Marmara Üniversitesi Öneri Dergisi • Cilt 18, Sayı 59, Ocak 2023, ISSN 2147-5377, ss. 202-242
DO1: 10.14783/maruoneri.1187973

ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

THIRLWALL'S BPCG MODEL WITH CAPITAL FLOWS AND DISAGGREGATED IMPORTS SECTORS USING A SIMPLIFIED GENERAL SOLUTION (SGS): THE CASE OF TURKEY, 1998-2019*

BASİTLEŞTİRİLMİŞ BİR GENEL ÇÖZÜM KULLANILARAK THIRLWALL'UN SERMAYE AKIŞLI VE AYRIŞTIRILMIŞ İTHALAT SEKTÖRLÜ ÖDEMELER DENGESİ KISITLI BÜYÜME MODELİ: TÜRKİYE'NİN DURUMU, 1998-2019

Ahmet ÖZÇAM**
Havva Nilgün YILMAZ***

Abstract

In this paper, we considered an extended version of the BPCG model incorporating both the capital inflows and some possible structural changes by disaggregating total imports into intermediate, consumption and capital imports for the 1998-2019 period to study the Turkish economy. We calculated the rate of growth of Turkish income for the extended BPCG model based on a Simplified General Solution (SGS) using the estimated income and price elasticities of demands for three types of imports separately and the *time-varying shares* of exports earnings and the *time-varying shares* of intermediate, consumption and capital imports sectors. The time-varying shares are introduced in order to capture some structural changes in the composition of imports and the type of financing the trade deficit in addition to the changes in the composition of manufactured imports. We observed that the economic growth in Turkey was almost always accompanied with heavy capital inflows which helped the financing of the merchandise trade deficits. Even though the real exports increased by an average of 6.01% during 1998-2019 period, its relatively small contribution to the rate of growth of income was found to be due to the fact that we took into account the rise in intermediate imports attributable to an

* This study was produced from the master thesis of Havva Nilgün Yılmaz named "Thirlwall's Balance of Payments Constrained Growth (BPCG) Model with Capital Flows and Disaggregated Imports Sectors for the Turkish Economy for 1998-2019 Period" which conducted under the consultancy of Prof. Ahmet Özçam.

** Yeditepe University, Department of Economics, aozcam@yeditepe.edu.tr, ORCID: 0000-0002-4145-6296.

*** Yeditepe University, MA, Department of Economics, h.nilgun.yilmaz@gmail.com, ORCID: 0000-0002-4422-938X.

Recieved: 12.10.2022
Accepted: 16.01.2023

increase in manufactured exports confining the BP-Equilibrium growth rate of Turkish income. Moreover, we also found that an average of 0.49% deterioration in the real exchange rate (RER) had a very small effect. We also pointed out that the short-run variations may be more important from a policy perspective, where the policy-makers may be more concerned for the next two or three years by taking into account the short run influences of especially those of expected abrupt changes in capital flows. Finally, we noticed that a first stylized fact for the Turkish economy seemed to be abrupt decreases in capital flows before/during the recessions like those in 2001 and 2009 and a second stylized fact that the Turkish economy grows during the periods when heavy capital inflows increase, generally after the recessions.

Keywords: Thirlwall's balance of payments equilibrium growth rate model; intermediate, consumption and capital goods imports; capital flows; components of growth of output; short run variations, simplified general solution of BP-Equilibrium growth rate of income.

JEL classification: F31, F41, F43.

Öz

Bu makalede, sermaye hareketleri ve yapısal değişim içeren BPCG modelinin geliştirilmiş bir versiyonunu toplam ithalat harcamalarını ara, tüketim ve sermaye ithalat kalemlerine ayrıştırarak 1998-2019 dönemde Türkiye ekonomisini incelemek için kullandık. Basitleştirilmiş Genel Çözüm (BGÇ) kullanarak Türkiye'nin gelirinin büyüme oranını, her üç tip ithalat harcamaları için talebin gelir ve fiyat esneklikleri, zaman içinde değişen ihracat harcamaları bileşenleri ve ara, tüketim ve sermaye ithalatı harcamalarını kullanarak hesapladık. Bileşenlerdeki zaman içindeki değişimler, ithalat kalemlerinde, imalat sanayi ithalatında muhtemel değişiklikleri ve ticari dengenin finansman tipini modelde gösterebilmek için incelenmiştir. Türkiye ekonomisinin büyümesinin hemen hemen her zaman ticari dengeyi finanse eden yoğun sermaye girişleriyle birlikte olduğu gözlemlenmiştir. 1998-2019 döneminde reel ihracat ortalamada %6.01 çoğalmasına rağmen, ekonominin büyümesine olan katkısının mukayeseli olarak az olması, sanayi ihracatı artışında ithal ara mallarının çoğalarak, Türkiye 'nin Ödemeler Dengesi Kısıtlı gelirini sınırladığı bulunmuştur. İlaveten, reel kurda %0.49'luk bir bozulmanın çok az bir etkisi olduğu saptanmıştır. Özellikle sermaye hareketlerindeki ani değişimler hesaba katıldığında, politika perspektifinden gelecekteki iki veya üç yıla bakılırsa, kısa dönemli dalgalanmaların daha önemli olduğu vurgulanmıştır. Son olarak, Türkiye ekonomisi ile ilgili birinci stilistik gerçek 2001 ve 2009'daki gibi resesyonlardan önceki ani sermaye akımlarındaki değişimler ve ikinci olarak ise, Türkiye ekonomisinin büyüdüğü dönemlerde hep sermaye girişlerinin olduğu zamanlar etkili olmuştur.

Anahtar Kelimeler: Thirlwall'un Ödemeler Dengesi Büyüme Modeli, Ara, Tüketim ve Sermaye ürünleri ithalatı, Sermaye Hareketleri, Üretim Büyümesinin Bileşenleri.

1. Introduction

In this paper we will adopt a Keynesian approach to the rates of growth of national incomes which stresses the demand side of the economy as opposed to the Neo-classical approach which concentrates on its supply side. Adopting a demand-side approach, Harrod (1933) and Thirlwall (1979) contended that the balance of payments (BP) was a major constraint to domestic spending on goods imported or domestically produced in the context of an open macro economy. This deficit in BP could not be financed indefinitely in the long run, since the countries where the BP deficit

approaches some critical limit will tend to experience ever-increasing difficulty in attracting capital flows from abroad. Hence, this lack of availability of foreign currency would eventually force adjustments in domestic expenditures that limit the rate of growth of output that is compatible with an equilibrium in BP. In such cases, the policy makers would sooner or later have to implement some fiscal and monetary policies to reduce the aggregate demand. Harrod (1933) and Thirlwall (1979) were independently able to formulate a simple rule stating that the rate of growth of income in the long run could be approximated by the ratio of the growth of exports to the income elasticity of imports of the country, assuming away foreign capital inflows and changes in the terms of trade. This model has become to be known as the balance-of-payments-constrained growth model (BPCG). A large empirical literature has applied the BPCG model to a variety of developed and developing countries, and these workings generally showed that this simple rule approximated quite closely the actual growth rates of the countries over the post-war period.

The BPCG literature is abundant with many extensions to the basic BPCG model. One branch of the literature investigated the multisectoral version of the basic BPCG model since changes in the composition of exports as well as imports and in the income elasticity of exports or imports for certain sectors may affect the growth rate compatible with an equilibrium in BP. Therefore, the multisectoral model emphasized the importance of supply-side factors more explicitly by showing the need for a country's economic policy to ameliorate its export structure towards the production of more goods with higher foreign income elasticity and the capability to produce domestic substitutes for high income elastic imports. The disaggregated model hence recognizes the time-varying nature of the BP-Equilibrium growth rate of income due to ongoing structural changes in which a country's composition of both of its trade and its GDP may be continuously evolving. Araujo and Lima (2007) and Gouvea and Lima (2010) adopted an extended version of Pasinetti's (1983, 1993) structural economic dynamics (SED) approach in a multisectoral BPCG model. They found that Mexico's ratio of the weighted income elasticities of exports to those of imports increased after the trade liberalization as Mexico's exports shifted towards more dynamic, high-technology sectors, indicating a relaxation of the BP constraint. However, their analysis of Mexico did not take into account the high import content of its manufactured exports. Ibarra (2011a) found that after controlling for manufactured exports in a function for intermediate imports, there was no significant increase in the income elasticity of those imports in the post-liberalization period of Mexico (1987-2006), while finding an increase in the income elasticity of final imports. Blecker and Ibarra (2013) also found no increase in the income elasticity of intermediate imports with respect to manufactured exports in the post-liberalization period, suggesting that what might appear as a rise in the income elasticity of aggregate imports in previous studies might have been due to the increasing share of manufactured exports in GDP and the use of intermediate imports in producing such exports, constructing an extended BPCG model that included two types of exports (manufactured and primary products) and two types of imports (intermediate and final goods). They argued that Mexico's BP-Equilibrium growth rate actually increased after the trade liberalization even taking the increasing importance of intermediate imports into

account. Ibarra and Blecker (2016) recognized that the estimated BP-equilibrium growth rates could not be expected to predict actual growth rates during their five sub-periods, especially because the BP constraint did not have to be binding in relatively shorter periods. Moreover, one of the assumptions of the basic BPCG model, that the real exchange rate (RER) is constant did not hold during most of these sub-periods and the intercepts and slopes may also have shifted in various years corresponding to major structural breaks or policy changes. Therefore, Ibarra and Blecker (2016) favor the use of the multisector BPCG model incorporating RER effects and structural breaks as a guide for understanding whether the growth process was or was not BP-constrained during various sub-periods distinguished by alternative policy regimes and external conditions.

Another branch of the literature investigated another key assumption of the basic BPCG model, that the trade in goods and services must be balanced in the long run which rules out the possibility that *heavy foreign capital inflows* may support countries to run *large* trade deficits over, at least a certain period of time which may relax the BP-equilibrium rate of growth of income. Thirlwall and Hussain (1982) incorporated the growth rate of net capital inflows to the basic BPCG model so that their faster growth raises the BP-Equilibrium growth rate of income by permitting more rapid growth of imports compared to that of exports without having an overall BP deficit. They argued that the relative price effect, even though possibly small, may nevertheless bring about a real appreciation of the currency due to persistent net capital inflows. In such a case the positive impact of the net capital inflows on BP-Equilibrium growth rate will at least partially be offset. However, it is controversial whether the solution for the BP-Equilibrium growth rate truly represents a long-run equilibrium. Thirlwall and Hussain (1982) defined the net capital inflows as the growth rate of permanent sustainable capital flows but did not explicitly explain what makes them sustainable. To stabilize a country's current account or its external debt as a percentage of GDP, the net capital inflows must be reduced until they grow at the same rate as GDP in the long run. However, then the country's BP-Equilibrium rate would be held below the rate that would arise if the country's trade balance were balanced. (McCombie & Thirlwall, 1997; Moreno-Brid, 1998-99).

In this paper, our motivation is to combine these two additions to the basic BPCG model: with respect to the capital inflows and three types of imports (intermediate, consumption and capital imports) into a single model which we call the extended BPCG model. In the case of Turkey, the rate of growth of income for the extended BPCG model, is calculated based on a Simplified General Solution (SGS) using the estimated income and price elasticities of demands for three types of imports separately and the *time-varying shares* of exports earnings in total imports expenditures and the *time-varying shares* of intermediate, consumption and capital imports sectors. The time-varying shares are introduced in order to capture some structural changes in the composition of imports and the type of financing the trade deficit in addition to the changes in the composition of manufactured imports that we will discuss in Section 4.3 below. The extension with respect to capital flows is important for many regions in the world: East Asia and Pacific, Latin America, Europe and Central Asia, South Asia, Middle East and North Africa…in descending order in terms of dollars of capital

inflows. The appetite of the global capital investment institutions increases especially after economic crises along with substantial devaluations when these assets of the countries in these regions become cheap. Afterwards, a period in which these counties run trade deficits and finance them by receiving substantial foreign currency is generally observed. These countries may additionally experience some structural changes in their economies in the sense we will explain below and therefore our extended BPCG model may be relevant in such cases.

In Section 6 below, we will discuss that a 6.01% growth of exports earnings contributed relatively much less compared to capital inflows because we took into account the rise in intermediate imports due to an increase in manufactured exports. Our finding that the relative price changes are not important for the growth rate of income in the long run is also consistent with the basic Thirlwall hypothesis. We will also argue that perhaps, the short-run variations may be more important from a policy perspective, where the policy-makers may be more concerned for the next two or three years by taking into account the short run influences of expected abrupt changes in capital flows and those of the real exchange rate rather than an assured long run growth of income dictated by the Thirlwall law which solely depends on an average long-run growth of exports and the income elasticity of imports. Finally, there seems to be two stylized facts in the case of Turkish economy. The first one is that decreases in capital flows are abrupt before/during the recessions. The second stylized fact is that the periods when the GDP grows rapidly are associated with heavy increases in capital inflows, generally after the recessions.

Moreover, in Section 3 below, unlike the Thirlwall's general solution for the BP-equilibrium growth rate of income, we will *not* incorporate the determinants of the exports and the manufacturing exports which are assumed to grow at exogenously given rates since the domestic income is the only adjusting variable that maintains a balanced trade in the long run in a Keynesian fashion. Our approach can be considered as an already simplified version of the general solution of BPCG which may be called a Simplified General Solution (SGS) of the BP-Equilibrium growth rate of income.

We will define the trade balance (TB) in terms of foreign currency ($) as opposed to trade balance (TB) defined in terms of domestic currency as considered in the original BPCG model by Thirlwall and in many other studies. Our formulation of the TB seems to be more appropriate for countries financing their TB deficits with continual foreign capital inflows, at least in the medium run. We will abstain from the services imports and exports, incomes earned/paid on investments at home/abroad and unilateral transfers so that the current account reduces to the trade balance of goods only (merchandise trade balance).

In Section 2, we will review the related research in the literature. In Section 3 below, we will derive the rate of growth of income consistent with a disequilibrium trade balance (TB) financed by capital flows and total imports apportioned among intermediate, consumption and capital goods imports using a Simplified General Solution (SGS). In Section 4, we will define the empirical measures and present the dataset and the estimation methods and the time periods using descriptive statistics and

graphs. In Section 5, we will show the empirical results of the regression equations of imports functions. In Section 6, we will compare the rate of growth of income from the extended BPCG model and the rate of growth of the actual income and show that the capital flows component of the extended BPCG model is the most important factor contributing to the growth of Turkish income.

2. Literature Review

2.1. Multisectoral BPCG Models

Regarding the extensions of the BPCG model incorporating multi-sectors, Araujo and Lima (2007) derived a BP-Equilibrium growth rate of income in an international context extending the Pasinettian multi-sector macro dynamic analysis and essentially transformed the solution of the basic BPCG model into the ratio of the shares-weighted averages of the industry-level income elasticities for exports and imports multiplied by the growth rate of foreign income. The fact that the exports and imports industry shares are time varying showed the structural change of the economy. For example, if a country has an indefinitely large proportion of high-income elastic imports, then the growth rate of that country will be constrained with its current account balance in the long run. They contended that a rise in Mexico's BOP equilibrium growth was associated with the country's exports being shifted towards more dynamic and high-technology industries. They found that Mexico's ratio of the share-weighted income elasticities of exports to the share-weighted income elasticities of imports increased after the trade liberalization. However, they did not take into account the high intermediate imports content of its manufacturing industry, which may have lessened the benefits of its export growth. Nevertheless, the multisectoral version is particularly suited to the developing and emerging nations where the structural change affects the composition of both the economic growth and the trade balance (TB).

Gouvea and Lima (2010) contributed to the empirical literature on BPCG by analyzing a sample of Latin American and Asian Countries. Trade data were retrieved from the United Nations Commodity Trade Statistics Database and the classification of industries came from Lall's (2000) technological classification. Overall, for both groups of countries the absolute mean error with respect to the rate of growth of actual income was found to be lower for the multisectoral version of the BPCG model compared to the simple rule. Gouvea and Lima (2013) estimated the sectoral elasticities of exports and imports for a considerable panel dataset of 90 countries grouping them by income level. They found the validity of the multisectoral version of the Thirlwall's Law, providing further understanding of the uneven international developments and some implications for the growth-raising national structural policies.

Using the bounds testing approach, Ibarra (2011a) estimated equations for intermediate and other types of imports in Mexico during 1960-2006. The results indicated that the intermediate imports were highly dependent on the manufactured exports and once this effect is controlled for, there

was no significant increase in the income elasticity of these types of imports (in contrast to other types of imports), unlike many previous studies of the BPCG model which concluded that Mexico's BP-equilibrium rate of growth fell after trade liberalization due to a sharp rise in income elasticity of imports. Therefore, what a typical BPCG regression detects as an increase in income elasticity of intermediate imports may actually show the re-composition of GDP towards exports. Ibarra (2011b) considers additionally the declining reaction of imports to the real exchange rate in Mexico. This may have happened due to the increasing share of maquiladoras in Mexico's exports and the increasing vertical specialization of non-maquiladoras exports. Ibarra (2011c) discusses the sharp rise in the import-intensity of Mexico's economic activity (an external constraint on growth) and a sustained real appreciation of the peso which may have created a profitability constraint for investment after trade liberalization in the mid-1908's. Some evidence was found as to the investment being deterred by the low profitability of an uncompetitive real exchange rate rather than by the external constraint.

Blecker and Ibarra (2013) examined the growth slowdown in Mexico following its liberalization of trade in the late 1980's and after the formation of the North American Free Trade Agreement (NAFTA) in 1994. They developed a disaggregated model of BPCG with two types of exports (manufactured and primary commodities, mainly oil and agricultural products) and two types of imports (intermediary and final goods comprised of consumption and capital goods) which represented another type of extension to the basic BPCG model. They particularly addressed the question whether the intensive use of intermediate imports in producing manufactured exports reduced the benefits of the growth of exports to the rate of output growth by increasing the total amounts of imports and thereby imposing a constraint of its own on the balance of payments. They showed that, after controlling for the effect of manufacturing industries on the intermediary imports, the income elasticity of intermediate imports (the largest component of Mexican imports) did not increase in the post-liberalization period.

Ibarra and Blecker (2016) estimated a structural model of the balance of payments with disaggregated exports and imports and a reduced-form model for the Mexican economy for the period 1960-2012. Even though Mexico adopted trade liberalization and was subjected to deep structural reforms, she did not achieve a high and sustained economic growth. The country went through two major rounds of trade liberalization: joining the General Agreement on Tariffs and Trade (GATT) in 1986 and the establishment of the North American Free Trade Agreement (NAFTA) with Canada and the USA in 1991. They estimated a function for manufactured exports treating it as endogenous in addition to estimating demands for intermediate and final goods imports. They concluded that a tightening of the BP constraint may have been in effect during the post-liberalization slowdown in Mexico's income growth only during certain subperiods. Their results indicated an asymmetry that whereas a country cannot grow faster than the rate consistent with the BP-Equilibrium, it can nevertheless grow below that rate when other constraints such as intensified Chinese competition or slower US growth after 2001 are additionally binding.

2.2. BPCG Models with Capital Flows

Regarding the extensions of the BPCG model incorporating capital flows, Thirlwall and Hussain (1982) considered the situations of developing countries that run current account deficits for prolonged periods, financed by direct or portfolio investments from foreigners. Therefore, the foreign currency earning is a bottleneck for the developing countries and it must be recognized that these countries are often able to build up ever-growing current account deficits financed by capital inflows which relax the balance of payments constraint even though for a temporary period of time. Thirlwall and Hussain (1982) claimed that if so, the growth rate of income becomes ultimately constrained by the rate of capital inflows and the basic model needed to be amended to allow for such inflows. They compared the basic Harrod model's predictions and those of the extended by capital flows model for 20 developing countries, for the years of 1951-1966, and generally found that the extended model performed better than the simple rule for this sample of countries based on the mean absolute error. They found that in the countries where the growth of actual income exceeded (fell short of) that of predicted by the simple Harrod model, real capital flows have been positive (negative). To evaluate the effect of relative price movements, they thought that the difference between the actual growth rates of countries and those predicted by the extended capital-flows model would reflect a measure of the extent to which the balance of payments constrained growth rate has been affected by the countries' terms of trades. They therefore compared the average annual percentage rates of change of the terms of trade variable with those obtained as residuals from the extended model. They finally concluded that even though the experiences of countries were very mixed, the relative prices measured in a common currency stayed fairly stable over the long run, constraining the growths of the sampled countries by about 0.6% per annum while the capital flows allowed countries to grow slightly faster than the Harrod's result by about 0.05% per annum on the average.

Atesoglu (1993-94) analyzed the Canadian economic growth by assessing the relative importance of export growth, capital flows and relative prices for the period of 1961-91. He used a regression analysis on a solved Thirlwall's rate of growth of income including the capital flows (Eq. 6, page 292). The overall estimation period was divided into roughly two parts, 1961-76 and 1977-91 since the growth in relative prices appeared to be more visible during the latter period compared with the earlier periods. It was observed that during the earlier subperiod neither the growth in capital inflows nor the relative price growth coefficients were significant, while the growth of the exports coefficient remained positive and significant. These findings from 1961-76 subperiod were in conformity with Thirlwall's law. However, the results for the latter 1977-91 subperiod were different. While the growth in capital flows coefficient were not significant, the coefficients of both the export and the relative prices variables were significant and had the theoretically permitted sign. Therefore, the overall result was that the export growth and relative prices were important factors in the Canadian economic growth, but the capital inflows were not.

Moreno-Brid (1998-99) discussed the additional complications introduced by external debt accumulation undermining the apparently sound and strong economic developments due to persistent

current account deficits. The extended model of Thirlwall and Hussain (1982) was criticized since once the nonzero current account is incorporated into the basic BPCG model, one could question whether the long-run trajectory of the rate of growth of income could be interpreted as a long-run equilibrium path. They further argued that during the Mexico's foreign exchange crisis in 1995 when the ratio of current account deficit to domestic income mattered, it was important whether the public or the private sector was the main borrower and the fact that the creditors would be willing to lend more only if this ratio was kept constant (not growing). Therefore, they redefined the notion of long-term equilibrium in the balance of payments in the extended model of Thirlwall and Hussain (1982) as a constant ratio of the current account deficit relative to domestic income. They found that, if the trade balance of a country is initially in deficit, then the long run multipliers of their revised model will be higher than those in the extended model of Thirlwall and Hussain (1982), meaning that all else equal a country with an initially higher current account deficit to GDP will have a faster long-term economic growth. They finally concluded that the balance-of-payments constrained rate of growth of the economy will only be globally stable under certain restrictions of some parameters of the revised model which implies that the economy may be accompanied by a sustainable build-up foreign debt.

We can also review the BPCG models applied to the Turkish economy by Turkish academicians (single or joint workings). Elitok and Campbell (2008) tested the existence of the balance of payments constraint on the long run economic growth of the Turkish economy taking capital flows into account over the period of 1960-2004 using the Ordinary Least Squares (OLS) method. They asserted that, for the whole period that is considered, empirical findings generally support the BPCG model, but for the different sub-periods, there might be different essential economics relations or behaviors behind the BOP constraint. Halicioglu (2012) applied the bounds test approach to cointegration in order to test the existence of the basic Thirlwall's law for Turkey during the period of 1980-2008. Based on empirical results, he confirmed that Thirlwall law holds for Turkey and suggested that the strategic planning of the target industries for export-based growth may be required along with curbing excess liberalization policies in the foreign trade which may then increase the balance-of-payments-equilibrium growth rate of Turkish income. Gokce and Cankal (2013) also applied the BPCG model to the Turkish economy for the 1968-2011 period. They tested Thirlwall's principle, the long-run relationship between the output and exports (cointegration) using the Johansen's methodology based on a Vector Auto-regression (VAR) model which uses maximum likelihood test. Using a lag-length of one and various goodness of fit tests, they found a statistically significant and positive relationship between the output and exports supporting again the validity of Thirlwall's BPCG model for the Turkish economy. Tatliyer (2017) also investigated whether the BPCG model or Thirlwall's law holds for Turkey, using annual data spanning from 1950 to 2014. He tested both the original Thirlwall's law and its modified version with capital flows and interest payments.

He found that Thirlwall's law somewhat holds for Turkey and the further restrictions imposed by the modified version of Thirlwall's law do not constitute an important hindrance to the economic

growth performance, since both the original and the modified BPCG models underestimate or overestimate actual growth rates in some periods, but the predicted growth rates tend to converge at the actual growth rate in the long run. He also asserted that the economic policies were important in the short run.

Table 1. BPCG Models Applied to the Turkish Economy

Author (s) / Date	Period and Frequency of Data	Estimation Method	Estimated Income Elasticity of Demand for Imports	Extensions to the Basic BPCG model
Elitok, S. P. and Campbell. A. (2008)	1960 – 2004, yearly	Ordinary Least Squares (OLS)	2.07	Capital Flows
Halicioglu, F. (2012)	1980 – 2008, yearly	ARDL Bounds Testing	1.82	n.a.
Gokce, A. and Cankal, E. (2013)	1968 – 2011, yearly	Vector Autoregression (VAR) and Johansen' methodology of Cointegration testing	2.60	n.a.
Tatliyer, (2017) M.	1950 – 2014, yearly	Vector Autoregression (VAR) and Johansen' methodology of Cointegration testing	2.07	Capital Flows and interest payments

n.a.: Not applicable.

In Table 1. above, we summarized the results of these searches. These four workings found an estimated income elasticity of imports between 1.82 and 2.60.

3. An Extended Thirwall's BPCG Model with Capital Flows and Disaggregated Imports Sectors

Turkey has been a developing country which has attracted foreign capital inflows, but the flows have not been at the same rate on all occasions. Moreover, it seems to be important to consider the imports industries (imports of intermediate, consumption and capital goods) in a disaggregated fashion to take some possible structural changes into account. Following Ibarra (2011a), Ibarra and Blecker (2016) and Thirlwall and Hussain (1982), we will additionally concentrate on simultaneously incorporating these two extensions to the basic BPCG model and apply it to the Turkish economy. We will use individual price indexes for disaggregated imports functions. The merchandise trade balance (TB) of the country expressed *in foreign currency* (in dollars) is in an initial disequilibrium and financed by capital flows, [1]

$$P_{xt}\, X_t + C_t = (M_{it} * P_{it} + M_{ct} * P_{ct} + M_{kt} * P_{kt}) \qquad (1)$$

1 We abstain from the services imports and exports, incomes earned/paid on investments at home/abroad and unilateral transfers so that the current account reduces to the trade balance of goods only.

where X_t and P_{xt} are the volume and price of exports in foreign currency and C_t is the value of capital flows measured in foreign currency. M_{it}, $_{ct}$ and M_{kt} are the volumes of intermediate, consumption and capital goods imports and, P_{it}, P_{ct} and P_{kt} are their prices in foreign currency respectively (multisectoral imports) and *t* is a time index. We define $M_t = (M_{it} * P_{it} + M_{ct} * P_{ct} + M_{kt} * P_{kt})$ as the nominal value of total imports in foreign currency. Taking the continuous rates of change of the variables in Equation (1) and denoting them by lower-case letters, [2]

$$\alpha_t (p_{xt} + x_t) + (1 - \alpha_t) c_t = [\theta_{1t} (m_{it} + p_{it}) + \theta_{2t} (m_{ct} + p_{ct}) + \theta_{3t} (m_{kt} + p_{kt})] \quad (2)$$

where $\alpha_t = \frac{P_{xt} X_t}{M_t}$ and $(1 - \alpha_t) = \frac{C_t}{M_t}$ are the time varying shares of exports earnings and capital flows as a proportion of the total imports bill respectively. $\theta_{jt} = \frac{(M_{jt} * P_{jt})}{M_t}$ for j =1, 2 and 3, are the time varying shares of intermediate, consumption and capital goods imports as a proportion of total imports respectively. [3]

Assuming a multiplicative intermediate, consumption and capital imports and exports demand functions with constant elasticities,

$$M_{it} = \left(\frac{P_{xt}}{P_{it}}\right)^{\varepsilon_i} Y_t^{\pi_i} X_{mt}^{\beta}$$

$$M_{ct} = \left(\frac{P_{xt}}{P_{ct}}\right)^{\varepsilon_c} Y_t^{\pi_c}$$

$$M_{kt} = \left(\frac{P_{xt}}{P_{kt}}\right)^{\varepsilon_k} Y_t^{\pi_k}$$

$$X_t = \left(\frac{P_{xt}}{P_{mt}}\right)^{-\varepsilon_x} Z_t^{\pi_f} \quad (3)$$

where ε_i , ε_c , ε_k and π_i , π_c ,π_k are the price and income elasticities of demands for intermediate, consumption and capital imports respectively. ε_x and π_f are the price and income elasticities of exports. Y_t and Z_t are the domestic and foreign real incomes, X_{mt} and X_t are the manufacturing and total exports respectively and β is the elasticity of demand for intermediate imports with respect to manufacturing exports. All elasticities are defined to be positive. We assumed that the demands for consumption and capital imports are not functions of manufactured exports and these types of imports are consumed for domestic purposes. On the other hand, the manufacturing exports use

2 In Equation (2), we used the fact that the instantaneous rate of growth of a *product* is the sum of the instantaneous rates of growth of its components whereas the instantaneous rate of growth of a *sum* is a weighted average of the instantaneous rates of growth of its components.

3 In Equation (2), we preserved the possible *time-dependency* of shares (α, θ_{1t} θ_{2t}, θ_3) just as the time variability of the growth rates of variables (p_{xt} , x_t , c_t, p_{it}, p_{ct} , p_{kt}, m_{it} , m_{ct} *and* m_{kt}).

imported intermediate goods. We differentiated the imports prices by types of imports, P_{it}, P_{ct} and P_{kt} in forming the relative prices in these subsectors. Finally, P_{mt} is the foreign price of total imports.

The rates of growth of demand for imports and exports equations in Equation (3) can be written (in lower-case letters)

$$\begin{aligned} m_{it} &= \varepsilon_i\,(p_{xt} - p_{it}) + \pi_i\, y_t + \beta\, x_{mt} \\ m_{ct} &= \varepsilon_c\,(p_{xt} - p_{ct}) + \pi_c\, y_t \\ m_{kt} &= \varepsilon_k\,(p_{xt} - p_{kt}) + \pi_k\, y_t \\ x_t &= -\varepsilon_x\,(p_{xt} - p_{mt}) + \pi_f\, z_t \qquad (4) \end{aligned}$$

Substituting the first three equations (and not the demand for exports function) in Equation (4) into Equation (2) we can solve for the rate of growth of income, y_{bt}, consistent with a disequilibrium merchandise trade balance (TB) financed by capital flows while apportioning total imports among intermediate, consumption and capital goods imports,

$$y_{bt} = \frac{(\alpha_t\, x_t - \beta\, \theta_{1t}\, x_{mt}) + (1-\alpha_t)\,(c_t - p_{xt})}{\theta_{1t}\,\pi_i + \theta_{2t}\,\pi_c + \theta_{3t}\,\pi_k} + \frac{[\,(p_{xt} - \theta_{1t}\, p_{it} - \theta_{2t}\, p_{ct} - \theta_{3t}\, p_{kt}) - (\theta_{1t}\,\varepsilon_i (p_{xt} - p_{it}) + \theta_{2t}\,\varepsilon_c (p_{xt} - p_{ct}) + \theta_{3t}\,\varepsilon_k (p_{xt} - p_{kt}))\,]}{\theta_{1t}\,\pi_i + \theta_{2t}\,\pi_c + \theta_{3t}\,\pi_k} \qquad (5)$$

All income and price elasticities (π′ and ε′) are constant in Equation (4). Following Thirlwall, we assume that the growth of foreign income (Z_t) and that of relative price of exports with respect to the prices of subsectors of total imports $(p_{xt} - p_{jt})$ j = 1,2,3 (Terms of Trades variables) are exogenously given. Based on these assumptions, the domestic income is the only adjusting variable that maintains a balanced trade in the long run in a Keynesian fashion as Thirlwall asserted. However, unlike the Thirlwall's general solution for the BP-equilibrium growth rate, we have *not* incorporated the determinants of the exports (x_t) in Equation (4) which grow at exogenously given rates by assumption. Necessarily then, the manufacturing exports (x_{mt}) is also externally determined.

Notice that the derivation in Equation (5) above is a *new way* of expressing the general solution for the Thirlwall's BP-Equilibrium growth rate since the income and price elasticities of demand for exports (π_f, ε_x) and the growth of foreign income (Z_t) are *not present*. There is a catch here. Since in the last equation in Equation (4) (the growth of demand for exports) the foreign income and the relative prices are *already assumed* to be exogenously given, the growth of exports (x_t) must necessarily be exogenous as well. This was our rationale for not substituting the equation for the growth of exports, (x_t) in Equation (4) in obtaining Equation (5). By contrast, the general solution for the Thirlwall's BP-Equilibrium growth rate always incorporates the income and price elasticities of demand for exports as well as the foreign income and it can only be reduced to the Strong Form of the Thirlwall Law $\left(\frac{(\varepsilon_x z)}{\theta_1\,\pi_i + \theta_2\,\pi_c + \theta_3\,\pi_k}\right)$ by assuming the elasticity pessimism, i.e. $(1 - \theta_1\,\varepsilon_i - \theta_2\,\varepsilon_c - \theta_3\,\varepsilon_k - \varepsilon_x = 0)$ and then the price elasticity of demand for exports (ε_x)

must be estimated econometrically. To have an expression free of ε_x and z the Weak Form of the Thirlwall Law is used ($\frac{x}{\theta_1 \pi_i + \theta_2 \pi_c + \theta_3 \pi_k}$). Since our general solution of BPCG model does not contain neither the income nor the price elasticities of demand for exports (π_f, ε_x) and the foreign income (z_t) but only incorporates the price elasticities of imports (ε_i , ε_c , ε_k), and the relative prices of subsectors of total imports, it can be considered as an already simplified version of the general solution of BPCG which may be called a Simplified General Solution (SGS) of the BP-Equilibrium growth rate (see also Atesoglu (1993-94) p.291). Our simplified formulation of the general solution of BPCG model necessarily changes the usual Marshall-Lerner condition as explained below. Our SGS in the basic Thirlwall model is shown in Appendix B.

If we further assume that the growths of imports prices in these three sectors are the same $(p_{it} = p_{ct} = p_{kt})$ and are equal to say, p_f (foreign prices), then Equation (5) reduces to (dropping the time subscript)

$$y_b = \frac{(\alpha x - \beta \theta_1 x_m) + (1-\alpha)(c - p_x) + [(p_x - p_f)(1 - \theta_1 \varepsilon_i - \theta_2 \varepsilon_c - \theta_3 \varepsilon_k)]}{\theta_1 \pi_i + \theta_2 \pi_c + \theta_3 \pi_k} \quad (6)$$

There are three terms in Equation (6) that contribute to the BP-Equilibrium growth rate of income, y_b . The first term in the numerator explains the contribution of the growth of the volume of exports taking into account the fact that intermediate imports rise due to an increase in manufactured exports, holding the level of GDP constant (Blecker & Ibarra, 2013). The second term in the numerator shows the effect of real capital flows (nominal capital flows adjusted by the exports' prices in foreign currency). Finally, the expression in parentheses, $(1 - \theta_1 \varepsilon_i - \theta_2 \varepsilon_c - \theta_3 \varepsilon_k)$ in the last term (the bracketed term) is *not quite* the usual Marshall Lerner (ML) condition since it does not include the price elasticity of the demand for exports ε_x of the country. We discussed above that this elasticity implicitly appears in the exports growth term, x_t. '1' represents the value effect of imports, i.e. the existing volume of imports becoming more expensive with a real depreciation of the currency ($p_x - p_f < 0$) giving support to a deteriorating trade balance (Özçam, 2021). In our empirical results in Section 5, we will show that the estimated shares-weighted price elasticity of demand for imports $(\theta_1 \varepsilon_i + \theta_2 \varepsilon_c + \theta_3 \varepsilon_k)$ is less than one. Therefore, a real appreciation (depreciation) of the domestic currency ($p_x - p_f > 0$ (< 0)) will lead to an increase (decrease) of the BP-equilibrium growth rate (given an exogenous exports growth rate), since the volume of imports will then increase (decrease) less than in proportion to the decreasing value of the existing imports (becoming cheaper). Consequently, the imports bill will decrease (increase) relaxing (constraining) the trade balance and allowing a faster (slower) income growth.

This formulation of ML condition is comprehendible at least in the case of Turkey where Turkish exporters have long been demanding a stable nominal foreign exchange (TL/$) rather than a fast depreciation from the government. If the depreciation in the real exchange rate does not help exports much and is determined mainly by the incomes of trading partners, then taking the exports as exogenous makes sense. Therefore, the discussion boils down to the case whether the sum of the

weighted imports' price elasticities exceeds one or not. If this condition is not met, as in the case of Turkey, then an appreciation boosts the growth of income. This seems to also explain the stance of the Turkish government in encouraging foreign inflows to let the Turkish Lira (TL) to appreciate in trying to maintain an economic growth, unlike for example in China where an exports-led growth is tried to be realized by a depreciation of Yuan.

With respect to foreign capital flows, the periods of rapid economic growth in Turkey have always been accompanied with heavy capital inflows (the second term) and this necessarily causes the real exchange rate to appreciate and as Equation (6) above indicates, this generates an additional channel to relax the BP-equilibrium growth rate of income (the third term) as will be further discussed in Section 4.3 below.

4. Empirical Measures, Dataset and Estimation Methods And Time Periods

4.1. Empirical Measures and Dataset

The empirical measures employed are:

Real output (LGDP): the logarithm of the gross domestic product (chained linked volume index expressed in local currency by expenditure approach (2009=100)),

Intermediate, consumption and capital imports (LIMPI, LIMPC and LIMPK): the logarithm of the volume indices of imports by BEC (Classification by Broad Economic Categories (UN), (2010=100)),

Manufacturing exports (LMANEX): the logarithm of manufacturing exports volume index using ISIC (International Standard Industry Classification (UN), Rev.3), (2010=100)),

Real Exchange Rate (LRER): the logarithm of the ratio of the consumer price index of Turkey to foreign country price index, multiplied by the inverse of the nominal exchange rate (2003 = 100) where an increase in LRER represents a real appreciation of Turkish Lira (TL),

Terms of trade in intermediate goods sector (LTOTI): the logarithm of (p_x/p_i) where p_i is the price index of intermediate imports (2010=100) in U.S. dollars and p_x is the price index of exports (2010=100) in U.S. dollars,

Terms of trade in consumption goods sector (LTOTC): the logarithm of (p_x/p_c) where p_c is the price index of consumption goods imports (2010=100) in U.S. dollars and p_x is the price index of exports (2010=100) in U.S. dollars,

Terms of trade in capital goods sector (LTOTK): the logarithm of (p_x/p_k) where p_k is the price index of capital goods imports (2010=100) in U.S. dollars and p_x is the price index of exports

(2010=100) in U.S. dollars,

x_m: the percentage change in exports obtained from the chained linked GDP volume index which is expressed in local currency by expenditure approach (2009=100)),

c: the percentage change in nominal capital flows which is simply nominal imports minus nominal exports,

p_f: the percentage change in price index of imports (2010=100) in U.S. dollars.

The sources of data for all of these measures are obtained from Turkish Statistical Institute (TurkStat), except LRER which is obtained from Central Bank of the Republic of Turkey (CBRT). Like the LRER variable, an increase in the terms of trade variable represents a real appreciation of Turkish Lira (TL).

4.2. Econometric Methodology

We checked our time-series variables (all expressed in natural logarithms) for stationarity using three alternative methods: Augmented Dickey Fuller (ADF) test from Dickey and Fuller (1981), Phillips-Perron (PP) test from Phillips and Perron (1988), and KPSS test from Kwiatkowski et al. (1992). The tests reveal a mixture of stationary and nonstationary variables either in their levels or in their levels with trend, but all variables are stationary in their first differences (See Appendix A).

In this paper, we implemented two different kinds of estimation methods: the bounds testing method and the first differences. Since our variables are not all integrated of the same order, the bounds testing method developed by (Pesaran, Shin & Smith, 2001) was also preferred. The former approach is suitable because the variables used in the estimation can be combined with different orders of integration, $I(0)$ or $I(1)$, and it has good small sample properties and provides unbiased estimators in the long run even if some variables are endogenous within an autoregressive distributed lag (ARDL) framework.

First, we estimate an autoregressive distributed lag (ARDL) model as (Pesaran, Shin & Smith, 2001) suggested. In this model, long-term and short-term variables can be shown simultaneously in error correction form as follows:

$$\Delta \text{Tradet} = d_0 + \sum_{j=1}^{n} a_j \Delta_{Trade_{t-j}} + \sum_{i=1}^{k} \sum_{j=0}^{n} b_{i,j} \Delta Z_{i,t-j} + \sigma \text{Tradet-1} + \sum^{k}_{i=1} d_i Z_{i,-1} + u_t \qquad (7)$$

where Δ refers to first difference of the variable, – σ measures the speed of adjustment (or error correction coefficient) of imports toward the long run equilibrium specified by Equation (8) below. Trade can be imports of intermediate, LIMPI, consumption, LIMPC, or capital goods, LIMPK. The regressors Z consist of three potential determinants: Turkey's real output, LGDP, the real exchange rate, LRER and manufacturing exports, LMANEX.

Second, as (Pesaran, Shin & Smith, 2001) suggested, two bounds tests are performed for the existence of a long run relationship: a t-test for the significance of the speed of adjustment coefficient, σ, and an F-test for the joint significance of σ and d_i coefficients. Each test has upper and lower bounds

for a given significance level, where the critical values depend on the number of independent variables. If the estimated statistic (t or F) is above the upper bound for a given significance level, the null of no long run relationship can be rejected even if all variables are *I*(1); if the statistics are between the upper and lower bounds, the null can be rejected only if all variables are *I*(0) but if the statistics are below the lower bound *I*(0), the null cannot be rejected regardless of the order of integration.

Third, the lag structure of Equation (7) is simplified by eliminating stepwise the longest statistically insignificant lags of the first differences of each variable. Then, the long run coefficients in Equation (7) can be retrieved as $\delta_i = -d_i / \sigma$ for each regressor i, leading the long run equation:

$$Trade_{LR} = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \ldots + \delta_k Z_k + u \qquad (8)$$

In bounds testing method, we used the real exchange rate variable (LRER) rather than the terms of trade variables (LTOTI, LTOTC and LTOTK). This was because in this method using three different types of terms of trade variables with respect to three regression equations (LIMPI, LIMPC and LIMPK) yielded either high or negative GDP coefficient or positive or statistically insignificant error-correction terms, especially when we allow for structural breaks.

In the first difference method, we divided the total imports into three sectors, and we estimated the demands for imports of intermediate, consumption and capital equations (LIMPI, LIMPC and LIMPK respectively) for a total of 22 yearly period. Furthermore, we used the terms of trade variables (or relative prices of these three sectors, LTOTI, LTOTC and LTOTK respectively) in those equations. Since the sample size for the OLS estimations in log first differences may not be sufficient to detect statistically credible effects and likely to lead to inconclusive results, we chose the ARDL model in incorporating the short-run dynamic adjustment process to the long-run relation in Equation (8) and this became the primary estimating strategy of the study.

4.3. Time Periods

In this section, we analyze the Turkish economy especially considering the 2001 and 2008 recessions which correspond to changes in Turkey's economic conditions. In 2001 the IMF suggested crawling-peg exchange rate regime collapsed and the 2008 was the era of global crisis. Turkey was able to acquire capital inflows whether due to the assistance from the IMF after the crisis of 2001 or owing to the appetite of global investment companies after the global crisis. In Section 6 below, we will discuss the importance of capital inflows in the determination of BP-Equilibrium rate of growth of Turkish income. Therefore, we divided 22-year data set into three periods: Collapse of the exchange rate-based stabilization program and 2001 crisis (1998-2001), Recovery from the 2001 crisis and the 2008 global crisis (2002-2008) and Recovery from the 2008 global crisis (2009-2019). Table 2 below shows the percentage changes in real GDP, in trade aggregates (manufacturing exports and three types of imports), the shares of these trade aggregates in total exports or total imports, and the real exchange rate and the balance of payments (as a percentage of GDP) over time. In the 22 years, the share of intermediate imports in total imports increased from 65% up to 78% (Table 2 and Figure 1 below),

the share of manufactured exports in total exports increased from 89% up to 94%. As components of manufactured exports, while the share of the basic metal industry and that of the motor vehicles increased, those of the textile products and clothing decreased significantly (Figure 2 below) pointing out some structural changes. These changes in the composition of the manufactured exports are important because the *imports contents* of the industries whose shares rose are higher (the basic metal (30%) and the motor vehicles (24.6%)) than those of the industries whose shares declined (the textile products (18.5%) and the clothing (13.6%)). It is therefore meaningful that in our estimation in Section 5 below, we find that rising manufactured exports significantly affect the demand for intermediate imports.

Collapse of the exchange rate-based stabilization program and 2001 crisis (1998-2001): In the 1990's the rate of inflation remained between 65-90 %, while the income went through cycles of growth-crisis-stabilization in Turkey. The nominal interest rates surpassed the level of 100% as the Central Bank (CB) generally exercised a contractionary monetary policy to fight against the inflationary pressures. The domestic debt and interest costs mounted rapidly. In December 1999, the Turkish government acted in accordance with *an exchange rate-based disinflation program* supervised and technically supported by the IMF covering three years till the end of 2002. The new program envisaged reducing the rate of inflation as measured by CPI down to 25%, 12% and 5-7% in 2000, 2001 and 2002 respectively. It also restricted the CB's monetary expansion to only variations in its net foreign assets setting upper limits on the net domestic assets (no sterilization). Moreover, a pre-announced daily calendar of the depreciation of the exchange rate which adds up to a cumulative 20% for 2000 was regarded as the main instrument in trying to bring down the persistent rise in prices in the past. Some targets on the fiscal aggregates were also placed (Yeldan, 2002).

Keeping the inflationary expectations under control by using the nominal exchange rate as an anchor and therefore letting the Turkish Lira (TL) to appreciate together with the elimination of the exchange risk gave rise to increasing capital flows but mainly in the form of short-term foreign borrowing and to increased imports expenditures. In 2000, the capital account increased to $9.58 billion from $4.83 a year ago (Figure 3 below) and the current account registered a large deficit of $9.92 billion in 2000 compared to $0.92 in 1999 mainly due to a deteriorating trade balance (Figure 4 below) as the real exchange rate (RER) appreciated by increasing from 95 up to 102 (Figure 5 below). The rate of inflation decreased from 69% in January 2000 down to 35% in January 2001. Given the strict application of the daily exchange rate depreciation (crawling-pegged) which amounted to about 20% for the whole year of 2000, the Turkish Lira (TL) appreciated by about 15% in real terms.

Even though the persistency of the rate of inflation in the past was responsible for the slow evolvement of the stabilization program, various demand factors have also played a role in sustaining high price levels. The sizeable drop in the real interest rates brought about strong consumption and investment expenditures pulling the price level up (Yeldan, 2002). The growth of the GDP reached a level of 6.55% in 2000 from – 3.37% in 1999.

The disinflation program actually provided a chance of exit to fully flexible foreign exchange rates after successfully containing the inflationary pressures before reaching the outburst of the pressures of external fragility. However, in November 2000, Turkey experienced a severe financial crisis as more than $6 billion of short-term capital ran away from the country causing a liquidity crunch in the domestic markets. The government was granted $7.5 billion of support from the Supplementary Reserve Facility of the IMF. Even though it seemed like a crisis was avoided, in February 2001 a political dispute between the President of the Republic and the Prime Minister caused the short-term interest rates to soar rapidly to above 5,000% and local investors also started to speculate by demanding foreign currency. Soon later, the government announced the demise of crawling-pegged exchange rate system allowing the exchange rate to float freely in the markets. In 2001 the economy shrank by 5.87% while the current account registered a surplus of $3.76 billion and the capital account turned into a deficit of $14.56 billion. The rate of inflation started rising again reaching 54.9% and the Turkish Lira (TL) depreciated by 51% as of the end of 2001.

Signing of the Customs Union agreement which is an economic integration model with the European Union in 1998 and the membership in World Trade Organization (WTO) in 1995 which supports the multilateral trading system (especially the exports of developing member countries) helped the increase in Turkish exports while the demand for intermediate imports rose, too.

Recovery from the 2001 crisis and the 2008 global crisis (2002-2008): To overcome the 2001 crisis, the 'transition to the strong economy program' was supported by the 18th stand-by arrangement signed with the IMF and the loans from the World Bank (WB) which ended in 2005. The 19th stand-by arrangement signed with the IMF became effective for 3 years: May 2005-May 2008. The Turkish government showed unwillingness to sign another contract with IMF after winning the election in 2007 (Uygur, 2010).

Since the mid-2000's, there has been an annual growth of 5% per year in the world output and high growth rates exceeding 8% per year in developing countries. However, this expansion process in the world economy was negatively affected by the financial crisis originating from the U.S. housing market in mid-2007, and an economic crisis was experienced throughout the world in the year of 2008. A worsening of the current account balance is an early signal for an economic crisis as also incorporated in the Thirlwall model. The current account was negative and deteriorating for about five to six quarters before the output started to decline in the second quarter of 2001 and the 2001 crisis was begun to be felt in the real sector while the current account deficit reached its peak level. After 2004, the current account deficit surpassed 4% of GDP and stayed at about 6% for about eight quarters before the crisis of 2009 was felt in Turkey (Figure 4 below). In both of these episodes, as anticipated well, a severe downturn in production caused the current account to ameliorate (Figure 4 below). However, there were three distinctions between these two crisis episodes. Firstly, the CB international reserves to external debt ratio started to deteriorate two quarters before the output declined in the 2001 crisis whereas there were plentiful reserves when the Turkish economy entered the 2009 crisis in a global environment when the FED was decreasing US interest rates (Cömert & Yeldan, 2018). In terms of the Thirlwall model this implies a BOP constraint in 2001 and not in 2009 in

terms of foreign capital flows. Secondly, the currency depreciation was not as severe in 2009 compared to 2001. Thirdly, even though the 2001 crisis caused the Turkish exports to increase supported by the large depreciation of the Turkish Lira (TL), exports earnings fell substantially in 2009 when the global crisis hit the Turkish economy.

The FED eased its monetary policy during the Turkish 2001 crisis even though it followed a relatively tight one before 2001. This caused ample financial inflows into the developing countries including Turkey. During the 2008 global crisis, the Fed and the central banks of other advanced economies started substantial expansionary policies providing massive amounts of liquidity and driving the interest rates down close to zero. The policy interest rates in Turkey were cut down due these financial inflows. Unlike in 2001, the absence of financial reversals in 2009 in Turkey occurred because of the continued expansionary monetary posture of advanced countries (Cömert & Yeldan, 2018).

Although the primary budget was in surplus in the in the period leading to the 2001 crisis due to tight fiscal policies, this did not prevent the overall budget balance to worsen due to rising interest payments. By contrast, the government budget showed a very strong improvement before 2008-09 crisis due to decreasing interest payments and a primary budget surplus of around 5% until 2006 induced an improved overall balance.

Table 2. Descriptive statistics by time period, Turkey

Period (phase) and years	1998-2019	1998-2001	2002-2008	2009-2019
Average annual growth rates (%)				
Real GDP, y	4.37	-0.89	6.22	4.62
Trade aggregates				
Manufactured exports (x_m)	8.90	12.55	12.61	5.22
Imports of intermediate goods (m_i)	6.21	2.95	12.16	3.62
Imports of consumption goods (m_c)	5.72	-2.28	18.59	0.43
Imports of capital goods (m_k)	6.37	-2.7	22.97	-0.90
Shares of exports and imports (%)				
Share of manufactures in total exports	92.86	89.75	93.86	93.36
Share of intermediate goods in total imports (θ_1)	71.44	67.5	71.86	73.00
Share of consumption goods in total imports (θ_2)	11.68	11.17	11.19	12.19
Share of capital goods in total imports (θ_3)	16.64	20.57	16.34	14.99
Real Exchange Rate (RER)				
Average level (index, 2003 = 100)	102.57	100.41	109.70	98.83
Average rate of change (RER) (%)	-0.49	-0.53	3.66	– 3.13
BOP (percentage of GDP)				
Current account balance	-3.30	-0.35	-3.80	-4.05
Trade balance (goods and services)	-2.59	-0.53	-2.90	-3.14
Merchandise trade balance	-5.84	-4.63	-5.76	-6.33
Capital account balance	-3.65	0.53	-5.04	-4.29

Source: Turkish Statistical Institute (TurkStat) and Central Bank of the Republic of Turkey (CBRT) for the RER index.

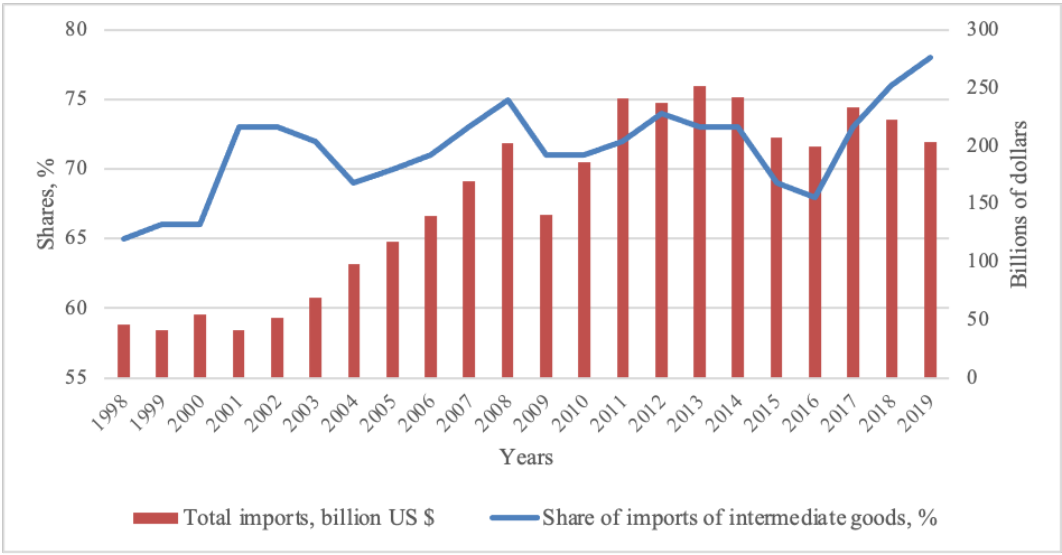

Figure 1. Share of Intermediate Imports in Total Imports, 1998-2019

Source: Turkish Statistical Institute (TurkStat).

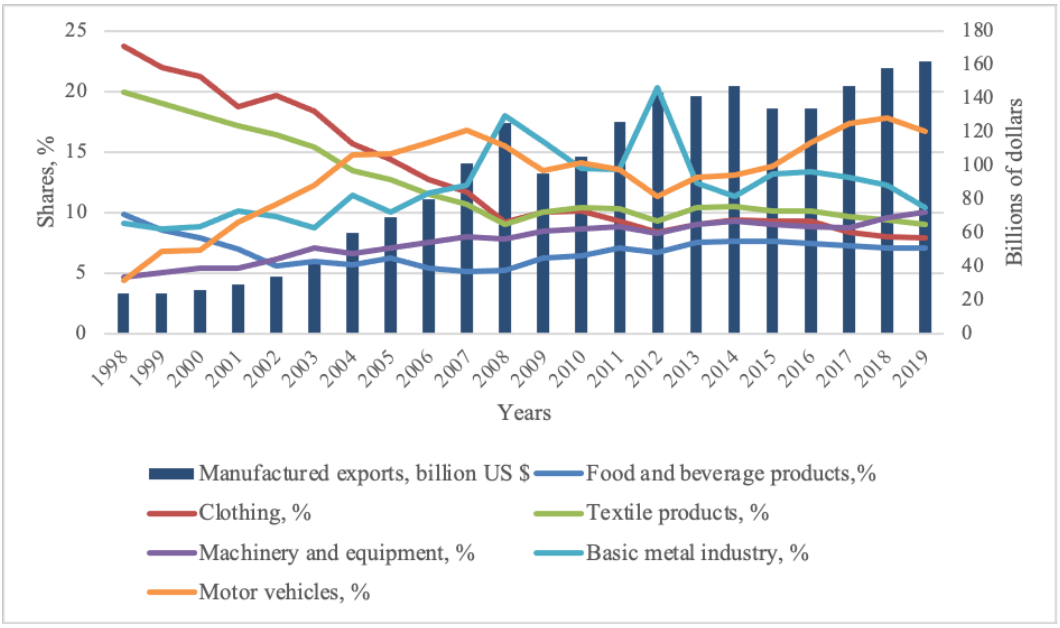

Figure 2. Components of Manufactured Exports, 1998-2019

Source: Turkish Statistical Institute (TurkStat).

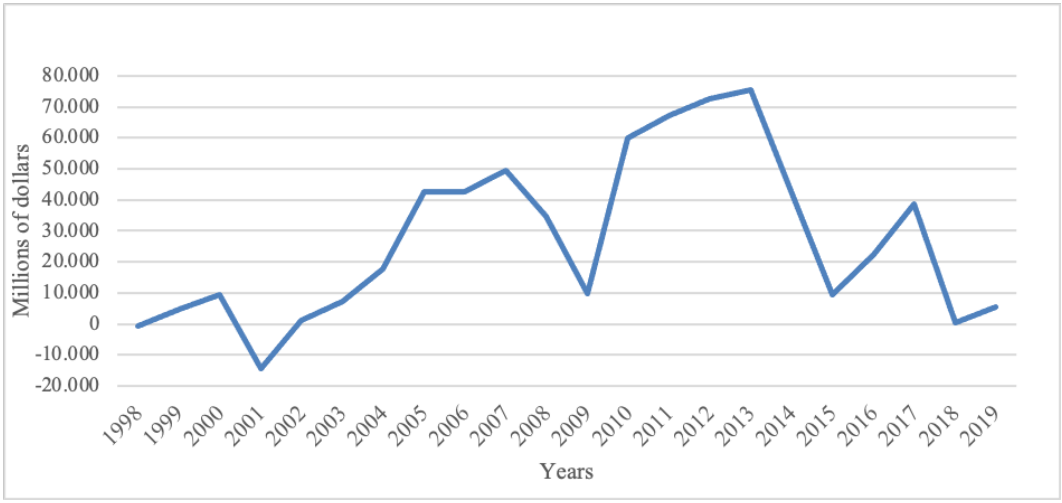

Figure 3. Capital Account, 1998-2019

Source: Turkish Statistical Institute (TurkStat).

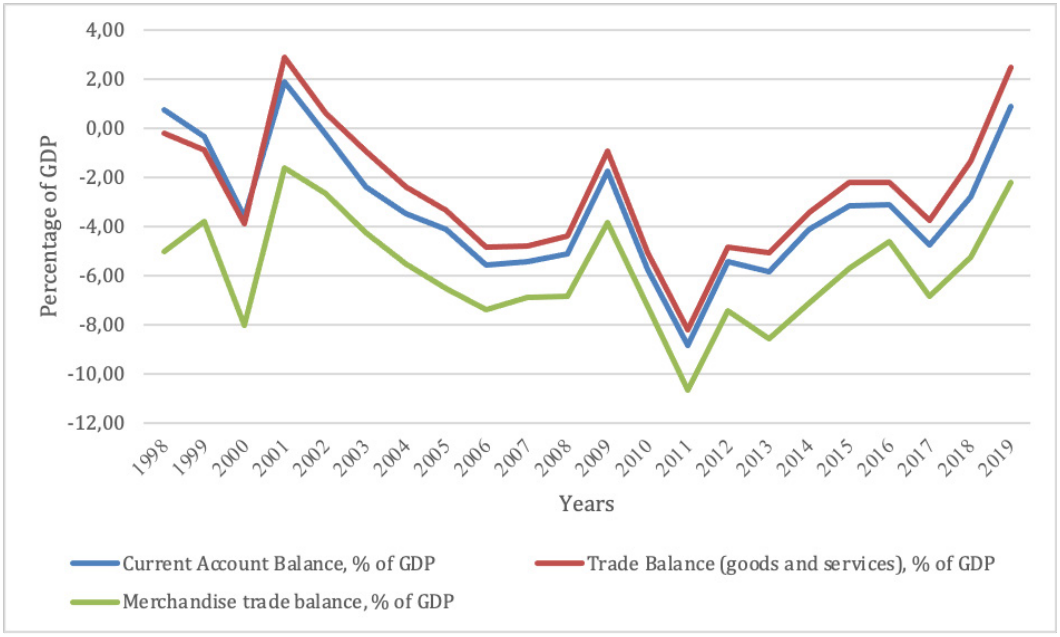

Figure 4. Current Account, Goods and Services and Merchandise Trade Balances for Turkey, as a Percentage of GDP, 1998-2019

Source: Turkish Statistical Institute (TurkStat).

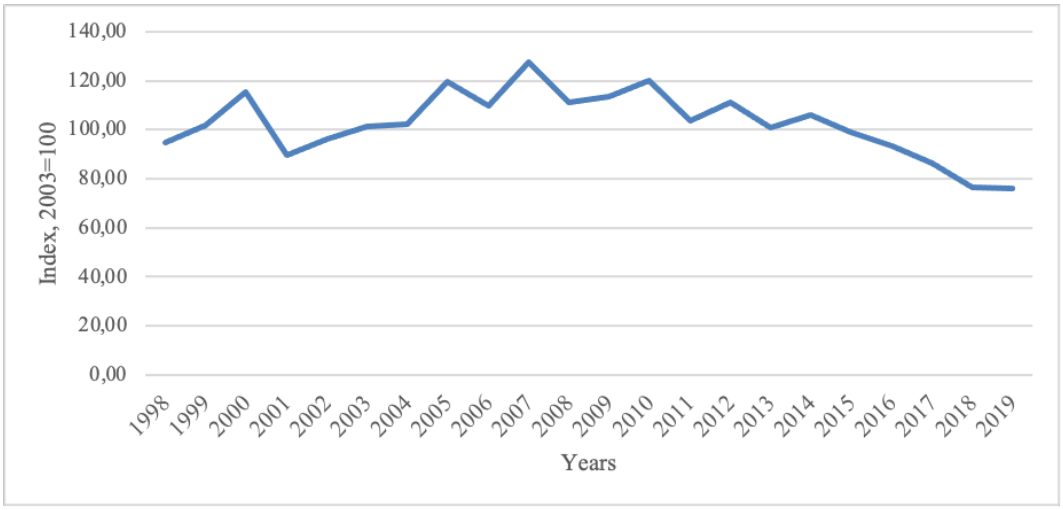

Figure 5. Real Exchange Rate, 1998-2019

Source: Central Bank of the Republic of Turkey (CBRT).

Recovery from the 2008 global crisis (2009-2019): Turkey's major trading partner countries (mainly the Euro area) experienced an economic contraction and there were serious contractions in the demands for consumption and investment in almost all countries during the 2008 global economic crisis. Moreover, the 2008 global economic crisis led to a sharp decline in the amount of capital inflows into Turkey in the year of 2009 (Figure 3 above). FED decided to implement an expansionary monetary policy to reduce the negative effects of the 2008 global economic crisis allowing plentiful of liquidity to flow to developing countries like Turkey.

After 2009, increased capital inflows led to an increase in Turkish imports, raising the percentage of current account deficit in GDP (Figure 4 above). However, as of 2014, the end of the FED's expansionary monetary policy negatively affected Turkey's growth performance. Turkey's foreign trade deficit began to improve again due to the capital outflow from the country causing the Turkish Lira (TL) to depreciate and the sharp decline in oil prices (Figures 1 and 2 above). The latter effect helped the Turkish real exchange rate (RER) to develop favorably (Figure 5 above). As of 2016, Turkey's economy slowed down due to a contraction in its domestic demand and external reasons such as the withdrawal of the United Kingdom (UK) from the European Union (EU), (Brexit), FED's initiation to increase interest rates, and continuation of low growth rates in European Union countries. In Figure 4, we observe that during the years of 2018 and 2019, the percentage of the merchandise trade deficit in GDP decreased from – 5.17% down to – 2.21% because of Turkey's slow growth performance.

To sum up, the 2001 crisis was internal and the level of public budget deficits, the structural problems of the banking system and some political instabilities were the most important issues in Turkey.

The 2001 crisis led to the capital inflows to the country to be interrupted and resulted in net capital outflows from the country, only being corrected sometime after the peak point of the crisis (reversal of financial flows) forming a V-like shape. On the other hand, the 2008 crisis was a global one experienced throughout the world and once again led to a decrease in the amount of capital inflows into Turkey, but never turning negative even though the growth performance of the economy slowed down. This shows that, in Turkey, the economic growth (slowdown) was almost always accompanied with heavy capital inflows (outflows) which helped (made it harder) the financing of the merchandise trade deficits. In Section 6 below we will calculate the components of the BP-Equilibrium rate of growth of Turkish income in the 22 years and find that the capital inflows are the most important contributor.

5. Empirical Results

The estimates of the equations for intermediate, consumption and capital goods using both bounds testing and first differences are reported in Tables 3-5, respectively. We paid attention to possible structural breaks in the estimated equations below using the Chow test. This test showed statistically significant breaks in 2001 using the bounds testing estimation method and in 2009 using the first difference estimation method. Additionally, outlier dummies for certain specific years were included in some equations to improve the fit and to pass the various diagnostic tests.

5.1. Imports of Intermediate Goods

The results of the estimated equations for the demand for imports of intermediate goods using the bounds testing and the first differences methods are reported in Table 3 below. In the bounds testing method, we first included the gross domestic product, LGDP, and the real exchange rate, LRER, as regressors. Then, we added LMANEX as a regressor to show the responsiveness of intermediate imports to manufactured exports, using quarterly data for the period of 1998-2019. Both the estimated equations (column (3.1) and column (3.2)) passed the bounds F-test and t-test (only under the condition that all variables are $I(0)$). In column (3.2), when we add manufactured exports, LMANEX, as another regressor. An increase in LGDP, an increase in LRER (a real appreciation of Turkish Lira), and an increase in LMANEX tend to raise the demand for imports of intermediate goods as expected. LGDP is highly significant and shows that a 1% increase in real income will increase intermediate imports by 1.05%. LRER is also significant and implies that a 1% appreciation (depreciation) of Turkish Lira would raise (decrease) Turkey's demand for imports of intermediate goods by about 0.35%. LMANEX is likewise significant, and we find that a 1% increase in manufacturing exports would raise Turkey's demand for imports of intermediate goods by about 0.57% showing that the manufactured exports production depends on intermediate imports. The speed of adjustment, σ is – 0.31 indicating that the imports of intermediate goods approach the equilibrium state in the long run at a speed of 31% each quarter.

In the first differences method ((columns (3.3) and (3.4)) we included the gross domestic product, LGDP, the terms of trade in the intermediate goods sector, LTOTI, and LMANEX as regressors. The elasticities with respect to LGDP (range of 1.03 to 1.05) were found to be quite close compared to the estimated elasticities of LGDP (range of 1.01 to 1.05) from the bounds testing approach below. However, the elasticities with respect to LMANEX (range of 0.67 to 0.74) were found to be high compared to the estimated elasticity of LMANEX (0.57) from the bounds testing approach below. We also found that the estimated price elasticity with respect to LTOTI (0.16) from the first differences method (column (3.3)) is insignificant and somewhat lower than the estimated price elasticity of LRER (column (3.2)) from the bounds testing approach above.

Table 3 Estimated Equations for Imports of Intermediate Goods

Estimation method	Bounds testing estimates in log levels		OLS estimates in log first differences	
Estimated equation	(3.1)	(3.2)[a]	(3.3)	(3.4)
Sample period	1998Q1-2019Q3	1998Q1-2019Q3	1998-2019	1998-2019
Speed of adjustment, σ	– 0.31	– 0.31		
Gross domestic product, LGDP	1.01(0.00)	1.05(0.00)	1.03(0.00)	1.05(0.00)
Real exchange rate, LRER	0.28(0.12)	0.35(0.04)		
Terms of trade, LTOTI			0.16(0.22)	
Manufactured exports, LMANEX		0.57(0.00)	0.74(0.00)	0.67(0.00)
Adjusted R^2	0.74	0.76	0.87	0.86
Bounds tests				
t-test	– 3.64[b]	– 3.99[*]		
F-test	6.93[***]	8.22[***]		
Diagnostics (p-values, for F-statistics, where relevant)				
Serial correlation (Breusch-Godfrey 2 lags)	0.843	0.604	0.714	0.680
RESET (squared fitted values)	0.414	0.250	0.070	0.263
ARCH (1 lag)	0.615	0.650	0.797	0.516

Notes: Numbers in parentheses are p-values.

Coefficients for the bounds testing estimates are long run coefficients after model simplification.

Diagnostic tests for the first differences and for the bounds testing show the p-values. We fail to reject the null hypotheses of no serial correlation (Breusch-Godfrey), no misspecification in model (Ramsey's RESET test), and no heteroskedasticity (no ARCH errors).

[a]: Includes a year outlier dummy for 2003Q1

[***], [**], [*]: rejects the null of no cointegration at 1%, 5%, and 10% (respectively) using the asymptotical upper critical values from Pesaran et al. (2001), tables CII(iii): Case for t-test and CI(iii) Case for F-test.

[b]: Rejects the null of no cointegration only under the condition that all variables are *I* (0), at 1% using asymptotical critical values (Pesaran et al., 2001).

5.2. Imports of Consumption Goods

The results of the estimated equations for the demand for imports of consumption goods using the bounds testing and the first differences methods are reported in Table 4 below. In the bounds testing method we included the gross domestic product, LGDP, and the real exchange rate, LRER, as regressors using quarterly data for the period of 1998-2019. Both the estimated equation without structural break (column (4.1)) and the estimated equation with structural break (column (4.2)) passed the bound**s** F and t – tests. An increase in LGDP, and an increase in LRER (a real appreciation of Turkish Lira) tend to raise the demand for imports of consumption goods. The elasticity of LGDP is 1.48 and significant for 1998-2019 (the whole period) in column (4.1). This elasticity is estimated to be 1.57 before 2001 and 1.56 (1.57-0.01) after 2001 using a structural break (Chow test) and thus having an average of about 1.57 for the whole period (column 4.2). This average elasticity of 1.57 of LGDP is close to 1.48 which was found without a structural break. Therefore, we conclude that a 1% increase in domestic income would raise Turkey's demand for imports of consumption goods by about 1.48 to 1.57 for the whole sample period. We also found that the elasticity of LRER is 2.02 and significant for the whole sample period. The speed of adjustment, σ is – 0.39 indicating that the imports of consumption goods approach the equilibrium state in the long run at a speed of 39% each quarter.

In the first differences method ((columns (4.3) and (4.4)), we included the gross domestic product, LGDP and manufacturing exports, LMANEX as the only regressors since the terms of trade variable was found to be statistically insignificant. The elasticity of LGDP is 2.52 and significant for 1998-2019 (the whole period) in column (4.3). This elasticity is estimated to be 3.75 before 2009 and 1.11 (3.75-2.64) after 2009 using a structural break (Chow test) and thus having an average of 2.43 for the whole period (column 4.4). This average elasticity of 2.43 of LGDP is quite close to 2.52, which was found without a structural break. Therefore, we concluded that a 1% increase in domestic income would raise Turkey's demand for imports of consumption goods by about 2.43 to 2.52 for the whole sample period. However, a significant downward shift (-2.64) in the elasticity of the demand for consumption goods with respect to LGDP is found after the Global Crisis of 2009. The elasticity of LMANEX is not significant in column (4.3) whereas it is significant only at 10% significance level in column (4.4) but has a wrong sign (negative). Therefore, we concluded that a change in the manufactured exports (LMANEX) does not affect the demand for the imported consumption goods holding GDP constant.

Table 4. Estimated Equations for Imports of Consumption Goods

Estimation method	Bounds testing estimates in log levels		OLS estimates in log first differences	
Estimated equation	(4.1)[a]	(4.2)[a]	(4.3)	(4.4)
Sample period	1998Q1-2019Q3	1998Q1-2019Q3	1998-2019	1998-2019
Speed of adjustment, σ	– 0.34	– 0.39		
Gross domestic product, LGDP	1.48(0.00)	1.57(0.00)	2.52(0.00)	3.75(0.00)
Real exchange rate, LRER	1.93(0.00)	2.02(0.00)		
Manufactured exports, LMANEX			0.19(0.67)	-0.71(0.08)
Dummy for 2001*LGDP		-0.01(0.03)		
Dummy for 2009*LGDP				-2.64(0.00)
Adjusted R^2	0.81	0.82	0.35	0.66
Bounds tests				
t-test	– 4.90*	– 5.41**		
F-test	8.33***	7.62***		
Diagnostics (p-values, for F-statistics, where relevant)				
Serial correlation (Breusch-Godfrey 2 lags)	0.109	0.958	0.051	0.227
RESET (squared fitted values)	0.860	0.922	0.094	0.991
ARCH (1 lag)	0.226	0.159	0.171	0.357

Notes: Numbers in parentheses are p-values.

Coefficients for the bounds testing estimates are long run coefficients after model simplification.

Diagnostic tests for the first differences and for the bounds testing show the p-values. We fail to reject the null hypotheses of no serial correlation (Breusch-Godfrey), no misspecification in model (Ramsey's RESET test), and no heteroskedasticity (no ARCH errors).

[a]: Includes a year outlier dummy for 2004Q2

***, **, *: rejects the null of no cointegration at 1%, 5%, and 10% (respectively) using the asymptotical upper critical values from Pesaran et al. (2001), tables CII(iii): Case for t-test and CI(iii): Case for F-test.

5.3. Imports of Capital Goods

The results of the estimated equations for the demand for imports of capital goods using the bounds testing and the first differences methods are reported in Table 5 below. In the bounds testing method we included the gross domestic product, LGD, and the real exchange rate, LRER, (column (5.1)) and additionally manufacturing exports, LMANEX (column(5.2)) as regressors using quarterly data for the period of 1998-2019. Both the estimated equations (column (5.1) and column (5.2)) passed the bounds F-test and t-test (only under the condition that all variables are *I*(0)). In column (5.1), an increase in LGDP, and an increase in LRER (a real appreciation of Turkish Lira), tend to raise the demand for imports of capital goods. LGDP is significant and implies that a 1% increase in domestic income would raise Turkey's demand for imports of capital goods by about 1.46% for the whole sample period. LRER is also significant and implies that a 1% appreciation (depreciation) of Turkish Lira would raise (decrease) Turkey's demand for imports of capital goods by about 2.28%.

In column(5.2), when we add manufactured exports, LMANEX, as another regressor a significant downward shift in the elasticities of the demand for capital goods with respect to LGDP and LRER is found (from 1.46 to 0.69 and from 2.28 to 1.42, respectively). LMANEX is significant and a 1% increase in manufactured exports would raise Turkey's demand for imports of capital goods by about 0.48%. The speed of adjustment, σ is – 0.37 indicating that the imports of capital goods approach the equilibrium state in the long run at a speed of 37% each quarter.

In the first differences method (columns (5.3) and (5.4)), we included the gross domestic product LGDP, the terms of trade in capital goods sector, LTOTK, and manufacturing exports, LMANEX as regressors. The elasticity of LGDP is 2.14 and significant for 1998-2019 (the whole period) in column (5.3). This elasticity is estimated to be 3.88 before 2009 and 1.25 (3.88-2.63) after 2009 using a structural break (Chow test) and thus having an average of 2.56 for the whole period (column 5.4). This average elasticity of 2.56 of LGDP is close to 2.14 which was found without a structural break. Therefore, we conclude that a 1% increase in domestic income would raise Turkey's demand for imports of capital goods by about 2.14 to 2.56 for the whole sample period. However, a significant downward shift (-2.63) in the elasticity of the demand for capital goods with respect to GDP is found after the Global Crisis of 2009.

The elasticity of LMANEX is significant in column (5.3) whereas it is not significant in column (5.4). Since the Dummy variable for LGDP is significant in column (5.4) and therefore the structural break in 2009 must be considered, we concluded that the changes in manufacturing exports do not affect the demand for imports of capital goods. Similarly, LTOTK is significant in column (5.3) whereas it is not significant in column (5.4). For the same reason we asserted that the changes in the terms of trade of the capital goods sector do not affect the demand for imports of capital goods.

Table 5. Estimated Equations for Imports of Capital Goods

Estimation method	Bounds testing estimates in log levels		OLS estimates in log first differences	
Estimated equation	(5.1)[a]	(5.2)[b]	(5.3)	(5.4)
Sample period	1998Q1-2019Q3	1998Q1-2019Q3	1998-2019	1998-2019
Speed of adjustment, σ	– 0.26	– 0.37		
Gross domestic product, LGDP	1.46(0.00)	0.69(0.03)	2.14(0.00)	3.88(0.00)
Real exchange rate, LRER	2.28(0.00)	1.42(0.00)		
Terms of trade, LTOTK			1.04(0.07)	-0.20(0.74)
Manufactured exports, LMANEX		0.48(0.01)	0.86(0.04)	0.29(0.44)
Dummy for 2009*LGDP				-2.63(0.01)
Adjusted R^2	0.77	0.82	0.62	0.74
Bounds tests				
t-test	-3.99[c]	-3.32[d]		
F-test	6.02***	4.48***		
Diagnostics (p-values, for F-statistics, where relevant)				
Serial correlation (Breusch-Godfrey 2 lags)	0.163	0.835	0.052	0.091++
RESET (squared fitted values)	0.727	0.687	0.041+	0.292
ARCH (1 lag)	0.816	0.562	0.439	0.967

Notes: Numbers in parentheses are p-values.

Coefficients for the bounds testing estimates are long run coefficients after model simplification.

Diagnostic tests for the first differences and for the bounds testing show the p-values. We fail to reject the null hypotheses of no serial correlation (Breusch-Godfrey), no misspecification in model (Ramsey's RESET test), and no heteroskedasticity (no ARCH errors).

$^{+}$: The null of no misspecification in model (Ramsey's RESET test) is rejected. $^{++}$: We fail to reject the null hypothesis of no serial correlation (Breusch-Godfrey, 1 lag).

[a]: Includes a year outlier dummy for 2003Q4

[b]: Includes a year outlier dummy for 2009Q2

***, **, *: rejects the null of no cointegration at 1%, 5%, and 10% (respectively) using the asymptotical upper critical values from Pesaran et al. (2001), tables CII(iii): Case for t-test and CI(iii) for F-test.

[c]: rejects the null of no cointegration only under the condition that all variables are *I* (0), at 1% using asymptotical critical values (Pesaran et al., 2001).

[d]: rejects the null of no cointegration only under the condition that all variables are *I* (0), at 5% using asymptotical critical values (Pesaran et al.,2001).

6. Comparison of the Rates of Growth of Actual Income and of the Extended BPCG Model and the Importance of Capital Flows

In this section, we will first compare the calculated rates of growth of income for the Turkish economy from our extended BPCG model (y_b) and that obtained from the basic Thirlwall Law, against the rate of growth of actual income of Turkey. The rate of growth of income for the extended BPCG model, is calculated using the estimated income and price elasticities of demands for three types of imports separately and the *time-varying shares* of exports earnings in total imports expenditures (α_t) and the *time-varying relative shares* of intermediate, consumption and capital imports sectors $(\theta's)$ as well as the exports, manufactured exports, real capital flows and the relative prices series, as given by Equation (5) above. The time-varying shares are introduced in order to capture some possible structural changes in the composition of imports and the type of financing the trade deficit in addition to the changes in the composition of manufactured imports that we discussed in Section 4.3 above. Secondly, we will find that the *short run variations* in the predicted growth rates of income from the extended BPCG model to be more in line with the actual growth rates of income compared to the basic Thirlwall law. Thirdly, we will display the contributions of the three components of the growth rate of income of the extended BPCG model: the effect of growth of exports adjusted for the growth of manufactured exports, of the real capital inflows growth and of the price effect. Finally, we will investigate the relationship between the yearly rates of growth of the Turkish GDP and those of the real capital flows.

Table 6 below shows that both the extended BPCG model and the basic Thirlwall Law provide quite close average yearly growth predictions, 5.43% and 5.70% respectively, compared to the average

growth rate of income of Turkey, 4.37% for the 1998-2019 period. The estimate of the rate of growth of income for the basic Thirlwall Law (5.70%) is calculated by dividing the average growth rate of real exports by the imports sectors' share-weighted income elasticity of the demands for imports for these three industries: intermediate, consumption and capital goods. We used 1.05, 1.57, 0.69 and 0.35, 2.02, 1.42 as the income and price elasticities respectively for the three imports sectors based on our econometric estimation in Section 5 above. The estimated elasticity of the demand for intermediate goods with respect to the manufacturing exports was found to be 0.57. The sample averages of the time-varying shares of intermediate, consumption and capital goods imports out of total imports were 0.71, 0.12 and 0.17 respectively.

Table 6. Turkish Average Actual GDP Growth Rate and those predicted from the Extended BPCG and the Basic Thirlwall Law Models (1998-2019)

Actual GDP Growth rate	4.37 %
GDP Growth rate from the Extended Model,	5.43 %
GDP Growth rate from the Basic Thirlwall Model	5.70 %

Figure 6 below shows that the predicted growth rates of income of the extended BPCG model, those of the basic Thirlwall rule and the actual growth rates of income in the 1998-2019 period in Turkey on yearly basis. The averages of these three growth rates were found to be quite close to each other for the 22-year period as given in Table 6 above. However, the predictions of the extended BPCG model have *a much higher variability* due to its additional considerations of the time-varying shares of exports and types of imports and of the changes in the composition of the manufactured exports and especially of capital flows compared to the basic Thirlwall law. The variations in the predicted growth rates of income from the extended BPCG model are seen to be more in line with the growth rates of actual income compared to the basic Thirlwall law. For example, between 2011-2016 when the growth of actual income and the growth of extended model moved in the same direction together whereas that from the basic Thirlwall rule moved in the opposite direction throughout this period. This observation is generally confirmed by the fact that the sample correlation between the growth rate of actual income and that of the extended BPCG model is 0.71 whereas the one between the growth rates of actual income and those of the Thirlwall rule is only 0.59, indicating that the Thirlwall rule is a very useful tool for the long run, but the extended BPCG model seems to depict the short-run variations better.

The short-run variations may be more important from a policy perspective, where the policy-makers may be more concerned for the next two or three years by taking into account the short run influences of especially expected abrupt changes in capital flows and those in the shares and relative prices rather than an assured long run growth of income dictated by the Thirlwall law which solely depends on an average long-run growth of exports and the income elasticity of imports. Even though the average rate of change of the real exchange rate (RER) was only – 0.49 for the whole 22 years, it fluctuated considerably in the short run (Figure 5).

In our discussion in Section 4.3 above (Time Periods) in trying to interpret the graphs, we argued that the economic growth in Turkey was almost always accompanied with heavy capital inflows which helped the financing of the merchandise trade deficits. This policy of allowing the real exchange rate to appreciate (by not preventing the nominal exchange rate to appreciate) by the Turkish government authorities stands in sharp contrast with the economic policies of some countries like China and others where the exchange rate is perhaps purposely depreciated in order to insure an exports-led growth of income. In Figure 6 below, we see that the yearly rates of growth of income for the Turkish economy from our extended BPCG model (y_b) is above the growth of actual income in 2000, 2002-2005, 2010-2011 and 2017 indicating that the BP was not a constraint for the growth of income. The opposite occurs in the remaining years. The latter are the years when Turkey was not able to attract foreign capital flow and therefore the BP restrained the economic growth. It is also interesting to note that the deepest points of the our extended BPCG model correspond to the two crises Turkey experienced, – 26% in 2001, – 1.59 in 2008 and – 8.6% in 2009. Even though the growth rates indicated by Thirlwall law were also low, 4.4% in 2001, 3.69 in 2008 and – 3.55% in 2009 in these years, they nevertheless stayed positive in 2001 and 2008 (Figure 6).

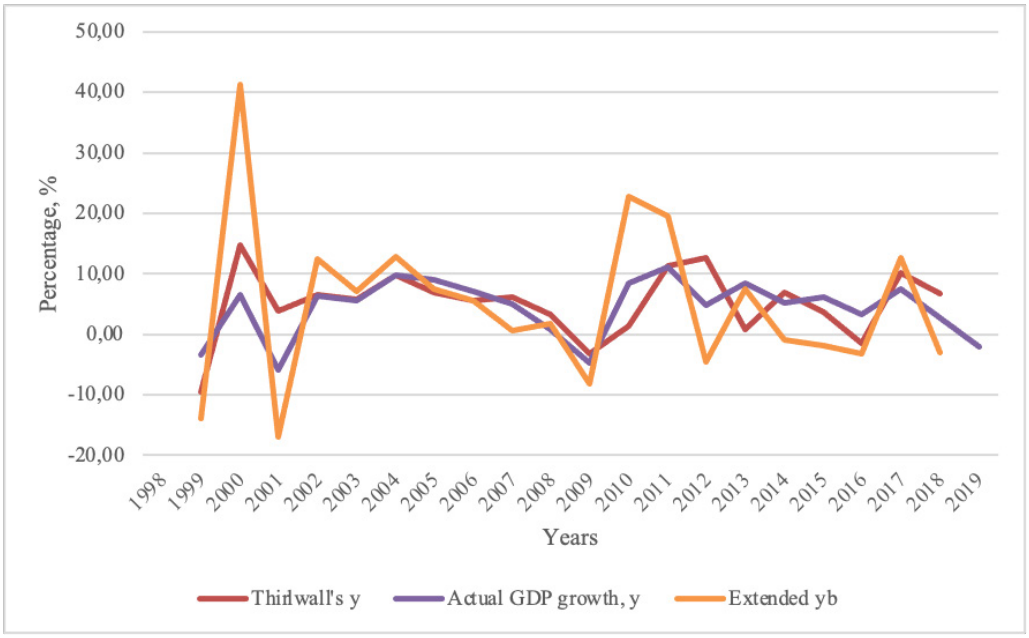

Figure 6. Turkish Yearly Actual GDP Growth Rates and those from The BPCG Extended and Basic Models, 1998-2019

Source: Turkish Statistical Institute (TurkStat).

Table 7 below shows the contributions of the three components of the extended BPCG model to the growth rate of GDP in Turkey. Notice that the average of the time-varying share of exports in

total imports bill is 66% ($\alpha = 0.66$) and that of the capital inflows is simply 34% ($1 - \alpha = 0.34$), (column 3). It must be recalled that we defined the *capital flows* as all items besides the merchandise trade balance in the Balance of Payments statement. Therefore, the services imports and exports, incomes earned/paid on investments at home/abroad and unilateral transfers included in the current account as well as the capital account, statistical discrepancy and official reserves are all part of our definition of *capital flows* so that it is simply equal to the difference between merchandise imports and exports. For example, tourism earnings are an important item in services exports in Turkey and they are considered to be a part of capital flows in our definition.

Even though the share of exports (66%) is much higher than that of the capital flows (34%) and that the real exports increased by an average of 6.01% during 1998-2019 period, its relatively small contribution to the rate of growth of income of 0.13% is due to the fact that we took into account the rise in intermediate imports due to the rise in manufactured exports (93% of total exports, Table 2) which also increased by 8.90%. This additional channel which gives rise to higher intermediate imports is an additional factor confining the growth of income of the extended BPCG model. In other words, the income can only grow to the extent that the value-added component of manufactured exports is high compared to its imports component. On the other hand, even though the share of capital flows is only 34% in the total imports bill, the growth of real capital inflows increased substantially by 9.68% and its contribution to the growth of income has been 5.02%. (c_t)

Table 7. Contributions of the Components of the Extended BPCG Model to the Growth Rate of Income

	Average Yearly Growth rate	Average Shares in Total Imports Bill	Average yearly Contributions of the Components to the Growth rate of GDP
Real Total Exports Growth Real Manufactured Exports Growth	6.01% 8.90%	66 %	0.131%
Relative prices (RER) ML condition with only imports elasticities	– 0.49% 0.27	n.a.	– 0.253%
Real Capital Inflows Growth rate	9.68%	34 %	5.017%

n.a = not applicable.

The average rate of growth of real capital flows, 9.68%, is calculated as the difference between the rate of growth of nominal capital flows (c_t), 11.04% and that of exports prices index (p_{xt},), 1.36%. The nominal capital flows are simply nominal exports subtracted from nominal imports. Weighted by the average share of nominal capital flows (34%) in total imports, the real capital flows contributed a sizeable amount, 5.02% to the rate of growth of Turkish income. This shows that the capital inflows, in the way of direct investments, portfolio investment, sales of real estate to foreigners and tourisms revenues are very important for the rate of growth of Turkish GDP by relaxing the balance of payment constraint and financing the total imports bill.

As mentioned before, we used the time-varying shares of types of imports in our yearly calculations of BP-Equilibrium rate of growth of income. Considering the average of our Marshall Lerner (ML) condition *only considering the imports sectors weighted price elasticity* is calculated to be 0.27 as follows: 1-(0.71*0.35+0.12*2.02+0.17*1.42) using the estimates in Section 5 above. In other words, the imports had an outweighing value effect (due to volumes of existing imports) compared to the volume effect given by the average of imports sectors weighted price elasticity. As ML coefficient was only 0.27, a deterioration in the relative prices (-0.49%) which is also small during 1998-2019, had a very small unfavorable overall price effect on the rate of growth of Turkish income (-0.253%). Therefore, we can say that PPP holds in Turkey over the period we investigated even though it fluctuated substantially in the short run and we suggest caution in arguing in favor of a continual exchange policy letting the Turkish Lira (TL) to appreciate as a strategy for sustaining an economic growth at the expense of a deteriorating trade balance (TB) (Figures 4 and 5 above). It is also interesting that our finding that the changes in the relative prices of trade (RER) coupled with our version of the Marshall-Lerner (ML) condition is negligible is consistent with the basic Thirlwall hypothesis that the relative price changes are not important for the growth rate of income in the long run.

All three components of the extended BPCG model are of course equally affected by the estimate of the income elasticity of demand for imports. As shown in denominator of the Equation (5) above, we have calculated an imports sectors weighted average of income elasticity of imports, say π_a using sing the elasticity estimates from Section 5 above and found that $\pi_a = \theta_{1t}\pi_i + \theta_{2t}\pi_c + {}_{3t}\pi_k = 0.71 * 1.05 + 0.12* 1.57 + 0.17 * 0.69 = 1.051$.

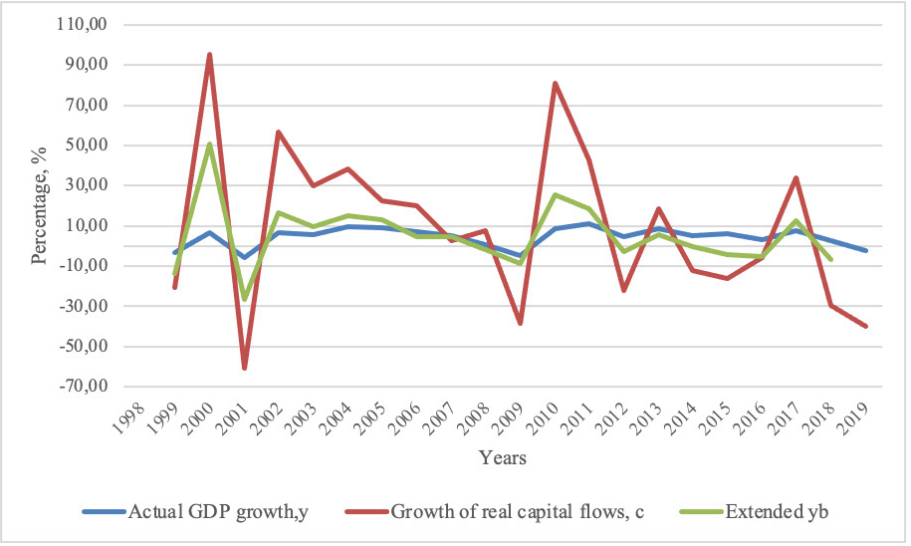

Figure 7. Turkish Yearly Growth Rates of real GDP and those of the Extended BPCG model and of Real Capital Flows, 1998-2019

Source: Turkish Statistical Institute (TurkStat).

Figure 7 above shows the yearly rates of growth of Turkish GDP and those of real capital flows. The first stylized fact for the Turkish economy seems to be abrupt decreases in capital flows before/during the recessions. For example, the real capital flow decrease of about 60% during the 2001 recession was accompanied by a substantial diminishing of the GDP growth rate by 5.87%. Likewise, during the 2009 recession in Turkey where the effect of global crisis was felt about a year later, the GDP diminished by 4.67% while the decrease in capital flows amounted to 38%. The second stylized fact for Turkey seems to be that the periods when the GDP grew rapidly have been associated with heavy increases in capital inflows, generally after the recessions. For example, between 2002-2007 when the capital inflows were quite strong, the GDP grew by 5.04-9.69%. Similarly, during 2010-2011 when Turkey again attracted sizeable foreign capital, the Turkish GDP increased by 8.5 – 11%. However, the rates of capital flows have been quite irregular since the year of 2012 up till 2017, perhaps due to the more globalized financial markets. Nevertheless, the Turkish economy kept growing by 3.2 – 8.47% during this period. The August 2018 was the beginning of another recession Turkish economy experienced and as we could expect from our extended BPCG model, the capital flows decreased by 29.5% in the year of 2018 and falling again by 40% in the year of 2019. During 1998-2019 the correlation coefficient between the growth rate of income and that of net capital flows in Turkey is found to be 0.74.

It is further interesting to note that in Figure 7 above, our extended BP-Equilibrium growth rate of income, (y_b) and the real capital flows move in tandem confirming our results in Table 7 above with a correlation coefficient of 0.94.

7. Conclusion

Harrod (1933) and Thirlwall (1979) were independently able to formulate a simple rule stating that the rate of long-run growth of income of countries could be approximated by the ratio of the growth of exports to the income elasticity of imports of the country, assuming away foreign capital inflows and changes in the relative prices of goods. This model has become to be known as the balance-of-payments-constrained growth model (BPCG). In this paper, we considered an extended version of the BPCG model incorporating both the capital inflows and some possible structural changes by disaggregating total imports into intermediate, consumption and capital imports. In the case of Turkey, we calculated the rate of growth of income for the extended BPCG model based on a Simplified General Solution (SGS) using the estimated income and price elasticities of demands for three types of imports separately and the *time-varying shares* of exports earnings in total imports expenditures and the *time-varying relative shares* of intermediate, consumption and capital imports sectors. The time-varying shares are introduced in order to capture some structural changes in the composition of imports and the type of financing the trade deficit in addition to the changes in the composition of manufactured imports.

The extension with respect to capital flows is important for many regions in the world: East Asia and Pacific, Latin America, Europe and Central Asia, South Asia, Middle East and North Africa…in descending order in terms of dollars of capital inflows. The appetite of the global capital investment institutions increases especially after economic crises along with substantial devaluations when these assets of the countries in these regions become cheap. Afterwards, a period in which these counties run trade deficits and finance it by receiving substantial foreign currency. These countries may additionally experience some structural changes and as a result our extended BPCG model may be relevant.

In trying to interpret the data by inspection, we also observed that the economic growth in Turkey was almost always accompanied with heavy capital inflows which helped the financing of the merchandise trade deficits. We argued that this policy of allowing the real exchange rate to appreciate by the Turkish government authorities stood in sharp contrast with the economic policies of some countries like China where the exchange rate is perhaps purposely depreciated in order to insure an exports-led growth of income.

We estimated the demands for disaggregated imports separately: intermediate, consumption and capital goods. As far as the demand for intermediate imports equation is concerned, we found that the elasticities with respect to the real GDP, to the relative prices and to the manufactured exports to be 1.05, 0.35 and 0.57 respectively. In the demand for consumption imports equation, we concluded that the elasticities with respect to the real GDP and to the relative prices to be 1.57 and 2.02 respectively. Finally, with respect the demand for capital imports equation, the elasticities with respect to the real GDP and to the relative prices were found to be 0.69% and 1.42% respectively.

Even though the real exports increased by an average of 6.01% during 1998-2019 period, its relatively small contribution to the rate of growth of income was found to be due to the fact that we took into account the rise in intermediate imports due to an increase in manufactured exports. This additional channel which gave rise to higher intermediate imports was an additional factor confining the BP-Equilibrium growth rate of Turkish income. Moreover, we also found that an average of 0.49% decrease (deterioration) in the real exchange rate (RER) had a very small effect on the rate of growth of Turkish income (-0.253%) during the 1998-2019 period. It was interesting that our finding that the changes in the relative prices coupled with our ML condition which only depended on imports price elasticities was negligible is consistent with the basic Thirlwall hypothesis that the relative price changes are not important for the growth rate of income in the long run.

Even though both the extended BPCG model and the basic Thirlwall Law provided quite close yearly average predictions, 5.43% and 5.70% respectively, compared to the average growth rate of actual income of Turkey, 4.37% for the 1998-2019 period, we pointed out that the short-run variations may be more important from a policy perspective, where the policy-makers may be more concerned for the next two or three years by taking into account the short run influences of especially those of

expected abrupt changes in capital flows rather than an assured long run growth of income dictated by the Thirlwall law which depends solely on an average long-run growth of exports.

Furthermore, we examined the relationship between the rates of growth of Turkish GDP and growth of nominal flows. Firstly, we noticed that a stylized fact for the Turkish economy seemed to be abrupt decreases in capital flows before/during the recessions like those in 2001 and 2009. The second stylized fact about the Turkish economy seems to be that the periods when the GDP grew rapidly have been associated with heavy increases in capital inflows, generally after the recessions, for example in 2002-2007 and 2010-2011. The August 2018 was the beginning of the last recession Turkish economy experienced as of today and as we could expect from our extended BPCG model, the capital flows decreased by 28% in the year of 2018 and falling again by 43% in the year of 2019.

Finally, we can compare the income elasticity for imports from our study and those found in the literature for Turkey, which is a very crucial parameter in the BPCG models. In this study, we found an income elasticity of 1.05 whereas those from the other studies were in the range of 1.82-2.60. Even with such a smaller income elasticity we found that the sample correlation between the growth rate of actual income and that of the extended BPCG model was 0.71 whereas the one between the growth rates of actual income and those of the Thirlwall rule was only 0.59. Moreover, we note that our study's data set extends up to 2019 whereas the other studies' latest data observations are the year of 2014 or earlier.

APPENDIX A

We checked our time-series variables (all expressed in natural logarithms) for stationarity using three alternative methods: Augmented Dickey Fuller (ADF) test from Dickey and Fuller (1981), Phillips-Perron (PP) test from Phillips and Perron (1988), and KPSS test from Kwiatkowski et al. (1992). The tests reveal a mixture of stationary and nonstationary variables either in their levels or in their levels with trend, but all variables are stationary in their first differences.

Table A1: Unit Root Test (sample period: 1998Q1-2019Q3; 87 observations)
Augmented Dickey Fuller (ADF) Test.

Null: unit root $I(1)$[a]	Level	Level with trend	First difference
Imports of intermediate goods, LIMPI	-1.75	– 3.35*	– 9.45***
Imports of consumption goods, LIMPC	-1.72	– 2.36	-12.68***
Imports of capital goods, LIMPK	-1.98	– 2.28	– 14.21***
Gross Domestic Products, LGDP	-1.50	– 7.18***	– 10.24***
Real exchange rate, LRER	-2.36	– 2.61	– 10.61***
Manufactured exports, LMANEX	-1.65	– 3.21*	– 14.18***
1%	-3.50	– 4.06	– 2.59
5%	-2.89	– 3.46	– 1.94
10%	-2.58	– 3.15	– 1.61

Note. All tests assume an intercept except first differences (no intercept, no trend).

[a] ***, **, *: The null hypothesis of a unit root is rejected at the 1%, 5%, 10% significance levels, using McKinnon one-sided p-values for ADF.

Table A2: Unit Root Test (sample period: 1998-2019; 22 observations)
Augmented Dickey Fuller (ADF)Test.

Null: unit root $I(1)$[a]	Level	Level with trend	First difference
Imports of intermediate goods, LIMPI	-1.65	– 2.05	– 4.31***
Imports of consumption goods, LIMPC	-1.43	– 1.29	– 5.11***
Imports of capital goods, LIMPK	-1.65	– 0.88	– 3.93***
Gross Domestic Products, LGDP	0.03	– 3.10	– 2.46**
Terms of trade of intermediate imports, LTOTI	-2.27	– 1.78	– 4.22***
Terms of trade of consumption imports, LTOTC	-1.47	– 1.79	– 3.99***
Terms of trade of capital imports, LTOTK	-1.46	– 1.05	– 4.38***
Manufactured exports, LMANEX	-2.58	– 1.25	– 1.80*
1%	-3.78	– 4.46	– 2.68
5%	-3.01	– 3.64	– 1.95
10%	-2.64	– 3.26	– 1.60

Notes. All tests assume an intercept except first differences (no intercept, no trend).

[a] ***, **, *: For first difference the null hypothesis of a unit root is rejected at the 1%, 5%, 10% significance levels, using McKinnon one-sided p-values for ADF.

Table A3: Unit Root Tests (sample period: 1998Q1-2019Q3; 87 observations). Phillips-Perron (PP) and Kwiatkowski, Phillips, Schmidt, and Shinn (KPSS) Tests

	Phillips-Perron (PP) Null: unit root $I(1)$[a]			Kwiatkowski, Phillips, Schmidt, and Shinn (KPSS) Null: stationarity $I(0)$[b]		
	Level	Level with trend	First difference	Level	Level with trend	First difference
Imports of intermediate goods, LIMPI	-1.86	-3.23*	-9.54***	1.11	0.22	0.37++
Imports of consumption goods, LIMPC	-1.55	-2.32	-12.59***	0.98	0.21	0.22+
Imports of capital goods, LIMPK	-1.77	– 2.23	– 13.72***	0.90	0.26	0.31+
Gross Domestic Products, LGDP	-0.94	– 7.14***	-12.63***	1.16	0.11	0.05+
Real exchange rate, LRER	-2.19	– 2.52	-11.10***	0.33	0.29	0.25+
Manufactured exports, LMANEX	-2.46	– 3.41*	-13.81***	1.13	0.29	0.39++
1%	-3.50	-4.06	-2.59	0.73	0.21	0.73
5%	-2.89	-3.46	-1.94	0.46	0.14	0.46
10%	-2.58	-3.15	-1.61	0.34	0.11	0.34

Notes. All tests assume an intercept except PP test, first differences (no intercept, no trend) and use the Bartlett kernel and Newey-West Bandwidth.

[a] ***, **, *: The null hypothesis of a unit root is rejected at the 1%, 5%, 10% significance levels, using McKinnon one-sided p-values for PP.

[b] ++, +: We fail to reject the null hypothesis of stationarity at the 1%, 5%, 10% significance levels. Critical values from Kwiatkowski et al. (1992, Table 1).

Table A4: Unit Root Tests (sample period: 1998-2019; 22 observations). Phillips-Perron (PP) and Kwiatkowski, Phillips, Schmidt, and Shinn (KPSS) Tests

	Phillips-Perron (PP) Null: unit root *I* (1)[a]			Kwiatkowski, Phillips, Schmidt, and Shinn (KPSS) Null: stationarity *I* (0)[b]		
	Level	Level with trend	First difference	Level	Level with trend	First difference
Imports of intermediate goods, LIMPI	-2.64*	-1.91	– 4.31***	0.62	0.17	0.29+
Imports of consumption goods, LIMPC	-1.39	-1.18	– 5.09***	0.54	0.16	0.17+
Imports of capital goods, LIMPK	– 1.65	– 0.90	– 3.94***	0.51	0.15	0.26+
Gross Domestic Products, LGDP	-0.02	-3.10	– 2.37**	0.64	0.07	0.11+
Terms of trade of intermediate imports, LTOTI	– 2.27	-1.78	– 4.22***	0.42	0.15	0.23+
Terms of trade of consumption goods, LTOTC	– 1.47	-1.93	– 3.98***	0.28	0.11	0.09+
Terms of trade of capital goods, LTOTK	– 1.46	– 1.05	– 4.38***	0.35	0.14	0.21+
Manufactured exports, LMANEX	-2.79*	-1.22	– 1.66*	0.63	0.16	0.39++
1%	-3.78	-4.46	– 2.68	0.73	0.21	0.73
5%	-3.01	-3.64	– 1.95	0.46	0.14	0.46
10%	-2.64	-3.26	– 1.60	0.34	0.11	0.34

Notes. All tests assume an intercept except PP test, first difference (no intercept, no trend) and use the Bartlett kernel and Newey-West Bandwidth.

[a] ***, **, * : The null hypothesis of a unit root is rejected at the 1%, 5%, 10% significance levels, using McKinnon one-sided p-values for PP.

[b] ++, +: We fail to reject the null hypothesis of stationarity at the 1%, 5%, 10% significance levels. Critical values from Kwiatkowski et al. (1992, Table 1).

As (Pesaran, Shin & Smith, 2001) suggested, two bounds tests were performed for the existence of a long run relationship: t-test and F-test. A t-test for the significance of the speed of adjustment coefficient, σ, and an F-test for the joint significance of σ and long run coefficients. In Section 5.1 Table 3, both the estimated equations (column (3.1) and column (3.2)) passed the bounds F-test and t-test (only under the condition that all variables are *I* (0)). In Section 5.2 Table 4, both the estimated equations without structural break (column (4.1)) and the estimated equation with structural break (column (4.2)) passed the bounds F-test and t – test. In Section 5.3 Table 5, both the estimated equations (column (5.1) and column (5.2)) passed the bounds F-test and t-test (only under the condition that all variables are *I* (0)).

Table A5: Asymptotic critical value bounds for the F-statistic.: Table CI(iii) Case III: unrestricted intercept and no trend

0.100		0.050		0.010	
I (0)	*I* (1)	*I* (0)	*I* (1)	*I* (0)	*I* (1)
1.83	2.94	2.06	3.24	2.54	3.86

Table A6: Asymptotic critical value bounds for the t-statistic: Table CII(iii) Case III : unrestricted intercept and no trend

0.100		0.050		0.010	
I (0)	*I* (1)	*I* (0)	*I* (1)	*I* (0)	*I* (1)
-2.57	-4.69	-2.86	-5.03	-3.43	-5.68

APPENDIX B

In this Appendix we will show our Simplified General Solution (SGS) for the BP-Equilibrium growth rate of income in the basic Thirlwall model (no disaggregated imports and no capital flows). Using the same notation as in the text, BP equilibrium requires balanced trade in goods and services, that is, the growth rates of exports and imports must be equal in foreign currency ($'s)

$$p_{xt} + x_t = p_{mt} + m_t \tag{B1}$$

The demand functions for the imports and the exports are

$$\begin{aligned} m_t &= \varepsilon_m (p_{xt} - p_{mt}) + \pi_m y_t \\ x_t &= -\varepsilon_x (p_{xt} - p_{mt}) + \pi_f z_t \end{aligned} \tag{B2}$$

Substituting the first equation only in Equation (B2) into Equation (B1) and rearranging, the Simplified General Solution for the BP-Equilibrium growth model, y_{bs} can be obtained as follows,

$$y_{bs} = \frac{x + (p_x - p_m)(1 - \varepsilon_m)}{\pi_m} \tag{B3}$$

As explained above in the text, the expression in Equation (B3) does not include the income and price elasticities of demand for exports (π_f, ε_x) and the growth of foreign income (z_t) since by an assumption of the model, the income is the adjusting variable and that the relative prices are exogenously taken, we assume that the growth of exports (x_t) is also exogenous. Notice that this solution of BP-Equilibrium growth rate of income differs from the usual general solution or the Weak and Strong forms of the Thirlwall law. The income and price elasticities of the demand for exports (π_f, ε_x), and the foreign income (z_t) are implicitly given in the growth of exports equation (the second equation in Equation (B2)).

There are two terms in Equation (B3) that contribute to the BP-Equilibrium growth rate of income, y_b. The first term in the numerator explains the contribution of the growth of the volume of exports. The second term in the numerator shows the effect of relative prices. The expression in parentheses, $(1-\varepsilon_m)$ is not quite the Marshall Lerner (ML) condition since it does not include the price elasticity of the demand for exports (ε_x) of the country. '1' represents the value effect of imports (i.e. the existing volume of imports becoming more expensive with a real depreciation ($p_x - p_m$ <0) giving support to a deteriorating trade balance. If $1-\varepsilon_m > 0$, then a real appreciation (depreciation) of the domestic currency ($p_x - p_m > 0$ (<0)) will lead to an increase (decrease) of the BP-equilibrium growth rate (given an exogenous exports growth rate), since the volume of imports will increase (decrease) less than in proportion to the decrease (increase) in the relative foreign prices of imports compared to those of exports in foreign currency. Consequently, the imports bill will decrease (increase) relaxing (constraining) the trade balance and allowing a faster (slower) income growth. If $1-\varepsilon_m < 0$, then the opposite of this outcome occurs.

References

Araujo, R. A. & Lima, G. T. (2007). A Structural Economic Dynamics Approach to Balance of-Payments-Constrained Growth. *Cambridge Journal of Economics*. Vol. 31 (5): p.755-74.

Atesoglu, H. S. (1993-94). Exports, Capital Flows, Relative Prices, and Economic Growth in Canada. *Journal of Post Keynesian Economic.* Vol. 16 (2): p.289-97.

Blecker, R. A. & Ibarra, C. A. (2013). Trade Liberalization and the Balance of Payments Constraint with Intermediate Imports: the case of Mexico revisited. *Structural Change and Economic Dynamics.* Vol. 25: p.33-47.

Blecker, R. A. & Setterfield, M (2019). Heterodox Macroeconomics: Models of Demand, Distribution and Growth. Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA.

Cömert, H. & Yeldan, E. (2018). A Tale of Three Crisis in Turkey: 1994, 2001 and 2008-09. *Political Economy Research Instıtute,* Working Papers Series. Number 465.

Dickey, D.A. & Fuller, W.A. (1981). *Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root*. http://www.u.arizona.edu: http://www.u.arizona.edu/~rlo/readings/278800.pdf

Elitok, S. P. & Campbell, A. (2018). The Balance of Payments as a Constraint on Turkey's Growth: 1960-2004. *University of Utah, Department of Economics Working Paper Series*. Working Paper. No: 2008-13.

Gouvea, R. R. & Lima, G. T. (2010). Structural Change, Balance of Payments Constraint and Economic Growth: Evidence from the Multisectoral Thirlwall's Law. *Journal of Post Keynesian Economics.* Vol.33 (1), p.169-204.

Gouvea, R. R. & Lima, G. T. (2013). Balance of Payments Constraint Growth in a Multisectoral Framework: A Panel Data Investigation. *Journal of Economic Studies.* Vol.40 (2), p.240-54.

Gokce, A. & Cankal, E. (2013). Balance-of-Payments Constrained Growth Model for the Turkish Economy. *Economic Modelling.* Vol.35, p.140-44.

Halicioglu, F. (2012). Balance-of-Payments-Constrained Growth: the case of Turkey. *Journal of Post Keynesian Economics.* Vol.35 (1), p.65-78.

Harrod, R. (1933). *International Economics*. Cambridge: Cambridge University Press.

Houthakker, H. & Magee, S. (1969). Income and Price Elasticities in World Trade. *Review of Economics and Statistics*. Vol. 51 (2), p.111-25.

Ibarra, C. (2011a). A note on Intermediate Imports and the BPCG model in Mexico. *Economic Change and Restructuring*. Vol.44 (4), p.357–368.

Ibarra, C. A. (2011b). Import Elasticities and the External Constraint in Mexico. *Economic Systems*. Vol 35-3, p.363–377. https://doi.org/10.1016/j.ecosys.2010.09.004

Ibarra, C. A. (2011c). Capital Flows, Real Exchange Rate, and Growth Constraints in Mexico.

International Review of Applied Economics. Vol.25 (6), p.653–668. https://doi.org/10.1080/02692.171.2011.557047

Ibarra, C. A. & Blecker, R. A. (2016). Structural Change, the Real Exchange Rate, and the Balance of Payments in Mexico, 1960-2012. *Cambridge Journal of Economics.* Vol. 40 (2): p.507-39.

Kern, D. (1978). An International Comparison of Major Economic Trends 1953-76. *National Westminster Bank Quarterly Review.* May, p.38-47.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P. & Shin, Y. (1992). *Testing the null hypothesis of stationarity against the alternative of a unit root*. http://debis.deu.edu.tr:

http://debis.deu.edu.tr/userweb//onder.hanedar/dosyalar/kpss.pdf

Lall, S. (2000). The Technological Change and Performance of Developing Country Manufactured Exports, 1985-98. *Oxford Development Studies*. Vol. 28 (3).

McCombie, J.S.L. & A.P. Thirlwall (1997). Economic Growth and the Balance-of-Payments constraint Revisited, in P. Arestis, G. Palma and M. Sawyer (eds), *Markets, Unemployment and Economic Policy: Essays in Honour of Geoff Harcourt.* Vol.2. Abingdon, UK: Routledge, p.498-511.

Moreno-Brid, J.C. (1998-99). On Capital Flows and the Balance-of-Payments-constrained Growth Model. *Journal of Post Keynesian Economics.* Vol. 21 (2): p.283-98.

Moreno-Brid, J.C. (2003). Capital flows, Interest payments and the Balance-of-Payments Constrained Growth Model: A Theoretical and Empirical analysis. *Metroeconomica*. Vol. 54 (2–3), p.346–365.

Özçam, A. (2021). An Explicit Partial-Equilibrium Model to Justify the Generalized Marshall-Lerner Condition (GML). *Metreoeconomica.* Vol 72, Issue 1, p. 173-188.

Pasinetti, L. (1993). *Structural Economic Dynamics*. Cambridge University Press.

https://doi.org/10.1017/CBO978.051.1551444

Pasinetti, L. L. (1983). Structural Change and Economic Growth. In *Cambridge Books*. Cambridge University Press. https://ideas.repec.org/b/cup/cbooks/978.052.1274104.html

Pesaran, M.H., Shin, Y. & Smith, R.J. (2001). *Bounds Testing Approaches to the Analysis of Level Relationships*. https://sci-hub.se: https://scihub.se/https://doi.org/10.1002/jae.616

Phillips, P.C.B. & Perron, P. (1988). *Testing for a unit root in time series regression*.

https://s3.amazonaws.com: https://s3.amazonaws.com/academia.edu.documents/30356828/phillipsperron1988.pdf

?response-content-disposition=inline%3B%20filename%3DTesting_ for_a_unit_root_in_time_series_r.pdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz – Credential=AKIAIWOWYYGZ2Y53UL3A%2F20200

Tatliyer, M. (2017). Balance of Payments Constrained Growth in Turkey (1950-2014). *Kırklareli Üniversitesi, İktisadi ve İdari Bilimler Fakültesi Dergisi*. Vol. 6: (2), p. 21-35.

Thirlwall, A. P. (1979). The Balance of Payments Constrained as an Explanation of International Growth Rate Differences. *Banca Nazionale del Lavoro Quarterly Review*. Vol. 128, 45-53.

Thirlwall A. P. & Hussain, M. N. (1982). The Balance of Payments Constraint, Capital Flows and Growth Rates Differences Between Developing Countries. *Oxford Economic Papers.* Vol. 10: p.498-509.

Uygur, E. (2001). 2000 Kasım ve 2001 Şubat Krizleri Üzerine Değerlendirmeler. *Mülkiye Dergisi.* Vol. XXV: (227).

Uygur, E. (2010). The Global Crisis and the Turkish economy. Discussion Paper. No.2010/3. *Turkish Economic Association,* Ankara.

Yeldan, E. (2002). The Ravages of Neo-Liberalism: Economy, Society and Gender in Turkey' in N. Balkan and S. Savran (eds*), On the IMF-Directed Disinflation Program in Turkey: A Program for Stabilization and Austerity or a Recipe for Impoverishment and Financial Chaos?* Nova Science Pub Inc; UK ed. edition.