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Income Distribution, Productive Structure and Growth in South America

Summary: Between 2003 and 2012, South American economies experienced a period of relatively high growth rates. That performance was accompanied by considerable improvements in income distribution and poverty indicators. Nonetheless, structural heterogeneity remained one of the central characteristics of these economies. The aim of this paper is to analyze the role income distribution and the productive structure played in the economic growth of Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela, for the period between 1990 and 2012.

Key words: Economic growth, South America, Income distribution, Structural change.

JEL: O11, O15, O41.

The 2000s can be considered a kind of exhilarating period for most of South American countries. After 2003, economic growth was relatively high and took place along with substantial advances in income distribution and poverty indicators. Notwithstanding, social conditions have remained a problem and these economies are still marked by deep asymmetries in their productive structure, mainly the one related to the huge differences in productivity levels between sectors, the so called structural heterogeneity.

The aim of this paper is to analyze the role income distribution and productive structure have played in the economic growth of a selected panel of South American countries, like Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela, for the period between 1990 and 2012.

The main hypothesis are: (i) all countries would have improved their income share after 2000s; (ii) countries like Brazil, Argentina, Uruguay and Venezuela would have gone through wage-led growth regimes, while in Chile, Peru and Colombia the growth regime would have been profit-led; (iii) countries with profit-led growth regime should have improved their productive structure; (iv) the rigidity of the productive structure in some countries, and its associated international trade pattern, slowed down the growth rates of GDP and productivity.

The paper will be divided as follows. In the first section, we develop a two-sector post Keynesian model with Kaleckian and Kaldorian features. In these models, GDP growth and productivity growth depend on the relation between two different regimes: (1) a demand regime; (2) a productivity regime. In the first case, as usual in

this literature, income distribution is the main driver of growth, but special attention will be given to the role of consumer debit and international trade pattern. In the second case, the literature generally sets GDP growth as the main driver of productivity growth, but in this paper some attention will be draw on the role of sectoral composition of the economy. The interaction between these two regimes is called growth regime.

In the second section, the paper will describe the main economic data of each of the seven aforementioned countries, trying to set the characteristics of their demand and productivity regimes. Finally, the third section will draw on the common patterns among the countries, inquiring about the existence or not of different growth regimes between groups of countries in South America.

1. Growth, Distribution and Structural Change in Post-Keynesian Economics

1.1 Growth and Distribution in Post-Keynesian Economics

For post-Keynesians, economic growth is a complex phenomenon, in which elements related to aggregate demand, income distribution and the innovation process influence the rate of economic growth. To this tradition, these elements are conditioned by the structure of the economy, as well as the decision-making of agents marked by conflict and uncertainty (Marc Lavoie 1992; Thomas Palley 1996; Eckhard Hein 2008).

Much of the post-Keynesian reflection on growth and distribution of income derives mainly from two major approaches. The first one is related to the reaction to Harrod's model by authors such as Nicholas Kaldor, Joan Robinson, and Luigi Pasinetti for whom the Keynesian trait of their models lies mainly in the fact that the investment is treated independently of saving and its determination depends crucially on the rate of profit besides the animal spirits. However, as noted by by Kaldor, this assumption, coupled with an exogenous full capacity utilization means that the price level in relation to nominal wages is determined by demand. Thus, an increase in investment and hence in demand will raise prices and profit margins, as well as diminish real consumption which means that, as in Solowian model, income distribution is endogenous.

The second kind of studies on growth and distribution of post-Keynesian tradition is associated with the works of Kalecki and Steindl, and its subsequent developments. Authors such as Robert Rowthorn (1981), Amitava Krishna Dutt (1984), Lance Taylor (1985, 1991), Edward Joaquim Amadeo (1986), Stephen Marglin and Amit Bhaduri (1990) developed models in which the capacity utilization, and therefore, the growth rate is determined mainly by investment and functional income distribution. In these models, while income distribution depends on the ability of the companies in setting profit margins (*mark-up)*, the main determinants of investment are the different impacts of the profit margin and the capacity utilization on the decision to invest. Two features stand out in these models: (a) an exogenous income distribution; (b) the central role of the capacity utilization in the investment function.

In some models, also known as 2nd generation models, post-Keynesian authors have made use of a fairly simple investment function based on, on one hand, the accelerator approach *a la* Harrod and, on the other hand, the profit rate approach, *a la* Robinson. This means that the rate of growth of capital stock will be determined by three factors: (i) the animal spirits; (ii) the rate of profit; (iii) the degree of capacity utilization.

This investment function shows three important results: (1) capacity utilization becomes endogenously determined and dependent on the autonomous investment, the profit share and the saving rate; (2) economic growth depends on capacity utilization, as well as the aforementioned determinants; (3) an increase in the saving rate and profit share decreases the growth rate (which means that the so called thrift and costs paradoxes are hold). Therefore, one of the major conclusions is that there would not be any opposition between real wage and profit rate, but the opposite. This occurs because the economy would not be on the growth-distribution schedule.

However, from the mid-1970s, empirical studies have shown that the relationship between wages and profits could have been negative in some countries. To tackle these evidences, the 3rd generation models, inspired by the work of Bhaduri and Marglin (1990) and Marglin and Bhaduri (1990) have led to an entire literature able to differentiate demand regimes. These models suggest that the effect of the profit margin on the profit rate ought to be separated from those related to the capacity utilization. Thereby, growth regimes might be wage-led or profit-led, depending on the elasticity of investment to capacity utilization and profit share.

Although the literature is mainly focused on the relationship between functional distribution of income and growth, some recent research about the 2007/2008 financial crisis has started to investigate the role of personal income distribution on economic growth. This is the case of the study of Palley (2015), in which the author develops a 3 classes neo-Kaleckian model in order to investigate the effect of senior financial executives (management middle class) income on economic growth. In a similar study, Laura Carvalho and Armon Rezai (2015) has shown that a more equal income distribution can have positive effects on growth. However, unlikely Palley, the authors obtain this result not by incorporation of a class to neo-Kaleckian model, but to make the propensity to save of the working class dependent on personal income distribution, so that the greater inequality of income the greater the propensity to save. Another study which adopts similar proposal is the one made by Amitava Krishna Dutt (2015). In this case, however, the author drew upon a vertical approach to personal income distribution, which divides people in society into two groups (the "top" and the "rest"), whose incomes may come from wages as well as from profits and dividends. Two important aspects of this model worth noting. The first is that the propensities to save from companies, high-income and low-income people are different. The second is that its findings are relatively different, depending on the state of the economy.

1.2 Growth and Structural Change in Post-Keynesian Economics

Another equally important issue concerns to the relationship between productive structure, structural change and economic growth. However, this subject has been

discussed with less intensity than income distribution. Multisector growth models, for example, have been relegated to a second plan by heterodox economists, except the neo-Schumepeterian and Pasinettian approaches of structural change, as well as few structuralist models.

One of the most interesting developments of contemporary heterodox thinking on economic growth is the one related to the notion of cumulative causation. Inspired initially by the work of Ragnar Nurkse (1953) and Gunnar Myrdal (1957), its contemporary version is associated with the argument put forward by Kaldor on the relationship between growth and productivity.

According to Nicholas Kaldor (1966), there is a positive relationship between performance in the industrial sector and economic growth, which stems from the increasing returns to scale in that sector. Industry has dynamic economies of scale that result from two mechanisms: (a) the increasing division of labor associated with the growth of the market; (b) the intensification of learning related to the differentiation and the emerging new productive activities. Generally speaking, a higher rate of growth, due to increases in aggregate demand, enables the differentiation and the appearing of new productive activities. Such mechanisms make industrial productivity growth dependent on the industry's GDP growth, which has been known in the literature as the Kaldor-Verdoorn law (Robert Dixon and Anthony Thirlwall 1975; Jan Fagerberg 1994).

Several authors, including Robert Boyer (1988), Boyer and Pascal Petit (1991), Petit (1999, 2005), Fulvio Castelati (2001), Miguel León-Ledesma (2002), Mark Setterfield and John Cornwall (2002), Mario Casseti (2003), C. W. M. Naastepad (2006), Servaas Storm and Naastepad (2007), Robert Blecker (2009), Hein and Artur Tarassow (2010), Setterfield (2010) have demonstrated the possibility of convergence between these streams of post-Keynesian tradition. On one side, there are the neo-Kaleckian models of growth and income distribution and, on the other, there are the neo-Kaldorian models of cumulative causation. In all these works, called *Cambridge Post-Keynesian* (CPK) approach by Palley (2005), the economic growth in the medium run is associated with the formation of a growth regime that has as main factors three elements: (i) the demand regime; (ii) the productivity regime; (iii) the institutional regime.

While the demand regime shows the determinants of aggregate demand components and their impact on the rate of economic growth, the productivity regime explains the determinants of technical progress, revealing that productivity depends on the social system of production and innovation (Bruno Amable 2000) and the rate of economic growth (Kaldor-Verdoorn law). The institutional regime is related to the institutional setting that shapes each regime, but also establishes the connection between them.

This literature has grown due to its ability to establish causal relationships between income distribution and growth, on the one hand, and growth and technological progress, on the other. Another interesting aspect of this literature is that it makes the introduction of productive structure into the model relatively easy. Actually, the number of studies that has analyzed the impact of the productive structure on economic growth has increased, as evidenced by the work of authors such as Mario

Cimoli, Annalisa Primi, and Maurizio Pugno (2006), Codrina Rada (2007) and José Antonio Ocampo, Rada, and Taylor (2009).

Generally, these studies have examined the importance of structural change in the economic growth. Inasmuch as Latin American economies are characterized by high structural heterogeneity, namely a dual economy with excess of labour, *a la* William Arthur Lewis (1954), the major question becomes the outcome of the migration of labor from traditional low-productivity sectors to high-productivity modern sectors.

In modern sectors, the notion of cumulative causation and Kaldor-Verdoorn effect lead to productivity regime, while on the demand side, net exports (Cimoli, Primi, and Pugno 2006; Ocampo, Rada, and Taylor 2009), investment and income distribution (Rada 2007) ensure the existence of *export-led*, *wage-led* or *profit-led* demand regimes. In the traditional sector, the GDP is controlled by the supply of labour and its productivity, while the productivity depends on, either the modern sector (Cimoli, Primi, and Pugno 2006), or the wages and employment in the subsistence sector itself (Rada 2007; Ocampo, Rada, and Taylor 2009).

1.3 A Post-Keynesian Two-Sector Model

In this section it will be developed a two-sector model, *a la* Lewis (1954), in which the economy is divided between modern and backward sectors. The GDP level and its growth rate are the result of the interaction between these sectors, as shown in the Equations (1) and (2):

$$y = y_M + y_B \tag{1}$$

$$g = \Delta_M g_M + \Delta_B g_B \tag{2}$$

in which y, y_M, y_B are the aggregate and sectoral GDP levels, g, g_M, g_B are their respective rates of growth and Δ_M and Δ_B are the weight of the GDP of modern and backward sectors in the aggregate GDP.

As it will be seen, each sector has different drivers of growth and the interaction between them, as well as the weight of backward sector have an undermining effect on the whole rate of economic growth. In the sake of simplification, we will suppose an open economy without government activities.

In the modern sector, economic growth is characterized by a demand regime that, besides the traditional investment and distributional equations, takes into account a different aspect in the trade balance equation (the so called technological multiplier), as well as it attributes a specific role to consumer indebtedness. In turn, the productivity regime is determined, on one hand, by the social system of production and innovation (Amable 2000) and, on the other, by the rate of economic growth (Kaldor-Verdoorn law).

It is worth saying that modern sector has the major share or almost the entire capital stock and for that reason has two classes, capitalists who earn profits and interests and workers, whose expenditures are financed out of their wages or by borrowing from the capitalists in order to expend more then they earn. Other key features of this sector are that it just produces tradable goods and it is the only one able to introduce technological change.

The modelling of modern sector starts with the usual macroeconomic identity, where:

$$y_M = c_M + i + x - m \tag{3}$$

in which (c) is the consumption of modern goods, (i) is the investment in modern sector and $(x - m)$ is the trade balance or the net exports of modern goods.

The consumption function is particularly different than usual in this model, once it has to tackle not only the issue of income distribution and saving rates, but also that workers in modern sector can borrow and spend part of their money in buying goods and services that stem from the backward sector. On the other hand, it must deal as well with the fact that part of the workers' consumption in the backward sector is spent on goods produced in the modern sector.

So, it is possible to write the level of consumption in the modern sector, normalized by the capital stock as follows:

$$c_{MK} = \delta_M \frac{w_M}{q_M} u + \delta_B \frac{w_B}{q_B} \gamma + (d - r)\zeta + (1 - s)\pi u \tag{4}$$

in which (w_M), (q_M), (δ_M) are variables related to the modern sector, whose meanings are the real wage rate, the productivity and the share of the wage bill spent in goods that comes from the modern sector. In turn, (u) is the domestic capacity utilization, (π) is the profit share and (s) is the propensity to save, both of them related to capitalists' expenditures in the modern sector. On the other hand, (w_B), (q_B), (δ_B) and (γ) are the real wage rate, the productivity, the share of the wage bill and the ratio between GDP and the stock of capital. Altogether, they show the total amount of money stemmed from the backward sector and spent in goods from the modern sector. Finally, (d) and (r) are the flow of borrowings and the interest rate, and ζ is the ratio between the stock of debts and the stock of capital.

$$u = \frac{y_M}{K}; \tag{5}$$

$$\gamma = \frac{y_B}{K}; \tag{6}$$

$$c_{MK} = \frac{c_M}{K}; \tag{7}$$

$$R = rB; e \tag{8}$$

$$\pi = \frac{\Pi}{y_M}; \tag{9}$$

$$\Pi = \Pi_M + R; \tag{10}$$

$$\zeta = \frac{B}{K}. \tag{11}$$

The investment function, as shown in Equation (12), is very conventional and follows the Bhaduri and Marglin (1990) proposal, in which investment normalized by capital stock (g_M) is determined by the animal spirits α_0, the profit share (π) and domestic capacity utilization. The parameters $(\alpha_1)$and (α_2) are the profit share and utilization elasticities to investment.

$$g_M = \alpha_0 + \alpha_1 \pi + \alpha_2 u \tag{12}$$

where $g_M = \frac{i}{K}$.

Regarding net exports normalized by capital stock (z), we have made the assumption that they are determined by real exchange rate (e_r), domestic capacity utilization, capacity utilization in the rest of the world (u_F) and technological multiplier (ψ_M) which is the ratio between the rate of growth of domestic productivity in modern sector and the rate of growth of the country in the technological frontier. This multiplier holds the idea that the more is the technological gap (Fagerberg 1994) between an underdeveloped country and the developed one, the less will be the rate of growth. This happens because, as pointed out by Cimoli, Primi, and Pugno (2006), product diversification and sophistication are positive determinants of exports, inasmuch as they imply greater competitiveness in international markets. They are the outcome of *"technological learning capabilities, linkages and the level of diversification in the production structure"* (Cimoli, Primi, and Pugno 2006, p. 92) and the distance between the leading country and those that lagged behind seems to be a good proxy of these two elements.

$$z = \beta_0 e_r - \beta_1 u + \beta_2 u_F + \beta_3 \psi_M; \tag{13}$$

in which:

$$z = \frac{x_M - m_M}{K} \tag{14}$$

and:

$$\psi_M = \frac{\hat{q}_M}{\hat{q}_F}. \tag{15}$$

Finally, Equations (16), for planned savings, and (17) for macroeconomic equilibrium will be defined in order to close the model and set the demand regime.

$$\sigma = sr = s\pi u; \tag{16}$$

$$\sigma = g + z. \tag{17}$$

Based on the above equations we can get the equilibrium expressions for:

1. Capacity utilization,

$$u^* = \frac{\theta_B \gamma + (d - r)\zeta + \alpha_0 + \alpha_1 \pi + \beta_0 e_r + \beta_2 u_F + \beta_3 \psi_M}{1 - \theta_M - (1 - s)\pi - \alpha_2 + \beta_1} \tag{18}$$

in which:

$$\delta_M \frac{w_M}{q_M} = \theta_M \ (19); \tag{19}$$

$$\delta_B \frac{w_B}{q_B} = \theta_B. \tag{20}$$

2. Profit rate:

$$r = \pi u^* \therefore r^* = \pi \frac{\theta_B \gamma + (d - r)\zeta + \alpha_0 + \alpha_1 \pi + \beta_0 e_r + \beta_2 u_F + \beta_3 \psi_M}{1 - \theta_M - (1 - s)\pi - \alpha_2 + \beta_1}. \tag{21}$$

3. Growth rate:

$$g = s\pi u^* - z \tag{22}$$

$$g^* = \frac{(s\pi+\beta_1)[\theta_B\gamma+(d-r)\zeta+\alpha_0+\alpha_1\pi]+(\theta_M+\alpha_2)(\beta_0 e_r+\beta_2 u_F)}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1} + \frac{(\theta_M+\alpha_2)\beta_3/\hat{q}_F}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1}\hat{q}_M. \tag{23}$$

It is worth noting that these three equations represent the short run equilibrium as long as they don't take into account what happened in the supply side or, to use a better expression, what happened in the productivity regime.

Notice that Equation (23) can be written as:

$$g^* = \Omega_0 + \Omega_1\hat{q}_M, \tag{23'}$$

in which: $\Omega_0 = \frac{(s\pi+\beta_1)[\theta_B\gamma+(d-r)\zeta+\alpha_0+\alpha_1\pi]+(\theta_M+\alpha_2)(\beta_0 e_r+\beta_2 u_F)}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1}$ and $\Omega_1 = \frac{(\theta_M+\alpha_2)\beta_3/\hat{q}_F}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1}$. It shows clearly that economic growth in the short run is a function of the productivity growth. The advantage of this equation is its straightforward connection with the productivity regime (Equation (24)), in which the rate of productivity growth is determined by the social system of production and innovation (λ_0), the rate of economic growth (g^*) and the Kaldor-Verdoorn parameter (λ_1).

$$\hat{q}_M = \lambda_0 + \lambda_1 g^*. \tag{24}$$

Combining equations 23' and 24 we find the equilibrium solutions for productivity and economic growth in the medium run[1], as shown in Equations (25) and (26):

$$\hat{q}_M^* = \frac{\lambda_0 + \lambda_1\Omega_0}{1 - \lambda_1\Omega_1} \tag{25}$$

$$g^{**} = \frac{\Omega_0+\Omega_1\lambda_0}{1-\lambda_1\Omega_1}, \tag{26}$$

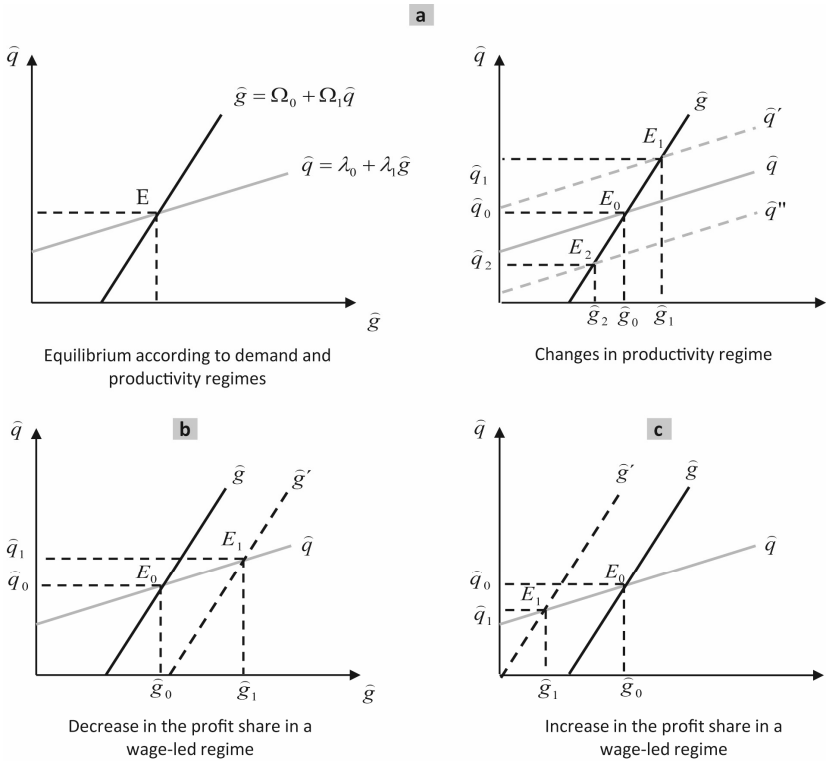
which making the appropriate substitutions can be written as:

$$\hat{q}_M^{**} = \frac{\lambda_0[1-\theta_M-(1-s)\pi-\alpha_2+\beta_1]+\lambda_1[(s\pi+\beta_1)[\theta_B\gamma+(d-r)\zeta+\alpha_0+\alpha_1\pi]+(\theta_M+\alpha_2)(\beta_0 e_r+\beta_2 u_F)]}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} \tag{25'}$$

$$g^{**} = \frac{(s\pi+\beta_1)[\theta_B\gamma+(d-r)\zeta+\alpha_0+\alpha_1\pi]+(\theta_M+\alpha_2)(\beta_0 e_r+\beta_2 u_F)+\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} \tag{26'}$$

Notice that the traditional results from the post-Kaleckian model are hold in the short run by the set of Equations (18), (21), (23), (25') and (26), as the paradox of thrift and the possibility of wage-led and profit-led regimes, which as usual depend on the sensibility of investment regarding the profit share *vis a vis* the capacity utilization.

[1] On the concept of medium run see Victoria Chick and Maurizio Caserta (1997).



Source: The author.

Figure 1 Demand and Productivity Regimes in Modern Sector

The graphics in Figure 1 can be seen as an attempt to identify the main traits of this kind of economy, its equilibrium position and what happened when some variables and parameters change. The first important issue is that the slope of demand regime is steeper than the one of productivity regime (Figure 1a). It warrants the stability of the system. Figure 1b shows clearly that if the economy is of the wage-led type a decrease in the profit share will move the (g^*) on the right and upward, raising the economic and productivity growth rates, whereas an increase in that share (Figure 1c) will move this curve downward and on the left, diminishing those rates.

Regarding the exchange rate and the capacity utilization of the rest of the world, they have positive effects on economic and productivity growth rates (Figure 2), while interest rate, as usual in Keynesian models, has a negative effect on both (Figure 2). In turn, the workers expenditures from both sectors have positive impacts on capacity utilization and economic growth, albeit the manufacturing workers expenditures in its own sector might have a negative impact on productivity growth (Figure 2). Improvements in the social system of production and innovation will move the (q^*) on the left and upward and retrogression in this system will move in the other way round. As usual, shifts in the Kaldor-Verdoorn coefficient will change the slope of productivity regime.

Impact of profit share on capacity utilization

$$\frac{\partial u^*}{\partial \pi} = \frac{\alpha_1 - s u^*}{[1-\theta_M-(1-s)\pi-\alpha_2+\beta_1]} \lessgtr 0$$

Impact of indebtedness on capacity utilization

$$\frac{\partial u^*}{\partial d} = \frac{\zeta}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1} > 0$$

Impact of technological multiplier on capacity utilization

$$\frac{\partial u^*}{\partial \psi_M} = \frac{\beta_3}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1} > 0$$

Other impacts on capacity utilization

$$\frac{\partial u^*}{\partial s} < 0; \frac{\partial u^*}{\partial \theta_B} > 0; \frac{\partial u^*}{\partial \theta_M} > 0\ ;\ \frac{\partial u^*}{\partial r} < 0; \frac{\partial u^*}{\partial e_r} > 0; \frac{\partial u^*}{\partial u_F} > 0$$

Impact of profit share on growth

$$\frac{\partial g^{**}}{\partial \pi} = \frac{s\{[\theta_B \gamma + (d-r)\zeta + \alpha_0 + 2\alpha_1\pi] - g^{**}\}}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} \lessgtr 0$$

Impact of indebtedness on growth

$$\frac{\partial g^{**}}{\partial d} = \frac{\zeta(s\pi+\beta_1)}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} > 0$$

Impact of technological multiplier on growth

$$\frac{\partial g^{**}}{\partial \beta_3} = \frac{\lambda_1(\theta_M+\alpha_2)/\hat{q}_F\,(1+g^{**})}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} > 0$$

Other impacts

$$\frac{\partial g^{**}}{\partial s} \lessgtr 0; \frac{\partial g^{**}}{\partial \theta_B} > 0; \frac{\partial g^{**}}{\partial \theta_M} > 0; \frac{\partial g^{**}}{\partial r} < 0; \frac{\partial g^{**}}{\partial e_r} > 0; \frac{\partial g^{**}}{\partial u_F} > 0$$

Impact of profit on productivity

$$\frac{\partial \hat{q}_M{}^{**}}{\partial \pi} = \frac{s\{\{\lambda_0+\lambda_1[\theta_B\gamma+(d-r)\zeta+\alpha_0+2\alpha_1\pi]\}-\hat{q}_M{}^{**}\}}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} \lessgtr 0$$

Impact of indebtedness on productivity

$$\frac{\partial \hat{q}_M{}^{**}}{\partial d} = \frac{\lambda_1\zeta(s\pi+\beta_1)}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} > 0$$

Impact of technological multiplier on productivity

$$\frac{\partial \hat{q}_M{}^{**}}{\partial \beta_3} = \frac{(\lambda_1(\theta_M+\alpha_2)/\hat{q}_F)\hat{q}_M{}^{**}}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} > 0$$

Other impacts

$$\frac{\partial \hat{q}_M{}^{**}}{\partial s} \lessgtr 0; \frac{\partial \hat{q}_M{}^{**}}{\partial \theta_B} > 0; \frac{\partial \hat{q}_M{}^{**}}{\partial \theta_M} \lessgtr 0; \frac{\partial \hat{q}_M{}^{**}}{\partial r} < 0; \frac{\partial \hat{q}_M{}^{**}}{\partial e_r} > 0; \frac{\partial \hat{q}_M{}^{**}}{\partial u_f} > 0$$

Source: The author.

Figure 2 Impact of Variables on Demand and Productivity Regimes in Modern Sector

Not with standing, two interesting aspects of the model stand out in Figure 2. Whilst consumer indebtedness and the technological multiplier have positive impacts on capacity utilization and growth rates, be it in the short or in the long run, the paradox of thrift might not hold in the long run.

In this paper the backward sector will be kept as simple as possible, and will be considered not only a trait of low technologic level but also a by-product of underdevelopment inasmuch as its growth rate will depend on the rate of growth of modern sector.

The major characteristics of backward sector are its low or irrelevant capital stock, its low productivity, generally determined by spillover from the modern sector, and the fact that it sells only non-tradable products.

In order to keep these features, let us make the backward sector's GDP (y_B) be a simple function of its productivity (q_B) times its employment level (L_B), as in Equation (27).

$$y_B = q_B L_B. \tag{27}$$

As a result, its GDP growth rate ($\hat{g}_B$) will be defined as the sum of its productivity and employment rates of growth[2].

$$\hat{g}_B = \hat{q}_B + \hat{L}_B. \tag{28}$$

[2] Applying the logarithm and taking the derivative with respect to time we will have that:

$$lny_B = lnq_B + lnL_B \therefore \frac{dlny_B}{dt} = \frac{dq_B}{dt}\cdot\frac{1}{q_B} + \frac{dL_B}{dt}\cdot\frac{1}{L_B} \tag{36}$$

In turn, the backward sector's productivity growth rate $(\hat{q}_B)$, as mentioned before, will be a function of the economic growth in modern sector, so as:

$$\hat{q}_B = \tau \hat{g}_M, \tag{29}$$

in which (τ) is a kind of Verdoorn coefficient of the backward sector.

As mentioned before, the backward sector is a by-product of underdevelopment in this model. As such, its level and growth rate of employment works as a buffer, absorbing workers in periods of crisis, and as an "industrial labour army", increasing the labour supply during the boom periods.

Equation (30) shows that total labour force (L) is given by the sum of employment in backward sector (L_B) with employment in modern sector (L_M). Taking the total derivative, using a little bit of algebra and solving the equation for the rate of growth of employment in the backward sector$\left(\hat{L}_B\right)$, it is easy to see (Equation (32)) that this growth rate is just the difference between the expansion of labour force $\left(\hat{L}\right)$ and the employment growth rate in the modern sector$\left(\hat{L}_M\right)$ adjusted by the weight of the modern sector employment level in the labour force (ϑ).

$$L = L_B + L_M. \tag{30}$$

$$\hat{L} = \hat{L}_B(1-\vartheta) + \hat{L}_M\vartheta \therefore \vartheta = \frac{L_M}{L} \tag{31}$$

$$\hat{L}_B = \frac{\hat{L}-\vartheta\hat{L}_M}{(1-\vartheta)}. \tag{32}$$

Substituting Equations (26') into (29) we get the rate of growth of productivity in the backward sector, as seen in Equation (33).

$$\hat{q}_B^* = \tau \frac{(s\pi+\beta_1)[\theta_B\gamma+(d-r)\zeta+\alpha_0+\alpha_1\pi]+(\theta_M+\alpha_2)(\beta_0 e_r+\beta_2 u_F)+\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F}. \tag{33}$$

And replacing this one and the Equation (30) and (32) into (28) we get the backward sector GDP growth rate.

$$\hat{g}_B^* = \tau \frac{(s\pi+\beta_1)[\theta_B\gamma+(d-r)\zeta+\alpha_0+\alpha_1\pi]+(\theta_M+\alpha_2)(\beta_0 e_r+\beta_2 u_F)+\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F}{1-\theta_M-(1-s)\pi-\alpha_2+\beta_1-\lambda_1(\theta_M+\alpha_2)\beta_3/\hat{q}_F} + \frac{\hat{L}-\vartheta\hat{L}_M}{(1-\vartheta)}. \tag{34}$$

Notice that all the derivatives follow the original signs of (g^{**})!

One of the interesting features of this model is that the backward sector is fostered by the modern sector in such a way that its growth per se does not mean the vanishing of that one.

To be sure of that, suppose that the level of employment in the modern sector is given by Equation (35).

$$L_M = \frac{Y_M}{q_M}. \tag{35}$$

Applying the logarithm in (35) and taking the derivative with respect to time we will have that $\hat{L}_M = g_M - \hat{q}_M$ (37).

From Equations (2), (34) and (37), it is quite clear that if the labour productivity growth is higher than GDP growth, its employment growth rate will be lower,

as well as its weight in total labour force, in the long run. If it happens, so there is a possibility that in some periods, the growth in backward sector be higher than in modern sector, explaining why this kind of relationship between these two sectors might be the endurance of backward sector. The model suggests the possibility of a kind of underdevelopment trap, in which a strategy to overcome it, that does not consider this aspect, can keep it unchanged.

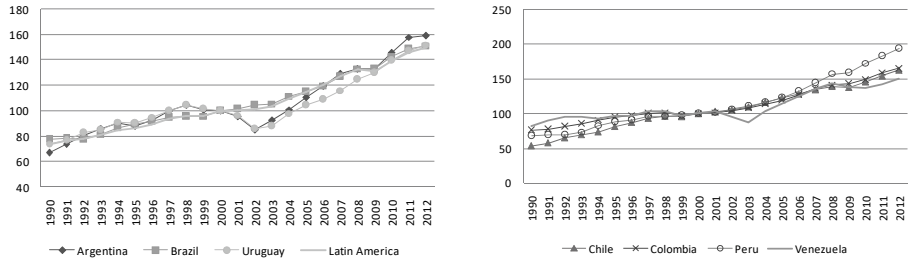
The model presented in this paper seems to be an interesting explanation of underdevelopment, but the immediate question that it raises is: up to which point South American countries fit in this kind of model? The next section will be dedicated to this issue.

2. Growth, Income Distribution and Structural Change in South America

The relationship between asymmetric diffusion of technical progress and the balance of payments constraints, on one hand, and the connection between income distribution and production structure, on the other, has been at the core of some explanations for the low rates of growth, as well as the economic backwardness in Latin America since long time (Economic Commission for Latin America and the Caribbean 1949; Ricardo Bielshowsky 2000, 2010; Octavio Rodriguez 2006). This perception has been reinforced and, indeed, the Economic Commission for Latin America and the Caribbean (Eclac hereafter) chose inequality and structural change as the main research topics of the institution since 2010. The documents "*Time for Equality: Closing Gaps, Opening Trails*" (Eclac 2010), "*Structural Change for Equality: An Integrated Approach to Development*" (Eclac 2012) and "*Compacts for Equality: Towards a Sustainable Future*" (Eclac 2014) are indicative of the importance that these topics have to the region.

The emphasis on themes such as inequality and structural change is due to the fact that recent economic growth has been accompanied by significant improvements in income distribution and moderate transformation in the productive structure (Eclac 2010, 2012, 2014; Osvaldo Kacef and Rafael López-Monti 2010; Ocampo 2010, 2011; Esteban Perez Caldentey and Ramon Pineda 2010; Perez Caldentey and Matias Vernengo 2010, 2012).

As mentioned in the beginning of this paper, 2000s were a decade of great excitement for South American countries. Democracy seemed to be consolidated in the region and from 2003 on, these economies experienced a period of relatively high growth rates. All this happened whilst the world observed the most impressive boom in commodities prices in years, as well as the affluence of Chinese economy that drove international trade and aggregate demand worldwide. On one hand, it sold manufactured goods to the world, particularly to developed countries, on the other, it bought commodities from the developing ones. Furthermore, South American countries went through a period of institutional transformation in their macroeconomic policies and developed a social agenda which gave rise to improvements in their income distribution and poverty indicators.



Source: Cepalstat (2016)[3].

Figure 3 GDP Growth Index (2000 = 100) - Constant Prices

The Figures about some social and economic characteristics of South American countries offer a brief snapshot of the improvements of that period, as well as how close these economies are from the idealized in the model beforehand developed.

As can be seen in Table 1, the seven countries under analysis represented in 2012 almost two thirds of Latin America population and almost 70% of the GDP of the region and their GDP per capita are slightly higher than the average of the region. In comparison with European Union, and according to World Bank (WB) data, the group was about 74% of its population, but had only 14,5% of its GDP and 21,4% of its GDP per capita in same year[4].

Table 1 Population, GDP and GDP per capita in some South American Countries

Country	Population (1)			GDP (2)			GDP per capita (3)		
	1990	2000	2012	1990	2000	2012	1990	2000	2012
Argentina	32,689	36,978	42,001	213,026	318,748	507,772	6,517	8,620	12,090
Brazil	150,310	174,989	202,213	1,193,815	1,543,613	2,335,803	7,942	8,821	11,551
Chile	13,176	15,259	17,516	80,234	149,161	242,806	6,089	9,775	13,862
Colombia	34,272	40,404	46,882	147,218	192,491	318,303	4,296	4,764	6,789
Peru	21,831	25,919	30,167	58,090	85,798	166,493	2,661	3,310	5,519
Uruguay	3,110	3,321	3,395	21,388	28,800	43,772	6,877	8,672	12,893
Venezuela	19,760	24,183	29,374	143,203	176,099	263,672	7,247	7,282	8,976
Total Group	275,147	321,054	371,548	1,856,974	2,494,711	3,878,621	6,749	7,770	10,439
Latin America	435,703	512,300	598,793	2,671,350	3,621,863	5,436,198	6,131	7,070	9,079
Group / LA	63.2%	62.7%	62.0%	69.5%	68.9%	71.3%	110.1%	109.9%	115.0%

Notes: (1) Total population. (2) US$ constant prices of 2010. (3) US$ constant prices of 2010. Group GDP per capita weighted by population share.

Source: Cepalstat (2016).

[3] Cepalstat is the gateway from Eclac (1949, 2010, 2012, 2014) to all the statistical information of Latin America and the Caribbean countries collected, systematized and published by Cepalstat (2016).
Cepalstat. 2016. Statistics and Indicators.
http://estadisticas.cepal.org/cepalstat/WEB_CEPALSTAT/estadisticasIndicadores.asp?idioma=i (accessed May 25, 2016).

[4] GDP and GDP per capita at market prices (constant 2005 US$).
World Bank. 2016. World Development Indicators. http://data.worldbank.org (accessed May 25, 2016).

These countries have many traits in common, as their high percentage of informal jobs and their high level of inequality. Table 2 presents some numbers on that subjects, showing that almost 40% on average of the employed people have been working on the informal economy and that the region has a Gini index before taxes that ranges from 0,40 to almost 0,54. Poverty is an issue as well, because of its high levels, but in these case differences between countries are quite remarkable.

Table 2 Poverty, Informality and Inequality in some South American Countries

Country	Poverty			Informality			Inequality (Gini)		
	Early 1990s (1)	Early 2000s (2)	Early 2010s (3)	Early 1990s (4)	Early 2000s (5)	Early 2010s (6)	Early 1990s (7)	Early 2000s (8)	Early 2010s (9)
Argentina	4.48	17.05	3.69	43.90	43.10	37.70	46.76	53.34	42.49
Brazil	35.77	25.82	9.28	41.90	45.60	37.30	60.49	59.33	52.67
Chile	15.30	8.95	2.91	38.80	31.80	26.70	57.25	55.25	50.84
Colombia	19.64	37.07	16.20	50.00	60.90	58.90	51.32	57.76	53.54
Peru	31.05	32.75	10.79	60.30	63.00	57.10	44.02	51.83	45.11
Uruguay	2.02	3.35	1.67	34.70	40.90	35.10	40.20	46.17	41.32
Venezuela	8.53	19.05	14.90	36.60	55.60	50.10	47.10	48.22	40.50

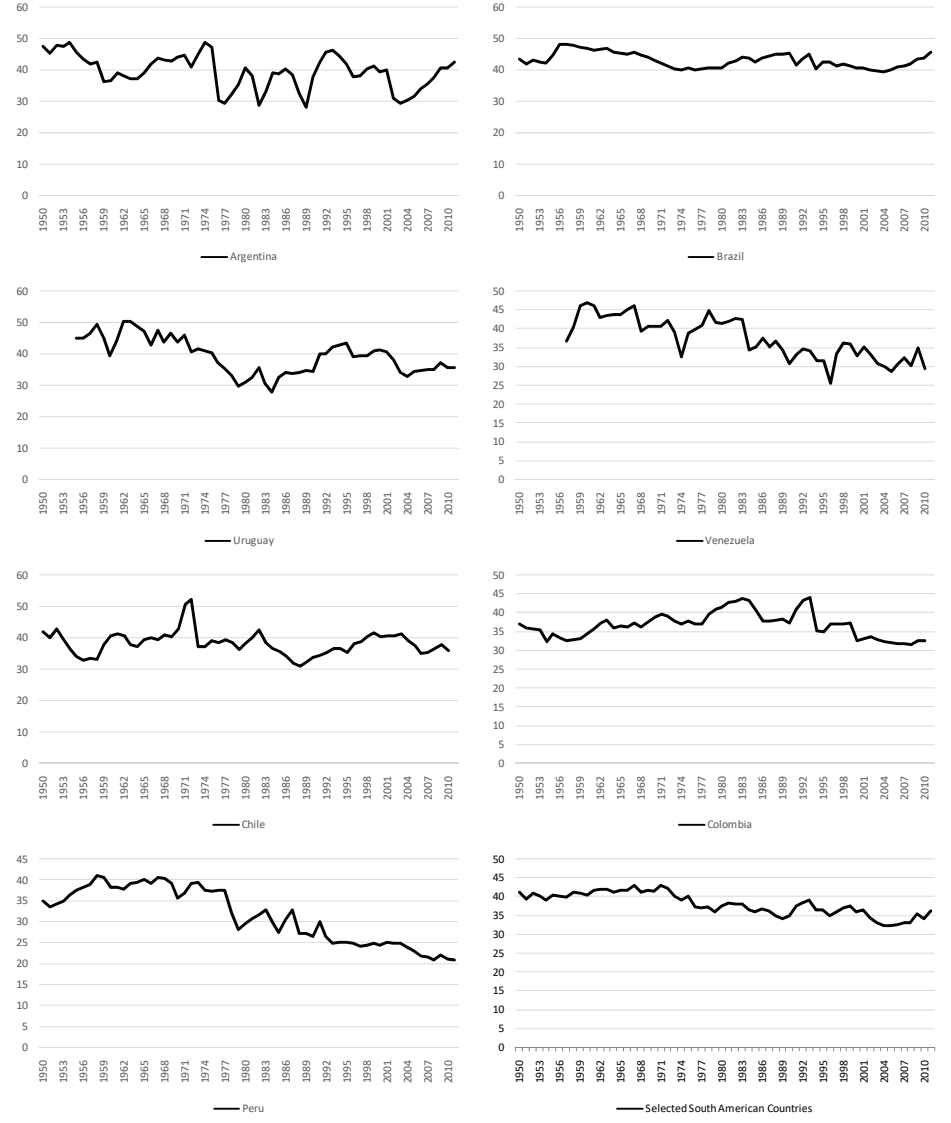
Notes: (1) Poverty headcount ratio at $3.10 a day (2011 PPP) (% of population). (2) For Argentina, Brazil, Chile, Colombia, Uruguay and Venezuela, 1992. For Peru, 1994. (Source: WB 2016). (3) For Argentina, Brazil, Colombia, Peru, Uruguay and Venezuela, 2001. For Chile, 2000. (Source: WB 2016). (4) For Argentina, Brazil, Colombia, Peru, Uruguay and 2012. For Chile, 2011 and for Venezuela, 2006. (Source: WB 2016). (5) For Argentina, Chile, Uruguay and Venezuela, 1990 (Source: Cepalstat 2016). For Brazil and Colombia, 1990 (Source: WB 2016). For Peru, 1997 (Source: Cepalstat 2016). (6) For Argentina, Brazil, Uruguay, Peru and Venezuela, 2001 (Source: Cepalstat 2016). For Chile, 2000 (Source: Cepalstat 2016) and Colombia, 2001 (Source: WB 2016). (7) For Argentina, Brazil, Colombia, Uruguay, Peru and Venezuela, 2012 (Source: Cepalstat 2016). For Chile, 2011 (Source: Cepalstat 2016). (8) For Brazil and Chile, 1990 (Source: WB 2016). For Argentina and Colombia, 1991 (Source: WB 2016). For Peru, 1994 and for Uruguay, 1992 (Source: WB 2016). For Venezuela, 1990(Source: Cepalstat 2016). (9) For Argentina, Brazil, Colombia, Peru, Uruguay and Venezuela, 2001 (Source: WB 2016). For Chile, 2000 (Source: WB 2016). (10) For Argentina, Brazil, Colombia, Peru, Uruguay and Venezuela, 2012 (Source: WB 2016). For Chile, 2011 (Source: WB 2016). For Venezuela, 2012 (Source: Cepalstat 2016).

Source: Cepalstat (2016), World Bank (2016).

According to Eclac (2014), while personal income inequality increased in practically all countries of the region between 1990 and 2002, from 2003 to 2011, inequality fell. Regarding functional income distribution, countries like Argentina, Brazil, Colombia and Peru showed falling wage share in national income between 1990 and 2000, while others like Chile and Venezuela showed increases in the same period. However, whilst Argentina, Brazil, Uruguay and Venezuela reverted the previous decline during the 2000s, in Chile, Colombia, Peru the wage share was reduced. These last findings were completely unexpected and contrary to one of our hypothesis!

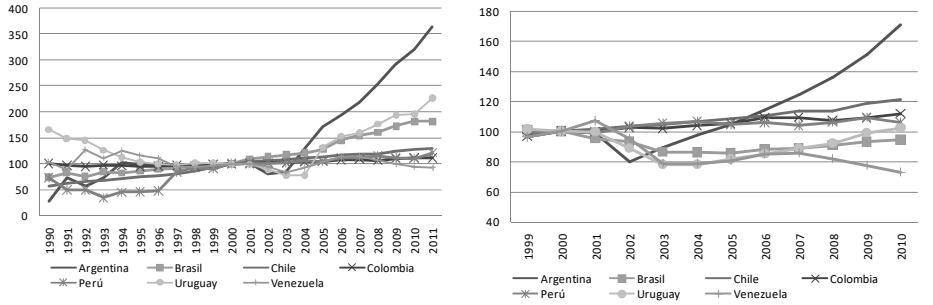
As shown by Eclac (2014) most of the countries in South America went about in cash transfers and alleviating poverty programs, but it seems to be that great part of the gains in wage share were related to the spreaded out policy in the region of raising minimum wages and its impacts on average real wages.

Another important feature of recent trends is that economic growth has been accompanied by moderate expansion of labor productivity. As can be seen in Figure 6, most countries had been presenting increases in productivity since the 90s, but from 2003 on it gained momentum being spreaded out to the whole region.



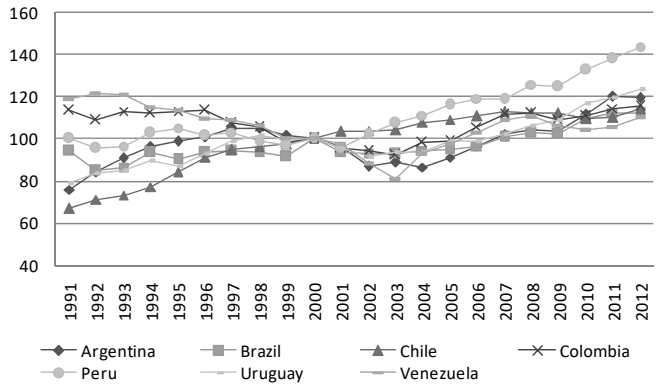
Source: Germán Alarco Tosoni (2014).

Figure 4 Wage Share in Seven Selected South American Countries since 1950



Source: Cepalstat (2016).

Figure 5 Minimum and Average Real Wage Index for Seven Selected South American Countries (2000 = 100)



Source: ILOSTAT (2016)[5].

Figure 6 Labour Productivity Growth Index for Selected South American Countries (2000 = 100)

However, the sectoral composition of GDP and employment has remained concentrated in low productivity sectors. Tables 3 and 4 show the huge and increasing concentration of GDP and employment in service activities and the stagnation of manufacture in the region.

[5] ILOSTAT is the gateway from International Labour Office (ILO) to worldwide labour statistical information collected, systematized and published by ILOSTAT (2016).
International Labour Organization Statistics (ILOSTAT). 2016. Key Indicators of the Labour Market.
http://www.ilo.org/ilostat/faces/wcnav_defaultSelection?_afrLoop=6087933248098&_afrWindowMode=0&_afrWindowId=n7ci8wx92_1#!%40%40%3F_afrWindowId%3Dn7ci8wx92_1%26_afrLoop%3D6087933248098%26_afrWindowMode%3D0%26_adf.ctrl-state%3Dn7ci8wx92_33 (accessed May 25, 2016).

Table 3 Share in Annual Gross Domestic Product (GDP) by Activity at Current Prices

Share	Argentina		Brazil		Chile		Colombia		Peru		Uruguay		Venezuela	
	1990	2012	1990	2012	1990	2012	1990	2012	1990	2012	1990	2012	1990	2012
Agriculture, hunting, forestry and fishing	9.4	5.7	3.8	4.0	3.8	3.1	8.8	6.1	8.0	6.7	8.9	7.5	5.8	4.9
Mining and quarrying	4.5	3.4	2.4	2.7	19.3	14.1	7.6	9.2	10.6	11.1	0.2	0.4	32.6	25.1
Manufacturing	16.7	15.9	15.7	12.2	14.8	10.8	16.9	12.1	16.5	15.1	18.5	12.0	17.5	12.3
Electricity, gas and water supply	1.7	2.2	2.3	2.4	3.2	3.0	4.4	3.4	1.5	1.7	3.0	1.7	0.4	0.4
Construction	3.7	4.8	6.3	5.6	8.0	7.0	7.5	7.5	3.7	6.6	9.4	8.0	6.6	9.0
Wholesale and retail trade, repair of goods, and hotels and restaurants	12.3	13.8	10.5	10.5	7.7	10.1	13.7	11.6	14.0	14.7	11.9	14.3	15.7	15.3
Transport, storage and communications	4.0	6.2	3.7	8.1	4.3	6.7	5.1	6.4	6.9	8.6	2.4	7.9	3.4	5.6
Financial intermediation, real estate, renting and business activities	14.2	14.8	13.9	13.0	20.8	22.1	17.7	19.5	13.6	13.2	28.0	18.4	7.4	8.1
Public administration, defence, compulsory social security, education, health and social work, and other community, social and personal service activities	23.1	19.4	31.8	26.4	20.7	14.9	11.1	15.4	18.3	13.8	25.1	18.9	13.3	13.9

Source: Cepalstat (2016).

Table 4 Share of Employment by Sector

Country	Early 1990s (1)			Early 2000s (2)			Early 2010s (3)		
	Agriculture	Industry	Services	Agriculture	Industry	Services	Agriculture	Industry	Services
Argentina									
Brazil	19.8	23.6	56.6	19.7	20.3	58.2	14.2	22.8	62.9
Chile	17.0	26.8	55.7	13.0	24.5	62.2	9.7	23.1	67.2
Colombia	25.9	21.6	52.4	23.0	18.0	58.9	17.1	20.6	62.2
Peru	31.5	15.8	52.8	35.2	14.1	50.6	25.5	17.6	56.9
Uruguay				11.0	21.9	67.2	8.6	21.1	70.2
Venezuela, RB	13.1	24.6	62.2	10.6	22.8	66.5	7.7	21.2	70.8
Latin America	21.7	21.8	55.6	19.4	21.8	58.7	16.0	21.9	61.9

Notes: (1) For Brazil, Chile and Venezuela, 1990. For Colombia, 1991. For Peru and Latin America, 1997. No data for Argentina and Uruguay. (2) For Brazil, Chile and Venezuela, 2000. For Colombia, 1999. For Peru, 2001 and Latin America, 2002. For Uruguay, 2007. No data for Argentina. (3) For Brazil, Colombia, Peru, Uruguai, Venezuela and Latin America, 2012. For Chile, 2011. No data for Argentina.

Source: Cepalstat (2016).

In turn, Table 5 show the concentration of employment in sectors of low productivity level throughout the region, where more than two thirds of occupations are carried out in these kind of activities and less than ten percent are realized by companies and sectors of high technological intensity.

Eclac (2014) has shown that, although the sectoral distribution of productivity gains has been uneven, differences in productivity between high and low productivity sectors have decreased, which meant a reduction in the structural heterogeneity in the region during the 2000s. But far from representing a stride to development, this movement was accompanied by a restructuring of productivity structure toward low productivity sectors. As can be seen in Figure 7, in all countries under analysis the

sectors that grew more between 1990 and 2010 were exactly the ones with the lowest productivity levels[6].

Table 5 Share of Employment by Sector Productivity Level

Country	Early 1990s (1)			Early 2000s (2)			Early 2010s (3)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
Argentina									
Brazil	66.3	26.3	7.4	69.2	24.5	4.4	63.7	26.6	9.5
Chile	58.1	31.7	7.4	60.0	29.5	10.1	60.6	27.2	12.1
Colombia	69.5	24.9	5.6	71.2	22.7	6.0	63.2	27.2	9.6
Peru	74.3	20.1	5.6	77.3	18.7	3.9	70.6	23.0	6.4
Uruguay				64.8	26.5	8.7	63.9	26.2	7.1
Venezuela, RB	63.1	28.8	8.1	65.4	28.3	6.2	63.1	29.6	7.1
Latin America	69.0	25.7	4.4	68.2	26.1	5.6	65.1	26.7	8.0

Notes: (1) For Brazil, Chile and Venezuela, 1990. For Colombia, 1991. For Peru and Latin America, 1997. No data for Argentina and Uruguay. (2) For Brazil, Chile and Venezuela, 2000. For Colombia, 1999. For Peru, 2001 and Latin America, 2002. For Uruguay, 2007. No data for Argentina. (3) For Brazil, Chile, Colombia, Peru, Uruguai, Venezuela and Latin America, 2011. No data for Argentina.

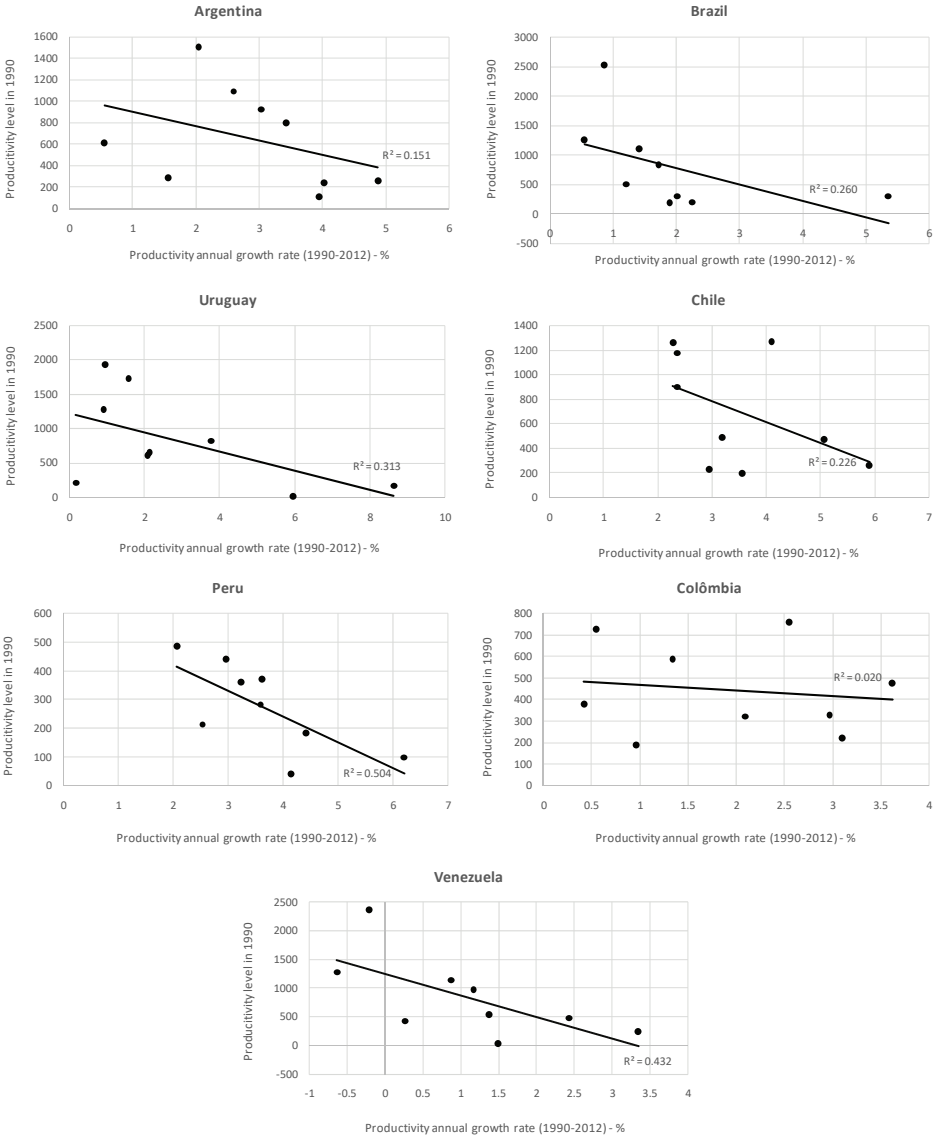
Source: Cepalstat (2016).

The implications of this process are complex. Despite labour productivity has grown, the technological gap between these countries and the one in the technological frontier, for instance the US, has not been narrowing. As can be seen in Figure 8, the technological multiplier (the ratio between the rate of growth of domestic productivity in modern sector and the rate of growth of the country in the technological frontier) has been pretty much constant in almost all countries, except Uruguay. Even in this case, the evolution of the country seems to be still quite modest. The comparison with some developing or recently developed (Korea) Asian countries is inevitable. There, contrarily to what happened in South America, most of the countries have been catching up with the US economy (Figure 8). Many factors can explain the reasons why these countries are falling behind (Moses Abramovitz 1986), like the level and quality of education (measured by years of schooling and the average score at PISA tests), the low percentage of labour force with secondary education, the low incentive to research and development and etc. But one of them is surely the high weight of low productivity sectors in the economy.

The slow rate of productivity growth and the resilience of low productivity sectors in the productive structure had consequences in the international trade pattern. In spite of the fact that trade balance improved a lot during most of the period, the trade specialization moved toward primary goods and natural resources, labour and low intensive technological products (Figure 9).

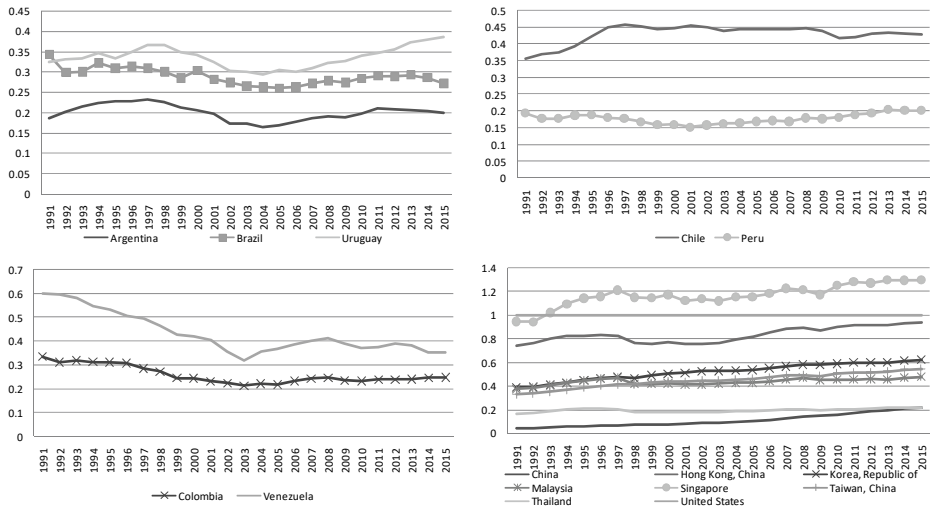
In sum, despite these countries have performed better in the period, in some of them income distribution has improved, while in others it has worsened. Moreover, although productivity increased, the productive structure has worsened and the gap between these economies got even larger.

[6] As it will be seen in the next section, even in the countries considered in this study as profit-led, the productive structure did not change in the period. Another finding contrary to one of our hypothesis!



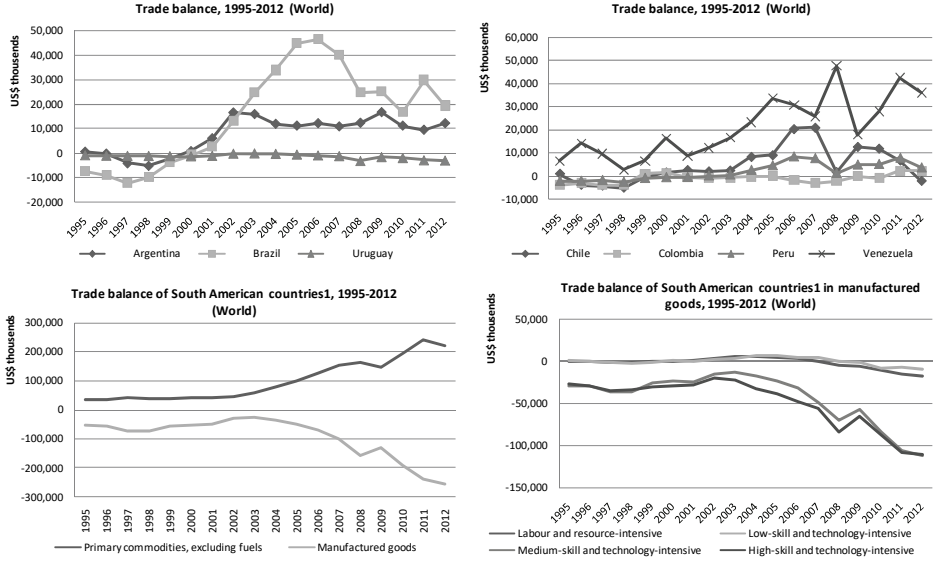
Source: Author calculation based on Cepalstat (2016).

Figure 7 Level (1990) and Growth (1990-2012) of Productivity by Sector and Country in Selected South American Countries



Source: Author calculation based on ILOSTAT (2016).

Figure 8 Technological Gap



Notes: (1) Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela.

Source: UNCTAD (2016)[7].

Figure 9 Selected South American Countries Trade Balance

[7] **United Nations Conference on Trade and Development (UNCTAD).** 2016. UNCTAD Statistics. http://unctad.org/en/Pages/statistics.aspx (accessed May 25, 2016).

3. An Indirect Evaluation of the Impacts of Income Distribution and Productive Structure on South America Economic Growth

Based on the data presented in the previous section, some questions can be raised. At first, how has income distribution been affecting economic growth in South American countries? Secondly, what role have the productive structure and structural change played on economic growth of those countries? Finally, are there relevant differences between countries' growth regimes?

Due to the low quality and the short period availability of data, it will be carried out just an indirect and suggestive evaluation of the main impact of the variables forehanded mentioned. It is important to say that the empirical literature on that has improved a lot. In the first study that tried to evaluate countries' growth regime, Samuel Bowles and Boyer (1995) estimated the impacts of the real wage on the components of aggregate demand of five developed countries, using single equation procedures. Other studies, like Naastepad (2006), Stefan Eger and Engelbert Stockhammer (2007), Naastepad and Storm (2007), Hein and Lena Vogel (2008, 2009), Engerlbert Stockhammer, Özlem Onaran, and Stefan Ederer (2009), Onaran, Stockhammer, and Lucas Grafl (2011), Stockhammer, Hein, and Grafl (2011) and mainly Onaran and Giorgios Galanis (2012) have used different econometric procedures and find different results regarding the classification of countries as profit-led or wage-led.

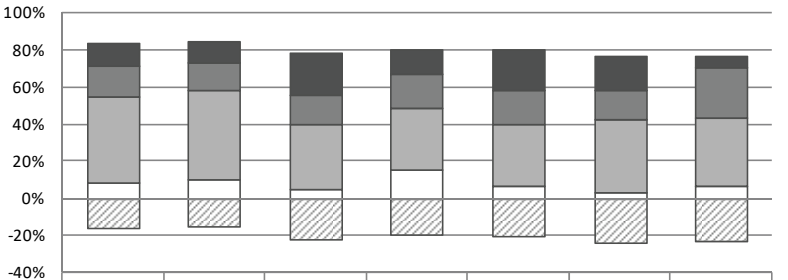
As mentioned before, in this paper we are not using any econometric model, just some correlations and indirect tests to identify growth regimes. It happens because our study is based on in a sample of developing countries with data limitations and many structural breaks. So, our classification is just suggestive and needs further evaluation.

Regarding income distribution, two simple tests were realized. The first was the gross contribution to the rate of economic growth, which is measured just by the weight of each component of aggregate demand times its own rate of growth. In order to evaluate their contribution to economic growth in South American countries we first took the geometric average of each component and then set two possible criteria to define growth regimes: (a) if the sum of the contribution of exports and investment is higher than the contribution of private consumption, it is a suggestion that the economy is profit-led, otherwise it is wage-led; (b) if the sum of the contribution of government consumption, exports and investment is higher than the contribution of private consumption, it is also means a possibility of a profit-led economy, otherwise wage-led.

The results, though not so robust, are quite intersting and indicate that Argentina, Brazil and Uruguay would be wage-led economies, whereas Chile and Peru might be profit-led. The outcomes for Colombia and Venezuela are inconclusive, once for one criteria they would be profit-led and for the other wage-led.

The second test carried out was the correlation between the rate of growth of wage share and that of investment. In this case, the results of these correlations combined with the aforementioned contribution to GDP growth rate suggest that while

Argentina and Uruguay could be strongly wage-led, Brazil could be just weakly wage-led.



	ARG	BRA	CHL	COL	PER	URY	VEN
Imports	-0.240569709	-0.216713334	-0.385295352	-0.32470174	-0.334209236	-0.43787678	-0.432961146
Exports	0.184418749	0.169451022	0.402042053	0.215937656	0.358022014	0.34808659	0.110616854
Gross capital formation	0.239057587	0.21211153	0.272666954	0.301344107	0.305738954	0.292006295	0.515115201
Private consumption	0.686323917	0.680520201	0.618666112	0.555468792	0.562337974	0.731962403	0.682834014
Government consumption	0.130769456	0.154630581	0.091920233	0.251951184	0.108110294	0.065821492	0.124395077

Regime 1 X + I > W ⇨ Profit-led	**Wage-led**	**Wage-led**	**Profit-led**	**Profit-led**	**Profit-led**	**Wage-led**	**Profit-led**
Regime 2 G + X + I > w ⇨ Profit-led	Wage-led	Wage-led	Profit-led	Wage-led	Profit-led	Wage-led	Wage-led

Source: Author, based on Cepalstat (2016).

Figure 10 Contribution of Aggregate Demand Components to GDP Growth

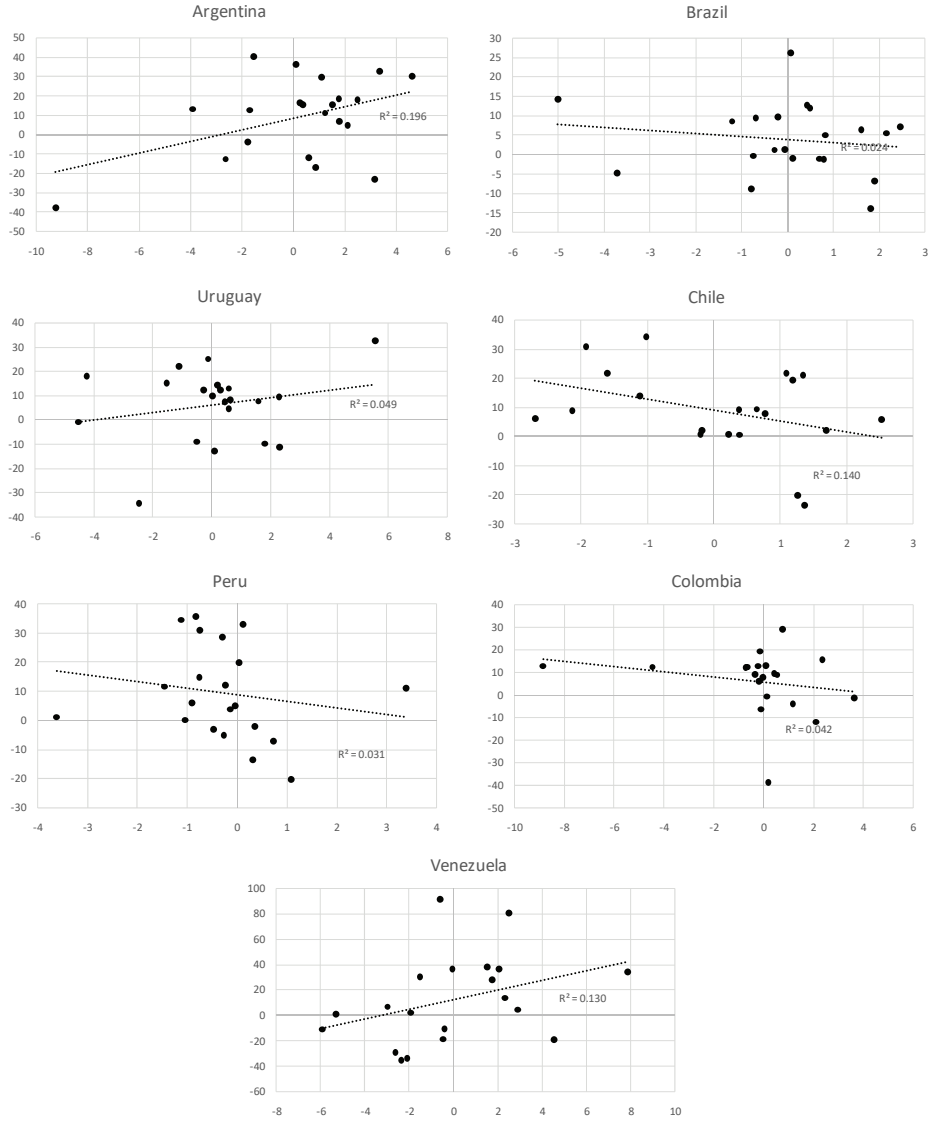
In turn, Chile and Peru could be strongly profit-led, whilst Venezuela could be weakly wage-led and Colombia could be weakly profit-led.

One may argue that from 1990 to 2002, in countries like Brazil, the growth regime was profit-led, from 2003 to 2007 it was export-led (mainly due to the increase in the international commodities prices) and, only after the subprime crisis, the growth regime became wage-led. But if we take into account that a growth regime is something that happens in the medium to long run, it would be quite hard to set so many regimes. Beyond that, it would be incompatible with the contribution of the consumption in the rate of growth[8].

Finally, in order to evaluate the role of productive structure on economic growth we decided to carry out a counterfactual exercise based on a slightly modified decomposition of sectoral value added, originally proposed by Claudio Roberto Amitrano and Gabriel Coelho Squeff (Forthcoming)[9].

[8] I am thankful to the referee who made this point in her comments to the paper.

[9] Something quite similar was made by Margaret McMillan and Dani Rodrik (2011, p. 27), where the authors found "that since 1990 structural change has been growth reducing in both Africa and Latin America, with the most striking changes taking place in Latin America. The bulk of the difference between these countries' productivity performance and that of Asia is accounted for by differences in the pattern of structural change – with labor moving from low- to high-productivity sectors in Asia, but in the opposite direction in Latin America and Africa".



Source: Author calculations, based on Tosoni (2014) and Cepalstat (2016).

Figure 11 Correlation Between Wage Share and Investment Rate

The exercise is very intuitive and begins by asking: what would happen if there was a migration from workers from backward sector to the modern sector? The answer to this question is given just by making explicit one of the identities for the aggregate output or value added. Formally, the value added in year t is nothing more than labour productivity multiplied by the level of employment, both in period "t". If

we add to this description the sectoral division of the economy between Agriculture, Industry and Services, then we have that the GDP in "t" corresponds to the sum of the sectoral productivities multiplied by their respective level of employment, according to the following identities.

$$Y^t = Y_A^t + Y_I^t + Y_S^t \tag{38}$$

$$L^t = L_A^t + L_I^t + L_S^t \tag{39}$$

$$q^t = \frac{Y^t}{L^t} \tag{40}$$

$$q_A^t = \frac{Y_A^t}{L_A^t} \tag{41}$$

$$q_I^t = \frac{Y_I^t}{L_I^t} \tag{42}$$

$$q_S^t = \frac{Y_S^t}{L_S^t} \tag{43}$$

$$Y^t = q^t \cdot L^t \tag{44}$$

$$Y^t = q_A^t \cdot L_A^t + q_I^t \cdot L_I^t + q_S^t \cdot L_S^t \tag{45}$$

$$q_A^t < q_S^t < q_I^t. \tag{46}$$

In which Y^t is the total value added of the economy in year "t", Y_A^t is the value added of the Agriculture, Y_I^t is the value added of the Industrial sector and Y_S^t is the value added of the Service sector. Similarly, L^t is the level of employment in the economy in year "t", L_A^t, L_I^t, L_S^t are the level of employment in Agriculture, in the Industrial and Service sectors. In turn, q^t is the labour productivity of the economy as a whole, and q_A^t, q_I^t, q_S^t represent their respective labour productivities.

Notice that, as the informal sector represents a large part of South American economies and the rest of service sector is characterized by low knowledge and technology intensity, it will be considered in this paper as the backward sector, as well as Manufacture will be considered as the modern one. Agriculture will be a neutral sector, used only to make sense of the data available.

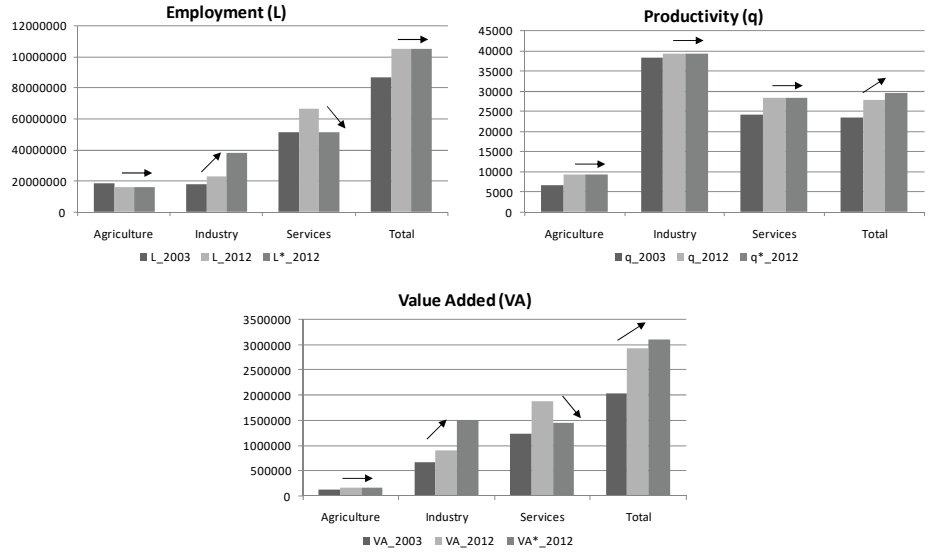
In order to answer the question proposed beforehand we can rewrite the value added in "t" as the result of labour productivity in t times the level of employment in "t-1" plus the variation of employment between "t" and "t-1". In this sense, we have:

$$Y^t = q_A^t \cdot (L_A^{t-1} + \Delta L_A^t) + q_I^t \cdot (L_I^{t-1} + \Delta L_I^t) + q_S^t \cdot (L_S^{t-1} + \Delta L_S^t) \tag{47}$$

To know what would have happened to the value added and the aggregate labour productivity if all occupations that were created in the 2000s had been allocated in the modern sector, we need to reallocate ΔL_S^t to the modern sector. Formally, this means that:

$$Y^{t^*} = q_A^t \cdot (L_A^{t-1} + \Delta L_A^t) + q_I^t \cdot [(L_I^{t-1} + \Delta L_I^t) + \Delta L_S^t] + q_S^t \cdot L_S^{t-1} \tag{48}$$

Note that the new value added of the economy keeps the sectoral productivity and the total stock of occupations constant. The only factor to change is the migration of jobs generated in the backward sector (Service) into the modern one (Manufacture). In this case, it is clear that both aggregate value added and productivity will be greater after the migration of workers than before since, according to Equation (46), $q_A^t < q_S^t < q_I^t$. Using Eclac data for the seven South American countries studied and aggregating them as a group, it is possible to confirm the implications of a hypothetical migration of jobs (L^*) generated in the backward sector (Service) into the modern one (Manufacture), as can be seen in Figure 12.



Source: Author, based on Cepalstat (2016).

Figure 12 Impacts of a Migration of Jobs from the Backward into the Modern Sector

4. Final Remarks

This paper intended to analyze the role of income distribution and productive structure in the economic growth of some South American countries, namely Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela, for the period between 1990 and 2012. In order to reach this objective, it was developed a post-Keynesian two-sector model in which the modern sector drives the economic growth and the technological progress and the backward sector retards them. It was shown, as well, that growth regime could be wage or profit-led and that the technological multiplier has an important role in it. Moreover, the interaction between the two sectors opened up the possibility of an underdevelopment trap.

The data collected and the indirect strategy to evaluate the impacts of income distribution and productive structure in the economic growth, seemed to show that there were two main growth regimes in South America. Countries like Brazil, Argentina and Uruguay would have gone through wage-led growth regimes, while in Chile

and Peru the growth regime would have been profit-led. Colombia and Venezuela seem to be two borderline cases. Furthermore, the rigidity of the productive structure, and its associated international trade pattern, have slowed the growth rates of GDP and productivity.

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