Exports *versus* capital accumulation in Argentina, Brazil, Chile and Mexico

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Abstract

This article analyzes the relative importance of exports and capital accumulation for growth rates in Argentina, Chile, and Mexico for the period 19612019, and Brazil for the period 1971-2019. This article finds evidence that capital accumulation has a significant positive effect on the growth rate, with exports also having a significant, although lesser, impact. Likewise, the effect of exports on reducing the external constraint to growth is insignificant compared to that of capital accumulation. The article concludes by suggesting that growth strategies should privilege capital accumulation, rather than exports.

Keywords: capital accumulation; exports; economic growth; trade balance; panel data.

1. INTRODUCTION

The Covid-19 pandemic caused the current economic crisis which in turn has slowed down most of the world economies' Gross Domestic Product (GDP) growth rates. This rekindled the debate on whether strategies can positively contribute to reviving economic activity in the short and long term, as well as stimulate processes of sustained economic growth.

Currently, within the main Latin American economies, an export-led growth strategy dominates (see Perrotini *et al.* 2008; Kristjanpoller and Olson, 2014).[1] One option borne from the economic crisis instigated by the Covid-19 pandemic is to continue with this model; however, the first signs of recovery seem to indicate that this policy will not be enough to reach the previous levels of economic activity, let alone surpass them (see Gamba, 2021; Werner *et al.,* 2021).[2]

With regard to the export growth model, the strategy itself is not considered to be the problem *per se*, but rather that the trade liberalization processes were not those required to stimulate the export growth rate nor its productive linkage with the rest of the sectors.[3] One can also argue that the region's sluggish growth is the result of a dramatic drop in the rate of capital accumulation (cf. Perrotini *et al*., 2008), so maybe the time is right for a change in the growth model, for a capital accumulation-led strategy to rise as an alternative capable of better results.

On the one hand, it is important to keep in mind that the liberalization of international trade can be justified, from the orthodox approach, as a measure to better position a country's productive resources (cf. Feder, 1983) and to solve the shortage of capital goods needed to increase aggregate productivity (cf. Awokuse, 2008). However, it can also be supported by the heterodox approach as a way to relax restrictions on effective demand by complementing the domestic market with the external market (cf. Kaldor, 1970; Thirlwall, 1979). Likewise, fostering capital accumulation can be brought about by stimulating savings (cf. Solow, 1956) or through a direct policy to drive investment, derived from post-Keynesian growth models (cf. Kurz and Salvadori, 2010). In this regard, this article's argument is housed within the heterodox approach even though it follows a causality flow framed by an open economy which employs Harrod's postulate on the dual-role of investment (see Moudud, 2000) as a source of demand and, therefore, potentially of a demand for imports and as a mechanism to replace imports and expand the domestic market given its ability to generate productive capacity.

Thus, the objective of this work is to show that investment, not exports, is the engine of growth in Latin America, both before and after the external debt crisis of the 1980s. We also seek to show that the reduction in capital accumulation seen in the region fundamentally explains the reduction in growth. To this end, we analyze four of the largest economies in the region: Argentina, Chile and Mexico during 1961-2019, and Brazil during 1971-2019.

This article is divided into four sections, including this introduction. The second section provides a brief exposition of Kaldor's (1970) and Thirlwall's (1979) export growth models, and a part that integrates in Thirlwall's model the role capital accumulation has in determining the growth rate. The third section presents an empirical analysis showing that capital accumulation is more relevant than export growth rate in determining the study's sample economies' growth rate. Finally, the fourth section presents some final thoughts on the subject.

2. EXPORT GROWTH MODELS AND CAPITAL ACCUMULATION

Economic growth theories provide various explanations for the differences seen in international growth rates, both between countries and between different time periods. Among the spectrum of explanations we find at one end those based on supply, that is the accumulation of productive factors through growth models both exogenous (cf. Solow, 1956; Mankiw *et al*., 1992) and endogenous (cf. Romer, 1986 and 1990; Lucas, 1988; Barro, 1990; Rebelo, 1991); at the other end are those based on demand (cf. Thirlwall, 1979; Clavijo and Ros, 2015).

Kaldor (1957), following a Keynesian approach at the demand end of growth theory, developed a model in which, in the short term, economic growth rates depend on capital accumulation. However, in the long run, growth depends on purely technological factors. In this case, differences seen in growth can be divided into two groups: short-term and long-term.

Thus, in the short term, different growth rates are explained by the differences in how the profits generated by income are distributed, with those economies which have the smallest share of profits growing the least. In the long run, growth rates depend on product's elasticity in regards to capital and on the flow of new ideas and economies' willingness to adopt them. However, regardless of its Keynesian nature, Kaldor's model (1957) implies that in the long run growth is restricted by the accumulation of productive resources.

The idea that the long-term growth rate can be determined by demand and not by the accumulation of productive factors can be traced back to Kaldor's (1970) export growth model,[4] which was formalized by Thirlwall (2003). This model is based on the "Verdoorn Law" and on the belief that exports are the only truly autonomous component of demand (cf. Thirlwall, 2003), thereby producing a virtuous cycle of more exports, more growth, more productivity, and more exports. The process described can be expressed in the following manner, assuming that the growth rate of product (g) depends on the growth rate of exports (x):

$$g = \gamma x \qquad (1)$$

where γ is output elasticity in regards to exports; while assuming that x depends on the percentage variation rate of the real exchange rate ($e + \pi^* - \pi$) and the foreign product growth rate (z):

$$x = \varepsilon_x(e + \pi^* - \pi) + \Psi^* z \qquad \varepsilon_x, \Psi^* > 0 \qquad (2)$$

where e is the nominal depreciation/appreciation rate, π^* and π are the external and domestic inflation rates respectively, ε_x is the price elasticity of export demand and Ψ^* is the income elasticity of the country's export demand with regards to the world or relevant trading partners. In turn, π depends on the change percentage in nominal wages (w), labor productivity (l) and profit margin (τ):

$$\pi = \tau + w - l \qquad (3)$$

The importance of the Verdoorn coefficient lies in the idea that l is endogenous to g:

$$l = l_0 + \lambda g \qquad 0 < \lambda < 1 \qquad (4)$$

Where l_0 is the autonomous growth rate of labor productivity. The equilibrium growth rate is obtained by substituting equation (4) in (3), the result in equation (2) and the new result in equation (1), from which the long-term growth rate (g_{LP}) is obtained:

$$g_{LP} = \frac{\gamma[\varepsilon_x(e+\pi*-\tau-w+l_0)]+\Psi*z}{1-\gamma\varepsilon_x\lambda} \qquad \gamma\varepsilon_x\lambda < 1 \qquad (5)$$

Equation (5) shows that when the Verdoorn coefficient is equal to zero, g_{LP} is less than when it is between zero and one; therefore, equation (5) also shows a positive relationship between domestic growth rate and foreign growth rate, or in other words, between domestic growth rate and export growth rate.

According to Thirlwall (1979), Kaldor's (1970) export growth model suffers from omitting imports and their effect on the trade balance in the economic growth process. In this regard, Thirlwall (1979) argues that while long-term growth depends on x, the trade balance's dynamic equilibrium is the main constraint to economies' growth, which he demonstrates based on Harrod's (1933) theory of an external multiplier. Thirlwall's model (1979) can be formalized on the basis that economies must maintain trade balance's dynamic equilibrium in the long term; this condition, in terms of domestic goods, can be expressed as follows:

$$x = \theta + m \qquad (6)$$

where θ is the variation percentage in the real exchange rate ($e + \pi^* - \pi$) and m is the import growth rate. We likewise assume that the behavior of x can be expressed by equation (2) and that, symmetrically, m depends on θ and on g:

$$m = \varepsilon_m(\pi - \pi^* - e) + \Psi g \qquad \varepsilon_m, \Psi > 0 \qquad (7)$$

where ε_m is the price elasticity of import demand and Ψ is the income elasticity of the domestic country's import demand. Substituting equations (2) and (7) in (6) and solving for g yields the long-term growth rate consistent with the trade balance's dynamic equilibrium (g_{tb}):

$$g_{tb} = \frac{(\varepsilon_x+\varepsilon_m-1)\theta+\Psi^* z}{\Psi} \quad (8)$$

In equation (8) we see that g_{tb} has a positive relationship with *θ* and *z*. Nevertheless, Thirlwall (1979) emphasizes the fact that even if the Marshall–Lerner condition is met ($\varepsilon_x + \varepsilon_m - 1 > 0$), it is impossible to use the real exchange rate as a permanent method for increasing g_{tb}. To this we add the fact that it is normal for price elasticities to be very low and/or for relative prices to be more or less constant,[5] with which Thirlwall (1979) discards the effect of *θ* on g_{tb}. On the other hand, given that $\Psi^* z$ represents *x*, equation (8) can be restated as what is called the weak version of Thirlwall's Law:

$$g_{tb1} = \frac{x}{\Psi} \quad (9)$$

so, according to equation (9), given *Ψ,* long-term growth depends on *x*. Now, according to Vázquez-Muñoz (2018), the long-term predictions provided by the weak version of Thirlwall's Law are not plausible as they imply that when *Ψ* is greater than one, the economy tends to only produce for the external market and, when it is less than one, tends to become a closed economy, which is not feasible in the real world.

Likewise, according to Vázquez-Muñoz (2018) and Ibarra (2015), the traditional specifications of the equations of *x* and *m* yield biased estimates of *Ψ* and *Ψ* *, given that they do not take into consideration the effects of capital accumulation, such as whether an expansion into the foreign market is accompanied by domestic capital accumulation or not. In the former, the increase in export demand will be accompanied by a greater supply of domestic goods, while in the latter it will occur without a response from domestic production. This means that in the first case the estimate of *Ψ* * is greater than in the second case. Likewise, if domestic expansion occurs without capital accumulation there will be an increase in *m* while, if it happens in the presence of capital accumulation, the response of imports will be low, meaning that in the first case the estimate of *Ψ* will be higher than that in the second case.

Thus, Vázquez-Muñoz (2018) expands Thirlwall’s model (1979) in order to include the role of capital accumulation in import demand. According to Vázquez-Muñoz (2018), capital accumulation has two effects on *m*, one direct and positive stemming from the need to import capital goods, and another negative and indirect resulting from the possibility of replacing imported goods with domestically produced goods. The function of the import growth rate is then respecified as:

$$m = \Psi_I \frac{I}{K} + \Psi(g - ce) \quad (10)$$

where Ψ_I is import demand’s gross capital stock elasticity, *I* is gross investment and *ce* is the growth rate of economic capacity, understood as the desired level of production, given capital stock (*K*) (cf. Shaikh, 2016). That is, *ce* is a variable which depends on I/K:

$$ce = a + \frac{I}{K} - \delta \quad (11)$$

where *a* is the growth rate of capital productivity. We likewise omit in equation (10) the effect of the real exchange rate on import demand. Therefore, assuming that *θ* is equal to one and remains constant, and considering that $\Psi^* z$ is equal to *x*, substituting equations (10) and (11) in (6), one obtains the long-term growth rate consistent with trade balance’s dynamic equilibrium which considers the role of capital accumulation (g_{tbI}):

$$g_{tbI} = \frac{x}{\Psi} + \frac{(\Psi-\Psi_I)}{\Psi}\frac{I}{K} + (a - \delta) \quad (12)$$

according to equation (12), the long-term growth rate in a model constrained by the trade balance’s dynamic equilibrium not only depends on *x*, but also on *I*/*K*.

Furthermore, we must add that according to Perrotini *et al.* (2019), given that the adjustment variable in the model is *g*, it is important to differentiate between its components, that is between the growth of domestic demand for domestic goods (*id*) and *x*, as the adjustment will be verified in the former. This distinction is important because, contrary to the traditional postulate that *x* improves trade balance, it can happen that *x* worsens it due to the multiplier effect on income, given *Ψ,* and that *x* therefore negatively affects *id*.

Next, we present empirical evidence on the importance of *x* and *I*/*K* in determining growth in economies constrained by the trade balance.

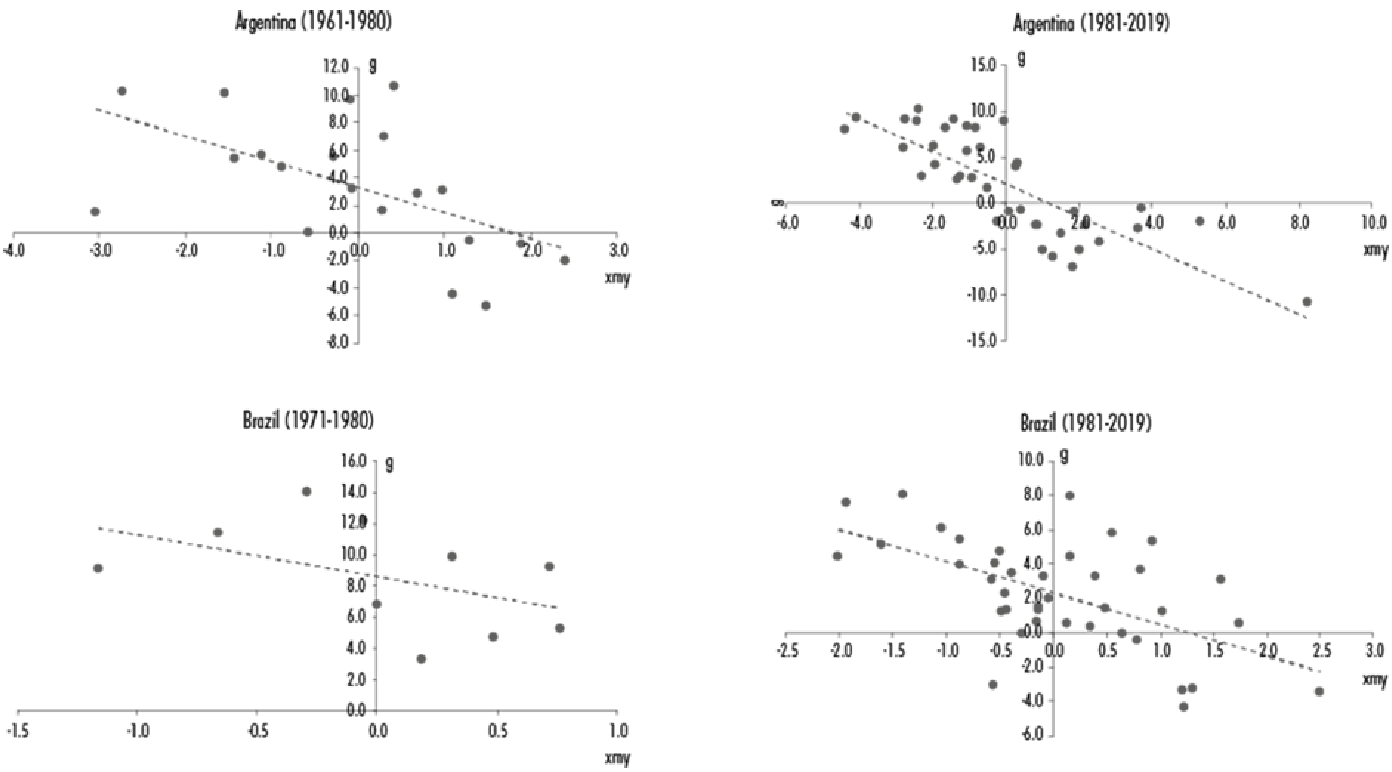
3. CAPITAL ACCUMULATION AND EXTERNAL CONSTRAINT, THE CASES OF ARGENTINA, BRAZIL, CHILE AND MEXICO

In this section we analyze the role of capital accumulation in determining GDP growth rate and in variations in the trade balance, as a proportion of GDP, in the cases of Argentina, Brazil, Chile and Mexico. The data used for the analysis was obtained from databases from CEPALSTAT,[6] World Penn Table version 10.0 and the World Bank’s World Development Indicators. The period analyzed was that of 1961-2019 for the cases of Argentina, Chile and Mexico, and 1971-2019 for Brazil; all series used were measured in domestic currency at constant prices.

It is important to begin the analysis by highlighting that while Thirlwall (1979) argues that the main constraint to economic growth is the trade balance’s dynamic equilibrium, Moreno-Brid (1998-1999) argues that the real constraint lies in maintaining the trade balance constant in proportion to GDP. In this regard, and taking into account the external debt crisis which affected the Latin American countries in the early 1980s, Figure 1 shows the relationship between the annual variation in the trade balance as a percentage of the GDP (*xmy*) and the GDP growth rate (*g*) for the four economies in the sample before and after their external debt crisis.

Figure 1 shows, on the one hand, that the four economies exhibit a negative relationship between *xmy* and *g*, and, on the other hand, that after the external debt crisis, every case exhibited a decrease in the growth rate that keeps the trade balance constant as a proportion of the GDP.[7] In the case of Argentina it went from 3.3 to 2.1%, in Brazil it went from 8.6 to 2.3%, Chile from 4.2 to 4.1%, and Mexico from 6.8 to 2.4%. This intrinsically means a tightening of the external constraint on economic growth[8] and, according to what we have shown in the previous section, this phenomenon can be attributed to a drop in the export growth rate or a slowdown in capital accumulation.

Figure 1. Annual variation in trade balance as a percentage of GDP (horizontal axis: *xmy*) and GDP growth rate (vertical axis: *g*)



Note: the line indicates g's estimated values with regards to xmy using a linear relationship acquired using the Ordinary Least Squares method.

Source: created by the authors using the CEPALSTAT's and the World Bank's World Development Indicators databases.

In order to analyze the effect capital accumulation has on the study's sample economies' growth rate, we first calculate the gross capital stock using the perpetual inventory method, for which in accordance with Berlemann and Wesselhöft (2014) we estimate the trend growth rate of the net capital stock as corresponding to that of gross investment (*I*) using the following equation:

$$lnI = \Theta_0 + \Theta_1 t + u_I \qquad (13)$$

where *ln* denotes the natural logarithmic operator, *t* is a trend variable, *uI* are the estimation errors, Θ_i are the parameters to be estimated and, in particular, Θ_1 is the estimated value of the trend growth rate of *I*.[9]

The gross investment trend growth rates are assumed to be equal to the trend growth rates of their net capital stocks. Once these were obtained for each country in the study's sample, the initial net capital stock for each country was calculated as follows:

$$K_0 = \frac{I_1}{\Theta_1 + \delta_1} \qquad (14)$$

where I_1 and δ_1 are the initial values of gross investment and the capital stock's depreciation rate respectively. Then we obtained the series of net capital stock[10] for each of the countries in the sample using the perpetual inventory method:

$$K_t = I_t + K_{t-1} - \delta_t K_{t-1} \quad (15)$$

Using the net capital stock series, Table 1 shows a closer relationship between GDP growth rates and gross capital accumulation rates than between GDP growth rates and export growth rates, both before and after the external debt crisis. In fact, according to what was described regarding the relationship between *xmy* and *g*, with the exception of Chile, all economies exhibited a reduction in their gross capital accumulation rate. Furthermore, it is worth pointing out that export growth rates fluctuated to a smaller degree than capital accumulation rates.

Table 1. Gross capital accumulation rate, export growth rate and GDP growth rate

	g	*x*	*I/K*	*g*	*x*	*I/K*	*g*	*x*	*I/K*
	1961-1980			*1981-1990*			*1981-2019*		
Argentina	3.4	6.2	7.2	-0.7	5.5	4.3	2.8	4.3	5.6
Chile	3.7	7.4	3.2	3.1	6.4	3.8	4.6	5.0	8.7
Mexico	6.8	11.1	15.6	1.9	7.5	8.2	2.5	6.0	6.7
	1971-1980			*1981-1990*			*1981-2019*		
Brazil	8.5	10.2	15.2	1.8	7.7	8.6	2.4	5.5	7.4

Source: created by the authors using the databases from CEPALSTAT, the World Bank's World Development Indicators databases and World Penn Table, version 10.0.

Based on the descriptive analysis of the data, we apply a more rigorous analysis of the relationship between GDP growth rate and export growth rate and the capital accumulation rate. To this end, and based on the theory for determining growth in an economy constrained by trade balance developed in the previous section, we calculate the following equation, based on equation (12):

$$g = \Theta_2 + \Theta_3\left(\frac{I}{K}\right) + \Theta_4 x + u_g \quad (16)$$

where Θ_i are the parameters to be estimated and u_g is an error term. The estimation of equation (16) is based on the panel data constructed with the available data for the sample countries. In this regard, this data allowed the construction of two panels, one balanced for the period of 1971-2019 and an unbalanced one covering the period of 1961-2019.

Table 2 presents the unit root tests for the series used. As one can see, all are stationary, allowing us to avoid the problem of spurious regression.

Table 2. Unit root tests for the I/K, id, x, g series.

Balanced panel					
Test	*Levin-Lin-Chu*	*Harris-Tzavalis*	*Breitung*	*Im-Pesaran-Shin*	*Fisher-type ADF*
I/K	-1.72**	-3.78***	-1.88**	-1.43*	24.71***
id	-8.63***	-21.71***	-4.84***	-8.21***	90.79***
x	-9.08***	-24.42***	-5.76***	-9.22***	112.36***
g	-8.44***	-20.90***	-4.78***	-8.02***	87.67***
Unbalanced panel					
I/K				-1.69**	26.48***
id				-8.53***	104.52***
x				-11.63***	154.09***
g				-8.91***	102.19***

Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. The null hypothesis of each test may vary, however, they all refer to the stationarity of the respective series.

Table 3 shows the results of the estimation of equation (16) for the methods of Fixed Effects, Random Effects, Feasible Generalized Least Squares and Panel Corrected Standard Errors. The use of four estimation models is due to two important reasons. First, we seek to obtain a robust estimate of equation (16) which guarantees the consistency of the estimated parameters in their statistical significance, whether the effect of dependent and independent variables is positive or negative in value and the magnitude of the estimated coefficient. In other words, we seek to demonstrate that even when changing the estimation technique, the estimations of the effect had by exports and capital accumulation are consistent. Second, estimation using Feasible Generalized Least Squares and Panel Corrected Standard Errors models allows one to control the estimation considering the panel type data models' problems of autocorrelation, contemporaneous correlation and heteroscedasticity (Beck and Katz, 1995).

Table 3. Estimation of the GDP's growth rate (g) equation

Independent variable	*Fixed effects*	*Random effects*	*Panel Corrected Standard Errors*	*Feasible Generalized Least Squares*
		Balanced panel 1971-2019		
x	0.086	0.085	0.078**	0.061**
	(0.057)	(0.056)	(0.036)	(0.031)
I/K	0.648***	0.598***	0.623***	0.631***
	(0.111)	(0.105)	(0.107)	(0.096)
Constant	-2.190**	-1.806**	-1.940**	-2.323***
	(0.491)	(0.902)	(1.007)	(0.888)
Observations	196	196	196	196
Groups	4	4	4	4
F Statistic	294.47***			
Wald Chi2 Statistic		706.43***	41.19***	50.37***
R^2	0.1745	0.1748	0.1578	
		Unbalanced panel 1961-2019		
x	0.046	0.045	0.039	
	(0.052)	(0.051)	(0.031)	
I/K	0.523**	0.424***	0.464***	
	(0.120)	(0.119)	(0.077)	
Constant	-0.891	-0.121	-0.387	
	(0.724)	(1.042)	(0.807)	
Observations	226	226	226	
Groups	4	4	4	
F Statistic	25.92***			
Wald Chi2 Statistic		74.19***	41.83***	
R^2	0.1421	0.1424	0.1217	

Note: the results obtained are maintained when estimating for the subperiods of 1961-1980 and 1981-2019 (see Table A1).
Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. Standard errors are shown in parentheses and are robust in all estimates.

According to the results acquired, there is a positive and significant relationship between the GDP growth rate and the capital accumulation rate; in contrast, the export growth rate does not seem to affect it, or to do so positively by a fairly small magnitude, as it was only statistically significant in the Pane Corrected Standard Errors and Feasible Generalized Least Squares models in the balanced panel, which implies exports have a reduced but positive effect on product growth.

Now, in order to present even more refined evidence of the comparative importance of capital accumulation versus export growth, we proceeded to substitute product growth rates as a dependent variable in the estimates with the growth of domestic demand for domestic goods.[11] Therefore, the next equation for estimation is specified below:

$$id = \Theta_5 + \Theta_6\left(\frac{I}{K}\right) + \Theta_6 x + u_{id} \qquad (17)$$

where Θ_i are the parameters to be estimated and u_{id} is an error term. In Table 2 we find the unit root tests for the *id* series which is shown to be stationary. Meanwhile, Table 4 shows the results of equation (17)'s estimation; as one can see, *I/K* consistently exhibits a positive and significant relationship with *id*; the estimated coefficient is highly significant in all models and its size barely changes. Likewise, x is not found to have a consistent relationship with *id* as it is only significant for the unbalanced panel's estimation with Panel Corrected Standard Corrected Errors, the estimated coefficient is very small however.

Table 4. Estimation of the equation for domestic demand for domestic goods (id) growth rate

Independent variable	Fixed effects	Random effects	Panel Corrected Standard Errors	Feasible Generalized Least Squares
		Balanced panel 1971-2019		
x	-0.024	-0.026	-0.035	-0.054
	(0.042)	(0.042)	(0.040)	(0.034)
I/K	0.800***	0.754***	0.759***	0.790***
	(0.096)	(0.090)	(0.119)	(0.106)
Constant	-3.079***	-2.720***	-2.692**	-3.396***
	(0.469)	(0.941)	(1.116)	(0.976)
Observations	196	196	196	196
Groups	4	4	4	4
F Statistic	292.16***			
Wald Chi2 Statistic		434.6***	40.51***	56.32***
R^2	0.1735	0.1736	0.1558	
		Unbalanced panel 1961-2019		
x	-0.052	-0.053	-0.058*	
	(0.037)	(0.036)	(0.034)	
I/K	0.652***	0.559***	0.569***	
	(0.108)	(0.107)	(0.087)	
Constant	-1.665*	-0.939	-0.982	
	(0.717)	(1.084)	(0.908)	
Observations	226	226	226	
Groups	4	4	4	
F Statistic	22.05**			
Wald Chi2 Statistic		34.07***	42.57***	
R^2	0.1510	0.1515	0.1319	

Note: the results obtained are maintained when estimating for the subperiods of 1961-1980 and 1981-2019 (see Table A2).
Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. Standard errors are shown in parentheses and are robust in all estimates.

Finally, in relation to the above, considering the fact that the trade balance as a proportion of GDP is the main constraint to economies' growth, we pose the next equation for estimation in order to analyze the effect of *x* and *I/K* on *xmy*:

$$xmy = \Theta_8 + \Theta_9\left(id - \frac{I}{K}\right) + \Theta_{10}\left(x - \frac{I}{K}\right) + u_{xmy} \qquad (18)$$ [12]

where Θ_i are the parameters to be estimated and u_{xmy} is an error term. Thus, table 5 presents the unit root tests of the series used in equation (18)'s estimation, by which we conclude that the series are stationary.

Table 5. Unit root tests for the xmy, id-I/K and x-I/K series

Test	*Levin-Lin-Chu*	*Harris-Tzavalis*	*Breitung*	*Im-Pesaran-Shin*	*Fisher-type ADF*
Balanced panel					
xmy	-8.83***	0.14***	-7.43***	-8.87***	105.67***
id-I/K	-9.54***	0.21***	-5.01***	-9.01***	103.43***
x-I/K	-7.40***	0.28***	-5.19***	-7.66***	106.89***
Unbalanced panel					
xmy				-7.84***	127.89***
id- I/K				-8.80***	106.65***
x-I/K				-9.27***	141.54***

Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. The null hypothesis of each test may vary, however, they all refer to the stationarity of the respective series.

Table 6 shows the results of the estimate and one can see that *x* positively affects *xmy*; however, the estimated values of the effect of *x* on *xmy* tend toward zero, while on the other hand, we obtained negative coefficients corresponding to *id*. This implies that *x* does not significantly improve *xmy*, while the effect of *I/K* on *xmy*, obtained by adding the estimated coefficients of *id – I/K* and *x – I/K*[13] is positive and greater in absolute value than the effect of *x*.

Table 6. Estimation of the equation for the annual variation in trade balance as a proportion of GDP (xmy)

Independent variable	*Fixed effects*	*Random effects*	*Panel Corrected Standard Errors*	*Feasible Generalized Least Squares*
		Balanced panel 1971-2019		
id- I/K	-0.308***	-0.288***	-0.302***	-0.256***
	(0.034)	(0.030)	(0.023)	(0.019)
x- I/K	0.084**	0.087***	0.080***	0.082***
	(0.021)	(0.021)	(0.011)	(0.009)
Constant	-1.319***	-1.224***	-1.286***	-1.219***
	(0.154)	(0.225)	(0.186)	(0.168)
Observations	196	196	196	196
Groups	4	4	4	4
F Statistic	39.83***			
Wald Chi^2 Statistic		90.01***	255.04***	278.47***
R^2	0.5798	0.5807	0.5892	
		Unbalanced panel 1961-2019		
id- I/K	-0.265***	-0.236***	-0.257***	
	(0.017)	(0.018)	(0.020)	
x- I/K	0.067**	0.071***	0.062***	
	(0.019)	(0.019)	(0.010)	
Constant	-1.116***	-0.976***	-1.077***	
	(0.073)	(0.162)	(0.179)	
Observations	226	226	226	
Groups	4	4	4	
F Statistic	127.94***			
Wald Chi^2 Statistic		180.44***	229.45***	
R^2	0.4935	0.4961	0.5140	

Note: the results obtained are maintained when estimating for the subperiods of 1961-1980 and 1981-2019 (see Table A2).

Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. Standard errors are shown in parentheses and are robust in all estimates.

4. FINAL THOUGHTS

According to the empirical evidence presented, in the context of the need to reconfigure growth strategies when faced by both old and new needs which have arisen in economies due to the current pandemic, economic policy needs to promote an accelerated rate of capital accumulation.

This may seem paradoxical given that, as has been mentioned, it is assumed that the study's sample economies are constrained by the trade balance's dynamic equilibrium, or rather, by the need to keep the trade balance constant as a proportion of GDP. This would make it seem that the natural candidate for leading growth is the export growth rate as it positively affects both growth as well as the trade balance. However, we must emphasize that imports depend on income which in turn depends on exports and if, as is typical, economies exhibit an income elasticity of import demand greater than one,[14] the response of imports to exports may be more than proportional or quasi-proportional. In addition to that demonstrated in the previous section, this means that exports would not be as relevant in the behavior of *xmy*, or at least they would not have the importance which they are normally attributed.

In contrast, capital accumulation has two effects on import demand. One positive effect is related to the import of capital goods and another negative, related to the production of goods and services which can lead to substituting imports, thereby improving the trade balance. In other words, capital accumulation increases income and relaxes external constraints on growth, allowing for greater long-term growth as seen in the empirical analysis for the panel composed with data from the four largest Latin American economies.

APPENDIX

This section reports the estimates made for two subperiods (1961-1980 and 1981-2019) in order to verify that the results are robust. This is because these sub-periods were marked by the implementation of different growth strategies and therefore different evolutions of capital accumulation and exports.

Table A1. Estimation of the GDP growth rate (g) equation

Independent variable	*Subperiods*			
	Fixed effects	*Random effects*	*Panel Corrected Standard errors*	*Feasible Generalized Least Squares*
		Unbalanced panel 1961-1980		
x	0.008	0.009	0.018	
	(0.047)	(0.046)	(0.047)	
I/K	**0.303**	**0.336*****	**0.324*****	
	(0.299)	(0.121)	(0.123)	
Constant	2.193	1.957**	1.925	
	(2.794)	(0.938)	(1.737)	
Observations	70	70	70	
Groups	4	4	4	
F Statistic	0.61			
Wald Chi2 Statistic		11.39***	7.73**	
R^2	0.1563	0.1563	0.1387	
		Balanced panel 1981-2019		
x	0.089	0.086	0.053	0.025
	(0.066)	(0.066)	(0.046)	(0.039)
I/K	**0.592***	**0.571*****	**0.713*****	**0.630*****
	(0.207)	(0.162)	(0.197)	(0.171)
Constant	-1.901	-1.734*	-2.567*	-2.142
	(1.220)	(1.015)	(1.562)	(1.351)
Observations	156	156	156	156
Groups	4	4	4	4
F Statistic	12.83**			
Wald Chi2 Statistic		24.78***	14.56***	14.05***
R^2	0.0849	0.0849	0.0861	

Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. Standard errors are shown in parentheses and are robust in all estimates.

Table A2. Estimation of the equation for the growth rate of domestic demand for domestic goods (id)

Independent variable	*Subperiods*			
	Fixed effects	*Random effects*	*Panel Corrected Standard errors*	*Feasible Generalized Least Squares*
		Unbalanced panel 1961-1980		
x	-0.059	-0.058	-0.046	
	(0.040)	(0.039)	(0.050)	
I/K	**0.365**	**0.385*****	**0.371*****	
	(0.318)	(0.120)	(0.136)	
Constant	1.900	1.784**	1.747	
	(2.940)	(0.884)	(1.931)	
Observations	70	70	70	
Groups	4	4	4	
F Statistic	1.27			
Wald Chi2 Statistic		10.24***	7.63**	
R^2	0.1722	0.1723	0.1450	
		Balanced panel 1981-2019		
x	-0.051	-0.063	-0.089*	-0.133***
	(0.040)	(0.040)	(0.051)	(0.042)
I/K	**0.821****	**0.726*****	**0.904*****	**0.860*****
	(0.217)	(0.097)	(0.222)	(0.194)
Constant	-3.159*	-2.438***	-3.548**	-3.517**
	(1.361)	(0.524)	(1.743)	(1.519)
Observations	156	156	156	156
Groups	4	4	4	4
F Statistic	8.22*			
Wald Chi2 Statistic		56.94***	19.31***	29.13***
R^2	0.1024	0.1031	0.1201	

Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. Standard errors are shown in parentheses and are robust in all estimates.

Table A3. Estimation of the equation for annual variation in the trade balance as a proportion of GDP (xmy)

Independent variable	*Subperiods*			
	Fixed effects	*Random effects*	*Panel Corrected Standard errors*	*Feasible Generalized Least Squares*
		Unbalanced panel 1961-1980		
id- I/K	-0.180**	-0.122***	-0.143***	
	(0.050)	(0.037)	(0.026)	
x- I/K	0.039*	0.050***	0.039***	
	(0.013)	(0.017)	(0.010)	
Constant	-0.719**	-0.437***	-0.582**	
	(0.227)	(0.056)	(0.248)	
Observations	70	70	70	
Groups	4	4	4	
F Statistic	6.64*			
Wald Chi2 Statistic		172.34***	51.03***	
R^2	0.3992	0.4376	0.4573	
		Balanced panel 1981-2019		
id- I/K	-0.339***	-0.321***	-0.336***	-0.288***
	(0.040)	(0.038)	(0.027)	(0.023)
x- I/K	0.092**	0.092***	0.083***	0.092***
	(0.029)	(0.027)	(0.015)	(0.013)
Constant	-1.439***	-1.357***	-1.440***	-1.364***
	(0.165)	(0.215)	(0.213)	(0.193)
Observations	156	156	156	156
Groups	4	4	4	4
F Statistic	40.77***			
Wald Chi2 Statistic		82.47***	235.22***	263.08***
R^2	0.5993	0.5995	0.6101	

Source: created by the authors using data from the databases from CEPALSTAT, the World Bank World Development Indicators and World Penn Table, version 10.0. *; **; *** imply statistical significance at 10%, 5% and 1%, respectively. Standard errors are shown in parentheses and are robust in all estimates.

BIBLIOGRAPHY

Awokuse, T. O. (2008). Trade openness and economic growth: is growth export-led or import-led? *Applied Economics*, *40(2).* https://doi.org/10.1080/00036840600749490

Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *The Journal of Political Economy, 98(5).* https://doi.org/ 10.1086/261726

Beck, N. and Katz, J. (1995). What to do (and not to do) with time-series cross-section data. *The American Political Science Review*, *89(3).* https://doi.org/10.2307/2082979

Berlemann, M. and Wesselöft, J. E. (2014). Estimating aggregates capital stocks using the perpetual inventory method - A survey of previous implementations and new empirical evidence for 103 countries. *Review of Economics*, *65(1*). https://doi.org/10.1515/roe-2014-0102

Bértola, L., Higachi, H. and Porcile, G. (2002). Balance-of-payments-constrained growth in Brazil: A test of Thirlwall's Law, 1890-1973. *Journal of Post Keynesian Economics, 25(1).* http://www.jstor.org/stable/4538815

Bresser-Pereira, L. C. (2011). From old to new developmentalist in Latin America. In J. A. Ocampo and J. Ros. *The Oxford Handbook of Latin American Economics* (pp. 3-25). Oxford University Press.

Clavijo, P. H. and Ros, J. (2015). La ley de Thirlwall: una lectura crítica. *Investigación Económica*, *74(292).* https://doi.org/10.1016/j.inveco.2015.05.003

Feder, G. (1983). On exports and economic growth. *Journal of Development Economics, 12(1-2).* https://doi.org/10.1016/0304-3878(83)90031-7

Gamba, L. (March 6, 2021). Slow economic recovery for Latin America. *Anadolu Agency*. https://www.aa.com.tr/en/americas/slow-economic-recovery-ahead-forlatin-america/2166459

Guerrero de Lizardi, C. (2006). Thirlwall's Law with an emphasis on the ratio of export/import income elasticities in Latin American economies during the twentieth century. *Estudios Económicos, 21(1).* https://doi. org/10.24201/ee.v21i1.159

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

Ibarra, C. A. (2015). Comentario a "La Ley de Thirlwall: una lectura crítica" de Pedro Clavijo y Jaime Ros. *Investigación Económica*, *74(292).* http://dx.doi.org/10.1016/j.inveco.2015.08.002

Jayme Jr., F. G. (2003). Balance-of-payments-constrained economic growth in Brazil. *Brazilian Journal of Political Economy, 23(1)*. https://doi.org/ 10.1590/0101-31572004-0708

Kaldor, N. (1957). A model of economic growth. *The Economic Journal, 67(268).* https://doi.org/10.2307/2227704

______ (1970). The case for regional policies. *Scottish Journal of Political Economy, 17(3)*. https://doi.org/10.1111/j.1467-9485.1970.tb00712.x

Kristjanpoller, W. and Olson, J. E. (2014). Economic growth in Latin America countries: It is based on export-led or import-led growth? *Emerging Markets Finance and Trade, 50(sup.1)*. https://doi.org/10.2753/REE1540- 496X5001S101

Kurz, H. D. and Salvadori, N. (2010). The post-Keynesian theories of growth and distribution: a survey. In M. Setterfield. *Handbook of alternative theories of economic growth* (pp. 95-107). Edward Elgar.

López, J. and Cruz, A. (2000). "Thirlwall's Law" and beyond: The Latin American experience. *Journal of Post Keynesian Economics*, *22(3).* https://www. jstor.org/stable/4538692

Lucas, R. E. Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22(1).* https://doi.org/10.1016/0304- 3932(88)90168-7

Mankiw, N. G., Romer, D. and Weil, D. N. (1992). A contribution to the empirics of economic growth. *The Quarterly Journal of Economics, 107(2).* https://doi.org/10.2307/2118477

Moreno-Brid, J. C. (1998). Balance-of-payments constrained economic growth: The case of Mexico. *Banca Nazionale del Lavoro Quarterly Review, 51(207).* https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/vie w/10604

________ (1999). Mexico's Economic Growth and the Balance of Payments Constraint: A cointegration analysis. *International Review of Applied Economics, 13(2)*. https://doi.org/10.1080/026921799101634

_______ (1998-1999). On capital flows and the balance-of-payments-constrained growth model. *Journal of Post-Keynesian Economics, 21(2).* https:// www.jstor.org/stable/4538629

Moudud, J. K. (2000). *Harrod versus Thirlwall: A reassessment of export-led growth* (TJLEI Working Paper no. 316). The Jerome Levy Economics Institute of Bard College. https://econwpa.ub.uni-muenchen.de/econ-wp/ mac/papers/0012/0012002.pdf

Ocampo, J. A. and Ros, J. (2011). Shifting paradigms in Latin America's economic development. In J. A. Ocampo and J. Ros. *The Oxford Handbook of Latin American economics* (pp. 3-25). Oxford University Press.

Pérez Caldentey, E. (2015). Una lectura crítica de "La lectura crítica" de la Ley de Thirlwall. *Investigación Económica*, *74(292).* http://dx.doi. org/10.1016/j.inveco.2015.08.003

Perrotini, I., Vázquez-Muñoz, J. A. and Avendaño, B. (2008). Toward a new developmental paradigm for Latin America. *International Journal of Political Economy, 37(3).* https://doi.org/10.2753/IJP0891-1916370303

______, Vázquez-Muñoz, J. A. and Angoa, M. I. (2019). Capital accumulation, economic growth and the balance-of-payments constraint: The case of Mexico, 1951-2014. *Nóesis, 28(55).* https://doi.org/10.20983/ noesis.2019.1.3

Rebelo, S. (1991). Long run policy analysis and long run growth. *The Journal of Political Economy*, *99(3).* https://doi.org/10.1086/261764

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy, 94(5).* https://www.jstor.org/stable/1833190

______ (1990). Endogenous technological change. *Journal of Political Economy, 98(5).* Parte 2: The problem of development: A conference of the Institute for the Study of Free Enterprise Systems. https://www.jstor.org/ stable/2937632

Shaikh, A. (2016). *Capitalism: Competition, conflict, crises.* Oxford University Press.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, *70(1).* https://doi.org/10.2307/1884513

Thirlwall, A. P. (1979). The balance of payments constraint as an explanation of international growth rate differences. *Banca Nazionale del Lavoro Quarterly Review*, *32(128)*. https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/12804

______ (2003). *La naturaleza del crecimiento económico: un marco alternativo para comprender la riqueza de las naciones.* Fondo de Cultura Económica.

______ (2011). Balance of payments constrained growth models: history and overview. *PSL Quarterly Review, 64(259)*. https://doi.org/10.13133/ 2037-3643/9404

Vázquez-Muñoz, J. A. (2018). La acumulación de capital como un determinante de la tasa de crecimiento de la Ley de Thirlwall. *Contaduría y Administración, 63(3)*. http://dx.doi.org/10.22201/fca.24488410e.2018.1260

Werner, A., Komatsuzaki, T. and Pizzinelli, C. (April 22, 2021). Latin America and the Caribbean: what does their COVID recovery look like? World Economic Forum. https://www.weforum.org/agenda/2021/04/covid19- economic-recovery-short-long-term/

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[1] According to Kristjanpoller and Olson (2014), the Latin American region was distinguished by an export-led economic growth strategy from 1970 to 2010. Likewise, Bolivia, Brazil, Colombia, the Dominican Republic, Ecuador, El Salvador, Mexico and Peru each experienced export growth whilst Argentina, Chile, Costa Rica, Guatemala, Honduras and Peru experienced import-led growth. Nevertheless, it is impossible for an economy to import without exporting.

[2] It is worth mentioning that according to Ocampo and Ros (2011), the growth trend exhibited by labor productivity in Latin America during the export-led growth period (1990-2008) is less than that seen in the State-led industrialization period (1950-1980). Meanwhile, at the individual level of each of the 18 sampled countries, only Chile and the Dominican Republic saw an improvement.

[3] For example, Bresser-Pereira (2011) argue that the ability of Latin American economies to achieve a high growth rate depends on their ability to export high value-added manufactured or primary goods. Something which they have been unable to achieve so far.

[4] In fact, it was Harrod (1933) who preceded the idea of external constraints on growth by proposing a static international trade multiplier (cf. Thirlwall, 2011).

[5] According to Pérez Caldentey (2015), the average variation rate for the actual real exchange rate is 0.29% for a sample of 93 countries in different parts of the world, based on a quarterly series starting with the first quarter of 1980 and ending with the first quarter of 2015.

[6] TL note: the ECLAC's statistical databases and publications.

[7] The calculation of the growth rate which keeps the trade balance constant as a proportion of the GDP is based on the Ordinary Least Square regressions shown in figure 1.

[8] See, among others, López and Cruz (2000), Bértola *et al*. (2002), Jayme Jr. (2003), Moreno-Brid (1998 and 1999) and Guerrero de Lizardi (2006) for estimates on equilibrium growth rates consistent with the external constraint on growth in Latin American economies.

[9] The estimation of equation 13 was carried out using the ordinary least squares methodology.

[10] The estimated series of net capital stock are available from the authors upon request.

[11] Domestic demand for domestic products is the difference between GDP and exports. The idea of substituting *g* with *id* is to obtain the effect that exports and capital accumulation have on the non-export sector's product growth. The aim of this is to clarify the degree of linkage with the rest of the economy on the one hand and, on the other, the multiplier effect had by capital accumulation on the non-export sector.

[12] Equation (18) makes it possible to disaggregate the effects of external and domestic demand for domestic goods in *xmy*. Likewise, we subtract from both *id* and *x* capital accumulation due to the idea presented in equation (10), according to which, the effect in both import demands and thusly *xmy* can be calculated more efficiently if we consider their values in relation to the country's productive capacity.

[13] If one considers that $g=\alpha id+(1-\alpha)x$, where α and $1-\alpha$ are the share of the GDP held by domestic demand for domestic goods and exports respectively, the above specification can be restated as follows: $xmy=\theta_{11}+\theta_{12}\,(\alpha id+(1-\alpha)x-I/k)+uxmy_2$ or $xmy=\theta_{11}+\theta_{12}(\alpha(di-I/k))+\theta_{12}((1-\alpha)(di-I/k))+uxmy_2$, whereupon the sum of $\theta_{12}\alpha$ and $\theta_{12}(1-\alpha)$ is the effect of I/k on *xmy*.

[14] See, among others, the references laid out in footnote 7.