



Balance-of-payments constrained growth model for the Turkish economy



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ARTICLE INFO

Article history:

Accepted 18 June 2013

JEL classification:

C32
F43
O40

Keywords:

Thirlwall model
Balance-of-payments constrained growth model
Johansen cointegration methodology

ABSTRACT

Economists have investigated the relationship between output and export in order to explain economic growth for long years. Numerous studies have found very close correspondence between the growth of output and export. It is commonly known that Thirlwall's papers indicate very tight relationship between the growth of output and the ratio of the growth of exports to the income elasticity of demand for imports. This paper aims to apply Thirlwall's balance-of-payments-constrained (BPC) model for the Turkish economy for 1968–2011 period. This research also evaluates the procedures of testing Thirlwall's principle by estimation of the income elasticity of demand for imports using the test of stationarity and cointegration methods. The findings are in accordance with the Harrod–Thirlwall growth model. The test results of Johansen cointegration procedure and the comments on these results are presented as well.

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1. Introduction

The main purpose of this study is to test the validity of Thirlwall's balance-of-payments constrained (BPC) economic growth model for the Turkish economy. For this purpose, dynamic long-term relationships between gross domestic product and export will be determined by using Johansen (1991, 1995) cointegration method that is more preferable in the literature than the Dickey–Fuller test. The study consists of four parts such as literature review, theoretical foundation of the Thirlwall principle, econometric methodology, and empirical findings.

Thirlwall (1979) showed that output and export are closely related to the elasticity of demand for import. Although he was unaware at the time, his finding was an estimate of the dynamic Harrod trade multiplier. Thirlwall's research showed that the level of income is equal to the rate of level of export to the marginal propensity to import. Thirlwall also reminded that the slow and rapid growth rates caused by the balance of payments would lead to low and high productivity rates respectively. The countries may sustain their budget deficits financed by the capital flows in the short run. However, in the long run, they can hardly finance the capital inflow that is over a certain percentage

of Gross Domestic Product (GDP) and ever increasing. International financial authorities push these countries to impose necessary policies to adjust in such situations. This model has been implemented in many countries today. Some of the important studies will be discussed in Section 2.

2. Literature review

Atesoglu (1993a, 1993b, 1994) performed a research and used Johansen technique in order to test the BPC model for the U.S., Canada, and Germany. His study showed that export and real income are cointegrated in the long run. Bairam (1988, 1990, 1993) also contributed to the literature by testing the model for many countries using cointegration analysis and supported the hypothesis of BPC growth.

The model was also applied for India by Razmi (2005), for Latin America by López and Cruz (2000) and Holland et al. (2004), for Southeast Asia countries by Ansari and Xi (2000), and for Africa and East Asia countries by Hussain (1999). The findings of these studies were mostly in favor of the model except for some sub-periods.

Thirlwall and Hussain (1982) studied on an extended model that allows unbalanced foreign trade along with capital flow in the long run. Their research on developing countries also led to the results that supported this extended new model. McCombie and Thirlwall (1997) tried to move the theory forward. Here, they wanted to make sure that the long run economic growth can be sustained by foreign borrowing. The theoretical result indicates that capital flows will not allow a country's growth to be higher than the rate

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determined by Thirlwall's model. The capital flows will not be longer than the duration determined by Thirlwall either. Later, [Elliot and Rhodd \(1999\)](#) and [Thirlwall and Hussain \(1982\)](#) showed that more advanced estimations can be obtained including the effect of borrowing using the same countries and time period.

[Moreno-Brid \(1998–99\)](#) contributed to the extended BPC growth model developed by Thirlwall and Hussain in 1982 by including the restriction that the current account deficit is constant in the long run. If the capital flows are permitted but the current deficit relative to domestic income remains constant, then Thirlwall's basic principles will still be valid. Similarly, [McCombie and Roberts \(2002\)](#), argued that under reasonable assumptions related to sustainable net foreign capital inflows as the rate of national income, the capital inflows in the BPC growth model do not make a great contribution in loosening the balance of payments restriction. However, according to [Barbosa-Filho \(2001\)](#), the contribution of [Moreno-Brid \(1998–99\)](#) has two limitations; namely, the model with the BPC is not necessary to be stable and it does not distinguish the interest payments from nonfactor services and good imports. So, [Barbosa-Filho \(2001\)](#) extended the model to allow a sustainable foreign borrowing by taking into account the effects of interest rates. [Moreno-Brid \(2003\)](#) argued that Thirlwall's principle does not take the interest payments to borrowed countries into account without referring to the studies done by [Elliot and Rhodd \(1999\)](#) and [Barbosa-Filho \(2001\)](#). They developed a BPC model that contained interest payments. The model was implemented for the Mexican economy and the results were found to be supportive of the model.

The Thirlwall model has still been investigated for various countries. There is an increasing number of empirical studies on this topic.

3. Theoretical framework

[Thirlwall model \(1979\)](#) expresses the long-term economic growth via the dynamic Harrod foreign trade multiplier. According to the model, demand side factors are primary actors on economic growth and the dominant constraint on demand is the balance of payments.

The primary aim of the [Thirlwall model \(1979\)](#) is to bring a light on how the balance of payments may affect the countries' performances on economic growth. Thirlwall model is expressed by the following three equations:

$$X_t = \varphi(P_{dt} - P_{ft}) + \rho Z_t \tag{1}$$

$$M_t = \alpha(P_{dt} - P_{ft}) + \pi Y_t \tag{2}$$

$$X_t + P_{dt} = M_t + p_{ft} \tag{3}$$

Here, $\rho, \pi, \alpha > 0$ and $\varphi < 0$. X is the growth rate of export and M is the growth rate of import. Z is the rate of increase in the world income and Y is the rate of increase in the gross domestic product of the relevant country. ρ and π are the elasticities of export and import with respect to income respectively. φ and α denote the export and import elasticities to demand respectively. Since p_d and p_f represent domestic and world prices then $(p_d - p_f)$ represents relative prices. Eqs. (1) and (2) are the export and import equations and Eq. (3) is the current account balance. Here, the sizeable impact of differences between the elasticities of export and import to income on the economic growth is taken into consideration ([McCombie and Thirlwall, 1997](#)).

If Eq. (3) is solved for GDP, the following equation can be written as

$$Y_t = [(1 + \varphi - \alpha)/\pi](P_{dt} - P_{ft}) + (\rho/\pi)Z_t \tag{4}$$

arranging Eq. (1) for Z and replace it in Eq. (4) gives

$$Y_t = [(1/\pi)(1 - \alpha)](P_{dt} - P_{ft}) + (1/\pi)X_t. \tag{5}$$

When relative prices are measured in the same monetary units, they will be constant and their difference will be equal to zero according to the Marshall–Lerner condition. Hence, the Eq. (5) can be rewritten as:

$$Y_t = (1/\pi)X_t. \tag{6}$$

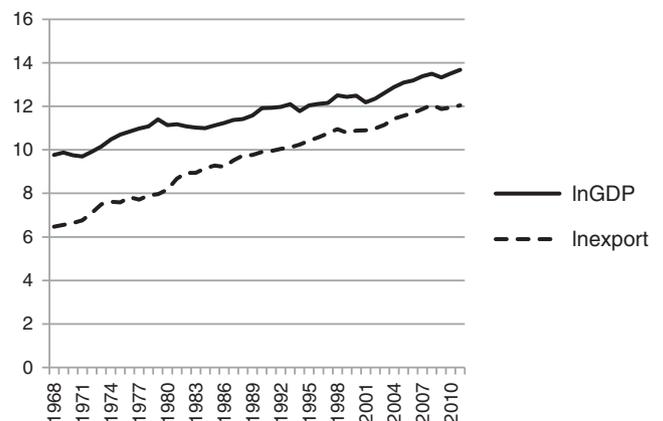
Eq. (6) shows Harrod foreign-trade multiplier relation, where $(1/\pi)$ is a foreign-trade multiplier. The economic growth model with the balance of payments constrained is called Thirlwall model. The model is a different version of Harrod's foreign trade multiplier. The Thirlwall model shown in Eq. (6) indicates that the growth rate with the constrained balanced of payments in the long-run is obtained by dividing the export (or the export growth rate) by the income elasticity of demand for imports.

4. Data, model, and methodology

Real exports and real income have been moving together, which reveals that these series may be cointegrated. An empirical confirmation of the Harrod–Thirlwall model requires the account of balance to be consistent with data. In the long-run output should be cointegrated with export, where $(1/\pi)$ is the cointegration coefficient. In this study, the objective is to test the presence of long term relationship between the variables in Eq. (6) using [Johansen \(1991, 1995\)](#) cointegration method. Here, $(1/\pi)$ is a cointegration parameter as mentioned previously. Johansen's methodology ascribes to the fundamentals of VAR methodology and uses maximum likelihood ratio test. In the first step, the order of cointegration of the series is determined with the augmented Dickey–Fuller (ADF) test. When the long-term equilibrium relationship is revealed by the Johansen cointegration method, the hypothesis of the Thirlwall model will not be rejected and the validity of the model for Turkish Economy will be proved.

The Thirlwall model is estimated for the Turkish economy using the annual data for 1968–2011 period. The Johansen cointegration analysis is performed between GDP and export for this period. The Johansen cointegration methodology is employed in order to show the long-run relationship between GDP and export. GDP and export series are used at their current values in million dollars. The series are in their natural logarithmic forms.

The data taken from the World Bank shows the movements of \ln GDP and \ln export in time on [Graph 1](#).



Graph 1. \ln GDP and \ln export for the Turkish Economy (1968–2011).

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