

External constraints on the Cuban economy in the current environment of uncertainty

Juan Carlos Palacios Cívico

Abstract

This study seeks to explore the external factors that are acting as constraints on the Cuban economy and to identify the main opportunities that are open to it and the main threats that it faces in the current context of uncertainty. In order to accomplish this, a balance-of-payments-constrained growth model is used which, unlike any other model of this type that has been used before, incorporates the effect of the different flows of foreign exchange on the short- and long-run growth paths of the Caribbean economy.

Keywords

Economic conditions, economic growth, foreign trade, balance of payments, economic policy, econometric models, economic indicators, Cuba

JEL classification

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I. Introduction

Cuba's recent history reflects its great vulnerability to changes in its economic environment. Events such as its entry into the Council for Mutual Economic Assistance (COMECON), the disappearance of the Union of Soviet Socialist Republics and its membership in the Bolivarian Alliance for the Peoples of Our America (ALBA) are crucial considerations in any analysis of the country's economic growth path during recent decades. Its dependence on external factors is also of pivotal importance for an understanding of how external shocks such as the political and economic crisis that has erupted in the Bolivarian Republic of Venezuela or recent changes in its relations with the United States may influence the material living conditions of the Cuban population in coming years.

This study seeks both to gather empirical evidence concerning the external constraints that may be limiting Cuba's economic growth and to arrive at disaggregated estimates of the extent of the effect that the main foreign exchange flows — exports, foreign direct investment (FDI), remittances and external loans— may be having on Cuba's GDP growth. The ultimate aim of this research effort is to identify the main opportunities that are open to the country and the chief threats that it is facing. The methodology used for this purpose involves the econometric estimation of the theoretical balance-of-payments-constrained growth model developed by Thirlwall and Hussain (1982), in which a country's economic rent is expressed as a function of export growth, the terms of trade and external financing. Short-run departures from equilibrium are estimated using an error correction mechanism. The study period runs from 1975 to 2013. The available statistical data for the different variables included in the model constitute the justification for its selection.

The study is structured as follows. Section II describes the theoretical model and the major general and Cuba-specific empirical studies that have been conducted on balance-of-payments-constrained growth models. Section III looks at the correlation existing between Cuba's GDP and its foreign trade flows and presents an analysis of the main scenarios and policies that may have a favourable or unfavourable influence on the country's balance-of-payments equilibrium and its economic growth. In section IV, a balance-of-payments-constrained growth model is estimated for Cuba, and confirmation is provided of the importance of the role played by access to foreign capital and the conclusion of preferential agreements in alleviating external constraints on the Cuba economy. Economic policy recommendations and conclusions are presented in section V.

II. The theoretical framework and existing empirical evidence

The identification of the determinants of economic growth and inter-country differences in national income has been one of the central issues dealt with in the economic literature ever since the emergence of economics as a scientific field of study. The works of classical authors such as Adam Smith, Thomas Malthus, John Stuart Mill, David Ricardo and Karl Marx all reflect their concern with the growth of national economies.

Based on John Maynard Keynes's work on static equilibrium, the writings of economists R. Harrod and D. Domar, who took a long-term view in their analysis of the instability of capitalism, inspired subsequent studies on balanced growth with full employment that ultimately served as the foundation for modern theories of economic growth.

Later on, some economists began to question the exogenous nature of factors of production and reintroduced demand into the explanation for economic growth. The arguments that they put forward dealt with the flexibility of labour in adapting to different phases of the business cycle, the nature of the goods being produced with capital inputs or the steady growth of both of these factors of production throughout history. This line of thinking, whose origin and theoretical foundation are to be found in the work of Kaldor and Thirlwall, explained growth by reference to the expansion of aggregate demand and, more specifically, to export demand as the only autonomous component of total demand.

Thirlwall (1979) used Harrod's foreign trade multiplier as his starting point for the line of thought that eventually led to his conclusion that, in the long run, an economy's pace of growth is limited by its supply of foreign exchange, which is, in turn, determined by exports and the income elasticity of the demand for imports. The basic idea is that a country's growth rate cannot surpass the rate consistent with its balance-of-payment equilibrium, since it would be unable to finance an endlessly expanding deficit.

One of the most controversial aspects of balance-of-payments-constrained growth models has been the assumption of price stability or the failure to consider the role of external financing in determining long-run growth rates (a flow of foreign exchange that is particularly important for less developed countries). In response to this second criticism, Thirlwall and Hussain (1982) added in external financing as an explanatory variable for long-term growth.

The empirical evidence for balance-of-payments-constrained growth models resoundingly corroborates the validity of Thirlwall's Law. Its relevance for developed economies can be found in works such as those of McCombie and Thirlwall (1994), Atesoglu (1997) and Hieke (1997). Meanwhile, the work of Moreno-Brid (1998), Moreno-Brid and Pérez (1999), López and Cruz (2000), Holland, Vilela and Canuto (2002), Yongbok (2006) and Arevilca and Risso (2007), among others, has focused on external growth constraints in developing economies.

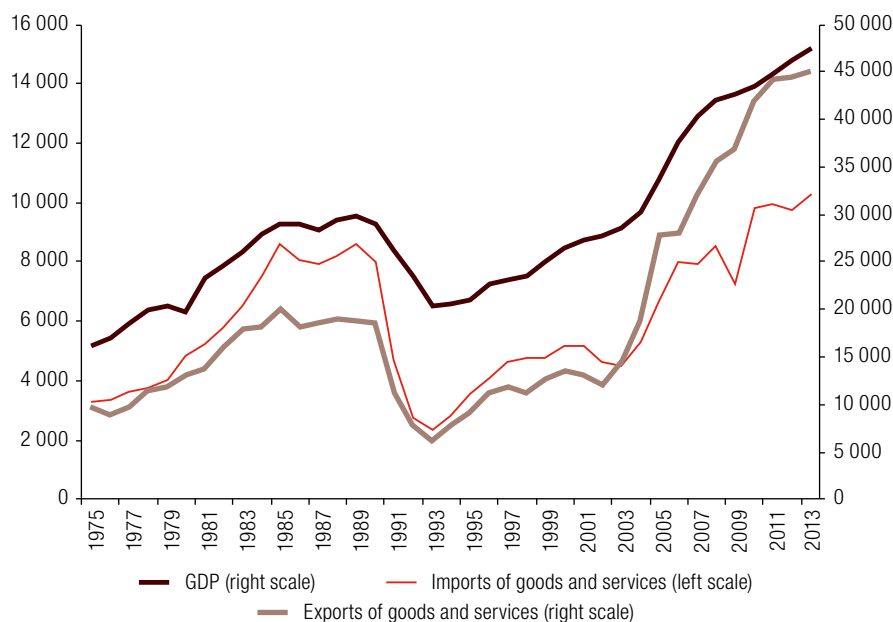
The empirical studies on this question of Mendoza and Robert (2000), Moreno-Brid (2000), Cribeiro and Triana (2005), Alonso and Sánchez (2005), Vidal and Fundora (2008) and Fugarolas, Matesans and Mañalich (2009) have validated the use of balance-of-payments-constrained growth models for the case of Cuba. It can be inferred from the income elasticity of import demand as estimated in the literature that, in the long run, each 1% expansion of Cuba's GDP has required an expansion of around 2% in its exports. Other conclusions shared by most of the studies on this subject include the negative sign of the price elasticity of imports and the stability problems associated with the estimated parameters.

III. External constraints on the Cuban economy: short- and medium-term growth opportunities and threats

Viewing balance-of-payments equilibrium as an economic growth constraint appears to be a plausible hypothesis in the case of open, developing economies such as Cuba's. Scant foreign exchange reserves and the difficulty that the country has had in gaining access to international financing in past decades (as a result of the economic embargo and its suspension of debt payments in 1986) appear to be likely reasons for the extreme sensitivity to export performance historically displayed by Cuban imports. Figure 1 shows how the two series have moved in step with one another during the period from 1975 to 2013 and illustrates the strong correlation between both series and GDP.¹

¹ The GDP correlation coefficients are 0.85 for the import series and 0.96 for the export series.

Figure 1
Cuba: GDP and exports and imports of goods and services, 1975–2013
(Millions of pesos at constant 1997 prices)



Source: Prepared by the author on the basis of data from the National Office of Statistics and Information (ONEI) and the National Economic Research Institute (INIE).

While it is true that correlation does not always imply causation, an analysis of these series and their inflection points clearly shows that Cuba's GDP is highly sensitive to changes in external sector conditions, thereby suggesting that, in this case, there is a cause-and-effect relationship.

The first sustained growth phase seen during the study period coincides with Cuba's entry into COMECON, which assured it of preferential treatment for its exports and imports.² A second inflection point in the GDP series corresponds to the collapse of the Union of Soviet Socialist Republics in 1990 and the end of the advantageous trade relations that Cuba had maintained with the socialist bloc. In response to those events, the Cuban government introduced a reform programme that enabled the country to swiftly find a place for itself in the international economy and paved the way for the recovery of its GDP starting in 1994. That recovery began to gather more steam in 2004 as a result, once again, of changes in the external sector: the upswing in international prices for some of the country's main products (nickel and tobacco) (Chuairey, 2008, p. 77) and the conclusion of trade agreements with Cuba's partners in ALBA, under which it began to export professional services and import Venezuelan oil on preferential terms. Then, however, the combined effect of the deterioration of the country's terms of trade,³ the international economic crisis, the amortization of Cuba's debt and the critical situation in the Bolivarian Republic of Venezuela led to a contraction of Cuban imports between 2010 and 2014 and cut its average annual growth rate for this period to a meagre 0.81%.⁴

The evident sensitivity of Cuba's GDP to changes in its balance of payments makes a case for examining factors which, given the prevailing degree of uncertainty, may alter its incoming foreign exchange flows in the coming years.

² The terms of trade improved by 90% between 1973 and 1975 (ONEI, several years).

³ The terms of trade worsened by 38% in 2008 (ONEI, several years).

⁴ According to the National People's Assembly of Cuba, it planned to make approximately US\$ 5.299 billion in payments on its external debt in 2016. See [online] <http://www.cubadebate.cu/opinion/2017/01/18/la-economia-cubana-2016-2017-valoracion-preliminar-ii/#.WTBBN8YIHU>.

1. Obama-era agreements and measures that have not been rolled back by Donald Trump

President Barack Obama's arrival in the White House brought the relaxation of some aspects of the economic embargo and, starting in April 2009, of restrictions on travel and remittances to Cuba.⁵ Then, during his second term in office, came the historic day of 17 December 2014, when President Raúl Castro and President Barack Obama announced to the world that they were embarking on an effort to normalize relations between the two countries. In the political arena, they agreed to restore diplomatic relations, reopen their embassies, remove Cuba from the list of State sponsors of terrorism, exchange prisoners and put an end to the United States special immigration policy for Cubans arriving on United States soil (commonly referred to as the “wet foot, dry foot” policy). On the economic front, the Obama Administration eased restrictions on travel to Cuba⁶ and on sending remittances from the United States to that country,⁷ approved new commercial regulations and gave authorization for United States citizens travelling to Cuba to open and hold bank accounts in that country, for airlines and shipping companies to establish direct routes to Cuba without obtaining special permission from the Treasury Department's Office of Foreign Assets Control and for United States firms to set up offices, stores and other facilities in Cuba in such sectors as the press, farming, construction, telecommunications and travel.⁸

The potential impact of these measures in terms of an increase in the supply of foreign exchange in Cuba will be assessed here, while bearing in mind that, since the products covered by these agreements represent no more than a very small portion of Cuba's goods exports, the potential trade effect is very limited.⁹ Another factor that greatly limits the potential impact of these agreements on Cuban export trade as a whole is the fact that the State has a monopoly on external sales and can choose to restrict exports by the non-State sector as it sees fit or to block activity that would not be conducive to the business activity of the military.

The new regulations' impact on earnings from service exports and especially from tourism may be quite different, however. Despite restrictions on the reasons for travel (such as the prohibition of individual educational or “people-to-people” travel) and other changes announced by President Trump, the new regulations open up the possibility for any United States resident to travel to Cuba, thereby significantly expanding the potential Cuban tourism market. The importance of the new regulations on travel to Cuba lies in three factors: the substantial relative size of the tourism sector in the Cuban economy, the proximity and size (in both demographic and economic terms) of the United States market and the considerable interest that people can be expected to have in visiting a country with a different political and economic system to which entry had been barred for over 55 years.¹⁰ According to some of the projections made before the change of Administration, such as the forecast prepared by the Boston Consulting Group, over 2 million people from the United States could be visiting Cuba each year by 2025; this projection appears to be borne out by the growth

⁵ All travel and remittance restrictions on United States residents with close family members in Cuba were lifted and the restrictions on other United States residents were eased (persons in the latter category were allowed to send up to US\$ 500 in remittances per quarter and were allowed to travel to Cuba for the purpose of educational, religious or “people-to-people” exchanges).

⁶ United States citizens who do not have family ties to persons residing in Cuba were allowed to travel to Cuba for any of 12 authorized reasons, with no spending limit during their stay.

⁷ In September 2015, limits on donative remittances and on the amount of money that authorized travellers could carry with them were eliminated.

⁸ In order to promote private enterprise, the Obama Administration authorized exports of building materials, tools, farm equipment and telecommunications technology to Cuba. In addition, the non-State sector was allowed to export coffee, textile products and mobile applications to United States firms, which were also allowed to hire Cuban workers.

⁹ In 2015, exports of coffee, tea, spices and extracts accounted for only 0.25% of Cuba's total merchandise exports, while external sales of yarn, fabric and articles made of textile fibres accounted for just 0.01% (ONEI, 2016).

¹⁰ With revenues of US\$ 2.8 billion in 2015, tourism was the second-biggest source of foreign exchange for Cuba, coming just after exports of professional services (ONEI, 2016).

rate in travel to the country seen in the last few years, although it may be slowed somewhat by the regulations issued by the new Administration.¹¹

One of the most visible effects of the new regulations has undoubtedly been the upswing in remittances. As a result of the regulatory changes introduced in 2009 by the Obama Administration, Cuba witnessed the largest increase in remittances of any Latin American country between 2008 and 2015, as they jumped from US\$ 1.447 billion in 2008 to US\$ 3.355 billion in 2015 (Morales, 2016). The further relaxation of regulations agreed upon in September 2015, which has not been reversed by the Trump Administration, gives reason to believe that this upward trend will continue in the coming years, especially in view of the fact that the total volume of remittances received by Cuba is still below the levels flowing into other countries of the region whose economies have similar characteristics.

2. A return to international capital markets

The rapprochement initiated by Obama opened up new opportunities in areas of particular importance for a country's growth and development, such as access to medium- and long-term financing at a reasonable cost. Cuba's participation in capital markets had been extremely limited in past decades by the United States embargo and its 1986 default on its external debt. Although the agreements between Cuba and the United States did not put an end to the sanctions imposed on financial institutions, they have allowed the country to finance its non-farm imports, have improved its medium- and long-term growth prospects (and, hence, buoyed market confidence) and have enabled it to garner support from the international community for the reform process approved at the sixth and seventh sessions of the Congress of the Community Party of Cuba (PCC).¹²

Another crucial factor in boosting market confidence has been the priority that the Cuban government has placed on fulfilling the payment obligations agreed upon in the course of the debt restructuring exercise of recent years. Under that restructuring agreement, 14 of the 20 members of the Paris Club forgave nearly 80% of Cuba's debt and extended the remaining maturities up to 18 years.¹³ As a result, the country's external debt had been cut from US\$ 35 billion in 2001 to US\$ 15 billion by 2016. This has enabled the Cuban government to begin to lay the groundwork for the Cuban economy's re-entry into international financial circles. Although this new strategy will only bear fruit slowly and gradually, the market's growing confidence in Cuba has already produced some early results, such as Moody's upward adjustment of the country's credit rating in 2015, the conclusion of major financial agreements with Saudi Arabia, China and the Russian Federation, and its acceptance as a member of the Central American Bank for Economic Integration (CABEI) in April 2017.¹⁴

3. The growth of foreign investment

The literature on the growth effect of foreign direct investment (FDI) offers a range of divergent opinions, but there appears to be a consensus that, in Cuba's case, this type of investment has had a positive impact on the economy since it was first authorized in 1994 (Pérez, 1999).

In addition to serving as a channel for fresh capital, FDI has given Cuba access to new technologies and to key international markets, such as tourism, mining, energy and telecommunications. The Cuban

¹¹ Three times as many United States tourists visited Cuba in 2016 as in 2014 (Fitzgerald, 2017).

¹² According to an EFE news agency report of January 2017, between December 2014 and January 2016, the Obama Administration levied US\$ 2.843 billion in fines on 11 (7 United States and 4 foreign) institutions (see [online] <https://www.efc.com/efe/espana/mundo/cuba-denuncia-multas-de-eeuu-a-ong-y-banco-canadiense-por-violar-el-embargo/10001-3150572>).

¹³ US\$ 8.5 billion out of a total of US\$ 11 billion was forgiven.

¹⁴ In its December 2015 risk assessment report, Moody's upgraded Cuba's rating outlook from stable to positive.

government also seems to share this view, since it has identified the promotion of FDI as a basic tool for updating the country's economic model, approved a new law on FDI in March 2014 (which authorizes foreign investment in all sectors except education, health and defence and offers more generous tax benefits and greater protection for foreign capital) and, each year since 2014, has published a portfolio of investment opportunities in over 300 projects for which it wants to attract foreign capital.¹⁵ In May 2014, Vice President Marino Murillo put the goal for annual FDI inflows at between US\$ 2 billion and US\$ 2.5 billion, which is far above the levels of FDI received by Cuba since its authorization in 1994 and appears to be a harbinger of the strong growth in this type of investment that is very likely to be seen in the coming years.¹⁶

In addition to the island's natural attractions, its security level is high, it enjoys political and social stability, and its population is highly skilled —all of which puts it in a position to absorb much more foreign investment than it currently receives.

The country's efforts to attract external capital have been greatly aided by its new relations with the United States and by its debt restructuring agreements. Although significant limitations are still placed on investments from the United States, the change in regulations has begun to bear fruit, as is demonstrated by the investment plans (authorized by the United States Department of the Treasury) announced by Cleber LLC and Starwood Hotels and Resorts Worldwide and by the start-up of operations by American Express and MasterCard in Cuba. United States businesses' interest in Cuba is also reflected in the nearly 500 permits for investments in Cuba (for a total of US\$ 4.3 billion) issued in 2015 by the United States Department of Commerce.¹⁷ Nevertheless, the greatest potential source of growth in FDI for Cuba lies beyond the borders of the United States, thanks to the renewed interest in Cuba that the normalization process has triggered in much of the international community in the wake of the country's rapprochement with the United States and the improvement in its business outlook (especially in the tourism sector).¹⁸

4. Relaunching the reform process

The reform process could provide yet another opportunity to spur economic growth and improve the country's balance of payments. Widening inequalities and the failure to meet people's expectations have fuelled a growing sense of unease in some segments of the population that has heightened internal divisions within the Communist Party and has all but brought the implementation of the reforms to a halt. Even so, the reform programme ratified at the seventh session of the Congress of the Communist Party of Cuba still holds out great promise for heightening the efficiency of the Cuban economy.

In view of the ground gained thus far, there would appear to be a need for a comprehensive socialist reform programme that would introduce an integral package of complementary measures while sequencing them in such a way as to permit their effective implementation and thus achieving the desired results. Some of the major reforms approved at the sixth session of the Communist Party Congress which still remain to be put into effect six years later include monetary and exchange unification. These measures are of pivotal importance but have been deferred for two main reasons: the fact that they could drive prices up and thus reduce the purchasing power of wages and the fact that they could make imports become more costly, thereby pushing many State enterprises into the red. One way of curbing inflationary pressures and providing more manoeuvring room for restructuring

¹⁵ The promotion of FDI is identified as a basic tool for the updating of the economic model in policy guidelines Nos. 78 and 79 as approved at the seventh session of the Congress of the Communist Party of Cuba.

¹⁶ The annual flow of FDI for the period 1994–2013 is estimated at US\$ 328 million.

¹⁷ See [online] <https://noticias.infocif.es/noticia/cuba-la-espera-de-la-inversion-estadounidense>.

¹⁸ The interest awakened by the normalization process is attested to by the Political Dialogue and Cooperation Agreement signed by Cuba and the European Union on 12 December 2016 and the repeal of the Common Position.

the business and labour sectors might be to use a sequential devaluation scheme such that each of a long series of partial devaluations would be preceded by productivity gains. This could make firms' real efficiency levels more apparent and could help to make Cuban exports more competitive and to improve the country's balance of payments.

Some of the main factors that may pose a threat to Cuba's economic growth in the coming years are discussed below.

(a) A tightening of the embargo by the Trump Administration

Although most of the agreements concluded by the Obama Administrations have not been undermined by the changes announced so far by the Trump Administration, it is clear that President Trump's attitude towards Cuba has dampened the expectations created by the normalization process. Furthermore, as the new president's main policy objective is to roll back Obama's policies, a further hardening of the conditions underlying relations between the two countries cannot be ruled out. This would be even more likely if the era of *Chavismo* were to come to an end in the Bolivarian Republic of Venezuela, as this would very probably trigger a deep economic crisis in Cuba that could be seen as an opportunity for the political and social destabilization of that country.

There are many reasons for thinking that the course plotted by Obama in December 2014 will not be entirely reversed, however. Some of the main ones are that a majority of voters in Florida, in particular, and in the United States as a whole view the rapprochement with Cuba as a positive development¹⁹, that a number of United States firms have a great deal at stake (especially in the agricultural, tourism and telecommunications sectors), that a steady stream of Republican governors and legislators have been visiting the country, that a number of major port agreements have been signed and that the embargo has clearly been ineffective.²⁰

(b) A change of government in the Bolivarian Republic of Venezuela

Relations between Cuba and the Bolivarian Republic of Venezuela have grown so much closer since 2000 that the latter is now Cuba's largest foreign investor and trading partner.²¹ Its degree of dependency has become all the more apparent since the Bolivarian Republic of Venezuela plunged into a severe political and economic crisis, with trade flows between the two countries plummeting by 51% between 2012 and 2015 (ONEI, 2017), Venezuelan oil shipments dropping from 105,000 barrels per day in September 2014 to just 55,000 barrels per day since then, a contraction of Venezuelan imports of Cuban medical services and the absence of Venezuelan investments in Cuba (Mesa-Lago, 2015, p. 3). As a result, in 2016 Cuba's GDP did not only fail to meet its 2% growth target but, for the first time since 1993, actually shrank (by 0.9%).

¹⁹ According to a 2016 survey conducted by the Florida International University, 64% of Cuban Americans in Miami support the policies introduced by President Obama in an effort to improve relations with Cuba. Another survey, published in 2014 by the Atlantic Council, put support for the thawing of relations between the two countries at 64% in the United States as a whole and at 67% in Miami.

²⁰ Agreements have been signed with Cuba by the ports of Lake Charles and New Orleans, in Louisiana, and ports in Alabama and Virginia during the current Administration.

²¹ Between 2010 and 2015, 40% of Cuba's total trade was with the Bolivarian Republic of Venezuela (ONEI, 2017), which supplied more than half of Cuba's total fuel needs and accounted for the lion's share of its exports of medical services (Quiñones and Mañalich, 2010, p. 11).

IV. Estimation of a balance-of-payments-constrained growth model for Cuba

The central idea underlying the model developed by Thirlwall (1979) is that current account imbalances cannot be sustained indefinitely, so a country's long-term growth must be consistent with its balance-of-payments equilibrium. In his analysis, that author cast exports and the income elasticity of the demand for imports as the fundamental variables in determining the long-run economic growth rate.

It follows from that model that all of the world's economies cannot be balance-of-payments constrained at the same time; it is sufficient for one country or one group of countries to not be constrained in order for the rest to be so.

The analysis starts from the identity that defines the balance of payments in equilibrium:

$$P_t^d X_t + E_t F_t = P_t^f M_t \quad (1)$$

where X_t stands for real exports, P_t^d is the local-currency price of exports, F_t is the flow of capital measured in the foreign currency, M_t stands for real imports, P_t^f for the foreign-currency price of imports and E_t for the nominal exchange rate expressed in units of the domestic currency per unit of foreign exchange.

In this model, the economy has two sources of foreign exchange: exports and external financing. The relative share of foreign exchange provided by exports is given by the following expression:

$$\theta = \frac{P_t^d X_t}{P_t^d X_t + E_t F_t} \quad (2)$$

Export and import demand are assumed and expressed as a function of income and price levels at constant elasticities.

$$X_t = \left(\frac{P_t^d}{E_t P_t^f} \right)^\Psi Z_t^\eta \quad \begin{array}{l} \psi, p > 0 \\ \eta, f > 0 \end{array} \quad (3)$$

$$M_t = \left(\frac{E_t P_t^f}{P_t^d} \right)^\phi Y_t^\pi \quad \begin{array}{l} \phi, p > 0 \\ \pi, f > 0 \end{array} \quad (4)$$

where Z_t stands for world income, Y_t for national income, Ψ and η for the price and income elasticities of export demand, and θ and π for the price and income elasticities of the demand for imports.

Using logarithms, equations (1), (3) and (4) can be expressed in growth rates:

$$\theta(p_t^d + x_t) + (1 - \theta)(e_t + f_t) = e_t + p_t^f + m_t \quad (5)$$

$$m_t = \phi(p_t^f - e_t - p_t^d) + \pi y_t \quad (6)$$

$$x_t = \psi(p_t^d + e_t - p_t^f) + \eta z_t \quad (7)$$

The combination of equations (5), (6) and (7) expresses the growth rate that is consistent with the balance of payments, as follows:

$$y_t = \frac{\theta\eta z_t + (\theta\psi + \phi + 1)(p_t^d - e_t - p_t^f) + (1 - \theta)(e_t + f_t - p_t^d)}{\pi} \quad (8)$$

This expression can be simplified if it is assumed that purchasing power parity obtains over the long term ($p_t^d - e_t - p_t^f = 0$) and the exchange rate remains stable ($e_t = 0$).

$$y_t = \frac{\theta\eta z_t + (1 - \theta)(f_t - p_t^d)}{\pi} \quad (9)$$

Thirlwall (1979) also considers that capital flows remain stable over time ($f_t - p_t^d$) or represent only a small percentage of total foreign exchange flows ($\theta = 1$). Therefore, equations (7) and (8) can be combined to produce the following equation:

$$y_t = \frac{x_t}{\pi} \quad (10)$$

Equation (10), which is known in the literature as Thirlwall's Law, can be used to estimate the growth rate that is consistent with balance-of-payments equilibrium based on the growth of exports and the income elasticity of imports.

The data used in the econometric analysis are the aggregate annual series for 1975–2013.

The GDP series is at constant market prices (using 1997 as the base year) and is taken from ONEI (several years). Because of methodological changes in the way Cuba's GDP is measured (social and personal services had formerly been measured in terms of their cost, but later began to be calculated at estimated market prices), the original series for 2007–2013 needs to be corrected since, as a result of those changes, in 2004 this sector's GDP soared by over 84% (jumping from 11.6% of total GDP in 2003 to 31.3% of GDP in 2004) and since then has inflated aggregate growth rates.²² Thus, from that year onward, output is recalculated by applying the growth rate of the production sector (which is not altered by the change in methodology) to the figure for the preceding year.²³

The data on exports of goods and services are taken from the breakdown of the balance of payments given in the statistical yearbooks published by Cuba and from the National Economic Research Institute (INIE).

In much of the literature on balance-of-payments-constrained growth, the external financing variable is proxied by the current account deficit. In order to capture the effect of remittances and FDI on the Cuban economy, the proxy for external financing needs to make it possible to differentiate between this economy's main external flows: external credits, remittances and FDI. External credits are proxied by the difference between the trade deficit (ONEI, several years) and FDI flows and remittances. This is a valid approach because, in an economy such as Cuba's that lacks foreign exchange reserves, the bulk of the deficit that is not financed either by FDI or by remittances will have to be financed via external credits.²⁴

The statistical yearbooks published by Cuba that provide official data on FDI flows cover only the period 1994–2001, so the rest of the series has been obtained from the estimates provided by the *Economist Intelligence Unit* (n/d).

²² For 2004, 2005, 2007 and 2008, the economy's overall growth rates were more than double the rates for the production sector (ONEI, several years).

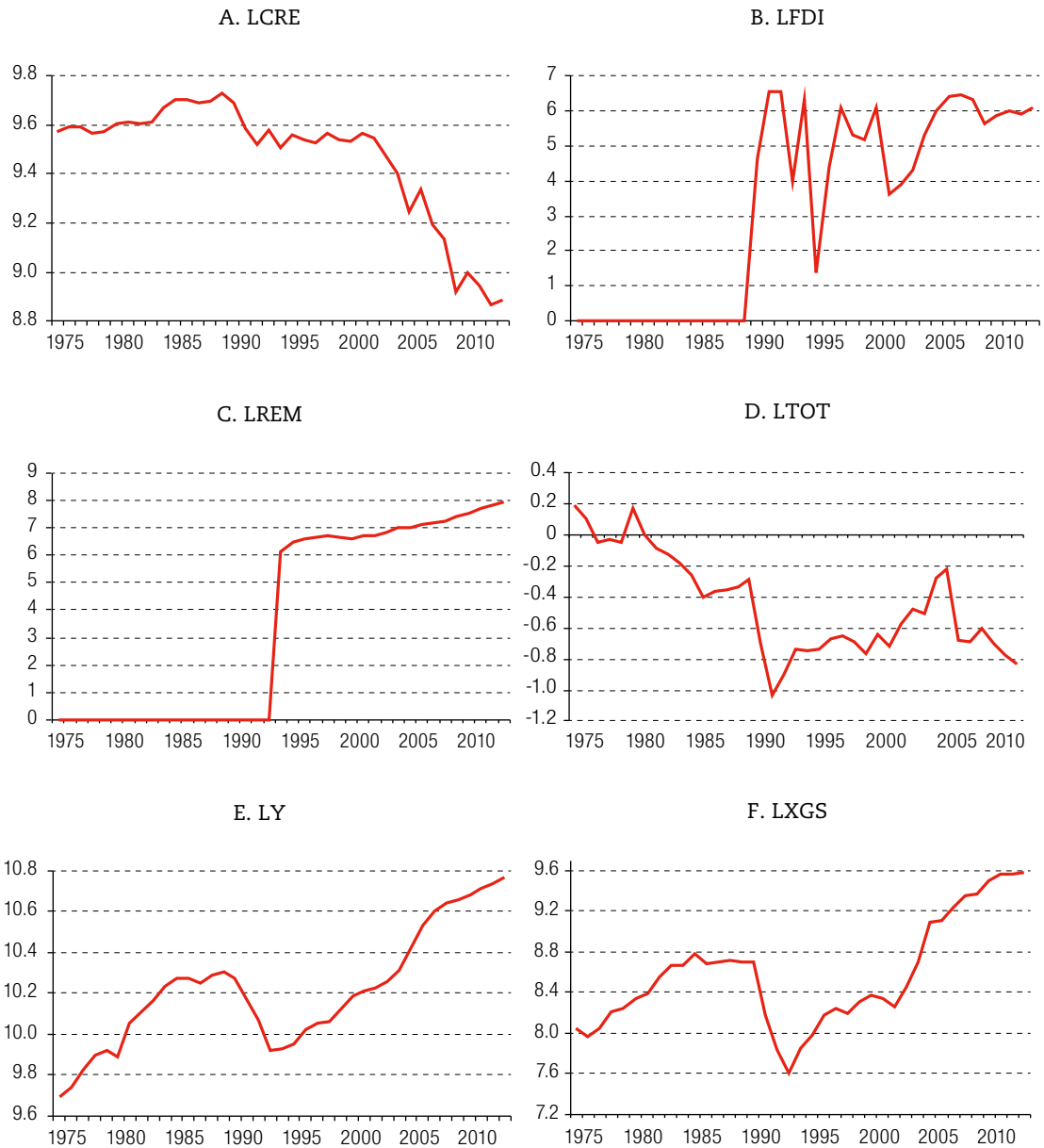
²³ The growth rates used here are taken from ONEI, and the calculations are based on its definition of the production sector, which includes agriculture, industry, mining and energy, tourism, construction, and transport and communications.

²⁴ Following Vidal and Fundora (2008), twice the minimum value is added to the entire series in order to avoid having negative data in the years where the deficit on current account was smaller than the volume of FDI. This makes it possible to express the variables in logarithms and obtain their elasticities.

Official data on remittances are available only for the years from 1994 to 2004 (ONEI, several years), so this series has been rounded out with data from the Havana Consulting Group for 2005–2013. Both series are in current prices. Data from ONEI and INIE have been used for the terms of trade.

Figure 2 traces the trends reflected in the series used for this analysis.

Figure 2
Time series trends, 1975–2013
(Logarithms)



Source: Prepared by the author.

Note: CRE: external financing in the form of credits; FDI: foreign direct investment; REM: remittances; TOT: terms of trade; Y: GDP; XGS: exports of goods and services. The LFDI and LREM series begin in 1990 and 1994, respectively, because before those dates foreign investment and remittances were not permitted.

The series' stationarity is analysed using augmented Dickey-Fuller tests. The results are shown in table 1.

Table 1
Series stationarity tests, 1975–2013^a
(Log statistics)

	t-statistic	Constant and trend	Lags
Y	-1.846	Yes	1
XGS	0.962	No	1
REM	0.403	No	0
FDI	-1.723	Constant	0
TOT	-1.933	Constant	0
CRE	-1.702	No	0
ΔY	-2.927*	No	0
ΔXGS	-3.561*	No	0
ΔREM	-5.673*	No	0
ΔFDI	-7.790*	No	0
ΔTOT	-5.527*	No	1
ΔCRE	-6.718*	Constant	0
Resid ^b	-6.672**	No	0

Source: Prepared by the author.

Note: Y: GDP; XGS: exports of goods and services; REM: remittances; FDI: foreign direct investment; TOT: terms of trade; CRE: external financing in the form of credits.

^a Augmented Dickey-Fuller test.

* Stationary at 1%.

** The values calculated from the t (tau) statistic are compared with the critical values computed in Engle and Yoo (1987), since, in this case, the Dickey-Fuller and MacKinnon (1996) critical values are not derived directly from an underlying stochastic process.

The results of the augmented Dickey-Fuller tests show that the series used for this econometric analysis are not stationary at an order of integration of 1, $I(1)$; any cointegration relationship that may exist between them can therefore be analysed.

To this end, the logarithmic transformations of equations (8) and (10) are alternately analysed in order to see which of the two specifications is the best fit for Cuba's economic growth over the past few decades. A proxy value is also included in the model that takes a value of 1 for the years during which Cuba was covered by preferential trade agreements and a value of 0 for the years when this was not the case in order to capture the benefits provided by those agreements that are not reflected in the official statistics.²⁵

$$\log Y_t = \alpha_1 + \alpha_2 \log XGS_t + e_t \quad (11)$$

$$\log Y_t = \beta_0 + \beta_1 \log XGS_t + \beta_2 \log FDI_t + \beta_3 \log REM_t + \beta_4 \log TOT_t + \beta_5 \log CRE_t + PA_t + e_t \quad (12)$$

where e_t is the random white-noise error term and the β parameters represent the long-term elasticities of the respective explanatory variables.

The minimum least squares (MLS) estimates for equations (11) and (12) are given in table 2.

²⁵ Cuba had preferential trade agreements with the Union of Soviet Socialist Republics from 1975 to 1989 and with the Bolivarian Republic of Venezuela from 2001 to 2013.

Table 2
Cuba: minimum least squares (MLS) estimates for equations 11 and 12^a
(Log statistics)

GDP _t	Equation (11)		Equation (12)	
	Coefficient	t-statistics	Coefficient	t-statistic
Constant	5.920 ^b	19.737	3.419 ^b	5.893
XGS	0.501 ^b	14.993	0.496 ^b	29.279
FDI	---	---	0.025 ^b	3.274
CRE	---	---	0.239 ^b	4.938
REM	---	---	-0.007 ^c	-2.425
TOT			-0.324 ^b	-7.186
PA			0.114 ^b	4.374
Adjusted R ²	0.865	(-1.513)	0.980	
Akaike (Schwarz)	-1.598		-3.424	(-3.126)
Durbin-Watson	0.322		2.020	

Source: Prepared by the author.

Note: XGS: exports of goods and services; FDI: foreign direct investment; CRE: external financing in the form of credits; REM: remittances; TOT: terms of trade; PA: preferential agreements.

^a Standard errors corrected for heteroscedasticity (Huber-White).

^b Significant at 1%.

^c Significant at 5%.

The greater explanatory power of the adjusted R² and the improvement in the Akaike and Schwarz criteria and in the Durbin-Watson statistic show that, in the case of Cuba, it is better to use balance-of-payments-constrained growth models that include the terms of trade and foreign exchange flows other than export earnings (such as FDI, external credits and remittances). Both of these models fulfil the assumptions of homoscedasticity and normality of residual and the absence of structural changes. The autocorrelation problems detected in the residuals estimated in equation (11) disappear when other foreign exchange flows, the terms of trade and the proxy variable are included in equation (12) (see the annex).

The variables' cointegration is analysed using the methodology developed by Engle and Granger (1987), in which a cointegration vector can be found such that, when the model's variables are integrated in the same order, these variables can be combined in a lesser order.²⁶ In the case at hand, the results of the augmented Dickey-Fuller test shown in table 1 indicate that the estimated residuals are stationary, which confirms the existence of a cointegration relationship between the model's variables.²⁷ Ruling out the possibility that the correlation could be the result of a spurious relationship between the variables makes it possible to interpret such log parameters as long-run elasticities. All the parameters are significant at a 95% confidence level.

The estimated income elasticity of exports (2.02) (which is calculated when using balance-of-payments-constrained growth models as the inverse of the export parameter $(1/\beta_2)$), is significant, positive and very close to the values estimated in previous studies that have used balance-of-payments-constrained growth models to analyse the situation in Cuba. The elasticity for FDI confirms the existence of a positive effect on the growth of the Cuban economy. In addition, the positive sign of the parameter for the CRE variable, as expected, indicates that the profitability of Cuban investments financed by external loans has outdistanced the high interest rates charged on those loans. On the other side of

²⁶ The cointegration methodology developed by Engle and Granger is used here because there are some problems with the generation of nearly singular matrixes when Johansen's test is applied to small samples (Matesanz, Fugarolas and Candaudap, 2007, p. 36).

²⁷ For the cointegration test, the values for the t-statistic are compared with the critical values calculated by Engle and Yoo (1987), since, in this case, the Dickey-Fuller and MacKinnon (1996) critical values are not directly derived from an underlying stochastic process but are instead the result of a series that is constructed after the model's parameters have been estimated.

the coin, the negative price elasticity of the parameter for the terms of trade is in line with the findings of earlier studies on Cuba and could be accounted for by the lesser importance of the price variable in trade between Cuba and other COMECON members and by the structure of Cuban imports, which are largely composed of staple goods for which demand is less sensitive to price trends. The parameter for remittances was the only one for which the results ran counter to expectations. While the scarcity of consistent public information on remittances to Cuba makes it necessary to exercise caution when evaluating the results of this type of analysis, the negative sign of this parameter may be attributable to the country's strict regulations on investment, which place such tight restrictions on the investment of remittances in the production sector that virtually all of these funds have to be used to improve the consumption levels of their recipients or to pursue highly informal activities involving very low levels of value added.

Following this long-term estimate, given Granger's representation theorem (which states that if a vector of variables is CI (1, 1), then there is a valid error correction mechanism (ECM) for representing the data generation process) (Intriligator, Bodkin and Hsiao, 1996), an ECM model can be applied to the present analysis. By combining variables in levels with variables in first differences, this model makes it possible to link a long-term equilibrium analysis with the short-term adjustment pattern and estimate how quickly any departures from long-term equilibrium will be corrected.

The Engle-Granger two-step method, which involves including the estimated residuals, lagged one period, in the ECM model, can then be used:

$$\Delta \log Y_t = \beta_0 + \beta_1 \Delta \log XGS_t + \beta_2 \Delta \log FDI_t + \beta_3 \Delta \log CRE_t + \beta_4 \Delta \log REM_t + \beta_5 \Delta \log TOT_t + \beta_6 PTA_t + \beta_7 errorLT_{t-1} + e_t \quad (13)$$

The results obtained from equation (13) are shown in table 3, which also gives the results obtained after eliminating the variables that had non-significant parameters in the first regression.

Table 3
Error correction mechanism^a
(Log statistics)

ΔGDP_t	Equation (13)		Equation (13) ^b	
	Coefficient	t- statistic	Coefficient	t-statistic
Constant	-0.006	-0.689	---	---
ΔXGS	0.351 ^c	6.552	0.337 ^c	5.424
ΔFDI	0.007	1.937	---	---
ΔCRE	0.183	1.551	---	---
ΔREM	-0.001	-0.150	---	---
ΔTOT	-0.204 ^c	-2.722	-0.176 ^c	-2.738
PA	0.024 ^c	2.304	0.016 ^d	2.121
LT error(-1)	-0.722 ^c	-2.883	-0.706 ^c	-3.069
Adjusted R ²	0.682		0.666	
Akaike (Schwarz)	-3.817	(-3.473)	-3.852	(-3.680)
Durbin-Watson	1.886			1.931

Source: Prepared by the author.

Note: XGS: exports of goods and services; FDI: foreign direct investment; CRE: external financing in the form of credits; REM: remittances; TOT: terms of trade.

^a Standard errors corrected for heteroscedasticity (Huber-White).

^b Estimation of equation (13), excluding variables that are not significant at 5%.

^c Significant at 1%.

^d Significant at 5%.

At a confidence level of 95%, the model fulfils the assumptions of homoscedasticity, non-autocorrelation and normality of residuals (see the annex). Cointegration is confirmed by the significance of the error correction term. The parameter for the estimated speed of adjustment is 0.706, which indicates that temporary departures from long-term equilibrium are fully adjusted in less than two years. The estimated short-term elasticities keep the same sign for all the variables, although, in the short run, only exports, the terms of trade and the proxy variable are significant. This suggests that it takes a longer time for the effect on GDP of credits, foreign investment and remittance to become apparent.

V. Economic policy recommendations and conclusions

The Cuban economy's small size and openness, its lack of foreign exchange reserves and its extremely limited access to international capital markets account for the fact that its growth is so sensitive to its external sector's performance.

The proposed cointegration analysis confirms this hypothesis and supports the conclusion that, although remittances did not have the expected impact on GDP during the study period, FDI, external credits and preferential agreements have all played a significant and positive role in determining the Cuban economy's long-run growth rates.

Consequently, one of the biggest challenges for the country in the long run will be to develop industrial and commercial policies that will reduce the economy's dependence on imports. The external constraints to which it is subject will be fundamental considerations when designing an economic policy that will enable the country to cope with the threats and seize the opportunities that will arise in the coming years. A change of government in the Bolivarian Republic of Venezuela or a hardening of the embargo by the Trump Administration would bring a steep cutback in the amount of foreign exchange that would be available to Cuba and would very likely push the country into another economic crisis during this time of greater political uncertainty so soon after Miguel Díaz-Canel has taken the place of his predecessor, Raúl Castro. In view of this possible scenario, it would appear to be a reasonable choice for the Cuban government to take advantage of the opportunities opened up by the thawing of relations with the United States to revitalize its domestic reform process.

In all probability, in order to ease its external constraints, Cuba will also need to boost FDI, continue to find its way back into capital markets and alter its regulations on the productive investment of remittances. To that end, investment in the non-State sector should be opened up for more highly productive professions and activities so that greater advantage can be taken of Cuba's enormous stock of human capital, much of which is currently underemployed in unskilled or very low-skilled activities. The potential and sustainability of this new framework will hinge on the Cuban government's ability to reconcile higher efficiency levels and the expansion of production capacity with its socialist principles by placing priority on cooperative forms of ownership and implementing a tax policy that will limit inequality and raise the real wages of the population as a whole.

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Annex A1

Table A1.1
Statistical test: ordinary least squares (OLS) estimates

Equation	BP ^a	BPG ^b	Jarque Bera
(1)	1.010	1.379	4.451
(2)	22.855	14.481	0.858
(3) ^c	0.741	0.641	2.655

Source: Prepared by the author.

^a Breusch-Pagan autocorrelation test.

^b Breusch-Pagan-Godfrey heteroscedasticity test.

^c Estimate from equation (13) after the elimination of redundant variables.