-present.[8] The changes in the exchange rate policies were among the most important measures adopted during the three trade regimes. The attempted liberalization regime saw four nominal devaluations of the Ghanaian Cedi and represented the transition from the fixed exchange rate system to a liberalized exchange rate system. To begin with, the government in April 1983 introduced a scheme of surcharges and bonuses that effectively created a multiple exchange rate system. In the same year, the government initiated an import liberalization process as part of its broad macroeconomic program; the objective of the liberalization was to eliminate the negative effects of the preceding extremely restrictive control regime. However, the import licensing system that the government inherited from the preceding government was maintained until 1986. A foreign exchange retail auction was introduced in September 1986, which eventually culminated in the official introduction of a two-tier system under which imports and exports of selected goods were subject to the official exchange rate while all other transactions were subject to the weekly auction rate. The structure of taxes on foreign trade virtually remained the same between 1983 and 1985. However, in 1986, an escalating tariff structure was established with raw materials and capital goods imports facing a lower import tariff rate than consumer finished goods imports.

In 1987, the government began the elimination of the import licensing system by replacing quotas and other restrictions with tariffs. The fixed exchange rate system was also brought to its conclusion and a new era of flexible exchange rates was ushered in. The tax schedules on foreign trade were also adjusted upwards in 1987 but were eventually reduced in 1988 to levels lower than what they were in 1986. However, the escalating tariff structure was maintained. There was also significant relaxation of the exchange control regulations. The two-tier exchange rate system between 1986 and 1988 could not eliminate the considerable and growing spread between the parallel and official exchange rates. In February 1988, the parallel market was legalized with the establishment of the foreign exchange bureaux. As a result of the liberalization of the trade and payment regimes, the spread of about 40% between the foreign bureaux buying rates and the Bank of Ghana auction rate at the beginning of 1989 was narrowed to less than 10% within the year.

In January 1989, the import licensing system was completely removed, since the liberalization of the foreign exchange market no longer supported it. The tax schedules on foreign trade were continuously reduced till the end of 2000. Among further efforts to liberalize the exchange rate system, the government introduced the wholesale auction system in 1990. This was later replaced by the interbank exchange market system in 1992. This system continued to 2000. A new government which came to power in 2001 immediately formulated the national trade policy and the Trade Sector Support Program. This program had two core elements. The first was an export-led industrialization strategy focused on agro-processing and other manufacturing, and involving mass mobilization of rural communities. The second was an import competing strategy aimed at stimulating the competitive production of import substitutes, particularly processed food and agriculture products.

[8] We used 1987 as the date of the trade liberalization in all the empirical analysis because it is the year that Ghana undertook trade liberalization in a significant way.

The government saw that the creation of the comprehensive trade policy would further develop the Industrial Reform and Accelerated Growth Program that it had earlier implemented and generate support both at home and abroad. In 2004 Cabinet approved the trade policy, which has been in force up to date.

Figure 1 shows the Ghanaian growth experience for the years 1960 to 2006. Growth fluctuated from time to time during the period prior to the trade liberalization in 1987, but it has been relatively stable during the post-trade liberalization period. Figures 2 and 3 show the performance of the external sector pre- and post-trade liberalization. Though the average annual growth rate of both imports and exports were around 20 percent during the period prior to the trade liberalization, import growth after the liberalization has increased to an average of 36.2 percent while the average for exports over the same period is 34 percent. Hence the trade liberalization has led to a more rapid growth in imports than exports. Consequently, as shown in figure 3, the trade balance as a percentage of GDP has worsened after the trade liberalization.

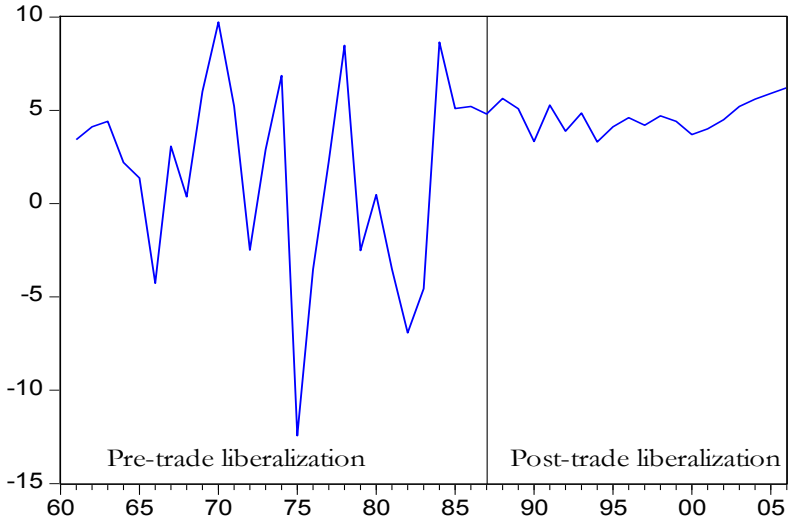


Figure 1: Ghana's GDP growth, 1960-2006

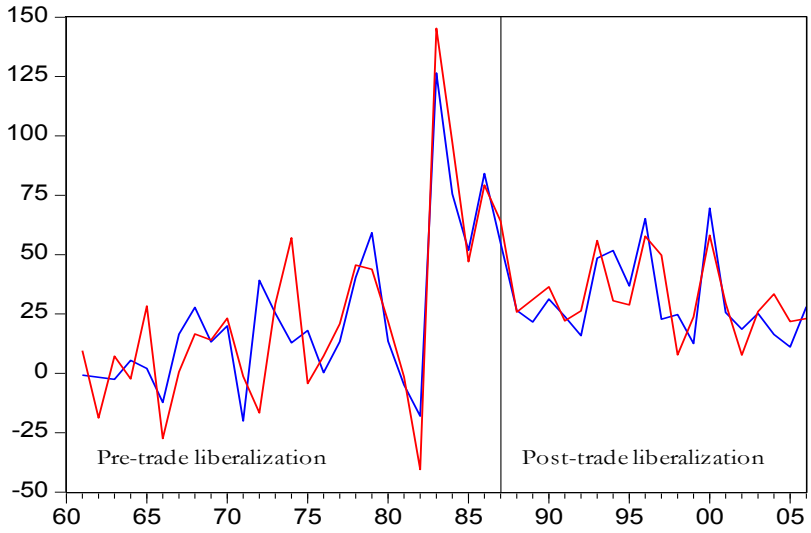
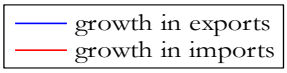


Figure 2: Growth rates of exports and imports



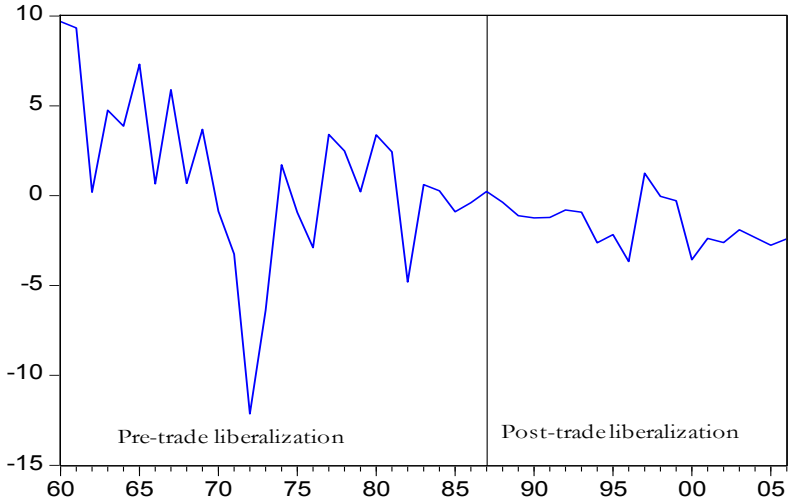


Figure 3: Trade balance as a percentage of GDP

3. THEORY AND MODEL SPECIFICATION

In this section, we discuss the models that will be used for the empirical analysis. We will focus on the trade balance and growth equations and discuss how trade liberalization impacts them. To fully appreciate the dynamics of the trade balance, before and after trade liberalization, we will start with the specification of the export and import demand equations and examine how trade liberalization impacts them.

3.1 Exports

The export performance of a country depends on competitiveness and the level of world demand for its product. Hence, we specify a standard multiplicative export demand function of the form:

$$X = A\left(\frac{P_f E}{P_d}\right)^{\beta_1} WY^{\beta_2}, \quad (1)$$

where X is the volume of export, A represents a constant, P_f is foreign price, P_d is domestic price, E is the nominal exchange rate defined as the domestic currency price of a unit of foreign currency, WY is the level of world income and β_1 and β_2 are the price and income elasticities respectively. These elasticities are expected to be positive. Taking logs of equation (1) above yields:

$$\ln X = \ln A + \beta_1 \left(\ln P_f + \ln E - \ln P_d\right) + \beta_2 \ln WY. \quad (2)$$

To test for the effect of trade liberalization on exports, we add a shift dummy (*lib87*). The dummy variable takes the value of "0" prior to trade liberalization and the value of "1" afterwards. Liberalization can also lead to increase in the sensitivity of exports to world income by making it easier for producers to shift resources to the export sector. To capture this effect, we include a slope dummy variable (*lib87*lnWY*). Thus the extended export demand equation to be estimated is:

$$\ln X_t = \ln A + \beta_1 \ln rer_t + \beta_2 \ln WY_t + \beta_3 lib87_t + \beta_4 (lib87 * \ln WY)_t + \mu_t, \quad (3)$$

where $\ln rer = \left(\ln P_f + \ln E - \ln P_d\right)$ is the real exchange rate which also represents relative prices measured in the same currency.

3.2 Imports

We next specify the import demand function and discuss the effect of trade liberalization on imports. For a typical developing country coming from an excessively restrictive trade regime and its related distortions in the economy, trade liberalization is expected to impact imports significantly. We test if this has been the case for Ghana.

To do this, we need to specify the import demand function. As in the case of exports, imports depend on the level of domestic income and price competitiveness, measured by the real exchange rate. We consider a standard multiplicative import demand function of the form:

$$M = B\left(\frac{P_f E}{P_d}\right)^{\delta_1} YG^{\delta_2}, \tag{4}$$

where M is the volume of imports, B is a constant, YG is Ghana's income, δ_1 is the price elasticity of import which is expected to be negative, δ_2 is the income elasticity of imports which is expected to be positive. The rest of the variables are as previously defined. Taking logs of equation (4) yields:

$$\ln M = \ln B + \delta_1(\ln P_f + \ln E - \ln P_d) + \delta_2 \ln YG. \tag{5}$$

To test for the effect of trade liberalization on imports, equation (5) is extended to include both shift and slope dummies. We also include a slope dummy to investigate the effect of trade liberalization on income elasticity of demand for imports. The extended import demand equation is expressed as:

$$\ln M_t = \ln B + \delta_1 \ln rer_t + \delta_2 \ln YG_t + \delta_3 lib87_t + \delta_4 (lib87 * \ln YG)_t + \varepsilon_t, \tag{6}$$

where (*lib87*) is the shift dummy which takes the value of "0" prior to trade liberalization and the value of "1" afterwards, the (*lib87*lnYG*) is the liberalization dummy interacted with domestic income. The coefficient δ_2 measures the income elasticity before the trade liberalization, and $\delta_2 + \delta_4$ measures the income elasticity after trade liberalization.

3.3 The trade balance

The effect of trade liberalization on the trade balance is the combined effect of export and imports but it is theoretically ambiguous. It depends on the price and income elasticities of both import and export demand. We specify the trade balance as follows:

$$TB = \frac{P_x X}{P_m M}, \tag{7}$$

where TB is the trade balance, $P_x X$ is the value of exports, the $P_m M$ is the value of imports, P_x is the price index for exports, P_m is the price index for imports, and the rest of the variables are as earlier defined. We measure trade balance in monetary terms because it is the nominal gap between imports and exports that measures a county's shortage of foreign exchange and determines how much a country need to borrow to sustain growth. Taking logs of equation (7) we get:

$$\ln TB = (\ln P_X + \ln X) - (\ln P_m + \ln M) \tag{8}$$

The difference between the export and import price indices $(P_x - P_m)$ measures the nominal/pure terms of trade (tot). Substituting equations (2) and (5) into (8) and rearranging terms, we obtain the following equation:

$$\ln TB = \varphi + \theta_1 \ln YG + \theta_2 \ln WY + \theta_3 \ln rer + \theta_4 \ln tot, \tag{9}$$

where φ is a constant, θ_1 is expected to be negative, θ_2 is expected to be positive, the sign of θ_3 depends on whether or not the Marshall-Lerner condition is satisfied, and θ_4 is expected to be positive. For policy purposes, we measure the trade balance as a ratio of domestic income (TB/Y) hence equation (9) becomes:

$$\ln(TB/Y) = \varphi + \theta_1 \ln YG + \theta_2 \ln WY + \theta_3 \ln rer + \theta_4 \ln tot. \tag{10}$$

If trade liberalization improves output performance, then some of the effect of trade liberalization on trade balance will be captured by the output variable. To capture this, we include in equation (10) an interactive dummy between liberalization and income. We also include a shift dummy to capture the pure trade liberalization effect (independent of the effect working through income). Hence the final equation to be tested is:

$$\ln(TB_t/Y_t) = \varphi + \theta_1 \ln YG_t + \theta_2 \ln WY_t + \theta_3 \ln rer_t + \theta_4 \ln tot_t + \theta_5 lib87 * \ln YG_t + \theta_6 lib87 + \nu_t. \tag{11}$$

If the sign of the interactive dummy is negative and significant, then it implies that the trade liberalization has raised income which in turn has increased imports and worsened the trade balance.

3.4 The relationship between trade and growth: the balance of payment constraint growth model

The balance of payment constraint growth model (also known as the Thirlwall's Law) is a post-Keynesian demand-side explanation of the process of economic growth. According to Thirlwall (1979), the basic version of the model relies on two critical assumptions: constant relative prices, and no capital flows. The model states that the growth rate of income equals the growth rate of exports multiplied by the inverse of the income elasticity of imports:

$$y_b = \frac{x}{\delta_2}, \tag{12}$$

where y_b is the predicted rate of growth of income, x is the rate of growth of exports and δ_2 is the income elasticity of imports. According to the model, export performance is crucial for economic growth because it provides the foreign exchange needed to pay for import requirements associated with economic growth. If exports do not grow, then income growth has to decrease to reduce imports and establish equilibrium in the balance of payments.

Hence, the economy's ability to grow depends largely on export performance. The extended version of the model, put forward by Thirlwall and Hussain (1982) relaxes the two assumptions. The extended model starts from the balance of payments accounting identity:

$$P_d X + K = P_f EM. \tag{13}$$

Where X is the volume of exports, P_d is the domestic price of exports, M is the volume of imports, P_f is the foreign price of imports, E is the exchange rate, and K is the value of nominal capital flows measured in domestic currency. $K>0$ measures capital inflow and $K<0$ measures capital outflow. Equation (13) can be expressed in rate of growth form as:

$$\lambda(p_d + x) + \Phi k = p_f + m + e, \tag{14}$$

where the lower case letters indicate rate of changes of variables expressed in natural logarithms, and λ and Φ represent the proportions of the total import bill financed by export earnings and capital flows respectively (i.e. $\lambda = P_d X/(P_d X + K)$ and $\Phi = K/(P_d X + K)$. Taking first difference of equations (2) and (5) and putting them into equation (14) yields:

$$\lambda[p_d + \beta_1(p_f + e - p_d) + \beta_2 wy] + \Phi k = p_f + \delta_1(p_f + e - p_d) + \delta_2 y + e. \tag{15}$$

The extended BPC growth model can be obtained by solving equation (15) for the rate of growth of real domestic income (y).

$$y_e = \frac{[-(1 + \lambda\beta_1 + \delta_1)(p_f + e - p_d) + \lambda\beta_2 wy + \Phi(k - p_d)]}{\delta_2}. \tag{16}$$

The extended model incorporates two factors that might cause a country's growth rate to deviate from the rate predicted by the basic BPC growth model: the rate of growth of real exchange rate and capital flows. Equation (16) has some growth implications that need explanation. First, all else constant, the higher the income elasticity of demand for imports (δ_2) the lower the growth rate of domestic income. Second, a higher growth rate of world income leads to an increase in demand for domestic exports which leads to increase in the growth rate of domestic income. Third, increasing growth in capital inflows will soften the constraints that the balance of payments impose on growth and allows income to keep growing so long as the increasing balance of payments deficits are sustainable. Finally, devaluation of the domestic currency will improve growth in income provided that the absolute sum of the price elasticity of export weighted by the proportion of the total import bill financed by exports earnings, and the price elasticity of demand for imports is greater than unity $(\lambda\beta_1 + \delta_1) > 1$.[9]

[9] This is a version of the famous Marshall-Lerner condition.

We can show the direct link between exports growth and domestic income growth by substituting in equation (16) for growth in real world income, (*wy*), from the export equation (2). This yields:

$$y_e = \frac{\left[-(1+\delta_1)(p_f + e - p_d) + \lambda x + \Phi(k - p_d)\right]}{\delta_2}. \tag{17}$$

Note that if we assume that $p_d = p_f + e$ (that is, if relative prices measured in a common currency remain unchanged), the current account is balanced and there are no capital flows, equation (17) will be reduced to equation (12) which is the basic form of the model. Hence, the implications for the growth in domestic income in equation (17) become empirical questions that need be addressed.

In this paper, we argue that for typical developing countries, the extended BPC growth model is the appropriate model to explain their growth experience. This is based on two important factors. First, developing countries rely heavily on export earnings of a few primary commodities, which make them susceptible to changes in the real exchange rate. Some empirical studies have documented the relationship between real exchange rate and growth in developing countries. Dollar (1992), Easterly (1999, 2005), and Rodrik (2007) have showed that real exchange rate depreciation has positive effect on income growth in developing countries. However, Rogers and Wang (1995), Kamin and Rogers (1997) and Rodriguez and Diaz (1995) have found that output growth was negatively affected by increase in real exchange rate depreciation in Peru and Mexico. Second, developing countries rely heavily on capital flows to finance development projects. As a result, foreign exchange becomes a more significant bottleneck for growth and development than for developed countries. Growth in capital flows then becomes an important determinant of growth in domestic income. Often times, developing countries are able to build up ever-growing current account deficits, financed by international borrowing/capital inflows which are later written off. This allows these countries to grow permanently faster than otherwise would be the case. If this claim is true, then, growth becomes constrained by the growth in capital flows and the basic BPC growth model fails to predict long run growth performance of these countries.

For empirical testing purposes we added an intercept and stochastic error terms to equation (17) to get:

$$y_{et} = \theta_0 + \theta_1 x_t + \theta_2 (k - p_d)_t + \theta_3 rer_t + \xi_t. \tag{18}$$

Here $\theta_1 = \lambda x/\delta_2$, $\theta_2 = \Phi/\delta_2$, and $\theta_3 = -(1+\delta_1)/\delta_2$. Note that while the expected value of θ_1 is positive, the expected signs of θ_2 and θ_3 cannot be determined *a priori*. They can be positive, negative or equal to zero. To test for the effect of trade liberalization on growth in income equation (18) is extended to include a shift dummy (*lib87*). This is supposed to capture the direct effect of liberalization on growth in income. We also included two interactive dummies that will potentially capture the indirect effect of trade liberalization on income growth. The first is between liberalization and exports ($lib87 * x$), and the second is

between trade liberalization and capital flows ($lib87*(k-p_d)$). Hence the final equation to be tested is:

$$y_{et} = \theta_0 + \theta_1 x_t + \theta_2 (k - p_d)_t + \theta_3 rer_t + \theta_4 lib87 + \theta_5 lib87 * x + \theta_6 lib87 * (k - p_d) + \xi_t \quad (19)$$

4. ECONOMETRIC MODELING

A number of studies have empirically tested the validity of different versions of the BPC growth model using various data sets and econometric techniques. Three main test procedures have been proposed in the literature. The first commonly used test compares the estimated income elasticity of import demand with the hypothetical elasticity which will equate the actual and the BPC model growth rates of income (hereafter known as McCombie's simple test procedure). The second method, proposed by McGregor and Swales (1985) suggests that the predicted power of the model can be measured by regressing the actual growth rate (y) on the model's predicted growth rate (y_b or y_e) and test whether the slope coefficient equals unity and the constant equals zero. If these conditions are satisfied, then the BPC model's predicted growth rate is a good estimate of the actual growth rate. McCombie (1989) criticized the McGregor and Swales test on the basis that the independent variable (y_b or y_e) is itself calculated using estimated parameter and could suffer from a misspecification analogous to an "error in variables" problem. He then suggested a third method which involves regressing (y_b or y_e) on "y" and test whether the slope coefficient equals unity and the constant term equals zero. Thirlwall and Hussain (1982), Hussain (1999), Perraton (2003), Pacheco-Lopez and Thirlwall (2006 and 2007), Pacheco-Lopez (2005) have all used one or the other of the above test methods with mixed results.

Atesoglu (1993) is the first study that estimated the extended BPC growth model using equation (18). Though he did not formally test the prediction of the model, he found that growth in exports and the real exchange rate (relative prices) played an important role in the process of economic growth in Canada, but capital flows did not play any important role. A few studies have used a cointegration approach to analyse the BPC growth model. McCombie (1997), Hieke (1997) and Anderson (1993) conducted cointegration test using the import demand function similar to equation (5) in order to obtain a true long run income elasticity of demand for imports. Atesoglu (1997) and Moreno-Brid (1999) conducted different cointegration analysis. They estimated the basic BPC growth model on levels and tested for a long run relationship between exports and income. None of these studies conducted the cointegration analysis on the final growth rate relationships predicted by the BPC growth model, expressed in equation (18). This paper attempts to fill this gap in the literature through its empirical analysis.

4.1 The Autoregressive Distributed Lag (ARDL) Approach to Cointegration

In contrast to studies which used cointegration approach to estimate the BPC growth model, we use the ARDL methodology to conduct a cointegration test of the extended BPC growth model, and determine the effect of trade liberalization on the trade balance and growth.[10] The ARDL method of cointegration analysis has some advantages over the Engle and Granger (1987) and Johansen and Juselius (1990) cointegration analysis (the EG and JJ methods respectively). First, the ARDL method does not generally require knowledge of the order of integration of variables. This means that the ARDL approach avoids the pre-testing problems associated with the EG and JJ methods, which require that the variables be already classified into I(1) or I(0) (Pesaran *et al*, 2001). Second, the ARDL can distinguish dependent and explanatory variables, while the EG and JJ methods suffer from endogeneity problems. Third, the ARDL method estimates the long run and the short run components of the model simultaneously avoiding problems associated with omitted variables and autocorrelation. Thus estimates from the ARDL method are unbiased and efficient, since they avoid the serial correlation and endogeneity problems. Finally, with the ARDL method, it is possible that different variables have different optimal numbers of lags, while the EG and JJ methods do not allow that possibility.

According to Pesaran and Pesaran (1997) and Pesaran and Shin (1998) the augmented ARDL ($p, q_1, q_2, \ldots\ldots, q_k$) can be written as follows:

$$\alpha(L,p)y_t = \alpha_0 + \sum_{i=1}^{k} \beta_i(L,q_i)x_{it} + \mu_t \tag{20}$$

where α_0 is a constant, y is the dependent variable, L is a lag operator, x_{it} is the ith independent variable (where i = 1, 2, …,k) and μ_t is the stochastic error term. In the long run, we have $y_t = y_{t-1} = ... = y_{t-q}$, and $x_{it} = x_{i,t-1} = ... = x_{i,t-q}$ (note that $x_{i,t-q}$ denotes the q^{th} lag of the i^{th} variable). The long run equation can be written as follows:

$$y = \alpha + \sum_{i=1}^{k} \beta_i x_i + \nu_t \tag{21}$$

where $\alpha = \frac{\alpha_o}{\alpha(1,p)}$, $\beta_i = \frac{\beta_i(1,q)}{\alpha(1,p)} = \frac{\sum_{j=0}^{q}\beta_{ij}}{\alpha(1,p)}$, and $\nu_t = \frac{\mu_t}{\alpha(1,p)}$.

[10] Pacheco-Lopez (2005) used this method to estimate the long run and short run parameters of imports, exports and trade balance. She did not apply it to the BPC growth model's predicted relationship.

The error correction (EC) representation of the ARDL model can be written as follows:

$$\Delta y = \Delta\hat{\alpha}_o - \sum_{j=2}^{p}\hat{\alpha}_j \Delta y_{t-j} + \sum_{i=1}^{k}\hat{\beta}_{io}\Delta x_{it} - \sum_{i=1}^{k}\sum_{j=2}^{q}\beta_{it-j}\Delta x_{i,t-j} - \alpha(1,p)ECM_{t-1} + \mu_t$$

$$ECM_t = y_t - \hat{\alpha} - \sum_{i=1}^{k}\hat{\beta}_i x_{it} \tag{22}$$

where Δ is the first difference operator, $\hat{\alpha}_{j,t-j}$ and $\hat{\beta}_{i,t-j}$ are the coefficients estimated from equation (20), and $\alpha(1,p)$ measures the speed of adjustment. A two-step procedure is used in estimating the long run relationship and the short run dynamics. In the first stage, the existence of any long run relationship among the variables of interest is determined using the following ARDL equation:

$$\Delta y = \alpha_o + \sum_{i=1}^{n} b_i \Delta y_{t-i} + \sum_{i=0}^{n} c_i \Delta x_{t-i} + \gamma_{1i} y_{t-1} + \gamma_{2i} x_{it-1} + \varepsilon_t \tag{23}$$

The order of the lags in the ARDL model is selected by the Akaike or the Schwartz criteria.

The second stage of the analysis uses equations (20), (21), and (22) to estimate the short run and the long run parameters. The F-test is used for testing the existence of long run relationship in equation (23). The null hypothesis of no long run relationship is defined by $(H_o : \gamma_1 = \gamma_{2i} = 0)$ is denoted by $F_y(y \mid x, y)$. The *F*-test has a non-standard distribution which depends upon: (i) whether variables included in the ARDL model are to be I(0) or I(1), (ii) whether the ARDL model contains an intercept and/or a trend. [11] Pesaran and Pesaran (1997) reported two sets of critical values (CVs): one set is calculated assuming that all variables included in the ARDL model are I(1) and the other is estimated considering the variables are I(0). If the calculated *F*-statistic is higher than the upper bound critical value, it suggests rejection of the null hypothesis of no long run relationship. If the calculated *F*-statistic is lower than the lower bound of the critical value, then the null hypothesis cannot be rejected. Finally, if it falls in between the lower and upper bound, then the result is inconclusive.

[11] Unit root tests indicate that all the variables are I(1). Their first differences are therefore I(0). Results are available from the author upon request. The Akaike's information criteria (AIC) were used in selecting the optimal lag length of each first differenced variable.

5. EMPIRICAL ESTIMATES

We applied the ARDL methodology to the export, import, the trade balance and the growth equations.[12] To check the specification of the ARDL model from which the long run coefficients and the ECM models are derived, we conducted diagnostic tests such as serial correlation, functional form, normality, and heteroscedasticity. Throughout the analysis, t-statistics are reported in parentheses. We used data from 1960 to 2006 for all the estimations.

5.1 Exports equation

The calculated *F*-statistic for applying the ARDL method to the export equation (2) under the assumption of a constant and no trend is 7.49. This is above the interval of the critical values (3.79 to 4.85) at the 5 percent significance level, hence, the null hypothesis of no long run relationship among the variables is rejected. The short run and the long run coefficients derived from the ARDL (1, 0, 2) are reported under columns (a) and (b) respectively in table 1. All the long run coefficients reported in column (b), with the exception of the constant and the slope dummy, are significant at the 5 percent level. The value of the coefficient on world income suggests that a 1 percentage increase in world income will lead to a 0.68 percent increase in exports. The coefficient on the *rer* variable indicates that a real depreciation of the Ghanaian currency leads to an increase in exports. The estimated coefficient on the shift dummy (*lib87*) is positive, suggesting that given changes in world income and the real exchange rates, total real exports increased by approximately 2.1 percent after the trade liberalization.[13] However as can be seen from the insignificance of the slope dummy, the income elasticity of export did not change significantly after the liberalization. The ECM estimates in column (a) show that with the exception of the constant and the slope dummy, all variables, including the error correction term are significant at the 5 percent level. Export growth responds positively to growth in world income and relative prices. The growth rate of exports has also increased after the trade liberalization program was implemented. The coefficient of the error correction term has the right sign and indicates that about 60 percent of the discrepancies between the actual and equilibrium value of real exports is corrected within a year. The diagnostic test statistics show that the ARDL model, from which the long run coefficients and the short run dynamics are derived, is correctly specified.

[12] The tests for the long run relationship in all the equations do not include the dummy variables. See Appendix A for the sources and definition of the data variables used.

[13] The value is calculated from $e^{\beta} - 1$, where β is the value of the coefficient.

Table 1. Exports and Imports Equations

Exports ARDL(1, 0, 2)			Imports ARDL(1, 0, 2)		
	(a)	(b)		(c)	(d)
Regressors	ECM	Long run	Regressors	ECM	Long run
Constant	0.014	-4.756	Constant	-0.069	-2.812
	(0.221)	(1.329)		(2.176)**	(1.984)**
WY	0203	0.684	YG	2.045	2.163
	(2.074)**	(4.145)***		(3.621)***	(3.665)***
Rer	0.168	0.219	rer	-0.157	-0.148
	(2.18)**	(1.987)**		(2.762)**	(2.468)**
lib87	0.015	0.021	lib87	0.052	0.078
	(7.301)***	(2.429)**		(2.263)**	(1.985)**
lib87*WY	0.002	0.003	lib87*YG	0.090	0.005
	(0.953)	(1.438)		(1.185)	(1.976)**
$ECM_{(-1)}$	-0.597		$ECM_{(-1)}$	-0.196	
	(2.778)**			(2.922)**	
$\overline{R}^2$	0.46	0.92	$\overline{R}^2$	0.41	0.89
DW	2.061	2.022	DW	1.984	2.11
Diagnostic tests					
Serial Correlation-		0.121	Serial Correlation-		0.463
Functional Form-		0.193	Functional Form-		0.203
Normality-		0.558	Normality-		0.123
Heteroscedasticity-		0.714	Heteroscedasticity-		0.691

Notes: t-statistics are shown in parentheses. ***, **, * denotes significance of the coefficient at 1, 5, 10 percent respectively. Variables in the long run equations are measured in log levels. The diagnostic tests show probabilities and they correspond to the ARDL models from which the ECM models and the long run coefficients are derived.

5.2 Imports equation

We next applied the ARDL method to the import equation and tested the null hypothesis of no long run relationship. The calculated *F*-statistic is 5.71 which is higher than the upper bound critical value of 4.35 at the 5 percent significance level. Therefore, the null hypothesis of no long run relationship among the variables in the import equation is rejected. The ECM model and the long run coefficients derived from the ARDL (1, 0, 2) are reported in column (c) and (d) respectively in table 1. Estimates from the long run indicate that both the price and the income elasticities of demand for imports have the expected signs and are significant at the 5 percent level.

We tested the effect of trade liberalization on imports by including a shift dummy and a slope dummy interacting with the income variable. The results indicate that, the effect of trade liberalization has been to raise the level of imports by 8.1 percent and increase the income elasticity of imports by 0.005. The ECM results in column (c) show the short run coefficients of the variables and the error correction term. All the variables, with the exception of the interactive dummy are significant at the 5 percent level. The ECM term has the expected sign and suggests that almost 20 percent of the difference between the actual and the equilibrium value of imports is corrected within a year. All the statistics for the diagnostic tests are statistically insignificant, implying that the ARDL model for imports is not misspecified.

The results from both the exports and imports demand functions, especially the effect of trade liberalization confirm our earlier argument that the trade liberalization has led to more rapid growth in imports than exports.

5.3 Trade liberalization and the Trade balance

The effect of trade liberalization on the trade balance is theoretically ambiguous. In general, two important factors are in play. First, the effect will depend on the extent to which export and import duties change, and the price elasticities of export and import (assuming both export and import duties fall after the liberalization). Export earnings measured in foreign currencies will increase if the price elasticity of demand is greater than unity, and import payments will increase if the price elasticity is greater than zero. Second, the effect of trade liberalization will depend on how real income is affected relative to real absorption. Whereas the reduction in export duties will switch expenditure to domestic goods, a reduction in the import duties will do the opposite. Even if output increases but propensity to absorb is greater than unity, the trade balance will not improve. Given this theoretical ambiguity, the effect of trade liberalization on the trade balance becomes an empirical question.

Table 2. Trade balance and Growth Equations

(TB/GDP) ARDL(2, 2,1, 0, 0)			Growth ARDL(2, 1, 1, 1)		
	(e)	(f)		(g)	(h)
Regressors	ECM	Long run	Regressors	ECM	Long run
Constant	-0.144	-1.512	Constant	0.001	0.017
	(1.495)	(0.624)		(0.175)	(1.548)
YG	-1.887	-0.755	exports	0.198	0.257
	(2.674)**	(3.032)***		(4.148)***	(2.965)***
WY	3.661	0.906	rer	0.034	0.031
	(1.801)*	(2.469)**		(1.701)*	(2.028)**
rer	0.248	0.297	capflow	0.113	0.133
	(2.135)**	(2.216)**		(6.021)***	(3.709)***
lib87	-0.078	-0.479	lib87	0.003	0.015
	(0.546)	(2.012)		(0.289)	(0.987)
lib87*WY	-0.036	-0.023	lib87*exports	0.002	0.001
	(1.241)	(0.938)		(1.121)	(0.873)
tot	0.864	0.928	lib87*capflow	-0.562	0.472
	(2.457)**	(1.981)**		(0.973)	(1.246)
$ECM_{(-1)}$	-0.851		$ECM_{(-1)}$	-0.978	
	(4.211)***			(4.032)***	
$\overline{R}^2$	0.51	0.63	$\overline{R}^2$	0.37	0.68
DW	2.338	1.891	DW	1.975	1.906
Diagnostic tests					
Serial Correlation-		0.161	Serial Correlation-		0.842
Functional Form-		0.755	Functional Form-		0.112
Normality-		0.163	Normality-		0.125
Heteroscedasticity-		0.725	Heteroscedasticity-		0.173

Notes: t-statistics are shown in parentheses. ***, **, * denotes significance of the coefficient at 1, 5, 10 percent respectively. Variables in the long run equations are measured in log levels. The diagnostic tests show probabilities and they correspond to the ARDL models from which the ECM models and the long run coefficients are derived.

We first used the ARDL method to test for the existence of long run relationship among the variables in equation (10). The calculated *F*-test is 4.96 which is above the interval of critical values of the *F*-test of (2.86-4.01) we therefore, reject the null hypothesis of no long run relationship. We next estimated the ECM and the long run coefficients using an ARDL (2, 2, 1, 0, 0) model. The results are reported in columns (e) and (f) respectively in table 2. The income elasticities from the long run equation have the expected signs and are statistically significant at the 5 percent level. An increase in domestic income, through its positive impact on imports leads to a deterioration of the trade balance, whilst an increase in world income through its positive effect on exports, leads to an improvement in the trade balance. The real exchange rate also has a positive and significant effect on the trade balance. These results are consistent with those obtained for the export and import demand equations and imply that the Marshall-Lerner condition is satisfied. The pure terms of trade effect is positive, that is, an improvement in the terms of trade translates into an improvement in the trade balance. Finally, the coefficient on the shift dummy indicates that trade liberalization has impacted negatively on the trade balance. This should not come as a surprise given that the positive effect of the trade liberalization on imports is significantly higher than the positive impact on exports. The coefficient on *lib87*gdp* is negative but statistically insignificant. Hence, the trade liberalization has not had any significant impact on the relations between domestic income and the trade balance

The pattern of the coefficients for the ECM is similar to that of the long run estimates, except that this time the shift dummy is not statistically significant. The error correction term has the right sign and significant at the 1 percent level. The coefficient tells us that about 85 percent of the discrepancy between the actual and the equilibrium value of the trade balance as a percentage of GDP is corrected within a year. All the statistics for the diagnostic test are statistically insignificant, implying that the ARDL model for the trade balance is correctly specified.

5.4 Trade liberalization and growth in income

In this section, we use the ARDL method to analyze the prediction of the extended BPC growth model and determine the impact of trade liberalization on the relationship predicted by the model. We are specifically interested in determining whether the extended BPC growth model is a good predictor of Ghana's long run economic growth performance and how trade liberalization has impacted it. In contrast with earlier studies that apply cointegration analysis to the BPC growth model, we use cointegration analysis within the ARDL framework to determine the validity of the extended BPC growth model for a developing nation. Most developing countries rely excessively on the exports of a few primary commodities for the much needed foreign exchange for development. Hence, international relative prices of goods and capital inflows become important determinant of their growth process because they relax the constraints that balance of payment deficits impose on economic growth. This is an empirical issue that we address in this section.

We applied the ARDL procedure to equation (18) and found that the calculated *F*-statistic is 7.31 which is higher than the upper bound of the critical value of 4.37 at the 5 percent significance level. Therefore, we reject the null hypothesis of no long run relationship among growth in income, exports, capital inflows, and the real exchange rate. We next estimated the ECM and the long run coefficients using ARDL (2, 1, 1, 1). The estimates are reported in columns (g) and (h) in table 2.

The empirical findings reveal that growth in exports, capital inflow, and relative prices (real exchange rate) have positive effect on growth in income in Ghana. Hence, the extended BPC growth model that postulates that, beside growth in exports, growth in capital inflow and growth in real exchange rate are important to the growth process in Ghana is valid. Among the factors, export growth has the greatest effect on income growth, followed by growth in capital flow and then the real exchange rate. To test for the effect of trade liberalization on growth, we included one shift dummy and two slope dummies interacted with growth in exports and growth in capital inflow. All the dummy variables have positive signs but are all statistically insignificant. This suggests that trade liberalization has not significantly improved growth performance in Ghana nor has it affected how export growth and capital flow growth impact economic growth. The pattern of the coefficients in the ECM is similar to those of the long run equation. The error correction term is significant and has the right sign. It suggests that about 98 percent of the discrepancy between the actual and the equilibrium values of growth in income is corrected within a year. The probability values reported for the diagnostic tests are statistically insignificant, implying no evidence of misspecification of the growth equation.

5.5 Testing the validity of the BPC growth model

We used the McGregor and Swales (1985) and McCombie (1989) tests procedures and the estimates from the ARDL method to test for the validity of the prediction of both the basic and extended BPC growth models. For the basic model, we used the McCombie's simple procedure. Based on equation (12), McCombie (1989) proposed that a hypothetical income elasticity of demand for imports that equates the actual and the BPC growth model's predicted growth rate $\left(\delta_2^* = x/y\right)$ be obtained and compared with the estimated income elasticity of demand for imports δ_2. If δ_2^* does not differ significantly from δ_2, then the actual growth rate is not different from y_b. Thus the hypothesis to be tested is whether $\delta_2 = \delta_2^*$. From table 1, the estimated income elasticity from the imports demand equation is $\delta_2 = 2.163$ before trade liberalization, and $\delta_2 = 2.168$ after the liberalization. The results from the test for both pre- and post- trade liberalization periods are reported in table 3 below. The t-statistics suggest that the hypothesis of equality between δ_2 and δ_2^* is rejected for both periods. Hence, the basic BPC growth model based on equation (12) is rejected.

Table 3. Testing the equality between δ_2 and δ_2^*

Periods	δ_2	δ_2^*	t-statistics
Pre-Liberalization 1960-1985	2.163	1.409	4.582
Post-Liberalization 1986-2006	2.168	1.735	2.174

Table 4. Testing the extended BPC growth model (full sample)

McGregor and Swales' text procedure

Dependent variables	Constant	y_e	see	$\overline{R}^2$	$\lvert t' \rvert$
y	1.340 (3.286)	0.481 (6.104)	2.26	0.47	6.594

McCombie's test procedure

Dependent variables	Constant	y	see	$\overline{R}^2$	$\lvert t' \rvert$
y_e	0.198 (0.304)	0.981 (6.104)	3.22	0.47	0.136

Notes: Figures in parentheses are the usual t-statistics. $\lvert t' \rvert$ is the absolute value of the t-statistic based on the null hypothesis that the slope coefficient is unity.

The other two test procedures discussed in section 4 are directly applicable to our estimated extended model. Both procedures involve the comparison of the actual growth rate (y) with the BPC predicted growth rate (y_e) to test the predictive power of the model. McGregor and Swales suggested that the actual growth rate (y) should be regressed on a constant and the predicted growth rate (y_e). After criticizing the approach, McCombie suggested that the predicted growth rate should rather be regressed on a constant and the actual growth rate. The null hypotheses of both tests are that the constant is zero and the slope coefficient equals unity. The results are reported in table 4 above. The McGregor and Swales test results indicate that the extended BPC growth model is not a good predictor of the actual growth rates.

The constant is significantly different from zero and the $\lvert t' \rvert$-statistic imply that the slope coefficient is significantly different from unity. The results from the McCombie test procedure tell a different story. The constant is not significantly different from zero, and according to the

$|t'|$-statistic the slope coefficient is statistically equal to unity. Based on the validity of McCombie's criticism of the McGregor and Swales test procedure, it can be concluded that in the case of the Ghanaian economy, the extended BPC growth model can be considered as a good estimate of the actual growth rates. Hence, growth rates in exports, capital inflows and the real exchange rate are important determinants of Ghanaian long run growth rate.

4. CONCLUSIONS AND POLICY RECOMMENDATIONS

Trade reforms among developing countries in the 1980s sponsored by the World Bank's Structural Adjustment Loans (SALs) as policy conditionality have generated a lot of studies that analyze the effect of trade liberalization on trade balance and growth. Taking into consideration the problems associated with previous studies that used the BPC growth model, we used the ARDL approach to cointegration to investigate the short run dynamics and the long run relationship among growth rates in output, exports, capital flows and real exchange rates. We then used the framework to test for the effect of trade liberalization on the trade balance and growth in income in Ghana.

The results of the study are of particular relevance for future policy changes. First, we found that there exists a long run relationship among the variables. An increase in the growth rates of exports, capital flows and real exchange rates leads to an increase in the growth rate of income. Growth in exports is the most important source of economic growth in Ghana, followed by growth in capital flows. The growth in real exchange rate (relative prices measured in a common currency) played the smallest role in the growth process in Ghana. Using the McCombie procedure to test the validity of the model, we concluded that the extended BPC growth model is a good estimate of the actual growth rates in Ghana. We did not find any evidence that the trade liberalization program that started in 1987 has significantly improved the growth process in Ghana.

Second, we found that trade liberalization has led to an increase in export growth but raised import growth by more. Consequently, the trade balance has worsened after trade liberalization. It is, therefore, expected that if the basic BPC growth model is true, then the trade liberalization and its associated worsening trade balance has resulted in making the balance of payments constraint on Ghana's long term growth even more binding. Fortunately, the growth in capital inflows has temporarily reduced the constraints that the worsening balance of payment imposes on growth in income. Hence, the growth performance after the implementation of the trade liberalization program has not been lower than the growth performance before the program. The extent to which such capital inflows can support economic growth in the future will depend largely on the sustainability of the balance of payments deficits or whether the foreign debt associated with the increasing foreign borrowing would eventually be forgiven, as is often the case for most developing countries. For instance, Ghana benefited significantly from debt forgiveness after joining the enhanced HIPC (highly indebted poor countries) program in 2001.

The results from this study question the idea that trade liberalization leads to improvement in the economic welfare of countries by raising the sustainable growth rate. We have found that in the Ghanaian case, trade liberalization has rather worsened the trade balance and has not had any significant positive impact on growth performances. Thus the impact of trade liberalization on the macroeconomic performance in Ghana can be regarded as disappointing. On the bright side, the implications of the findings for long term growth policy is that measures and institutional changes, beyond trade liberalization, that lead to higher long term export growth and keep Ghanaian inflation below her major trading partners' would significantly enhance growth in income. This may involve a reorientation of the non-traditional export drive program that begun around the same time as the trade liberalization program. This will bring the much needed change in the structure of exports by shifting resources from primary production to the production of more attractive exports such as light manufacturing goods.

This should be part of an active national economic management program, designed and directed to create new comparative advantages through comprehensive industrial transformation and the diversification of the economy.

Efficient management of capital inflows should be part of the program as the results indicate that growth in capital inflows lead to growth in income growth. This will require policies to increase the productivity of the inflows and prevent their usage for consumption activities, which often exacerbate the balance of payment deficits as a result of raising debt repayment obligation. Currently, the bulk of capital inflows to Ghana are foreign aid which is often tied to other activities that may not be in the interest of the country. It is also often associated with misappropriation of funds and corruption. There must be efforts to attract more foreign direct investment to ensure the achievement of significant transformation of production structures, and raise the technology content and quality of domestic products, either for export or domestic consumption. Once these capital inflows are channeled to raising domestic productivity, it will also prevent the possibility of overvaluation of the domestic currency and its associated loss of international competitiveness (the so-called Dutch disease).

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APPENDIX A

Data definition and sources
The source of all the data is the World Bank's World Development Indicators and the International Finance Statistics of the International Monetary Fund.

Imports: Imports of goods and services (constant 2000 US$).
Exports: Exports of goods and services (constant 2000 US$).
Domestic Income: Ghana's gross domestic product (constant 2000 US$).
World Income: World GDP less Ghana's GDP (constant 2000 US$).

Capital Flow: Real imports less real exports.

Real Exchange Rate: Defined as $ER \times \frac{P_f}{P_d}$ where ER is the nominal exchange rate (quantity of Cedis per $1), P_f represents the price index of the United States, and P_d is the price index of Ghana. An increase in the real exchange rate represents depreciation.

Trade Balance: Exports less Imports.
Terms of Trade: Relative price of exports to imports (Net barter terms of trade).