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Looking for the engines of growth: A demand led growth approach for Nicaragua

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José Noguera

ABSTRACT

After 2008 financial crisis many of the neoclassic theory assumptions were questioned leading to the resurgence of Keynesianism. The aim of this study is to contribute to the decision making process of public policies by assessing the factors that drive economic growth with a demand side perspective. We use an ARDL model to determine the macroeconomics variables that pull production. The results show that economic growth of Nicaragua responds positively to demand effects. More importantly, the exports and to a less extend government expenditure have driven the economic growth of the country during 1994q1-2011q4 period.

Keywords: Economic growth, demand led growth, long-run development, Post-Keynesianism, ARDL, Nicaragua.

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1. Introduction

In recent years Nicaragua has accomplished higher rates of economic growth compared to its Central American peers and it has outperformed compared to Latin American countries (see appendix, graph no. 5). This has allowed to increase per capita income, employment and improve the nation's well-being. However, it has been argued that even if Nicaragua keeps this rate of growth in the next years, probably, the country will not converge in relative per capita income with the rest of the region.

The urge to account for higher rates has led many to debate on the actions the country should take in order to accomplish economic prosperity. Unfortunately, most of the proposed options are orthodox policies² such as increasing productivity or improving technology. As an alternative, we propose a different approach; our hypothesis is that long run growth determinants are influenced by demand factors. Thus, it is necessary to examine more variables, others than those considered by mainstream economics. As Keynes (1979 cited in Hein 2015) pointed: Say's law can only be assumed to hold in a "*barter economy*", where aggregate demand and aggregate supply cannot deviate in a real-wage. However, in today's economy, there may be leakages from the circuit of income which are not compensated for injections of the same amount, and aggregate demand may systematically deviate from aggregate supply (Hein, 2015). Therefore, the production of the economy and growth can be demand determined.

Studies on economic growth for Nicaragua are usually conducted using a supply side framework, limiting the policies options to this strand. However, there are some authors who have contributed to reverse the trend. De Franco (2011) identifies the factors that add-up to the economic growth considering the demand factors of the economy. He estimates growth through an accounting method finding that during the 50-70 decades growth was explained by the growth of internal demand, and from 2000 until 2007 due to exports.

Moreover, Moreno-Brid & Perez (1999) find a strong association between the rate of growth of real GDP and real exports and terms of trade (with a stronger effect of the former) in Central American countries in the 1950-1996 period. Vogel (2007) tests for the endogeneity of

² The dominant "school of thought" represented by the neoclassical economics.

the natural rate of growth of eleven countries - Nicaragua included- finding that countries are sensitive of potential growth to demand. Furthermore, due to low levels of industrialization and production, less developed countries reacts very sensitively to increases in actual growth. And most recently, Miranda (2016) finds that the determinant of the productivity growth is the growth of GDP. This open the debate on what factors should be considered in order to account for a more robust economic growth rate.

The aim of this study is to contribute to the decision making process of public policies. After 2008 financial crisis many prominent economists questioned the ability of the market to self-correct the deviations and restore itself back into equilibrium. Thus, we explore new possibilities that affect directly the economic growth rate, in this sense, we use an Auto Regressive Distributed Lag model (ARDL) to determine the macroeconomics variables that pull production.

The remaining of this article is organized as follow: section two discusses the theory of demand led growth. Next section, presents the performance of Nicaragua in the last two decades. Section four describes the methodology. Section 5 presents the results of the empirical analysis. Section 6 discusses policy implication and, finally, section 7 presents the conclusions of the analysis.

2. Long-run growth Theory: A demand side perspective.

The neo-classical theory of long-run growth is based on the models of Solow (1956) and Swan (1956). The model establishes a relationship between the rate of growth and the total factor productivity along with the quantities of labour and capital. Based on the premise that economies converge to a steady state where the stock of capital does not vary; the changes in the rate of growth are determined exogenously - i.e. changes in the rate of savings, productivity progress, etc.

However, this approach has failed to answer why the growth of factors supply differs between countries (Thirlwall, 2011b). In this line, Palley (1996) summarized the limitations of this theory in three aspects. First, capital accumulation rate depends exclusively on household savings behavior, completely neglecting the investment-saving nexus. Second, demand is not

considered in any aspect as a constraint, assuming that markets will clear at any level of production. And finally, neo-classical theory failed to endogenize steady state growth.

On the other hand, the problems of the production function are stressed by Temple (2006). He explains that since labour across sectors is allocated endogenously, it is impossible to write down an aggregate production form. Also, any form of aggregation of factors can hardly be considered as an approximation to reality since technology from one sector to another can differ greatly. In a similar vein Valle (1991 cited in Miranda 2016) claims that since the productivity is neglected to a residual calculation, after adjusting a model of arbitrary inputs and products, the goodness of fit of the residual is imperfect.

Neo-classic models restrict economic growth to savings, population growth and technologic progress. Nevertheless, these restrictions can easily be tackled down. Kaldor (1988) and Oreiro et al. (2012) argue that: i) Capital/Investment depends on the opportunity cost of capital and the expectation of future growth of sales and production; therefore, investment is an endogenous variable that is aligned with the expected growth of demand. ii) The number of hours worked can easily being increased resulting in a greater production. And, iii) innovation is largely determined by the rate of capital accumulation. It shows a structural relationship between the rate of growth of labour productivity and the rate of growth of output, known as the Kaldor-Verdoon Law³.

In terms of real world application, many of the assumptions of neoclassical theory proved wrong after the 2008 financial crisis. The efficient market hypothesis asserted that financial markets always get prices right. Pre-crisis debates among economists were centered in market self-correction mechanisms (Krugman, 2009). According to Krugman (2009), there were some economists who believed markets do not fail and others who believe that they fail from time to time but it could be corrected by Central Banks.

The lack of capacity of the market or Central Banks to restore equilibrium during the crisis led to the Keynesian resurgence. Keynes pointed out that government must participate in the economy when the monetary policy is ineffective or the private sector cannot be persuaded to spend more. This policy gained popularity again and in consequence, after the housing market

³ Kaldor-Verdoon Law implies that an increase in aggregate demand will cause labour productivity to grow faster, since output growth will accelerate in the wake of stronger demand (Oreiro et al., 2012).

crash, policy makers used sizable fiscal intervention to cope with the recession (Stockhammer et al., 2016).

Given all the limitations and downturns of classical theory, an alternative to deal with the problems of economic growth that concern governments is looking at them from a demand side perspective. Davidson (2006) points out that Keynes realized that the only path to global full employment requires every nation to actively undertake a program for public domestic investment to generate domestic full employment. If the nations follow a growth strategy based on the competitive advantages that aims to increase exports, the results would lead to a zero-sum game, that is, some nations obtaining a higher level of employment at the expenses of their trading partners or competing counterparts.

Despite the neoclassic belief of a passive government, the role that the public sector must play is in a way that full employment is reached through domestic demand policies. Only after these policies are implanted then an export led growth approach can be considered. These results are taken from experiences of countries such as Japan, Germany and later on China and India which used the export sector to grow at the expenses of the rest of the world (Davidson, 2006).

This economic stream has led to develop the theory of demand led growth. Based on the idea that Say's law works inversely, according to which the expansion on supply responds to the expansion of demand (Cornwall 1972 cited in Setterfield 2002). This theory gives a central role to the demand side of the economy. In words of Kaldor (1988 cited in Oreiro et al. 2012), the demand led growth premise is where means of production are themselves goods produced within the system; meaning that supply factors' endowments can increase continuously, and by doing so, do not represent a long-run growth constraint.

Demand led growth started with the contributions of Harrod (1939) and Kaldor (1957) following the ideas of Keynes. In his work, Harrod establishes the acceleration principle which is based on the changes of growth rate where the system of supply and demand is flowing at an altered rate, contrary to the steady state. According to the author, the line of output traced by the warranted rate of growth is a moving equilibrium, that is, the pace at which producers are satisfied with their production level and it will induce them to continue with this trend.

In this sense, an upward deviation of the warranted growth will create a greater stimulus to expansion in line with the acceleration principle, and conversely. Furthermore, contrary to the steady state, changes in the fundamental variables - such as saving, technology, etc. - can cause an opposite effect on the warrant path of growth (Harrod, 1939).

Kaldor (1957), inspired by Harrod (1939), develops a model with his own lights. The central ideas of the model are: i) in order to have continued growth, it is necessary that output increases as a result of capital investments and investments to take place in response to an increase in output. ii) Through the continue increase of machinery, etc. used in combination with labour, the productivity of labour will continuously be increased.

Accepting that the long-run growth is determined by demand factors, will lead us to conclude that the pace at which the real output grows is determined by autonomous demand growth. In the case of open economies, autonomous demand has two components: exports and government consumption (Park 2000 cited in Oreiro et al. 2012). Investment, however, is endogenously determined by the increase of output as Kaldor establishes.

For small open economies, export growth is the exogenous variable. If government consumption grows faster than export growth, then the real output and income will outpace exports. Additionally, the import's growth plays an important role determining the long-term deficit (Oreiro et al., 2012). A sustained trade deficit will curtailed demand, so supply is never fully utilized and the country's goods become less desirable worsening the balance of payment even further (Thirlwall, 2011a), implying that in the long-run the commercial deficit will constrain the rate of growth.

This idea of balance constraint led Thirlwall to set a model where no country can grow faster than the rate consistent with the balance of payment equilibrium on current account, unless it can finance the growing deficit. As fundamental law, the rate of growth of a country will approximate to the ratio of its rate of growth of exports and its income elasticity demand for imports (Thirlwall, 2011a).

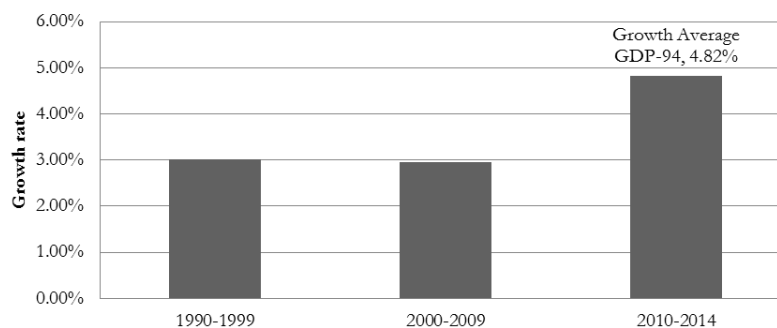
3. The growth performance of Nicaragua 1990 - 2014

The implementation of neo-classical policies collected in the Washington Consensus were intended to reduce the size of the government, eliminate the trade barriers and guide the economy to a free market. The aim of the strategy was to grow by increasing productive capacity and focusing on foreign markets. During the 1990-2000, growth was driven by exports and investment⁴. The public expenditure was reduced drastically, the private consumption recovered, however, the imports were the component that grew the most (De Franco, 2011).

In the subsequent decade growth was explained solely by the increase of exports (De Franco, 2011). Albeit the exports volume increased at a higher pace than previous years, the economic performance was still low. This period of relative stable growth was impacted by two external shocks, the first during 2001-03, due to coffee prices, agricultural stagnation and slowdown in other Latin American countries. The second hit was in 2009 where real GDP fell 1.5% led by sharp declines in private consumption and investment (World Bank, 2012).

From 2010 and forth the growth rate increased to a higher rate (see graph no.1), pushed by the exports which grew 13.2 percent in real terms in the first year (World Bank, 2012). Even though from 2007 the volume of the main exportable products experienced a decline, the favourable prices of commodities compensated the fall.

Graph no. 1
Growth rate of Nicaragua 1990-2014



Source: Self elaboration, BCN statistics.

⁴ The increase in investment was due to the reconstruction program that the public sector followed after the Hurricane Mitch.

Another aspects that have contributed to Nicaragua economic growth are certainly the macroeconomic and fiscal sound policies. Nicaragua has successfully reduced external debts levels, from above 150 percent of GDP in 2001 to less than 60 percent in 2010. Also, monetary policy has been adequate and inflation has been kept down to one digit for most of the years (World Bank, 2012).

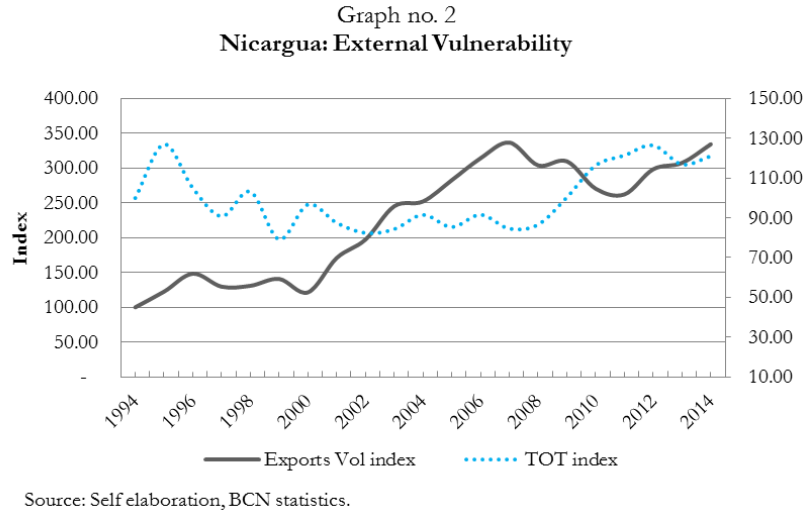
Nicaragua has subscribed to many international trade agreements recently, possibly being DR-CAFTA the most important that allowed to cut down tariffs in the trade of goods and services with the United State. These processes have intensified the integration of the country to the international commerce. However, the shortcomings have been many, as exports are highly concentrated into primary goods and to one country. In 2015 and 2016, goods sent to United States accounted for almost 40% of total exports⁵, thus it is vulnerable to food price movements and political relationships. Also, share of imports has expanded to 71.5 as a share of GDP, increasing external dependency (World Bank, 2012).

The Foreign Direct Investment (FDI), foreign aid along with the remittances have contributed to finance the deficit in the current account in 2016 (BCN, 2017). Growing (the FDI) almost 280% from 2007 to 2016, without these inflows of capital Nicaragua's economy would probably had performed similar or worse than the last two decades because of Thirlwall's Law.

Nicaragua has relied on its export potential to account for growth. However, overtime, it has changed little or nothing its exportable offer. According to FUNIDES (2016) in 2015, 85% of the export value corresponded to natural resources. Moreover, through the period studied (1994-2011), the terms of trade index has not yet over-passed the level of 1995 (see graph no.2), probably confirming the Prebisch-Singer thesis⁶.

⁵ Source: <http://www.cetrex.gob.ni/webSite/servicios/estadisticas2.jsp>

⁶ Price of commodities goods declines relative to the price of manufactured good over the long term, which causes terms of trade of primary-product-based economies to deteriorate.



4. Methodology

Following the methodology of Ledesma & Thirlwall (1998), we can approach the natural rate of growth as the actual rate of growth that keeps unemployment constant; implying the so-called rate of growth of labour force in efficiency units by Harrod.

From Okun's law (1962), we can specify the changes in the percentage of unemployment as a linear function of the growth of output:

$$\Delta \%U = a - b(g) \quad (1)$$

Where $\%U$ is the percentage of unemployment, a is a constant, b is a parameter and (g) is the growth of output. When $\Delta \%U = 0$, the natural rate of growth is defined as a/b . However, labour market conditions (such as labour hoarding or drop-outs of labour) can affect the estimates of a and b , causing problems in the parameters and risking to under/overestimate the natural rate of growth (Ledesma & Thirlwall, 1998).

This problem is especially important to address for Nicaragua. We know that during the decade of the 90's, the country suffered dramatic changes in its economy as a result of the structural reforms of the Washington Consensus. In this period hundreds of thousands of people were dismissed from the central government to reduce the size and role of the public sector; resulting in a significance increase of the unemployment rate in the early years.

To gauche with the problem of bias, we can reverse the dependent variable of equation (1):

$$g = a_1 - b_1(\Delta\%U) \quad (2)$$

Where the constant a_1 now defines the natural rate of growth; that is, the growth rate consistent with no change in percentage level of unemployment.

To test for endogeneity, after estimate the natural rate of growth, deviations of the actual rate of growth from the natural rate can be calculated. We can rewrite equation (2) introducing a dummy variable ($D=1$), from periods when the actual rate of growth is above natural rate and zero otherwise (Ledesma & Thirlwall, 1998), resulting in:

$$g = a_2 + b_2D - c_2(\Delta\%U) \quad (3)$$

If the coefficient on the dummy b_2 plus the constant a_2 is significantly higher than the original constant a_1 in equation (2), this means that the rate of growth to keep unemployment constant in booms must have risen (Ledesma & Thirlwall, 1998). In other words, we face a dynamic equilibrium as proposed by Harrod (1939), so the altered growth rate will not affect the unemployment level, and the idea of full utilization of resources is no longer tenable.

It is necessary to prove that the rate of growth is determined endogenously. If it can be shown that the buoyancy of demand affects positively the rate of growth, and that output growth induces input growth, there needs to be much more focus on the components of demand, and constraints of demand (Ledesma & Thirlwall, 1998). Only after this point the study of demand factors is feasible.

4.1 A demand led growth model

The proposed model is in the spirit of Atesoglu (2002 cited in Pieroni et al. 2008), who uses an IS-PM approach to identifies the policy fiscal shocks by using the defense and civilian spending of the public budget sector. However, the equation used in this paper is set by Oreiro et al. (2012) to test the influences of demand-side factors on growth:

$$Y_t = I_t + EXP_t + GOV_t + GIR_t \quad (4)$$

Where all the variables are measure in real terms. Y is the Gross Domestic Product (GDP), I , investment, EXP , exports, GOV , government expenditure and GIR , gross international reserves.

An important difference from the models of Atesoglu (2002) and Oreiro et al. (2012) is that the Central Bank of Nicaragua does not predetermine the real interest rate⁷ nor targets inflation. In Nicaragua the monetary policy is set to ensure national price stability. The authorities have pegged the inflation to the nominal exchange rate; using the gross international reserves to guaranty free currency convertibility. Thus GIR is introduced in the model.

4.2 The method

After Granger and Newbold (1974) draw attention to the problem of series correlation, and then Granger (1981) proved that a vector of variables could have a linear combination which are stationary in levels (Nkoro & Uko, 2016), a series of methodologies have been developed to determine the long run relationship between series that are not stationary – i.e. Engel and Granger (1987), Johansen and Juselius (1990), as well as reparametrization of Error Correction Model (ECM).

Another methodology concerning cointegration which has increased in popularity among researchers is Autoregressive Distributed Lag model (ARDL). And it was proposed by Pesaran and Shin (1999) and Pesaran et al. (2001).

ARDL consists of two stages which can be explained as follows: in the first stage, whether there is a long run relationship between variables is determined. In the second stage, if the results indicate a long run relationship, a two-step procedure is executed (Tunali, 2016). The model takes each underlying variables as a single-run relationship equation. If one cointegration vector is identified, the model is reparametrized into ECM (Nkoro & Uko, 2016).

To test cointegration, an F-test is used to decide the existence of a long run relationship between variables. The null hypothesis of this test is $H_0 = \alpha_{11} = \alpha_{12} = \alpha_{13} = 0$ or that

⁷ The interest rate target is for countries where Central Bank have an additional objective for boosting economic growth such as U.S.A. (for an extended discussion see Romer 2000), not being the case for Nicaragua.

there is no long run relationship between the variables. The calculate F-statistic is compared with two critical values and three different results can be derived from this comparison. If F-statistic surpasses the upper critical value, the null hypothesis is rejected; hence there is a cointegration between the variables. If F-statistic is between the upper and lower limit, the result is inconclusive. And finally if the F-statistic falls below the lower bound, the null hypothesis cannot be rejected (Tunali, 2016).

Among the advantages of ARDL are that it can be used irrespective of order of integration of the variables as long as they are integrated of order $I(0)$, $I(1)$ or fractionally integrated (Pahlavani et al., 2005). Also, prevents serial correlation and endogeneity problems by proper augmentation. Finally, more reliable results are obtained when the sample size is small (Tunali, 2016).

On the other hand, one of the limitations of ARDL is that it can only accommodate one co-integration relationship. If there is more than one relationship then the Johansen and Joselius method is recommended, otherwise the model would be misspecified with ARDL.

According to Pesaran (1997 cited in Pahlavani et al. 2005), the ARDL is represented by the following equation:

$$\phi(L, p)y_t = \sum_{i=1}^k \beta_i(L, q_i)x_{it} + \delta'w_t + u_t \quad (5)$$

Where

$$\phi(L, p)y_t = 1 - \phi_1L - \phi_2L^2 - \dots \phi_pL^p$$

And

$$\beta_i(L, q_i) = 1 - \beta_{1i}L - \beta_{2i}L^2 - \dots \beta_{iq_i}L^{q_i} \quad i = 1, 2, \dots, k$$

In the above equation, y_t is the dependent variable, x_{it} denotes de i dependent variables, L is the lag operator and w_t is the $S \times 1$ vector of deterministic terms, dummy variables, time trends and other exogenous variables. The optimum lags are selected in this methodology according to Akaike Information Criterion (AIC) and Schwarz Bayesian Criteria (SBC) (Pahlavani et al., 2005).

As in Pahlavani et al. (2005) “According to Pessaran and Pessaran, as cited in Wilson and Chaudhri , “the long run elasticity can be estimated by:

$$\widehat{\theta}_i = \frac{\widehat{\beta}_{i0} + \widehat{\beta}_{i1} + \dots + \widehat{\beta}_{qi}}{1 - \widehat{\phi}_1 - \widehat{\phi}_2 - \dots - \widehat{\phi}_p} \quad \forall i = 1, 2, \dots, k \quad (6)$$

And the long run cointegration relationship is shown as:

$$\Delta y_t - \widehat{\theta}_0 - \widehat{\theta}_1 x_{1t} - \widehat{\theta}_2 x_{2t} - \dots - \widehat{\theta}_k x_{kt} = \varepsilon_t \quad \forall t = 1, 2, \dots, n \quad (7)$$

In this equation constant term is equal to:

$$\widehat{\theta}_0 = \frac{\widehat{\beta}_0}{1 - \widehat{\phi}_1 - \widehat{\phi}_2 - \dots - \widehat{\phi}_p} \quad (8)$$

Pahlavani et al. (2005) affirms that the version of the ARDL model can be obtained by rewriting equation (5), in terms of the lagged levels and first difference of $y_t, x_{2t}, \dots, x_{kt}$ and w_t as follows:

$$\Delta y_t = -\phi(1, \hat{p})EC_{t-1} + \sum_{i=1}^k \beta_{io} \Delta x_{it} + \delta' \Delta w_t - \sum_{j=1}^{\hat{p}} \varphi^* y_{t-j} - \sum_{l=1}^k \sum_{j=1}^{\widehat{q}_{l-1}} \beta_{ij}^* \Delta x_{it} + u_t \quad (9)$$

And finally, in the above equation the error correction term is defined by:

$$EC_t = y_t - \sum_{i=1}^k \widehat{\theta}_i x_{it} - \psi' w_t \quad (10)$$

In the above equations φ^* , δ' and β^* are coefficients which are related to the short-run dynamics of the model's convergence to equilibrium and $\phi(1, \hat{p})$ is the speed of adjustment.

Hence, our model in error correction is:

$$\begin{aligned} \Delta \ln GDP_t = & \alpha_0 + \sum_{j=1}^n b_j \Delta \ln GDP_{t-j} + \sum_{j=1}^n c_j \Delta \ln I_{t-j} + \sum_{j=1}^n d_j \Delta \ln EXP_{t-j} + \sum_{j=1}^n e_j \Delta \ln GOV_{t-j} \\ & + \sum_{j=1}^n f_j \Delta \ln IGR_{t-j} + \delta_1 \ln GDP_{t-1} + \delta_2 \ln I_{t-1} + \delta_3 \ln EXP_{t-1} + \delta_4 \ln GOV_{t-1} \\ & + \delta_5 \ln IGR_{t-1} + \varepsilon_{1t} \end{aligned} \quad (11)$$

The parameters $\delta_i, i = 1, 2, 3, 4, 5$ function as the long run multipliers while b_j, c_j, d_j, e_j, f_j parameters function as the short run dynamics of the underlying ARDL model.

4.3 Data

The database used to compute the natural rate of growth was taken from the Nicaraguan Central Bank Statistics (BCN). The Gross Domestic Product chained index is base 1994, also from de BCN database. Both variables were transformed into rate of growth. The period taken into consideration starts from 1990 until 2014⁸. For the case of the demand led growth model, the data is quarterly from the 1994Q1 to 2011Q4 also chained index base 1994 and seasonal adjusted.

4.4 Variables

The unemployment series is available yearly and was calculated from the difference between the Economically Active Population (EAP) and the open unemployment. For the years, 2001 and 2002 observations were not available, thus they were estimated with the average rate of growth of the last 10 years.

The variable public spending was calculated from the yearly series “collective spending” and used the quarterly budget execution report from the Finance Office of Nicaragua (MHCP) to obtain the quarterly data. Through the execution percentage, we could estimate how much it was spent every quarter. However, the report is only available from 2000 and forth. For the cases of the 1994-1999 periods, we used a moving average of the subsequent three years of the period and from there backwards. We used the TRAMO/SEATs procedure to adjust government spending and the GIR.

5. Results

Results of the natural rate of growth are presented in table 5.1. The first model uses equation (1) of the methodology, where unemployment rate is function of the GDP. The natural rate of growth is the quotient between the intercept and the slope. The method is robust regression to

⁸ Although there is available data for the decade of the 80's, we decided not to include it in the analysis since it was a time of extraordinary conditions. A time of civil war where thousands were displaced to other countries, and many others were occupied for the patriotic military service which prevent them from entering into the labor market.

correct problems of residuals non-normality and heteroscedasticity. For Nicaragua, the long run growth that keeps unemployment invariable is 3.651 per cent annually during the 1990-2014 period.

Second regression shows the reverse of equation (1), this time using Ordinary Least Square (OLS). The natural rate of growth (3.431) differs from the previous results confirming the overestimation of equation (1) as a consequence of labour market distortions. In both cases, the Durbin-Watson estimates are above the upper limit so we accept the null hypothesis of non-autocorrelated errors at 1 per cent confident.

Table 5.1 Natural Rate of Growth						
	Method	Intercept	Slope	DW	R ²	NRG
Equation (1)	RR	18.143** (7.17)	-4.968*** (1.38)	2.165	0.281	3.651
Equation (2)	OLS	3.431*** (0.43)	-0.057*** (0.02)	1.475	0.281	3.431

Figures in parentheses are standard errors; ***p<0.01, **p<0.05, * p<0.10.

To prove the endogeneity, we used equation (3). First with OLS, and then with the Prais-Winsten method with robust errors to correct problems of autocorrelation and heteroscedasticity. Results show that the natural growth rate responds positively to effective rate of growth. During booming times, the natural rate of growth is around 5.01 per cent meaning that the economy could growth at pace higher than 3.4 % without overheating it, as neo-classic theory suggests.

Table 5.2 Endogeneity of the Natural Rate of Growth							
	Method	Intercept	Dummy	Slope	DW	R ²	NRG
Equation (3)	OLS	1.410** (0.5)	3.506*** (0.7)	-0.018 (0.02)	2.610	0.666	4.916
Equation (3)	PWER	1.342*** (0.35)	3.669*** (0.44)	-0.022* (0.01)	2.040	0.809	5.011

Figures in parentheses are standard errors; ***p<0.01, **p<0.05, * p<0.10.

5.1 Testing for the engines of growth

Now that it has been proved that the economy of Nicaragua responds to the movements of demand factors, we proceed to test the variables that have account the most in the growth rate of the country. For that, we first check for stationarity of the variables.

We use Zivot and Andrews test (1992). Argued by some authors, this test has higher power than Augmented Dickey Fuller (Raza & Afsha, 2017). They propose a variation of Perron's test that showed that the power to reject a unit root decreases when the stationary alternative is true and a structural break is ignored (Waheed, Alam & Pervaiz, 2006). Thus, it provides more robust results. Table 5.2 shows that all variables are stationary at first difference. This confirms the robustness of results that all the variables are integrated of order one $I(1)$ and that long run relationships are plausible.

5.3 Zivot-Andrews structural break trended Unit Root Tests				
	At level		At first difference	
	t-statistic	Time break	t-statistic	Time break
GDP	-2.602.	2006Q4	-5.266***	2009Q1
GOV	-3.849	2003Q4	-10.584***	1999Q3
I	-3.354	1999Q3	-8.500***	2009Q1
EXP	-3.712	2008Q2	-5.149***	1998Q1
GIR	-3.440	2007Q2	-6.873***	1997Q3

Note: Significance level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

To prove that in the long-run all variables have at least one relationship and so converge to equilibrium, we use Johansen's method to determine how many cointegration equations exist. Results of table 5.3 indicate that in the long run exist at most one relationship. Since only one relationship exists, we can use ARDL model to establish the long run relationship in the model.

5.4 Co-integration test results of Demand-led Model			
Null Hypothesis No. Of CS(s)	Trace Statistics	5% Critical Values	Eigenvalues
None	69.93	68.52	.
At most 1	0.596216	47.21	0.3424
At most 2	24.83	29.68	0.2015
At most 3	11.40	15.41	0.1746

As explained in the methodology, first step of ARDL is to determine a whether the long run relationship exists. The bound test for cointegration when the GDP is dependent of demand factors yields significant at 0.1% level (see table 5.5), so we can reject the null hypothesis.

5.5 Bound test for co-integration						
Calculated F-statistic : 7.240***						
Critical value bounds of the F-statistic: unrestricted constant and no trend						
k	90 % level		95 % level		99 % level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
4	2.45	3.52	2.86	4.01	3.74	5.06

Note: Critical values from Pesaran, Shin & Smith (2001).

In the ARDL, the lags selection were determined by the Schwarz Bayesian Criterium (BSC) because it tends to choose more parsimonious specification (Pesaram & Shin 1998 cited in Pahlavani et al., 2005). Table 5.6 summerizes the results of long run and short run dynamics in the models of the error correction form. In the long run 1% of increase in government spending has an increment of 9% in GDP at 1% level and 1% increase of exports leads to 29.5% increment of GDP, demostrating an important effect on long run growth. On the other hand, international gross reserves is not statitically significant in the contributions of economic growth.

The short-run effects show that the error correction term (ECM_{t-1}) is negative and very significant confirming the existence of a stable long run relationship. The coefficient is -0.380 and implies that the deviation from the long term growth rate in GDP is corrected by 38 percent by the coming quarter.

5.6 Demand led growth elasticities

Dependent variable:
GDP

Autoregressive Distributed Lags

Long run elasticities

<u>GOV</u>	<u>I.</u>	<u>EXP</u>	<u>GIR</u>
0.089**	0.082*	0.299***	0.008
(0.037)	(0.035)	(0.030)	(0.016)

Short run elasticities

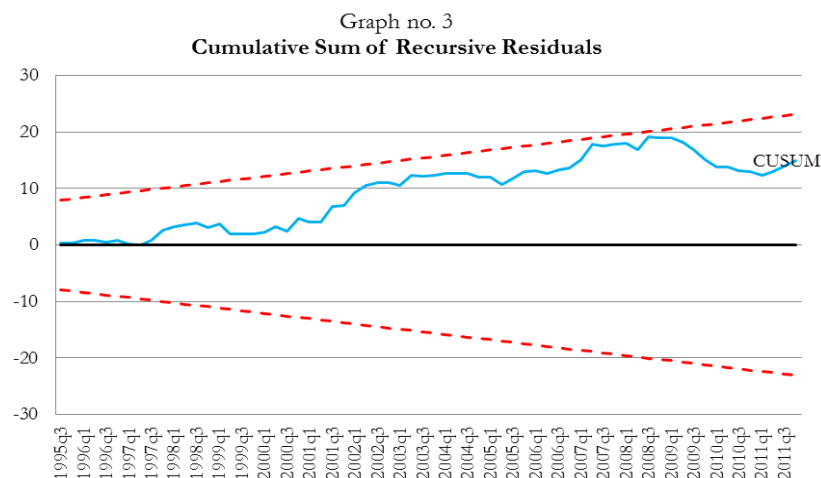
<u>Constant</u>	<u>GDP_{t-1}</u>	<u>GDP_{t-2}</u>	<u>ECM_{t-1}</u>
2.044***	-0.523***	-0.220*	-0.380***
(0.392)	(0.104)	(0.103)	(0.070)

Note: Significance level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Figures in parenthesis are standard error.

5.2 Long term stability

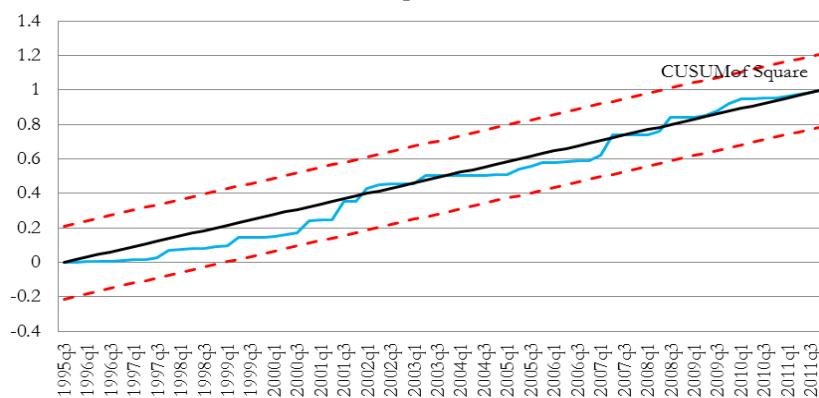
The stability of the parameters of long run in the period is tested by CUSUM and CUSUM of square test on recursive residuals. According to Brown, Durbin, & Ewans (1975 cited in Raza & Afshan 2017) the systematic changes from the coefficient of regression are detected using the CUSUM test, whereas the sudden changes from constancy of regression coefficients are detected using the CUSUM of square test.

The results of CUSUM and CUSUM of square shows that the parameters do not suffer from structural instability in the residuals of the models. This implies that the coefficients can be used to make predictions or make economical analysis with them.



Source: Authors' calculation

Graph no. 4
Cumulative Sum of Square of Recursive Residuals



Source: Authors' calculation

6. Policy implications

The results of the model show that the GDP's growth of Nicaragua has been pulled by the exports in the 1994q1-2011q4 period. In this sense, Nicaragua has opened itself to international commerce through many free-trade agreements. In terms of policy, more trade agreements would boost growth as extra increment of external demand is directed to the goods produced inside the economy. However, this in practice has not happened.

According to Kalecki (1960 cited in Kriesler 2011) unemployment dynamics in developing countries differs significantly from developed economies. They result from the shortage of capital equipment rather than from deficiency of effective demand. However, this conclusion does not deny that there may be a lack of effective demand at the same time.

In developing economies, the size of capital is not sufficient to employ all the labour. Not even if there was no excess capacity, there would not be full employment (Kriesler, 2011). The excess of labour force reduces the pressure of wages, so reduction of full capacity is less likely. Being this one of the reasons why poverty co-exists with low levels of unemployment in low-income economies.

When capital equipment is low and population large, marginal productivity comes down to the level of marginal disutility of labour at a stage where unemployment still persists in physical sense (Dasgupta, 2003). At this light, developing economies could face a dual challenge; increase effective demand while at the same time increasing productive capacity so the economy can respond to the increments of the former.

To better understand the dynamics, we take two concepts from Harrod, the warranted rate of growth (g_w)⁹ and the natural rate of growth (g_n)¹⁰. According to Thirlwall (2007) the relationship between these two rates is $g_n > g_w$ in less developed economies. This gives a serious imbalance between the growth of effective labour force and the rate of capital accumulation caused for the lack of capital to labour work with, and in consequence the source of unemployment and underemployment.

Policy options to gauche the problem are related to the interest rate. The real interest rate should be low to boost investment and keep down operation costs. Thirlwall (2007) states that one of the fundamental message of Keynes is that a capitalist economy is driven by the decision to invest. Studies related have found a negative relationship between interest rate and growth of GDP (see Fry 1997).

Contrary to the Mckinnon-Shaw hypothesis¹¹ of financial repression, De Gregorio & Guidotti (1995 cited in Fry 1997) claim that real interest rates are not good indicator of distortions in the financial market. Instead, they propose a U-inverted relationship between interest rate and growth. Very low interest rate cause financial disintermediation and hence, reduces growth. Very high interest would result in reduction of investment level. What is the optimum interest rate cannot be addressed in this article, however further investigation should be conducted in this line.

Another alternative is to move towards the use of more labour intensive techniques. There is evidence that firms can substitute capital for labour and stay in the efficiency frontier (Thirlwall, 2007). Since different combinations of labour and output are used among countries, one can choose from the spectrum techniques (know how), of those that are more labour intense and yet remain efficient (Thirlwall, 2007). Even though, it has been argued that moving down the curve of efficiency would reduce the level of saving because the propensity to consume is less in profits than wages; more unemployment leads to less savings from

⁹ The required amount of investment to produce additional flow of output, given the prevailing technology and the rate of interest (Thirlwall, 2007)

¹⁰ The sum of the rate of growth of labor force and the rate of growth of labor productivity determined by technical progress (Thirlwall, 2007)

¹¹ Hypothesis expresses that if the interest rate can approximate toward its market-price equilibrium, it can exert a positive effect on growth rates (Gemetch & Struthers, 2003).

individuals and families. It is also noteworthy to mention that enterprises are not meant to save but to invest. It is the role of the bank system to provide the resources.

7. Conclusions

This article has examined the variables that drive economic growth from a demand side perspective. We proved the economic growth of Nicaragua is determined endogenously, responding positively to increments of demand. More important, we found evidence that exports and to a less extend government expenditure have driven the growth of the last two decades in the country. According to Keynesian economics, developing countries can suffer from lack of demand as well as lack of productive capacity, increasing the problems which face less developed economies. In terms of policy, this change completely the picture as demand constraint can also deter economic prosperity.

Finally, a last consideration is necessary if it is intended to grow by exports. The belief that developing countries can reach sustainable growth through export led growth has led to a race-to-the-bottom competition where the countries compete with each other to sell in developed markets, so the problem becomes of export displacement. To gain competitive advantage in international markets, countries compete across every dimension, including work conditions and the environment (Palley, 2002).

8. Bibliography

- Arevilca & Risso. (2007) The balance of payments constrained growth model: empirical evidence for Bolivia, 1953-2002. *Revista de Humanidades y Ciencias Sociales*, Vol. 9, No. 1-2 (Jun – Dec 2006) pp. 187-219.
- BCN. (2017) Informe Anual 2016. Banco Central de Nicaragua.
- Dasgupta, A. (2003) Keynesian Economics and underdeveloped countries. *Economic and Political Weekly*, Vol. 38, No. 28 (July 12-18, 2003) pp. 2919-2922.
- Davidson, P. (2006) Chapter 4: Keynes, Post Keynesian Analysis, and the Open Economies of the Twenty-First Century (Arestis, McCombie & Vickerman, Ed.). In *Growth and economic development: essays in honour of A.P Thirlwall*. Edward Elgar.
- De Franco, M. (2011) Causas del (de)crecimiento económico de largo plazo de Nicaragua. *Serie de Estudios Especiales*, No. 7 (June, 2011). Fundación Nicaragüense para el Desarrollo Económico y Social.
- Fry, M. (1997) In favor of financial liberalisation. *Economic Journal*, May (1997).
- FUNIDES (2016) Coyuntura Económica. Tercer informe 2016. Fundación Nicaragüense para el Desarrollo Económico y Social.
- Gemech & Struthers (2003) The Mckinnon-Shaw Hypothesis: Thirty Years on: A Review of Recent Developments in Financial Liberalization Theory. Development Studies Association. Annual Conference on “Globalisation and Development”, Glasgow (Sept, 2003).
- Harrod, F. (1939) An Essay in Dynamic Theory. *The Economic Journal*, Vol.49, No. 193 (Mar, 1939), pp.14-33.
- Hein, E. (2015) The Principle of effective demand – Marx, Kalecki, Keynes and beyond. Working paper, No. 60/2015. Institute of International Political Economy Berlin.
- Kaldor, N. (1957) A Model of Economic Growth. *The Economic Journal*, Vol. 67, No.268, pp. 591-624.

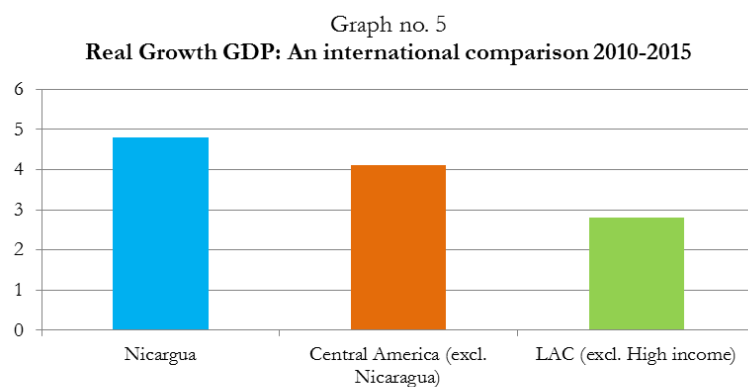
- Kaldor, N. (1988) The Role of Effective Demand in the short-run and the long-run growth. In: Barrère, A. (org.). The Foundations of Keynesian Analysis. Macmillan Press: London.
- Kriesler, P. (2011) Post Keynesian Perspectives on Economic Development and Growth. UNSW Australian School of Business Research Paper No. 2012 ECON04.
- Krugman, P. (2009) How did economists get it so wrong?. Retrieved August 2017 from <http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html>.
- Ledesma & Thrilwall. (1998) The Endogeneity of the Natural Rate of Growth. School of economics discussion papers, University of Kent.
- Miranda, M. (2016) Crecimiento y Productividad. *Revista de Economía y Finanzas*, Vol. 3, (Nov, 2016), pp. 59-90.
- Moreno-Brid & Perez. (1999) Balance of Payments Constrained Growth in Central America: 1950-96. *Journal of Post Keynesian Economics*. Vol. 22, No. 1, (Autumn, 1999) pp. 131-147.
- Nkoro & Uko (2016) Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods*, Vol. 5, No. 4 (2016) pp. 63-91.
- Oreiro, Nakabashi, Costa da Silva & Guimarães. (2012) The economics of demand-led growth. Theory and evidence for Brazil. *CEPAL Review*, No. 106, pp. 151-168.
- Pahlavani, Wilson & Worthington. (2005) Trade GDP nexus in Iran: An application of the Autoregressive Distributed Lag (ARDL) model. University of Wollongong.
- Palley, T. (1996) Growth theory in a Keynesian mode: some Keynesian foundations for new endogenous growth theory. *Journal of Post Keynesian Economics*, Vol.19, No. 1 (Fall 1996) pp. 113-135.
- Palley, T. (2002) Domestic demand-led growth: A new paradigm for development. Alternatives to Neoliberalism Conference. The New Rules for Global Finance Coalition.

- Pieroni, d'Agostino & Lorusso. (2008) Can we declare military Keynesianism dead?. *Journal of Policy Modeling*, Vol. 30, No.5, (Sept-Oct 2008) pp. 675-691.
- Raza & Afshan. (2017) Determinants of Exchange Rate in Pakistan: Revisited with Structural Break. *Global Business Review*, 18(4).
- Romer, D. (2000) Keynesian Macroeconomics without LM Curve. *Journal of Economics Perspectives*, Vol. 14, No. 2, (Spring, 2000) pp. 149-169.
- Setterfield, M. (2002) Introduction: a dissenter's view of development of growth theory and the importance of demand led growth. In 'The economics of demand led growth. Challenging the Supply-side Vision of the Long Run (Setterfield, Ed.). Edward Elgar.
- Stockhammer, Qazizada & Gechert. (2016) Demand Effects of Fiscal Policy since 2008. *Post Keynesian Economics Study Group*. Working paper 1607. (April 2016).
- Temple, J. (2006) Aggregate production functions and growth economics. *International Review of Applied Economics*, Vol. 20, No. 3, pp. 301-317.
- Thirlwall, A. (2007) Keynes and economic development. *Economia Aplicada*, 11(3), pp. 447-457.
- Thirlwall, A. (2011a) Balance of Payments constrained growth models: History and overview. *PSL Quarterly Review*, Vol. 64, No. 259, pp. 307-351.
- Thirlwall, A. (2011b) The Balance of Payments Constraint as an Explanation of International Growth Rate Differences. *PSL Quarterly Review*, Vol. 64, No. 259, pp. 429-438.
- Tunali, C. (2016) Chapter 7: An empirical analysis of Wagner's Law in the European periphery. (Cevik, Simsek & Mittal, Ed.) In *Social and Economic Dynamics of Development: Case Studies. Institutions, Society & Economics Development* (1st ed.).
- Vogel, L. (2007) The Endogeneity of the Natural Rate of Growth – an Empirical Study for Latin-American Countries. DEP discussion papers Macroeconomics and finance series 4/2007.
- Waheed, Alam & Pervaiz. (2006) Structural breaks and unit root: evidence from Pakistani macroeconomic time series. MPRA paper, No. 1797, (February, 2007).

World Bank. (2012) Nicaragua: Promoting Competitiveness and Inclusive Growth. Washington DC. World Bank Group. (November, 2012).

World Bank. (2017) Nicaragua – Systematic Country Diagnostic. Washington DC. World Bank Group. (June, 2017).

Appendix



Source: World Bank (2017).