universität wien

MAGISTERARBEIT

Titel der Magisterarbeit

"Unlimited Labor Supply Analysis in Seven South-American Countries in the Arthur Lewis Theory"

Verfasser

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angestrebter akademischer Grad

Magister der Sozial- und Wirtschaftswissenschaften

(Mag.rer.soc.oec.)

Wien, 2012

Studienkennzahl lt. Studienblatt : A 066913

Studienrichtung lt. Studienblatt : Magisterstudium Volkswirtschaftslehre

Betreuer : Mag. Dr. Robert Stehrer

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ACKNOWLEDGEMENTS

The topic of this Master Thesis was recommended by Professor Dr. Robert Stehrer at the beginning of my Master program in Economics at the University of Vienna. After studying the concerning literature, it became clear to me that the "unlimited labor supply" in developing economies is still a relevant topic. This Thesis is based on the paper "Economic Development with Unlimited Supplies of Labor" written in 1954 by economist and Professor, William Arthur Lewis. The purpose of this study is to identify the relevant and current characteristics of the labor supply in seven South-American economies and match them with those from the Lewis framework. The Lewis paper is basically theoretical and intuitive and has been formalized by further researchers such as John Fei & Gustav Ranis (1964). Professors John Fei and Gustav Ranis developed a growth Model and determined the necessary condition for success in economies with particular characteristics in their labor markets. After reviewing the theory, my empirical research focuses on the analysis of labor market and macroeconomic indicators that support the existence of unlimited supplies of labor in seven South-American countries (SA-7). In order to determine some of the conclusions concerning the labor market situation and growth path in these economies, I test the condition for success of the Lewis-Fei-Ranis growth model to prove statically the significance of the model for these SA-7 economies.

INTRODUCTION

Why is the Arthur Lewis paper – published 58 years ago - still important? Arthur Lewis analysis and perception marked an important change in the labor market analysis in developing countries and further in theories of growth. Before the publication of the Arthur Lewis paper, "Economic Development with Unlimited Supplies of Labor" (1954), the labor market analysis, practiced in the main international organizations such as *Comisión Económica para América Latina y el Caribe* (CEPAL) and the national institutes of statistics[1] in each country in Latin America, was related to the *neoclassic* vision, framed in an economy context of one productive market in the economy where labor was re-allocated. After publishing his paper in 1954, which was focused on the Asian economy situation, Arthur Lewis marked an important *turning point* in the labor market analysis for developing countries including the South-American countries, recognizing that labor force is allocated from one sector of the economy to another much more productive sector.

Table 1 shows chronologically the trends of the labor market analysis in South- American countries since 1940. The new labor market analysis inspired by the Lewis model has been used by different economic schools.

[1] The national institutes of statistics in each country are agencies of the executive (government) in charge of supervising all public statistics and organizing and managing the national statistic system. Source: www.indec.gov.ar

Table 1: Views of the Labor Market Analysis in Latin America

School	Decades	Operation	Results
Neoclassic	1940 – 50	One market / Only frictions	Full Employment / Leveling of Income
Dualism	**1950 – 60**	**Two sectors / Excess Supply**	**Full Employment / Leveling of Income**
Structuralism	1960 – 70	Two sectors / Excess Supply	Unemployment / Income Inequality
Informal Sector	1970 – 80	Two sectors / Excess Supply	Full Employment / Leveling of Income
Neoclassical resurgence	1980 in LA	One market / Only frictions	Full Employment / Leveling of Income
Segmentation	1990 in LA	Two sectors / Several Sectors / Excess Supply	Unemployment / Income Inequality

Source: F. Verdera " El Mercado de Trabajo e Lima Metropolitana: estructura y evolución 1970-1990" INEI - Perú

People familiar with the economic situation in the South- American economies, may notice that many properties of the labor market, described in the article "*Economic Development with Unlimited Supplies of Labor*" from Arthur Lewis, seem to prevail to some extent in these economies. The Lewis model describes three main characteristics of the labor market, enough to consider the labor supply perfectly elastic or its equivalent "unlimited". These three characteristics refer explicitly to the following aspects:

- The existence of two succinctly different sectors in the economy: According to Arthur Lewis the level of development of the capitalist sector (modern) in the economy will make every difference between rich and poor economies. The higher the levels of

development of the capitalist sector in comparison to the agriculture sector, the richer the economy. Lewis considers that in the traditional or agricultural sector the main output are goods of first necessity. Goods of first necessity are normal goods until a point or quantity, where they become an inferior good; which means that the individual or household will not spend more than a fixed quota of food. Thus any additional dollar of income will be used for buying other kinds of goods or to save. This traditional sector has as its constraints land and labor as factors of production. In the capitalist sector instead, labor force is involved in activities where the output is normal goods and do not become inferior.

- Quality of employment*: Underemployment* is a manifest of employment problems. Underemployment is related to people working less than the hours desired, people in paid[2] or self-employment and people who work but are willing to accept an additional job and people with inadequate employment situation. According to the International Labor Office (ILO), underemployment is classified into *visible* underemployment (1) and *invisible* Underemployment (2).

> *(1) Persons visibly underemployed comprise all persons in paid or self-employment, whether at work or not at work, involuntarily working less than the normal duration of work determined for the activity, who were seeking or available for additional work during the reference period.*
>
> *(2) Invisible underemployment is primarily an analytical concept reflecting a misallocation of labour resources or a fundamental imbalance as between labour and other factors of production. Characteristic symptoms might- be low income, underutilisation of skill, low productivity. Analytical studies of invisible underemployment should be directed to the examination and analysis of a wide variety of data, including income and skill levels (disguised underemployment) and productivity measures (potential underemployment)."*

Source: ILO website http://www.ilo.org/global/statistics-and-databases/statistics-overview-and-topics/underemployment/lang--en/index.htm

[2] *"in paid employment"* is also said for people self-employed according to the International Labor Office.

- The third characteristic is referred to as the labor force willing to work unlimitedly for a minimum salary or wage, referred to as "subsistence wage", by Lewis and further on named "institutional wage" by some other authors.

Observing these characteristics of the labor market, Arthur Lewis declared situation as evidence for the "existence" of an excess of labor in these economies.

Excess labor is thus related to overpopulation and labor force not well employed that earn a wage equivalent to the minimum level of subsistence and thus vulnerable to poverty. Unemployment and poverty are linked together as an effect of the excess labor. The surplus of labor tends to start developing some unproductive activities with small revenues only. In these economies, there is also another part of the society that works "formally" and gets higher loans or salaries. The group of labor force under low quality of labor is mainly allocated in the so-called "non capitalist sector" or *"subsistence sector"* (Lewis, 1954:4-5). The magnitude of this subsistence sector is the most important component of the so-called *unlimited labor supply* situation.

In this analysis I selected a group of seven South-American countries (SA-7): Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela. In these economies, at first glance the characteristics such as high rates of underemployment and huge portions of the labor force working at very low wages levels, match almost perfectly with the assumptions proposed in the Lewis Model.

Therefore, my analysis is comprised of three core chapters. In the first chapter I review the concept of unlimited labor supply in an economy (Lewis approach), remarking the most important characteristics of an economy with unlimited labor supply according to his paper "Economic Development with Unlimited Supplies of Labor" published in 1954. This unlimited labor supply assumption will be the base for professors John Fei and Gustav Ranis to develop and present the growth theory for the two sector or dualistic economies with unlimited labor supply in the book titled "Development of the Labor Surplus Economy: Theory and Policy". Following the theory by Fei & Ranis, I explain briefly its view and theory of growth and the success condition for a further empirical analysis in the second chapter of this study.

In the second chapter I provide a descriptive analysis in order to show and identify the characteristics that give supportive evidence of unlimited labor supplies in these countries.

The third chapter provides tests of the condition for success under an economy facing unlimited labor supplies and the determination of growth factor, following the decomposition analysis of Fei & Ranis growth model.

Finally, in the fourth chapter, I provide my conclusions for those countries within the SA-7, which have had successful results in all steps of my analysis.

The analysis answers the following research questions:

1. Can we find evidence for an excess of labor supply in the seven South American countries considered?

2. According to Lewis framework, do we have relevant empirical evidence exerting pressure on wages and supporting unlimited labor supply?

3. Did the seven South- American countries show some improvements on labor productivity on their economic sectors in the last 40 years? To which extent is that in accordance to the Arthur Lewis theory?

4. Which are the most productive sectors in the economies? Which sector is the most labor intensive? Do the patterns match with Lewis framework of development?

5. Do the SA-7 economies fit in the Lewis-Fei-Ranis growth Model proposed in 1954 and 1964? To which activities is the poor part of the society related?

6. In the framework of the Lewis-Fei-Ranis model, what are the factors of the economy that have been crucial to offset the labor force growth?

7. Considering the growth path of the dualistic economy, in which stage of development are these economies located?

The data for the study was compiled from the World Bank online database, Oxford University - Department of International Development Studies Data Base, UNIDO data base, CEPAL online database and ILO database available on the respective websites (see references and survey). Some recent data was also compiled from each country's statistics

government institute. I considered transcendental the politic and economic policy changes from 2001 in the seven South-American countries in analysis. Due to data availability, the period of analysis in the empirical part will be from 1991 through 2007 in order to skip the current financial crisis.

Argentina and *Brazil* are the biggest industrialized economies in Latin America with 48% and 37% of industry value added (IVA) as share of their respective GDP. *Argentina* and *Uruguay* have the highest GDP per capita/year in 2009 in the South American region (10,682 US$ and 9,284US$ respectively). *Uruguay* is geographically a small commercial country between the giant Brazil and the big Argentina. *Venezuela* is a powerful country which is one of the biggest industrialized countries and the fourth highest GDP per capita/year in Latin America (IVA 41% of GDP and 5,425 US$ per capita/year) after Argentina, Uruguay and Chile. Venezuela´s economy depends on oil revenues which account for roughly 95% of export earnings, about 40% of federal budget revenues, and around 12% of GDP[3]. *Chile* is an important economy due to its export potential worldwide, mainly in agro-industry and has the third highest GDP per capita/year in the region. *Peru* is an economy with significant GDP growth rates in the last 10 years. Peru is considered a primary export Economy. Peruvian Mining and industrial sector have led the Peruvian economy to important economic changes since 2000 where successful policies reduced poverty around 10% in the last decade (from 45% in 2000 to 35% in 2009). *Colombia* was chosen for its interesting macro indicators that reveal a match with the Lewis approach, such as 64% of the population living with an income over the national poverty line and high rates of underemployment.

[3] Economy overview at http://www.indexmundi.com/venezuela/economy_profile.html

1. THEORETICAL BACKGROUND: UNLIMITED SUPPLIES OF LABOR AND ECONOMIC GROWTH

In 1954, William Arthur Lewis based his analysis on the roots of the classical growth model, focusing on the labor *supply* in the expansion process.

Textbook contributions assume an upward-sloped labor supply curve, putting aside the possibility of an ***unlimited labor supply***. This approach is justified with respect to developed economies, e.g. the Western European countries, which do not suffer from an unlimited labor supply. With respect to developing economies, however, Lewis argued, *"... on the other hand over the greater part of Asia labor is unlimited in supply, and economic expansion certainly cannot be taken for granted."* (Lewis, 1954: 4)

Arthur Lewis identified some relevant characteristics of the labor market in developing countries such as the high rate of underemployment, overpopulated sectors relative to capital or labor opportunities, largest groups of society working by their own perceiving minimum compensations or low wages and also one sector of the economy well developed with higher standards of living. This is what the next section is about.

In Section 1.2, the microeconomic approach developed by John Fei and Gustav Ranis (1964) that supports the unlimited labor supply assumption is explained. This approach follows the structure of the authors in their book "*Development of the Labor Surplus Economy*" written in 1964 arguing that the first order condition of the classical model that refers that the marginal product of labor $\frac{\partial Y}{\partial L}$ equals the real wage ω is not satisfied, i.e. $\frac{\partial Y}{\partial L} \neq \omega$ where $Y = f(K, L)$ is a textbook production function, i.e. output Y is a function of capital K and labor L. This result which holds when labor is of unlimited supply, that, $\frac{\partial Y}{\partial L} \neq \omega$, becomes the cornerstone of John Fei and Gustav Ranis contribution, which supports the Lewis approach with respect to the existence of an unlimited supply of labor in these economies.

In Section 1.3 I briefly explain and illustrate the economic expansion concept and depict the conditions for success in the Lewis model framework. Section 1.3.1 is basically the explanation of the accumulation process in the two sectors economy with unlimited labor supply. In section 1.3.2 I depict the conditions for success proposed by professors John Fei and Gustav Ranis, related to the labor absorption process.

1.1. Unlimited Labor Supply approach and Lewis Labor Market Analysis

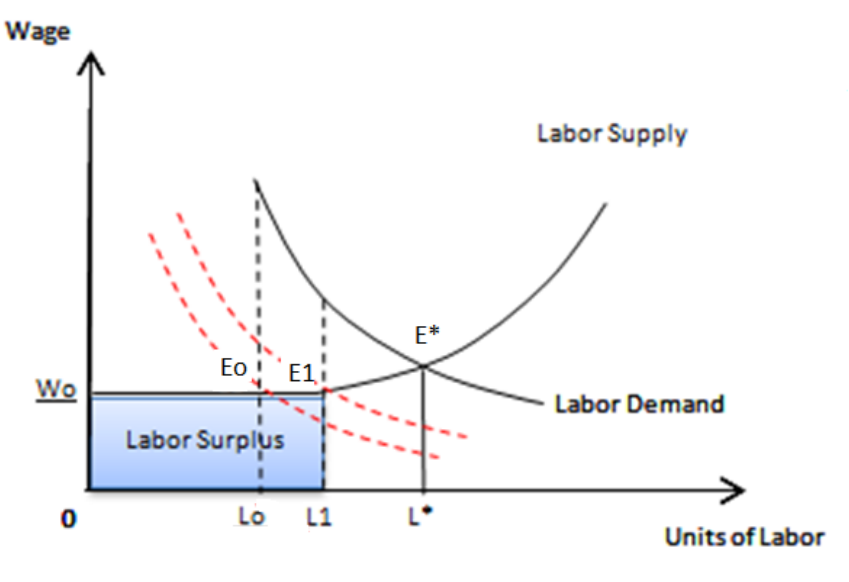
In this section I present the Arthur Lewis arguments of unlimited labor supply in a graphical manner and explain the main labor market characteristics that support the idea of unlimited supplies of labor in less developed economies. The unlimited labor supply is a critical and crucially departing assumption for further growth theories for less developed economies.

1.1.1. Representation of the Unlimited Labor Supply

Arthur Lewis proposed the scenario of a labor market with *unlimited labor supplies.* Lewis, in his essay, remarked the necessity and set the feasibility to consider the assumption of an unlimited labor supply in economies in countries such as Egypt, India or Jamaica, which present high rates of underemployment, extreme low wages and low standards of living that will be listed in section 1.1.2 of this chapter.

Diagram 1 illustrates the Lewis labor market scenario of the industrial or capitalist sector of the economy. Real wage is depicted in the vertical axis of diagram 1 and labor units (hours) are represented at the horizontal axis. At a low level of demand labor supply is essentially unlimited implying a constant wage rate $\underline{W_0}$ until the E_1. From E_1 the labor supply curve starts to slope positively. The labor supply is perfectly elastic at a wage level $\underline{W_0}$ which means that an individual will offer a maximum of work at this constant level of wage $\underline{W_0}$.

Diagram 1: Representation of the Unlimited Labor Supply Approach



Author´s graph

Two important issues can be derived from this unlimited labor supply labor market scenario, which are explained in Section 1.3.1:

- The feasibility of an unchanged or constant wage level $\underline{W_0}$
- Capitalist profits are higher when capitalist faces constant real wages $\underline{W_0}$

Considering a negative classic labor demand curve, in *diagram 1.1* any shift of the labor demand between $\underline{W_0}$ – L_0 will be at a constant real wage. Capitalist can freely decide its level of production. Lewis proposes that Capitalists will make profits from this cheap labor force cost.

1.1.2. Labor market characteristics supporting the Unlimited Labor Supply approach in developing countries

The questions arising are therefore to which extent the unlimited labor supply exists and what are the determinants? Unlimited labor supply is said to exist in those countries with

high rates of underemployment and where population is large relative to capital and/or natural resources (Lewis, 1954:5). Under these circumstances a negligible marginal productivity of labor occurs. This is what capitalist income can profit from; but how far can they go? The overpopulated agriculture sector will supply the manpower to fuel the development process (Fei & Ranis, 1964:8). Therefore, below I describe the characteristics of the labor supply with labor surplus.

i. Underemployment and Occasional jobs domain

"*Occasional jobs*" are activities developed by the unemployed or underemployed labor force. These are jobs, where an individual tries to get some monetary compensation or *tips* from doing some occasional short service. Some examples of occasional jobs are such as carrying bags at the train station, jobbing gardener, etc (Lewis, 1954:2). The occasional job was one of the main characteristics of the Asian labor market at that time and Lewis determined it as something very important to be added to the classical labor market and growth path. The existence of an "*occasional sector*" conformed by the "*occasional jobbers*" can also be observed in South American countries in a generalized way which has developed over time. The "occasional sector" is considered in the statistics as part of the "underemployment sector". According to Lewis the "occasional sector" can be also related to the unskilled labor force and represents in overpopulated economies an enormous possibility of an industrial expansion without shortage of unskilled labor (Lewis, 1954:4).

ii. Labor surplus and redundant labor in the Agriculture sector

Arthur Lewis identified two sectors in these developing economies, with one sector being much more productive than the other. The less productive sector is the agriculture sector located in rural areas with a large rate of underemployed population with low wages and low standards of living. Due to the over-populated situation with respect to capital in this sector of the economy, a large portion of the labor force is *"redundant"* in terms of productivity. "Redundant labor force" is a situation where the position of employment of an employee is or will become surplus to the requirements of the employer's business (Fei & Ranis, 1964:13).

On the other hand, in this economy a much more productive sector (industrial or capital sector) exists, where labor force is needed. Due to the free mobility of labor within one economy, a transfer of labor force from the agriculture sector to the capital sector is feasible and will reduce the "redundant" labor force in the traditional sector. The portion of the redundant labor force transferred from one sector to the other becomes part of the industrial labor force.

iii. **Negligible Marginal productivity of Labor & Subsistence wage**

Negligible marginal productivity prevails in economies with redundant labor force where the minimum wage rate is institutionally determined. In these economies, the minimum wage level will be fixed at a "*subsistence level*" (Lewis, 1954:6), comparable with the national poverty line. In this scenario, we can intuitively deduce that the minimum wage rate does not equal the marginal productivity of labor.

Now it is time to relate and enclose the idea related to "subsistence wage level" and "negligible marginal productivity" into the idea of labor surplus and the consequence of an "unlimited labor supply". The supply of labor is said to be "*unlimited*" as long as there is labor force willing to work for this "*subsistence wage*".

The identification of two interconnected sectors in the economy (agriculture and industrial sector) will let us think of two groups of labor force that freely allocate themselves in any of these two sectors of the economy. That is one of the main issues emphasized by Lewis in his article, to argue that this labor reallocation from agriculture sector to the industrial sector will generate a pressure on wages in the industrial sector.

1.2. Microeconomic approach of the Lewis "Unlimited Labor Supply" assumption / John Fei & Gustav Ranis

According to Arthur Lewis, an economy with unlimited labor supply has two important characteristics. The first one is related to the marginal productivity of labor that is in some cases negligible; and the second one, is about the existence of an institutional wage at the subsistence level (minimum wage). This subsistence wage level appears to be constant in

real terms due to the abundant unskilled rural labor that transfer to the cities and pressure the wage in the capitalist sector over a minimum level of wage.

When we talk about unlimited labor supply, labor surplus intuitively comes to mind. The classical economists consider the notion of "surplus labor" as the presence of disguised unemployment with wages determined in a bargaining context; and the neoclassical economists accept labor market clearance and labor supply decisions supported on individual solution of its utility maximization problem based on the labor/leisure trade off (Fei & Ranis, 1997:146).

According to Lewis' model, in the traditional sector of the economy there is no labor market clearance, thus labor surplus. The traditional sector with labor surplus is characterized by the following issues:

- Redundant labor force: There is a large labor supply relative to fixed supply productive available land.
- Output is concentrated on first necessity goods with a limit on demand.

In this framework, the neoclassical wage that equals the marginal product is not achieved. Thus, there is an institutional minimum wage that is greater than the marginal productivity of labor; hence, there is no equilibrium or competitive wage reached. These issues do not allow the classical and neoclassical economists to derive analytically the institutional wage (Fei & Ranis 1997:147).

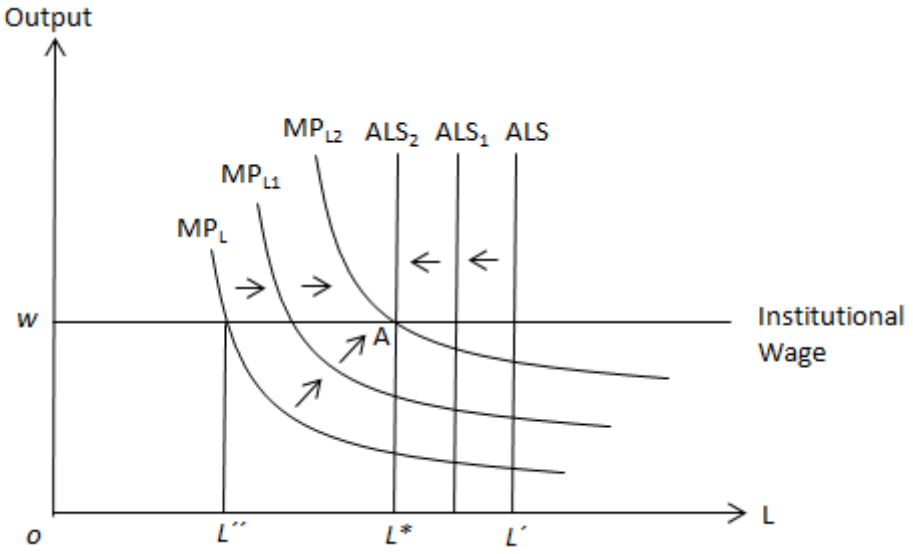
On the other hand, the capitalist sector is tied to the traditional or agriculture sectors institutional wage, of course, as long as the surplus labor persists. The way to erase the labor surplus is through the labor reallocation, in which traditional sector labor force becomes labor force in the capitalist sector. This labor reallocation is going to be achieved with both sector effort and investment following the classic or neoclassic growth model. Dualism disappears as the traditional or agriculture sector loses its characteristic labor surplus and verges to the one-sector neoclassical model.

Clearing wages are obtained in the capitalist sector with the unskilled real wage tied to the traditional sectors institutional real wage at some premium reflecting the necessary

inducement to move, possibly including an additional gap due to other government interventions in the organized labor market (Fei & Ranis 1997: 148).

Diagram 2 illustrates the transition process from the traditional market view. Labor is represented on the horizontal axis with an initial endowment L'. The vertical axis shows the output and wage where w represents the constant institutional wage and MP_L are the correspondent marginal productivity of labor in the agriculture sector. ($L'' - L'$) represents the portion of the labor whose marginal product is under the institutional marginal wage and is related to the underemployed or unemployed portion of the labor force.

Diagram 2: Transition Process



Source: Fei & Ranis, 1997:149. "Growth and Development from an Evolutionary Perspective".

As the capitalist sector demands more labor force, the marginal productivity of the remaining labor force in the traditional sector rises, hence MP_L shifts to the right (MP_L -MP_{L1} -MP_{L2}), reducing the portion of agricultural labor force who is paid under the institutional wage. Labor force reallocation in the capitalist sector reduces the endowment of labor force in the traditional sector and ALS shifts to the left (ALS-ALS_1-ALS_2). As long as the labor

demand in the capitalist sector increases, this scenario will continue until the underemployment or disguised unemployment totally disappears. This process ends at point A when the marginal productivity of labor equals the wage at a given labor force endowment.

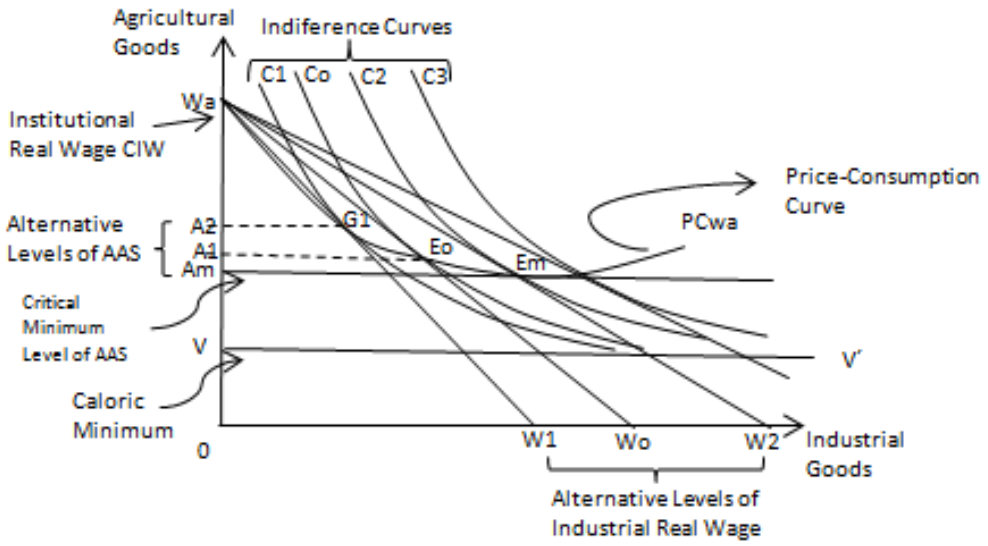
In the Lewis model framework, John Fei and Arthur Ranis conclude that during the first stage, the institutional wage does not equal the marginal productivity of labor until point *A* is reached. The institutional wage is determined by each government and could also be considered the legal minimum wage.

Following the Lewis model, John Fei and Gustav Ranis support the unlimited labor supply assumption based on empirical results where they show that there is an institutional wage above the very low marginal product of labor and that this wage rises only slowly via institutional wage (CIW) adjustment and lags substantially behind the agricultural productivity increases (Fei & Ranis 1997: 156).

The indifference map plotted in *diagram 3* shows the dynamics of the industrial real wage according to Fei and Ranis, supporting the constant behavior of the real wage. *Diagram 3* describes the consumer preferences of an industrial worker who perceives a real wage in terms of industrial goods. Agricultural goods are plotted in the vertical axis and the industrial goods in the horizontal one. The indifference curves are represented in curves C_0, C_1, C_2 and C_3. The vector VV′ represents the caloric minimum of any individual and a consequent location of all indifference curves is to be considered above this caloric minimum. When the indifference curves become flat asymptotically above the caloric minimum, it means that the industrial goods become poor substitutes of the agricultural goods. Below the caloric minimum the individual begins to starve.

Now, the main topic is to understand the behavior of the industrial real wage. In *diagram 3* the industrial wage w_0, represented in the horizontal axis, is measured in terms of a basket of industrial goods. On the other hand, in the agriculture sector exist a *"reservoir"* of disguised unemployment (Fei and Ranis 1964: 156) with a negligible marginal productivity and nevertheless perceives a positive institutional real wage (CIW) measure in terms of agricultural goods.

Diagram 3: The Industrial Real Wage is determined by Agricultural Surplus



Source: Fei & Ranis, 1964: 155 C.4, S. 2 "Agricultural Surplus and the Industrial Real Wage".

Since the agricultural goods are goods of first necessity, these are going to be part of the consumption bundle of the industrial worker. The CIW in the agriculture sector governs the value in exchange of the industrial real wage *w*. As long as there is disguised labor force in the agriculture ready to transfer to the industrial sector, the real wage in the industrial sector is not going to change even if there is an increase on the employment in the industrial sector. The industrial real wage is to be tied to the CIW at w_a.

To understand the dynamics, let's consider a total agricultural surplus (*TAS*) that will all be consumed by the industrial sector. Thus, an agricultural surplus per industrial worker (*AAS*) is plotted in *diagram 3* by A_2, A_1 and A_m. The magnitude of *AAS,* given the CIW, determines the terms of trade and industrial real wage. Suppose an initial *AAS* level A_2 with consumption level and the terms of trade G_1 (price consumption line). The industrial real wage w_1[4] is determined from the terms of trade level w_aG_1. Since the real industrial wage is

[4] "The industrial real wage is indicated by the point w_1 on the horizontal axis, due to the fact that only at this level of industrial wage w_1 and at this terms of trade level (slope of w_aw_1) will the industrial

tied to the CIW, or has the same exchange value as the CIW, it implies that any tendency for the real wage to increase substantially and thus create wage differential between agriculture and industry will be "*thwarted*" by the flow of agriculture workers to industry (Fei & Ranis, 1964:157).

Notice that if *AAS* is reduced, reduction in the consumption of agricultural goods cannot fall under the minimum caloric level A_m, where at point E_m the price-consumption curve PCw_a starts to increase. E_m is the point where the industrial good become to be no more a perfect substitute of the first necessity agricultural good and the price of food begins to rise.

1.3. Economic growth and Condition for Success under the unlimited labor supply assumption

Following the Arthur Lewis approach about the unlimited labor supply and two sectors in the economy, in 1965 John Fei & Gustav Ranis developed a growth theory for those countries with labor surplus. Fei & Ranis remark that for the development of their growth theory, *the intuitive notion of labor surplus is translated into an analytical condition, which becomes an integral part of the framework. (Fei & Ranis 1964:4, Introduction: an Approach to the Problem, "Development of the labor surplus Economy")*

The core theme of Fei & Ranis research was the continuous reallocation of labor from the agricultural sector to the industrial sector. The rate of labor reallocation is crucial and defines the success, stagnation or failure in the development effort of these economies.

1.3.1. Sectoral Interaction and Growth with Unlimited Labor Supply

Based on the theoretical background in the previous sections, Lewis provides a way to consider a growing economy:

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real wage command the same exchange value as CIW and will the commodity market be cleared (the typical industrial worker will buy all the *AAS* available)" Fei & Ranis 1964: Development of the labor surplus Economy. Page 158.

"*…the key to the process is the use which is made of the capitalist surplus in so far as this is reinvested in creating new capital; the capitalist sector expands, taking more people into the capitalist employment out of the subsistence sector. The surplus is then larger, still, capital formation is still greater and so the process continues until the labor is surplus labor*" (Lewis, 1954:11).

The process of success is going to be represented in two stages: The first one is when the economy faces a surplus of labor represented by the unlimited labor supply. This first stage is a representation of the two sectors economy. The second stage will be after the break point where the labor supply is positive and wages will be bargained.

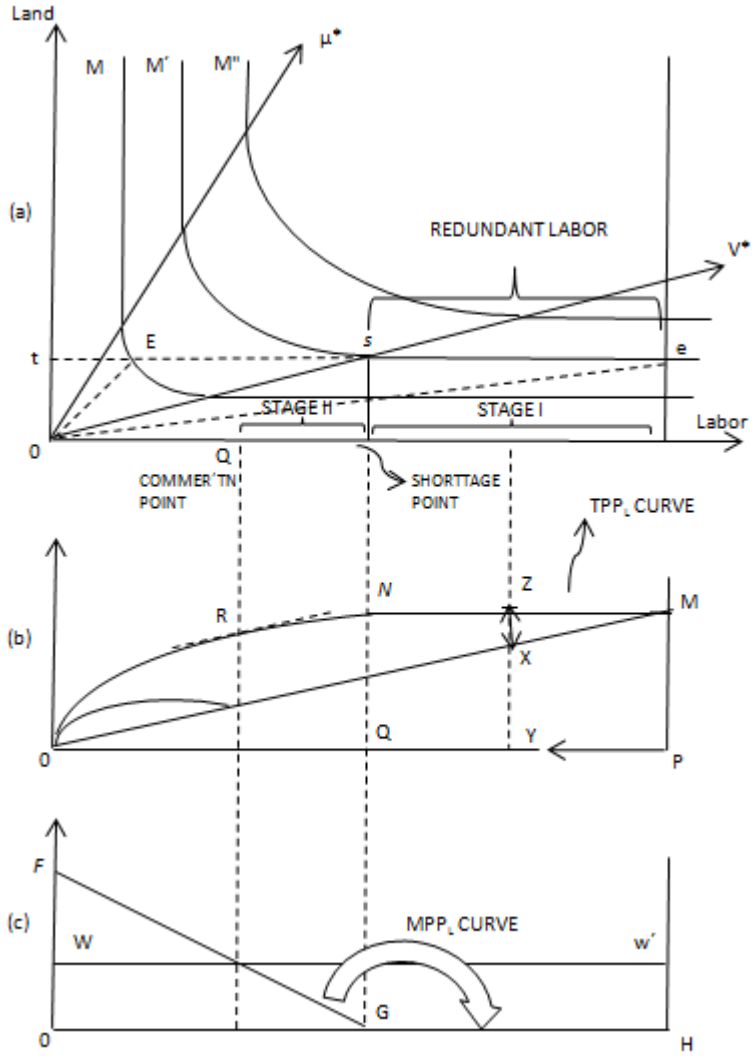
When talking about interaction, we may all think about this phenomenon in two different locations (or regions). From Arthur Lewis' approach, Fei and Ranis identified two locations in the economy such as the agriculture sector located in rural areas and the industrial or capitalist sector located in the cities or urban areas. The transcendental phenomenon in Fei and Ranis is the role of redundant labor force in the production of agricultural goods, the industrial production and employment and the labor reallocation process.

i. Redundant Labor force and agricultural production

The main characteristic of the agriculture sector is the overpopulation and the persistence pressure of population on the scarce natural resources. The first assumption in these economies is the initial and worsening bad endowment ratio land-labor, leading to rapidly diminishing increments in agricultural output. Labor and land are the factors of production in the agriculture sector and are represented in *Diagram 4a*. The respective contour lines are depicted by M, M´, M´´ assuming constant returns to scale. The region of factor substitutability is marked off by two ridge lines 0*v** and 0*u**; which means that under the line 0*u** the contour lines M, M´, M´´ became completely horizontal, indicating that with the factor land held constant, labor becomes redundant as output cannot be raised. In the theory it is assumed that the land available for cultivation is given. In *Diagram 4a,* for example, the production factors in the agriculture sector are depicted, where the given land available is established by the line 0*t*, and the line *ts* indicates the labor force employed productively. This productively employed part of the labor force is called the *"labor utilization ratio" by* Fei and Ranis, and denoted by *R*

$$R = \frac{ts}{0t} = \text{"Labor Utilization Ratio"}$$

Diagram 4: Labor Dynamics in the Agriculture sector



Source: Fei & Ranis, 1964:12 C.1. S.2. Fei & Ranis Conditions for Agricultural Production.

Given the quantity of land available for cultivation and agricultural production, an endowment rate is given by the labor force available or by population density in the agriculture sector. If the population density is huge, then the factor endowment is going to be allocated under the line marked, 0*v**, located in the horizontal part of the contour line,

which means that there is redundant labor. The endowment ratio *S* in this case with redundant labor is going to be strictly greater than the labor utilization rate *R (S > R)*. The endowment ratio is going to be given by $S = \frac{tE}{0t}$; where *E* is any point that indicates the magnitude of labor. Non-redundant labor is going to be given as long as the labor utilization rate *R* equals or exceed the endowment rate *S* is ($R \geq S$).

Now there is a point *s* that represents the point at which the endowment ratio *S* equals the labor utilization ratio *R*. At this point a non-redundancy labor ratio or coefficient *T* can be calculated just by dividing *T = ts/te (Fei & Ranis, 1997:14)*. This ratio T refers to the labor utilization ratio *R = ts/t0* and the endowment ratio *S = te/t0;* which dividing both by *t0* we get that:

$$T = \frac{R}{S} = Non-redundancy\ ratio$$

The non-redundancy ratio is directly proportional to the labor utilization ratio and inversely proportional to the endowment ratio or density proportion.

Diagram 4(b) depicts the total physical productivity of labor TPP_L given the assumption that land available is given; and *Diagram 4(c)* depicts the TPP_L lined up with the corresponding marginal productivity of labor MPP_L. *Diagrams 4(b)* and *(c)* are vertically lined up with *Diagram 4(a)*.

Assuming that land is fixed, the TPP_L represented in *Diagram* 4*(b)* increases at a decreasing rate until the point N, where the MPP_L becomes horizontal where TPP_L cannot increase anymore by adding more labor force. At this point N lined up with point G on the *Diagram 4(c)* the MPP_L becomes zero.

Thus, in *Diagrams 4 (a), (b)* and *(c)* the non-redundancy ratio *T* will be given as:

$$T = \frac{R}{S} = \frac{OQ}{OP} = \frac{OG}{OH}.$$

In the Lewis, Fei and Ranis analysis, the development track in the long run will be strictly related to the increase on productivity. For the analysis, area of land available for

cultivation will be given. It does not block the possibility of any further expansion of cultivating land through forest clearing, drainage and other programs.

In this context, as a redundant labor force exists with marginal productivity of labor zero, and following a profit-maximizing pattern of behavior in a competitive market, the wage perceived by this redundant labor force is supposed to be zero. As a zero real wage level is not possible, the wage perceived by this redundant labor force is going to be institutionally determined by the government, based on minimum and necessary levels of subsistence (minimum wage) and called by Fei and Ranis, the "Constant Institutional Wage" (CIW)[5]. In this sense, Fei and Ranis considered that CIW level is *"more or less"* related to the average productivity of labor APP_L = MP/OP (see *diagram 4 (b)*) (Fei and Ranis 1964:21). In that sense, APP_L equals the real wage and be represented by the vector OM in *diagram 4(b)* and by the vector ww´ in *diagram 4(c)*.

An important dynamic issue that is shown in *Diagram 4(b),* is the reallocation and further reduction of agricultural redundant labor force. Suppose a reallocation of agricultural labor force to the industrial sector that reduces the redundant labor force from point *P* to *Y*, and the agricultural production level *M* remains constant. As the agricultural production remains constant and population in the agriculture sector has been reduced, then an agricultural surplus is available to be transferred to the industrial sector. This production surplus is called the Total Agriculture Sector or *TAS* and is represented on diagram *4(b)* by the vector *XZ* that is the difference between the agricultural output *YZ* and the wage income of agricultural labor force *XY*.

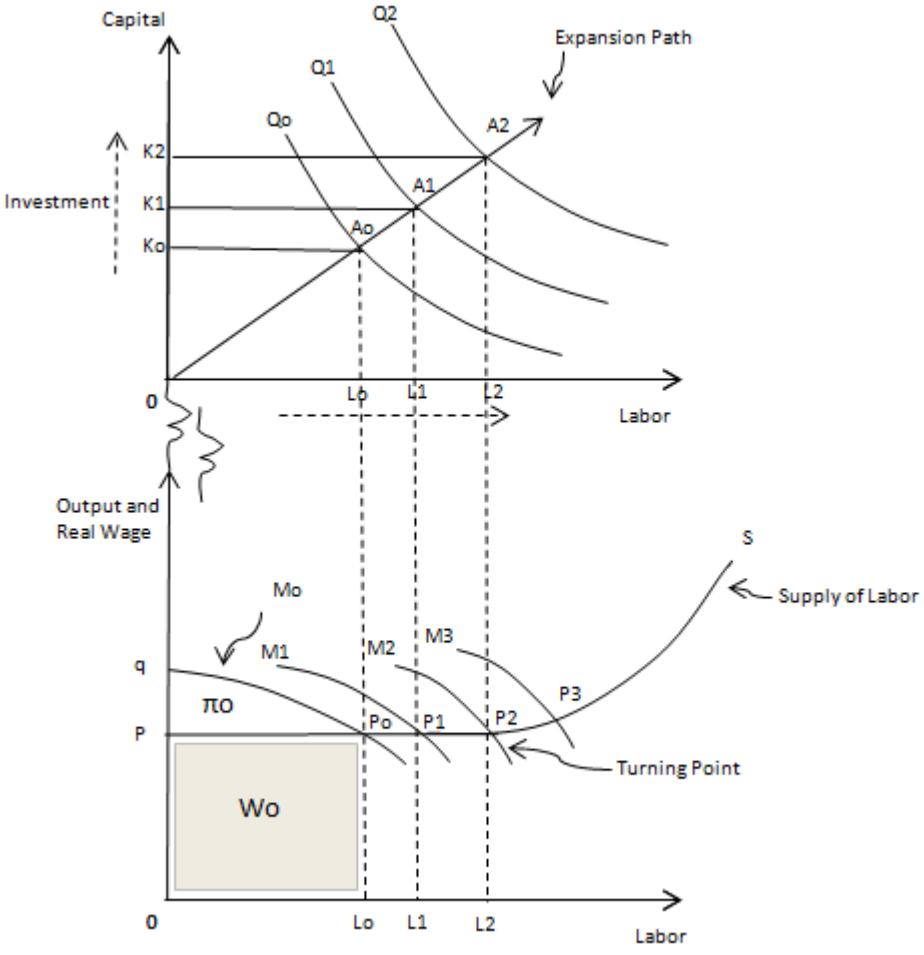
ii. Industrial production and employment

Following the Fei & Ranis growth theory with unlimited labor supply, I explain briefly the role of the industrial sector. As stated earlier, the industrial or capitalist sector has the role of creating jobs and employment opportunities through capital formation. The creation of employment opportunities is required for the absorption of the labor surplus released by the agriculture sector that transfers to the cities. The inputs in the industrial sector will be

[5] Fei and Ranis called to this the „Real institutional wage hypothesis"recognized in the development literature. P. 22 "Development of the Labor Surplus Economy".

capital and labor. *Diagram 5a* below depicts the quantity of labor in the horizontal axis and capital on the vertical axis. The production contours in the industrial sector are Q_0, Q_1, Q_2 … exhibiting the property of constants returns to scale. The expansionary role of the industrial sector is depicted in the expansionary path line and formed by the intersection points between the contour lines and the quantity of capital acquired A_1 K_0 , K_1 , K_2 … represented by the points A_0, A_1, A_2…. To each gradual expansion of capital a correspondent increase on labor force involved L_0, L_1, L_2 in the industrial sector is represented, hence an increase of output Q_0, Q_1, Q_2.

Diagram 5: Labor Market Dynamics in the Industrial Sector



Source: Fei & Ranis, 1964:18 C.1. S.2. Fei & Ranis Industrial Sector in Dualistic Economy.

The analysis in the long run is depicted in *Diagram 5b*, representing *the phenomena* that the industrial sector can hire labor at a given supply curve, determined by the forces in the agriculture sector. The labor supply curve S is determined by the curve P_0, P_1, P_2, P_3. In *Diagram 5b* the vertical axis measures the *wage of the labor force in the industrial sector in terms of industrial goods*. The horizontal part of the labor supply depicted in *Diagram* 5b represents the postulation of Arthur Lewis assuming the release of labor from the agriculture sector without affecting the agricultural production. The agriculture sector provides a pool of redundant labor that will be the source of the labor supply in the industrial sector after reallocation. For each amount of capital K_0, K_1, K_2 the respective marginal productivity of labor curves MPP_L are depicted in *Diagram 5*b (M_0, M_1, M_2) determining the amount of labor in equilibrium and correspondent level of production or output. Notice that for example at the level of capital K_0 the correspondent amount of labor L_0 is hired and a correspondent level of production is reached. The whole area under the marginal productivity of labor curve M_0 encloses the magnitude of the benefit π of the capitalist and the magnitude of wages paid (labor costs). In that sense, notice that with horizontal supplies of labor the benefits of capitalist are much higher than would be with a positive supply of labor. Hence, the investment rate will be high, including the so-called hidden savings from workers, and is formalized by John Fei and Gustav Ranis as follows:

$$K1 = Ko + So + \pi o$$

where:

K_0 = Capital Stock in period 0

K_1 = Capital Stock in period 1

π_0 = Benefits of capitalist

S_0 = Hidden saving from agriculture sector and labor force

The following process tends to be a continuing expansion process, where output and growth is viewed as a continuing shifting of the marginal productivity of labor curves MPP_L to the right through time. An imminent reinvestment process and increase of labor demand in the industrial sector is assumed to happen.

iii. Labor reallocation Process

According to Lewis, Fei and Ranis, there is the necessity of labor reallocation in the successfully development process of a dualistic economy with unlimited labor.

A dualistic economy in the Arthur Lewis framework with an unlimited labor supply can obtain three possible scenarios through time, with all of them determined by the labor reallocation of its labor force θ and consequently labor absorption capability of the capitalist or industrial sector.

- Failure of the capitalist economy: In the case of failure, the proportion of the labor force absorbed by the capitalist or industrial sector is falling as the rate of population growth overwhelms labor reallocation efforts. This results in insufficient demand in the capitalist or industrial sector or an explosion in population and consequently labor force growth

$$\eta P > \eta W$$

- Stagnation of the capitalist economy: In this case, a stand-off situation emerges represented by a constant reallocation.

$$\eta P = \eta W$$

- Success of the capitalist economy: In this case, the labor reallocation is increasing, signifying and increase in the fraction of the labor force engaged in commercialized activities. (page 250 Fei & Ranis 1997)

$$\eta P < \eta W$$

The goal of a developing economy is, therefore, that the labor reallocation shall increase at a rate exceeding the population or labor force growth rate.

1.3.2. Minimum labor reallocation - condition for success

Ranis and Fei defined the growth rate of the industrial labor force exceeding the growth rate of the total population or labor force as the necessary condition for development. The

necessary condition for success is the result in the following equation (Fei & Ranis 1997, page 250):

$$\eta P < \eta w = \eta K + \frac{BL + J}{\epsilon LL} - \eta Wna / \epsilon LL$$

where:

η_K: rate of capital accumulation

J: Intensity of Innovation

B_L: Labor using Bias of Innovation

ηw_{na},: the growth in wages

ϵ_{LL}: the law of diminishing returns to labor

The equation above states that the development effort can be related to five factors and must occur at the rate of capital accumulation η_K, the intensity of innovation J, the labor using bias of innovation BL must be strong enough and the growth in wages ηw_{na} small enough together with low diminishing returns to labor $\epsilon_{LL,}$ such that the combined effect on the industrial sector demand for labor η_W exceeds the population growth rate η_P. (Page 262 Fei and Ranis 1997)

In the case of an unlimited labor supply the growth rate of the real wage ηw_{na}, will equal zero, that is ηw_{na}= 0. Assuming a growth rate of the real wage ηw_{na}= 0 the equation of the condition of successful development simplifies to:

$$\eta P < \eta w = \eta K + \frac{BL + J}{\epsilon LL}$$

According to Lewis, Ranis and Fei, assuming an unlimited labor supply with labor reallocation and exogenous demographic pressures, success in these economies is determined by the growth rate of capital accumulation η_K and technological change $(BL + J)$, which are the two most important factors in their growth theory.

2. EMPIRICAL EVIDENCE: UNLIMITED LABOR SUPPLY IN SEVEN SOUTH-AMERICAN COUNTRIES SA-7

> *"...Rosenzweig´s empirical findings are inherently reasonable given the normal neoclassical machinery, especially when the individual family´s leisure/work trade off is viewed in its proper LDC perspective. But they are not applicable to our view of an Institutional real wage as part of the dynamic transition growth of the dualistic economy."*
>
> John Fei & Gustav Ranis[6]

Thus, the most important departing point to support the Lewis Model and, hence, the Fei and Ranis growth theory, is to find evidence for the assumption of the existence of an unlimited labor supply in the capitalist sector due to redundant labor force in the agricultural or traditional sectors.

The Lewis model assumes that the real wage curve in the modern sector is flat until the labor surplus on the traditional sector is absorbed by the capitalist sector promoted by the labor reallocation process. At this point the real wage curve starts moving up, which - according to Lewis - is represented by the "turning point".

[6] "Growth and Development from an evolutionary perspective", 1997, Gustav Ranis & John Fei Page 160.

According to Fei and Ranis, an interaction between labor reallocation and a corresponding increase of capital investment constitutes the path for development in less developed countries (LDC). Fei and Ranis, based on the experiences of countries such as United Kingdom, Taiwan and Japan, proposed a necessary condition for success, as explained in Section 1.3.2: synthesizing, that an economy will succeed if the growth rate of employment in the capitalist sector ηw is greater than the growth rate of population ηP for a sufficiently long period of time. Recalling the formal expression for this

$$\eta P < \eta w = \eta K + \frac{BL + J}{\epsilon LL}$$

shows that ηw depends on other variables such as growth rate of capital accumulation, intensity of Innovation J, labor using bias of innovation B_L, and the elasticity of labor ϵ_{LL} (representing the law of diminishing returns to labor).

In this second chapter, I will document the most important data and trends concerning macroeconomics, social, demographic and labor indicators over the last 20 years in Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela (SA-7). I divided this chapter into four sections. In the *first part,* a macro overview is presented depicting some important macroeconomic and labor market indicators. In the *second part,* I present data that reflects the process of industrialization and the dualistic nature of the economies in the selected countries. In doing so, I graphically identify the various sectors in the economy and their relevance based on their shares or contributions to GDP. In *part three,* employment patterns (in volumes) are analyzed in order to identify the greatest labor employer sector in the SA-7 economies. Finally, *Part four* gives an intuitive impression supporting the Lewis core assumption about unlimited labor supplies in less developed countries. For this purpose, I select and plot some data related to poverty for the SA-7 countries, identifying a great part of labor force willing to work for a minimum subsistence level (minimum wage).

2.1. SA-7 Macro Overview

I begin the analysis by examining the data at the aggregate level. According to the theory explained in the previous chapter I show some relevant data in order to determine in an intuitive way how these seven countries in South-America are compatible with the dualistic model presented by Lewis. The seven countries chosen for the analysis are as follows: Argentina, Brazil, Chile, Colombia, Uruguay, Peru and Venezuela. These countries provide the most relevant contributions to South-American region development.

From Table 2.a it becomes evident that the fastest growing countries in the region between 1960 and 2010 were Brazil (4,50%), Chile (4,27%), Colombia (4,23%) and Peru (3,65%). Contrary, the richest economies - Argentina, Uruguay and Venezuela - have had a GDP growth of around 2,95%, 2,27% and 2,85%, respectively, from 1960 to 2010 on average.

In terms of GDP per capita we can determine that Argentina, Uruguay, Chile and Venezuela are the richest countries within the SA-7. Argentina has experienced an enormous change in GDP per capita in the last 50 years. Brazil and Chile have indeed had a relevant rate of improvement in terms of GDP per capita. Venezuela instead, has had a marginal change in the last 50 years in terms of GDP per capita. Uruguay, Peru and Colombia present a considerable change in GDP per capita as well but lower as compared to Chile.

The economically active population (EAP) has increased in all countries at almost the same proportion in the last 50 years. This is explained in part due to the economically active women share, in which their participation in the total EAP over 15 years old has increased. For example, in countries such as Argentina, Brazil, Chile and Colombia the share of women in the EAP rose from 39,4%, 38,1%, 28,8%, 22,8% to 52%, 60%, 41,8% and 40,7% respectively.

Table 2a: SA-7 macroeconomic data

COUNTRY	GDP Growth	GDP per Capita (Constant Prices 2000) US$		Total Population Million		EAP Total		Poverty headcount ratio at poverty line % Total Population		Unemployment rate % EAP	
	1960 – 2010	1960	2010	1960	2010	1980	2010	1960	2009	1980	2009
ARG	2,98%	5,236	10,682	20,7	40,1	58,3%	65,0%	(*) 32%	(*) 13%	2,3%	8,6%
BRA	4,50%	1,447	4,699	72,8	194,9	61,5%	70,7%	40,0%	21,0%	4,3%	8,3%
CHI	4,27%	1,842	6,326	7,6	17,1	50,3%	57,3%	(1)45%	18,7%	10,4%	9,7%
COL	4,23%	1,188	3,236	16,0	43,3	49,3%	58,6%	(**)69,3%	64,0%	9,1%	12,0%
PER	3,65%	1,646	3,136	9,9	29,5	60,0%	67,1%	42,0%	34,8%	5,3%	6,8%
URU	2,27%	4,182	9,284	2,5	3,5	60,2%	64,1%	(***)27,5%	20,5%	7,3%	7,3%
VEN	2,85%	5,425	5,443	7,5	28,9	54,4%	66,0%	(2) 54,5%	29,0%	5,9%	7,6%
U.S.	(3)2,91%	18,228	37,797			63,8%	65,0%	--	--	7,1%	9,3%
EU	(4)2,67%	(4)11,662	(4)24,391			57,6%	57,3%	--	--	8,2%	8,9%
World	--	--	1,052			66,1%	64,1%	--	--	--	--

Author´s calculations

Source: World Bank Database http://databank.worldbank.org/ddp/home.do

(*) Data only for Urban Poverty headcount ratio at urban poverty line (**) data from 2002 (***) Data from 2006

(1) Data from 1987 (2) Data from 1997

(3)data from 1970 - 2010

(4) Austria, Germany and France average

Table 2b: SA-7 Sectoral overview

COUNTRY	Agriculture Value Added %GDP		Industrial Value Added %GDP		Services Value Added %GDP	
	1960	2009	1960	2009	1960	2009
ARG	12,9%	7,5%	48,4%	31,7%	38,0%	60,0%
BRA	20,0%	6,8%	37,0%	25,4%	42,0%	68,0%
CHI	9,4%	3,3%	35,4%	42,1%	55,0%	54,6%
COL	29,3%	7,5%	26,9%	34,4%	43,8%	58,2%
PER	20,8%	7,3%	30,8%	34,1%	48,4%	58,6%
URU	13,4%	9,8%	33,1%	25,8%	53,5%	64,4%
VEN	4,7%	4,2%	41,3%	57,8%	52,0%	38,0%
US	3,5%	1,2%	35,2%	21,4%	61,2%	77,4%
EU	6,6%	1,5%	40,8%	23,9%	(4)52,9%	(4)73,74%
World	9,0%	3,0%	32,2%	27,0%	--	--

Author´s calculations

Source: World Bank Database http://databank.worldbank.org/ddp/home.do

(1) Data from 1987 (2) Data from 1997

(3)data from 1970 - 2010

(4) Austria, Germany and France average

Also, in Table 2a, we can observe the poverty headcount ratio at the national poverty line, which is the ratio that gives the percent of the urban and rural population that lives under the poverty line as defined by the income level and some standard of living indicators. As of 2009 the poorest country within SA-7 is Colombia with 64% of the total population living under this poverty line. Over the last 50 years Colombia has improved this ratio to 5,3%. The biggest success in this respect within the SA-7 countries is Chile, which has reduced this incidence of poverty ratio from 45% in 1987 to 18,7% in 2009. Brazil has an important success rate at reducing the respective ratio from 40% in 1981 to 21% in 2009. Considerable reduction is found for Peru and Venezuela from 42% and 54,5% in 1993 and 1997, to 34,8% and 29% respectively in 2009. For Uruguay there is only data for the period 2006 – 2008, in which the ratio of population living under the poverty line has been reduced from 27% to 20%, according to the World Bank Data Base. Argentina has reduced its poverty headcount rate at the national poverty line of the urban population[7], from 32% in 1990 to 13,2% in 2009.

Since 1980, unemployment rates in the SA-7 have worsened in general, but not so in Chile. In 1980 Chile experienced an unemployment rate of 10,4% and has been reduced to 9,68% of the active population.

In table 2.b, value added by sector tells us that in 1960 agriculture had an important share in the GDP of more than 20% and has suffered a relative reduction in the last 50 years approaching levels of only 6% to 7% of GDP. This is the result of the development of other new productive activities in the economies. This could be related directly to the rising importance of industry and services (e.g. banks, financial services, tourism, etc). On the contrary, in countries such as Argentina, Uruguay, Venezuela and Chile, the share of agricultural value added (AVA) decreased, but less than in Brazil, Colombia and Peru.

The industrial value added share of GDP in Chile was determined by a related substitution and development of industry productivity. AVA was replaced by industrial value added (IVA) as a share of total GDP. Services value added (SVA) remained unchanged and has even been reduced from 55% in 1960 to 54,6% in 2009. A similar trend is found in Venezuela,

[7] See appendix 1

where a reduction of the shares of SVA to GDP and an increase in the share of IVA has been almost unchanged. This is definitely a phenomenon of the ongoing industrialization of the economies. On the other hand, in countries such as Argentina, Brazil, and Uruguay, the IVA has been reduced and compensated with an enormous increase on the SVA. A mixed tendency is found for Peru and Colombia, which have gradually increased their industries accompanied with a considerable and quite interesting increase in SVA.

2.2. Gross Domestic Product (GDP) structure and the "Lewis Two Sectors Economy"

The gross domestic product (GDP) of an economy represents the total market value of all final goods and services produced in a given period. GDP equals the total value of consumption, the total investment and the government spending plus the net value of exports and imports. GDP growth is what matters in economics and it is what has been considered in growth theory.

Gross Domestic Product (GDP) can be distinguished by three broad sectors of the economy such as Agriculture[8], Industry[9] and Services[10] and measured in terms of value added[11]. According to the classification of the International Labor Office (ILO), the value added in the agriculture sector includes forestry, hunting, fishing, cultivation of crops and livestock production.

[8] According to the International Standard Industry Classification division (ISIC) agriculture corresponds to divisions 1-5. http://search.worldbank.org

[9] According to the ISIC divisions Industry corresponds to divisions 10-45. http://search.worldbank.org

[10] According to the ISIC divisions Services correspond to divisions 50-99. http://search.worldbank.org

[11] Value Added is the net output of a sector after adding up all outputs and substracting intermediate inputs. It is calculated without making deductions for depreciations of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. http://search.worldbank.org/

The industrial value added, according to the International Standard of Industrial classification (ISIC), comprises the value added in mining, manufacturing, construction, electricity, water and gas. Data is given in US dollars (US$) at constant prices in 2000.

Services value added includes value added in wholesale and retail trade including hotels and restaurants, transport, and government, financial, professional and personal services charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling.

Using the framework of the Lewis model and the notion of a dualistic economy, the agriculture sector corresponds to the traditional sector of Lewis model. On the other hand, industry and services are to be considered to correspond to the modern or capitalist sector of the economy.

Lewis identified the characteristics of the dualistic economy as:

- The traditional sector produces first necessity goods and is located in rural areas and faces the pressure of a vast labor force looking for job, that result in redundant labor.
- The modern or capitalist sector (industry and services related to industry and trade), located in urban areas that demand labor force and better labor conditions. The modern sector is the only productive sector able to use the redundant labor force in an efficient and productive way released by the agriculture sector located in rural areas.

2.2.1. Gross Domestic Product per capita (GDP_{pc}) in SA-7

Lewis proposed the growth analysis based on the Gross National Income (GNI)[12]. The difference between GDP and GNI is that profits of a firm in country A operating in country B will only count for country A GNI but for country "B" GDP. Debts and interest payments of services will decrease the GNI but not the GDP. If country A sells off its resources to entities outside their country this will also be reflected over time in decreased GNI, but not decreased GDP. I consider that an analysis of GDP seems to be more appropriate for countries such as the SA-7, with increasing national debt and decreasing assets. For methodology I will analyze the GDP conditions in SA-7.

There is a relevant increase of production in all SA-7 countries, especially for Chile, which has an increasing trend without any stops since 1982 due to the new political changes in that country based on the industrialization. In the 90´s, however, the creation of the Mercosur, as the free-trading agreement between Brazil, Argentina, Uruguay and Mexico, implied positive results in terms of GDPpc growth in only some member countries.

In *Graph 1*, the respective GDPpc at constant price in 2005 are plotted. Brazil shows an interesting growth in GDP per capita from 1982 with a slight slowdown during the 90´s and a recovery in the new century. Starting from the beginning of the 90´s, most of the countries of the SA-7 started to show an increasing GDPpc growth rate. Peru is the only country that has experienced remarkable changes in GDPpc since 2003. From 1980 until 1989, the SA-7 in common presented a decrease in GDPpc. For countries such as Argentina, Brazil and Uruguay there is a turning point in the 1990s, since the GDPpc has increased steady. Chile instead, shows a permanent growth of GDPpc from the period 1980 – 2010. Colombia and Peru´s GDPpc follow similar trend with a remarkable acceleration since 2001.

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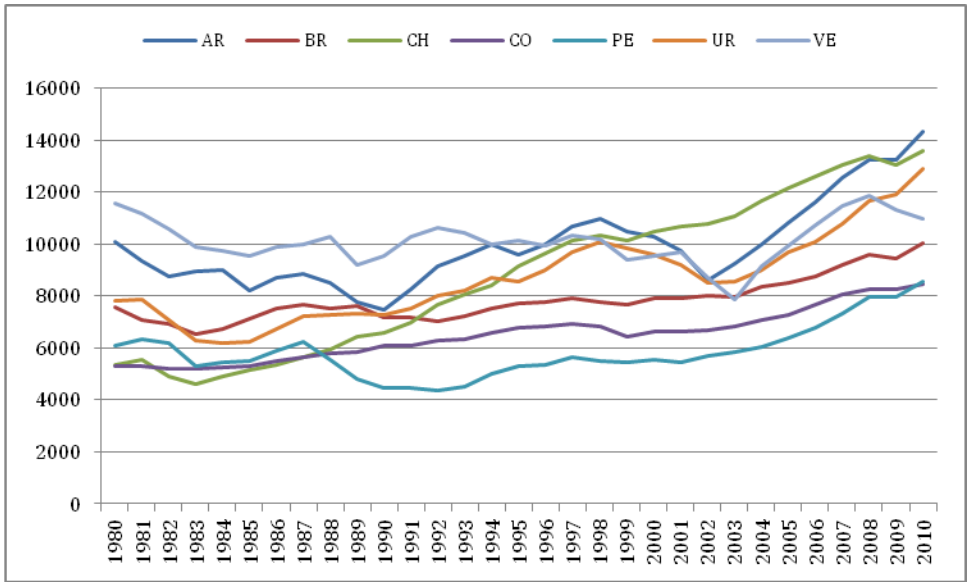
[12] **Gross national income (GNI)** comprises the value of all products and services generated within a country in one year, together with its net income received from other countries. The GNI consists of: the personal consumption expenditures, the gross private investment, the government consumption expenditures, the net income from assets abroad (net income receipts), and the gross exports of goods and services, after deducting two components: the gross imports of goods and services, and the indirect business taxes. The GNI is similar to the gross national product (GNP), except that in measuring the GNP one does not deduct the indirect business taxes. http://www.ilo.org/global/lang--en/index.htm.

Graph 1: GDP per capita SA-7 (US$ PPP 2005)

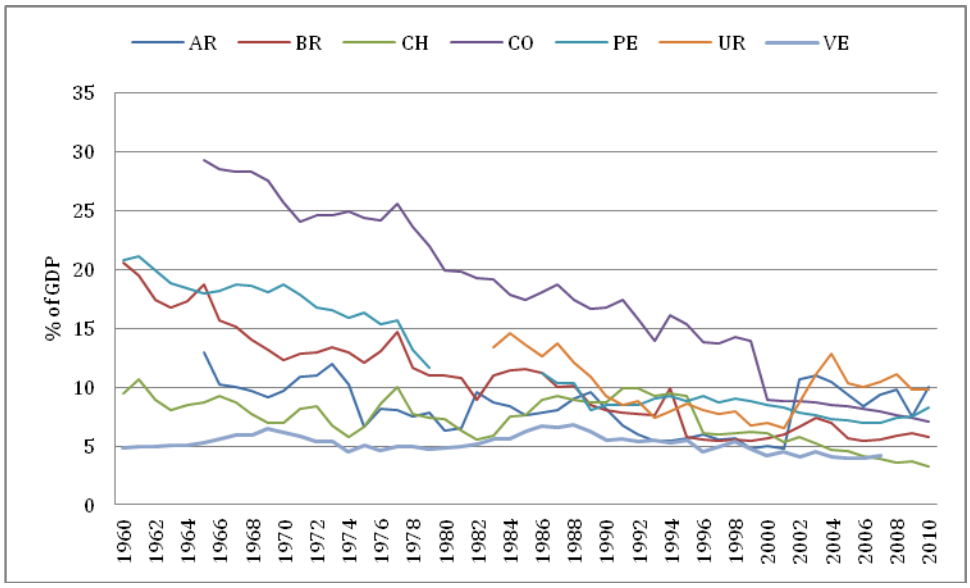


Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

2.2.2. Identification of the "Dualistic Economy" and the determination of the main activities value added and their share in GDP in the SA-7

According to the predictions of Lewis, a normal scenario of the transfer process of an economy to a more industrialized and capitalist system is shown in *Graph 2,* which plots the agriculture value added as percent of GDP. Within the SA-7 the agriculture value contribution to GDP has decreased over time. Since 1960, in countries such as Colombia, Peru and Brazil, the contribution of agriculture value added to GDP was over 20%, which represent one fifth of the GDP.

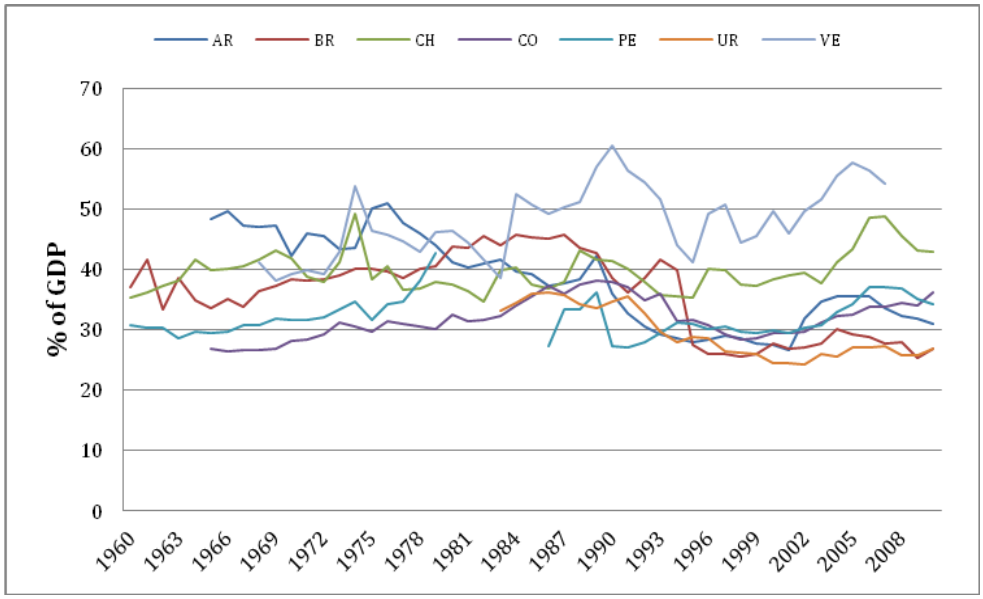
Graph 2: Agriculture value added (in % of GDP) SA-7



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

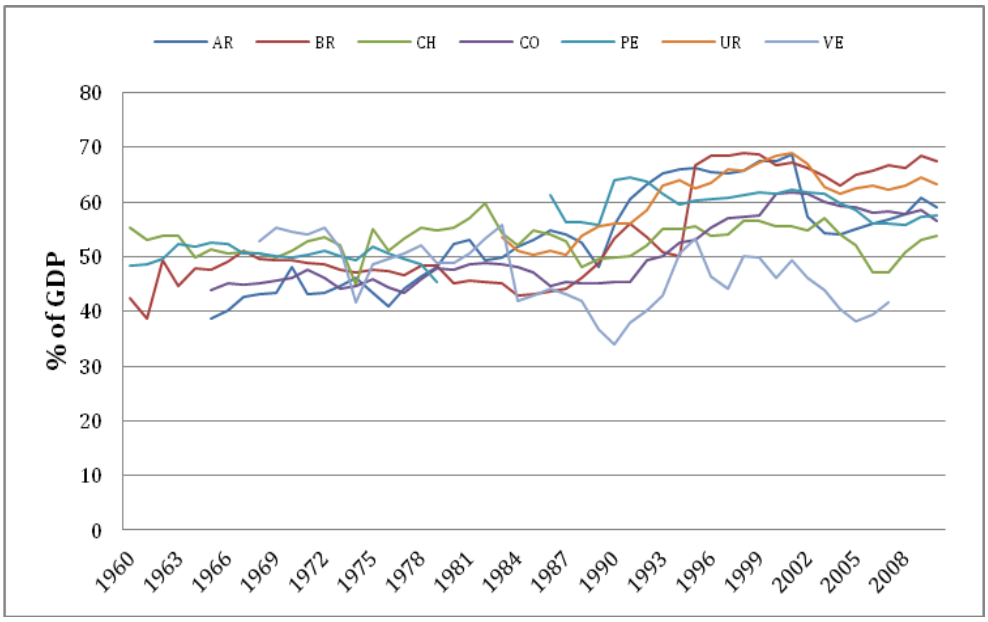
In 1960 the representative richest countries within the SA-7 have shown the lowest agriculture contribution to GDP, indicating the importance of the modern or capitalist sector in the development of these countries. In *Graph 3* the importance of the modern sector is reflected. The industry value added contribution to GDP represented in 1960 for the richest countries such as Argentina and Venezuela at that time was over 40% of the GDP. Venezuela industry value added contribution to GDP constitutes the highest within the SA-7, reaching 60% in 1990 of GDP and more than 55% in 2008. This is followed by Argentina, Brazil and Chile, for which in 1960 industry value added contribution to GDP constituted about 43% (Argentina), 38% (Brazil) and 36% (Chile) of GDP. Since 1975 the industry value added contribution to GDP in almost all countries of the SA-7 except for Venezuela decreased. In the case of Brazil there was a tremendous drop of industry value added contribution to GDP from 1987 until 1996 when all the SA-7's started to increase their industry value added in terms of contribution to GDP.

Graph 3: Industry value added (in % of GDP) SA – 7



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Graph 4: Services value added (in % of GDP) SA-7



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

The other activity representing the modern sector is the services sector. In *Graph 4* the services value added and its contribution to GDP is plotted. In all SA-7 economies these shares have increased.

This general picture of structural changes in the Latin-America countries will help to deduce some interesting analysis in connection with the employment patterns and characteristics in these SA-7 economies presented in the next section.

2.3. Employment and Labor Force Patterns in the SA-7 economies.

Employment is demanded in the different sectors and activities of the economy (agriculture, industry or services). As argued in the previous sections, industry and services probably correspond directly to activities developed in the urban and agriculture in the rural areas. Services are more related to industry and manufacture.

A vast population and potential labor force moving from the agriculture sector to the industrial sector is a phenomenon predicted by Lewis, that should be set off by the industrial sector in order to demand and employ this labor force in the capitalist and productive economy.

In order to analyze the employment structure in the SA-7 economies, I first confirm the labor reallocation phenomenon as explained by Lewis, where the labor force is transferred from the agriculture sector to the industrial sector. In the second part I illustrate to which extent the capitalist sector (industry and services) play an important role in the employment structure as predicted by Lewis. Arguing that the capitalist sector will absorb the largest part of the total population and better standards of living will depend on the development of the capitalist sector.

2.3.1. Labor Force Reallocation - Shift towards urban or capitalist sector

Staying in the rural or agriculture sector or migrating to the urban or capitalist sector has always been a problem from a family perspective. Some factors related to better standards of living such as higher wages or remunerations, a wider job opportunities spectrum and

less chances of starving make the decision of migration towards urban areas easier. I will plot the data provided by the World Bank and UNIDO in a way that allows empirically the ability to observe a shift towards capitalist sector.

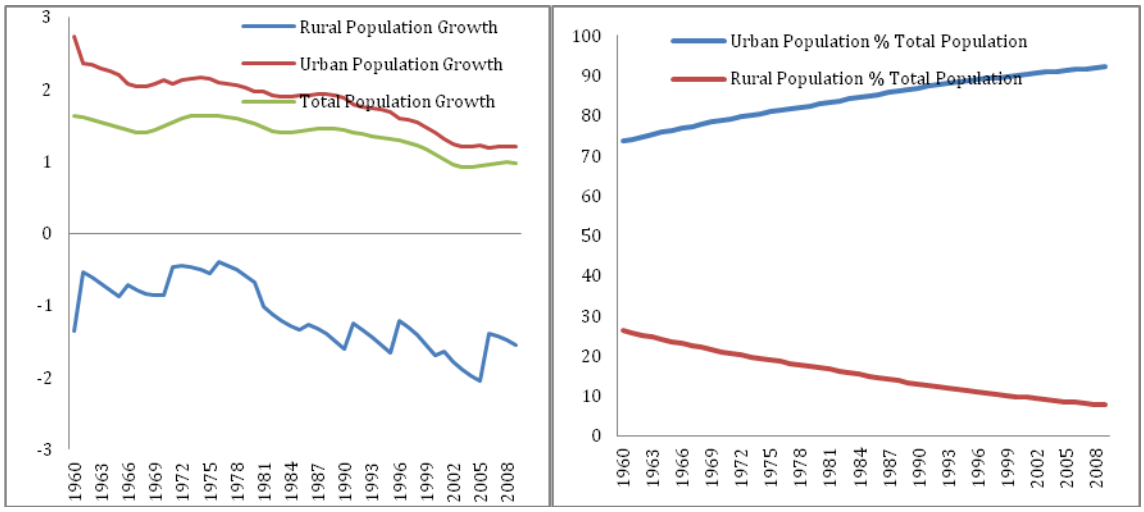
In this section I plot and analyze the growth rate of rural and urban population and their share to total population. According to Lewis assumptions, rural population is related to the labor force available for agriculture outside the cities. The cities and urban areas represent the industrialization of a country and its activities are related mostly to the manufacture and services. Urban population can also be employed in the productive activities and new kinds of services, such as tourism, financial advisors, financial services on banks, transport and expeditions, etc.

The main demographic phenomenon predicted by Arthur Lewis that happens in dualistic economies with labor surplus is related to the migration of the rural population to cities or urban societies that work in industry and services.

For each country, two graphs are plotted beside each other. The graphs on the left hand side show the population growth rate and are divided into two groups; those who live in the rural areas (rural sector) and those who live in the cities, or urban areas (urban sector). The graphs on the right hand side show the respective shares from 1960 to 2008 and are divided in the two groups in order to show how there is an implicit inner migration and, hence, a labor force reallocation.

In the case of Argentina *(Graph 5)* the migration from rural to urban is significant with the latter representing more than the 90% of the total population departing in 2009 from less than the 80% in 1960. Understand that this 50 years analysis matches with the industrialization era of all South-American countries.

Graph 5: Argentina urban and rural population

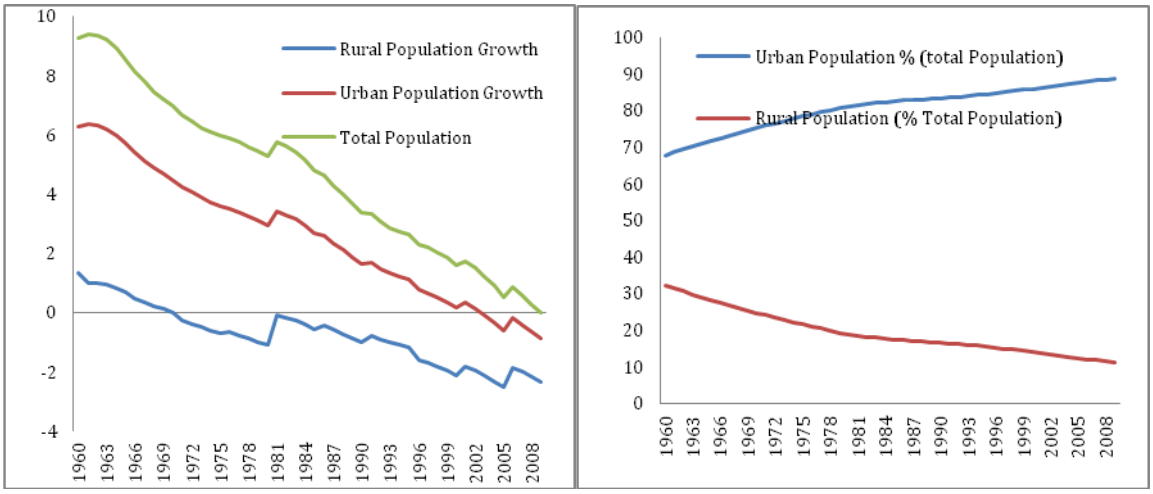


Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Brazil *(Graph 6)* presents an interesting behavior with a very pronounced trend of decreasing both urban and rural population growth, accompanied by a high increasing trend showing the increase of the Brazilian urban population as a share of total population. Until 1960, the urban population represented only little more than 40% of the total population. Fifty years later urban population is more than the 80% of the total population. The particular topic for Brazil nowadays is the higher level of total population growth in 1960 and the almost parallel behavior of urban, rural and total growth rate along the fifty years series.

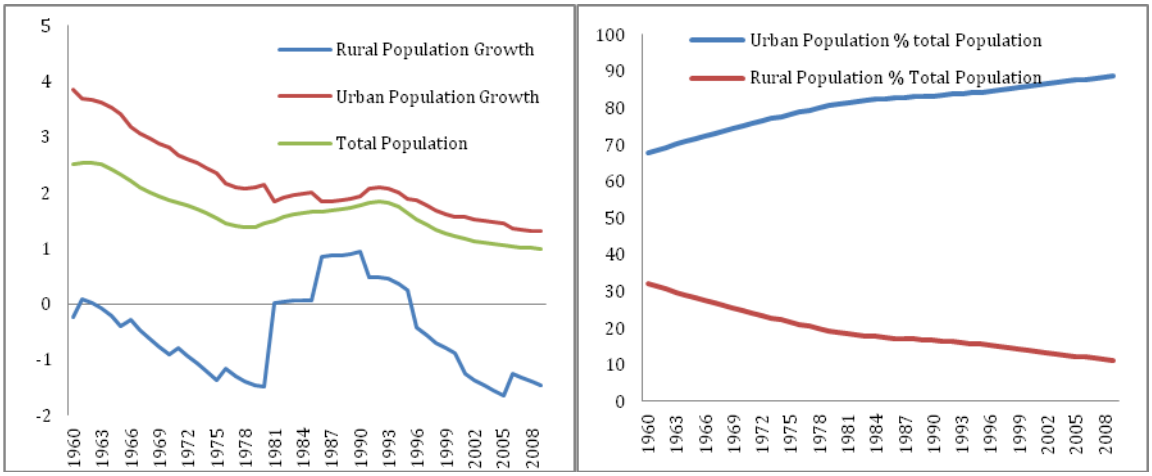
Chile *(Graph 7)* and the other countries show a typical case of growth, with the urban population growth being higher total population growth. In the last 25 years in Chile, both growth rates of population are almost at the same level with urban population growth being slightly above the total population growth rate. In the 1980s strong political changes occurred in the economy, which caused a considerable increase on rural population growth rate for 10 years.

Graph 6: Brazil urban and rural population



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Graph 7: Chile urban and rural population

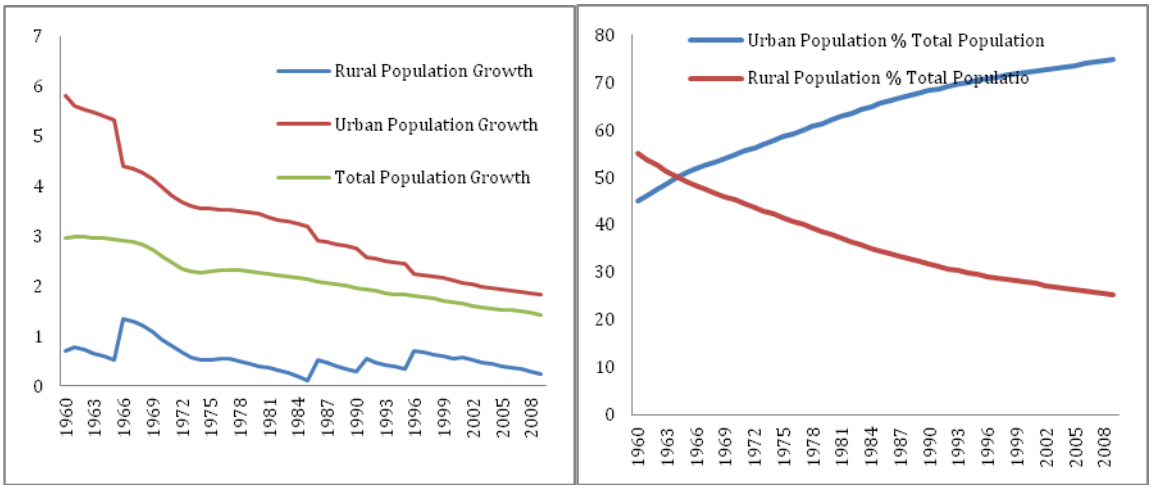


Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Colombia (*Graph 8*) and Peru (*Graph 9*) present a clear migration trend from rural to urban areas as well. This phenomenon started in 1965 for the case of Colombia and in 1964 in Peru. Both countries have had similar shares of urban during the last fifty years, departing from close to 45% in 1960 and reaching to 75% in 2009. Peru and Colombia represented in the sixties the less industrialized economies of the region; however, both of these countries do not actually reach the 80% of urban population. Peru and Colombia have not presented a

negative growth rate in rural population in this fifty-year analysis. At first glance, Peru and Colombia characterize strongly the dualistic economy studied and identified by Arthur Lewis.

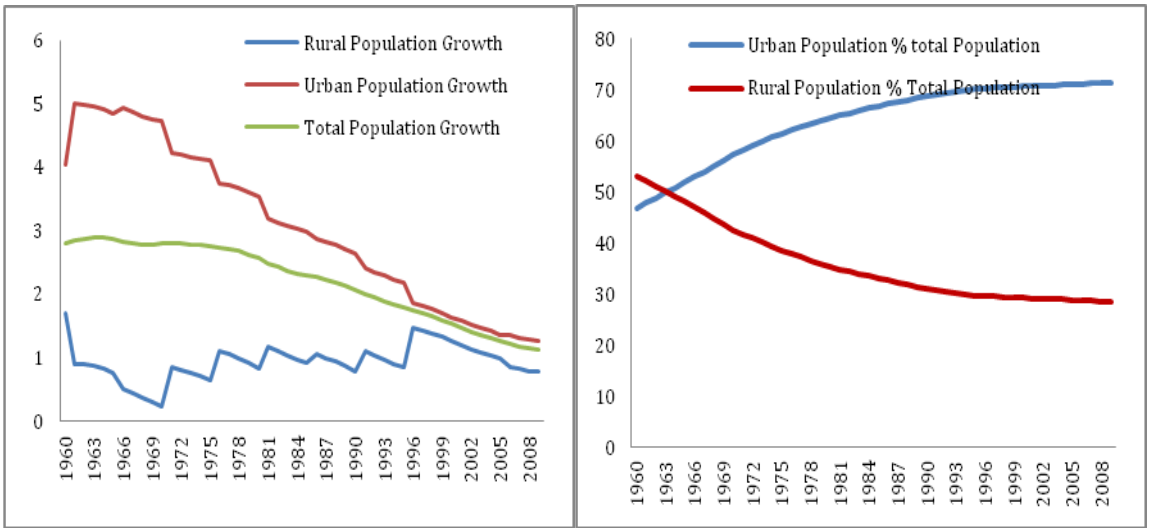
Graph 8: Colombia rural and urban population



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

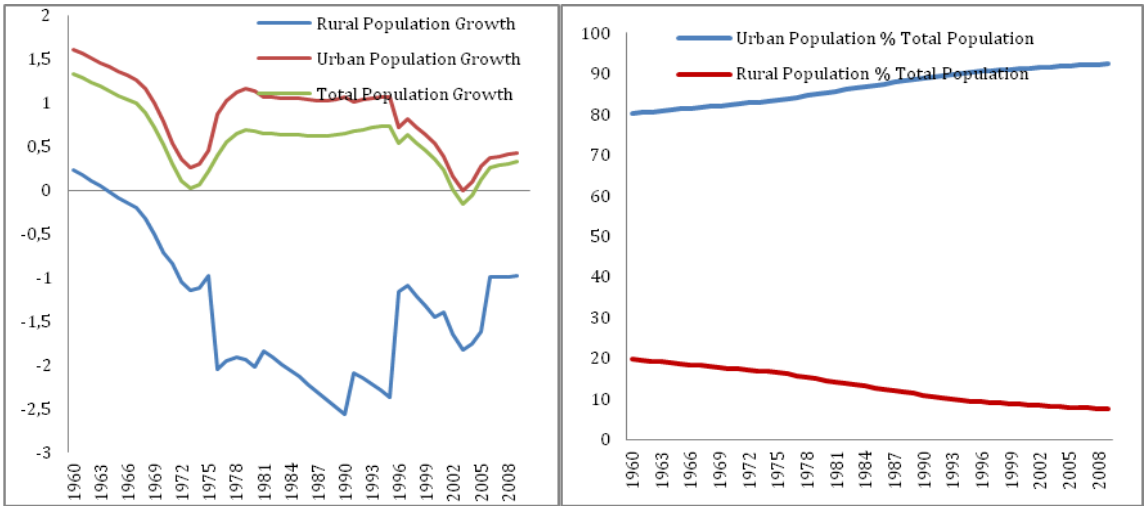
Uruguay *(Graph 10)* is one of the richest countries in South-America and from these selected SA-7 economies, presents an interesting migration process from rural to urban sector over the period of 1974 to 1996. This effect can be observed from the opposite trends of the growth rate of rural and urban population. Total population growth is determined from 1997 by the urban population growth rate. Almost 93% of the total population in Uruguay lives in the urban sector, which indicates that this works in the industry or services activities (see *Graph 10*).

Graph 9: Peru urban and rural population



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Graph 10: Uruguay urban and rural population

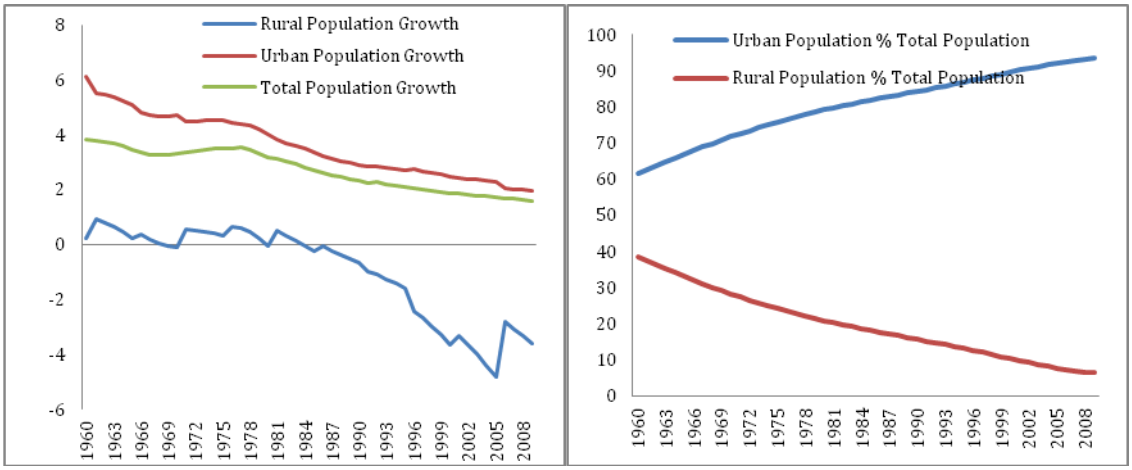


Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Venezuela *(Graph 11)* presents higher and increasing rates of urban population as a share of total population; this is definitely caused by their scarce agriculture sector development

during the last 50 years. Since 1988 Venezuela faces a negative growth in rural population that has declined even more, reaching levels of almost -5%.

Graph 11: Venezuela rural and urban population



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

From this graphical analysis I conclude that all countries considered in the SA-7 faced a decline of rural population growth, and a rise of the share of urban population. In countries such as Brazil, Peru and Colombia an evident migration from rural areas to urban areas has occurred. This permanent shift from the agricultural labor force predominantly living in the rural areas towards the urban areas could definitely be, as Arthur Lewis said, caused by overpopulation in the rural and agriculture sector not directly involved in the agricultural activity. Urban population is forced to move to the urban areas with industrial activities prevailing. The redundant labor force from the agriculture sector, that migrates to the urban sector, will put pressure on the "urban wages" as the new industrial labor force is willing to work at low subsistence (or agricultural) wage levels.

From the analysis developed in this section and considering an eminent increase of urban labor force, the following section analyzes employment patterns in both sectors.

2.3.2. Employment in the Modern Sector: Industry and Services - the greatest employers in the Economy

In the SA-7 economies, the greatest employer is the modern sector distributing employment in services and industry. Agriculture employs a small part of the labor force in all SA-7.

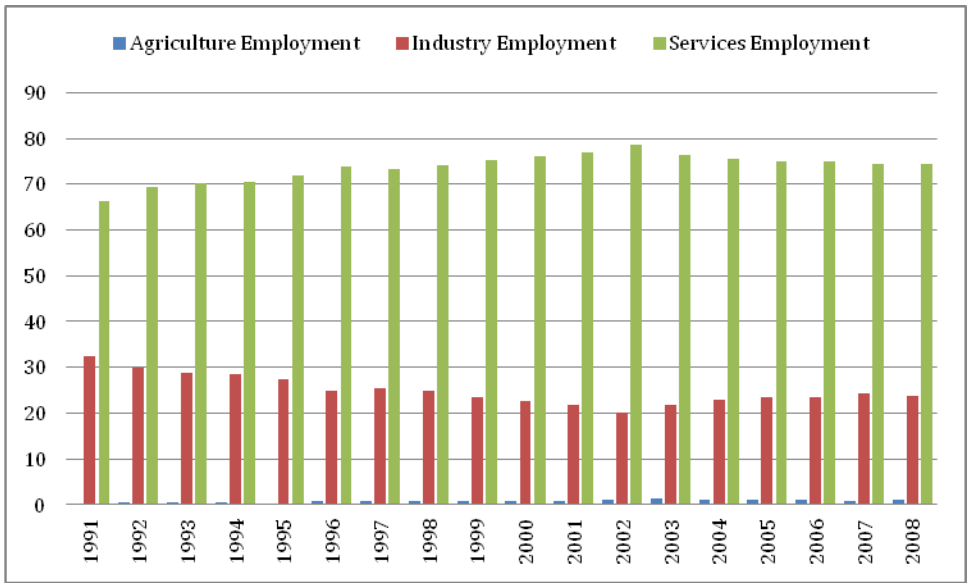
These patterns in the SA-7 are in most of the cases quite constant without breaks in the trends; only in the cases of Peru and Colombia, there are some strange breaks where employment distribution is visible. In the case of Peru in 2003, a mobility of employees within the modern sector went from services activities to the industrial activity sector (see *Graph 17*). In the case of Colombia in 2001, the country experienced a tremendous change in terms of employment, due to an increase on agriculture value added growth rate that has presented positive growth rates for a medium term period from 2001 – 2007 after experiencing only a negative growth rate in agriculture value added before 2001 (see *Graphs 15-16*).

Argentina has a high rate of urban population and the highest within these SA-7 countries. The labor force in Argentina is related to activities in the modern sector. Proof of that is shown in *Graph 12*, where it is observed that in Argentina the modern sector between services and industry employ over the 98% of the total employment.

As for the case of Brazil, as plotted in *Graph 13*, the industry employed 26,7% of the total employment in 1991 and 26,6% in 2009. The share of total employment in agriculture has reduced from 22,8% in 1991 to 17% in 2009 with an increase of the employment share in services from 1991 to 2009 (54% and 59% respectively).

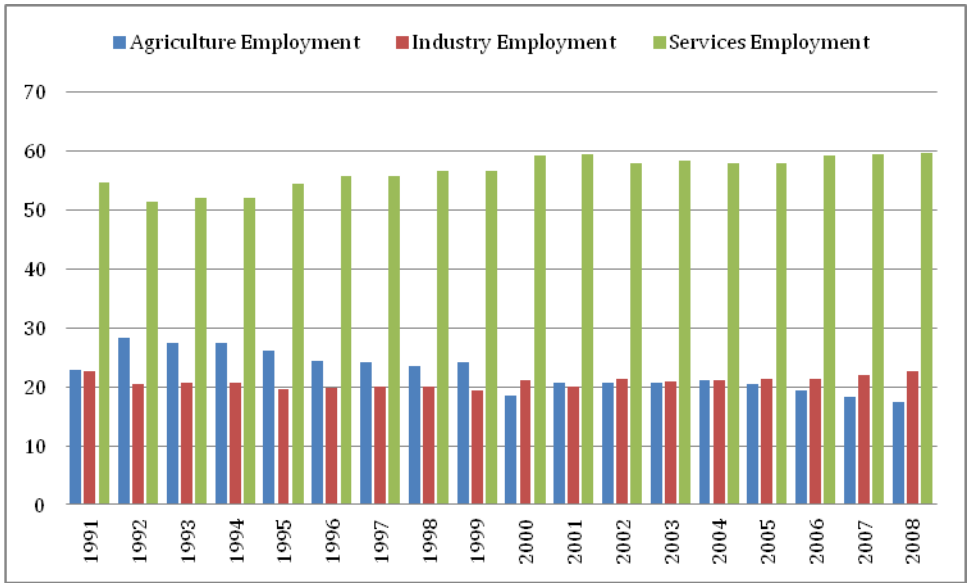
In *Graph 14* the employment distribution for Chile is presented. Chile presents a decreasing share of employment in agriculture and industry from 1991 to 2008 and a more important employer is becoming the service sector, employing in 2008 over 64,7% of the population.

Graph 12: Argentina employment distribution (% of total employment)



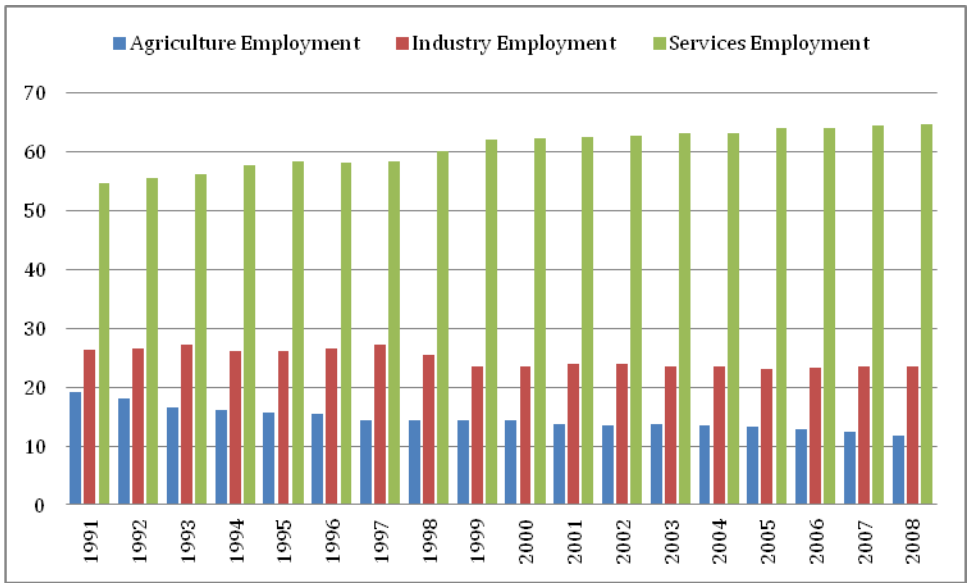
Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Graph 13: Brazil employment distribution (% of total employment)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

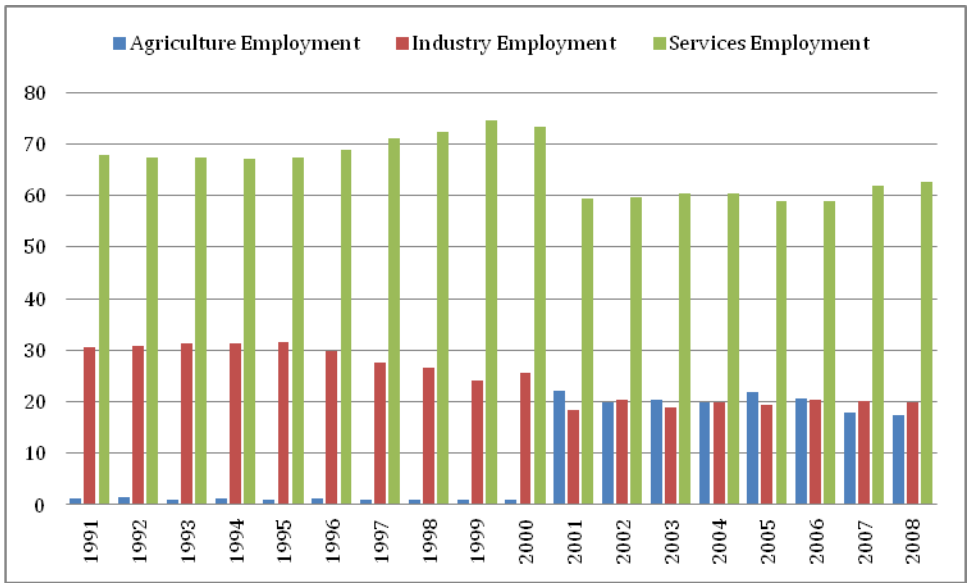
Graph 14: Chile employment distribution (% of total employment)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

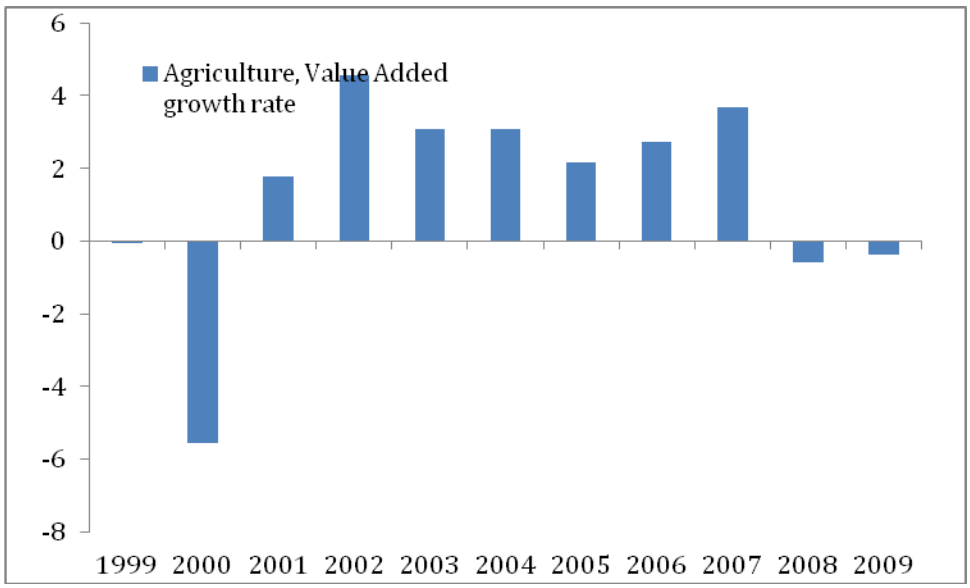
Colombia, as previously stated, had experienced a tremendous change with respect to employment in the agriculture sector due to an increase of the agriculture value added growth rate increase (see *Graph 16*). This is a non-normal and non predicted effect of Lewis, that at this point of development, the agriculture sector becomes greater as employer of the economy. Agriculture in Colombia is not even growing in terms of contribution to GDP, in fact, the opposite is happening: agriculture value added contribution to the Colombian GDP is decreasing (see *Graph 2*). 20% of the total employment in average is related to industry and an almost constant 60% of the total employment is related to services.

Graph 15: Colombia employment distribution (% of total employment)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

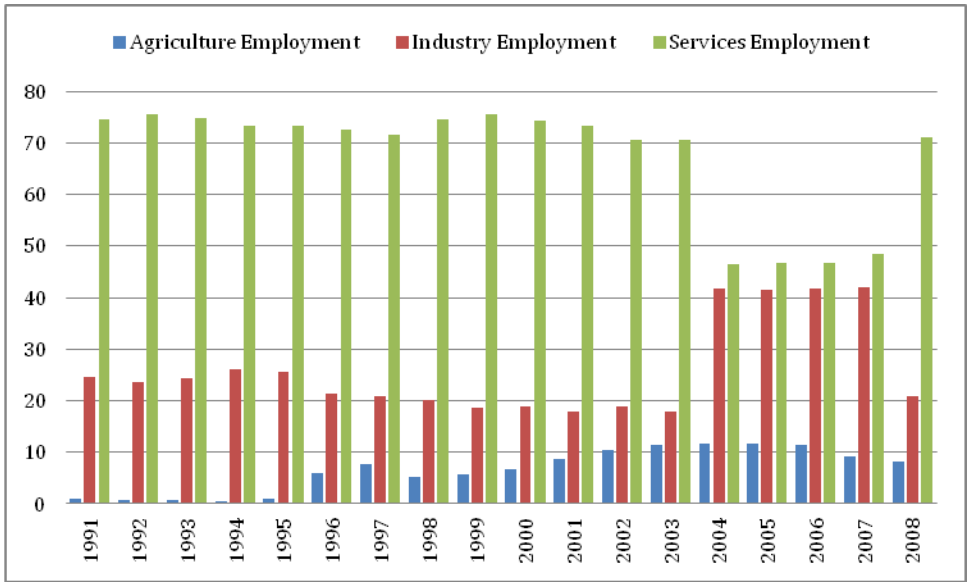
Graph 16: Colombia agriculture value added growth rate 1999 - 2009



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s calculations for growth rates

Peru has two important changes that caught my attention in this analysis. The first change occurred in 1996 when the share of total employment in the agriculture sector increased and the industrial employment decreased; and, the second one, in 2003, when there was a mobility of employees migrating from one activity (services) to another within the modern sector (industry). If I strictly follow the "Lewis Model", the main activity, according to Lewis, the only one able to bring any development is the industry sector, because it is the most productive activity. In the next chapter I will explain, in detail, the reallocation of labor force. This event will definitely have a positive impact in terms of development of the Peruvian economy.

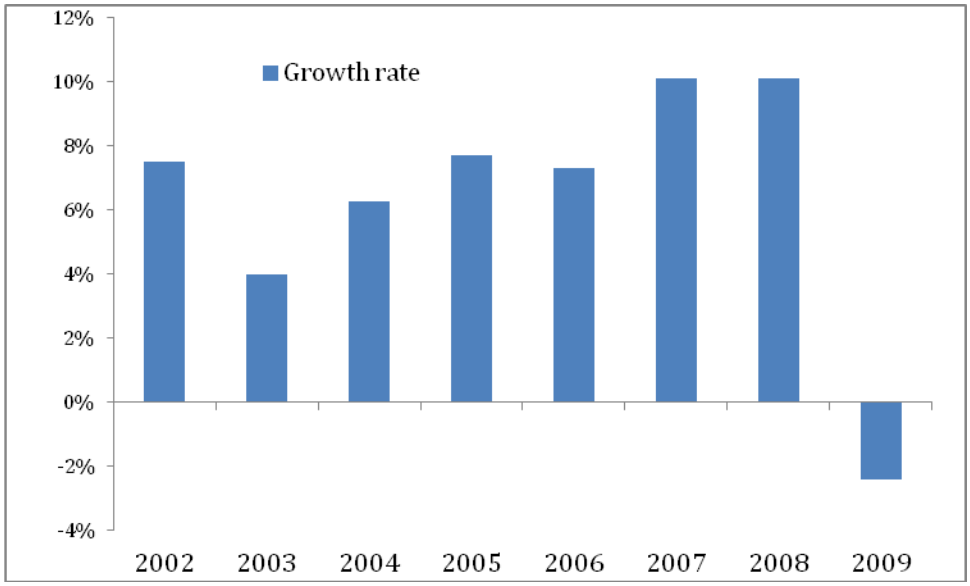
Graph 17: Peru employment distribution (% of total employment)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

The mobility of labor force employed first in services sector and transferred to industry, according to the Instituto Nacional de Estadística del Peru INEI (http://www.inei.gob.pe/) and, as shown in *Graph 18* Peru, could have been due to an increase of the industry value added growth rate from 2003 until 2008. The growth of value added in the industry, could be considered a possible explanation for the mobility of workers to the industry sector.

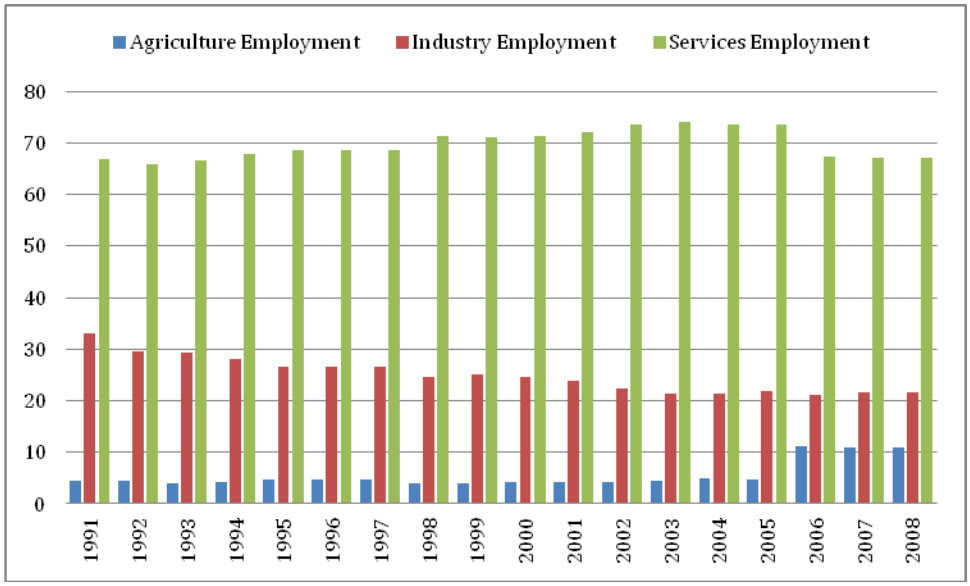
Graph 18: Industry, value added growth rate - Peru



Source: Instituto Nacional de Estadística del Peru INEI http://www.inei.gob.pe/
Author´s calculations for growth rates

In Uruguay, as shown in *Graph 19,* important changes in the employment structure by activity have occurred in the last years of the period of analysis from 1991 – 2008. In 2006 the % of total employment in services has been reduced while, on the other hand, agriculture % of total employment has risen from 4,6% of total employment in 2005 to 11% in 2006 through 2008. The percentage of total employment in services in 2005 was around 73,5% and in 2006 this rate was reduced by 6% to 67,5%. This is an example of reallocation of labor, but once again, to the agriculture sector (as in the case of Colombia).

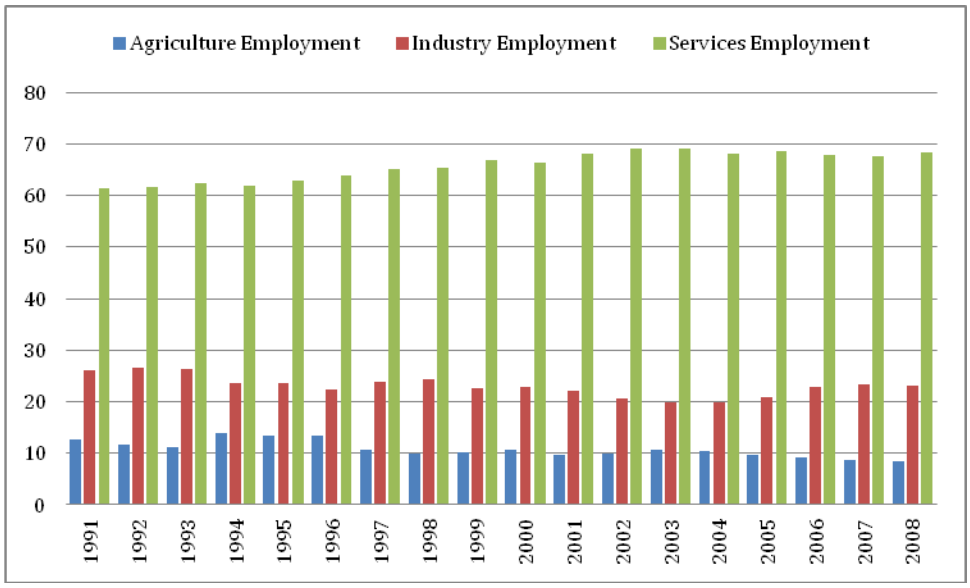
Graph 19: Uruguay employment distribution (% of total employment)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

In the last 18 years, Venezuela has not experienced any important or radical changes in its employment structure by activity (see *Graph 20*). Venezuela has an agriculture sector with a rather stable employment share and is an economy that presents quite a constant employment structure in agriculture (traditional sector) and in industry and services (modern sector). Nevertheless, let us note that Venezuela's rural population and labor force growth rate has been negative in the last 7 years, which means that there is a clear consequent transfer of redundant labor force from the traditional or agriculture sector to the capitalist or modern sector, apparently with a positive response of the capital sector to employ this redundant labor force. Further analysis is going to be developed in the next chapter (labor reallocation analysis in Chapter 3).

Graph 20: Venezuela employment distribution (% of total employment)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

2.4. Labor market indicators supporting the intuitive existence of the unlimited labor supply

In this section, I present the labor market indicators (see point a, b, c) that may intuitively identify the *redundant labor force* (labor surplus) released at first by the agriculture sector and allocated to the modern sector implying pressures the wage rate in the urban or capitalist sector.

a. **Poverty headcount rate at the national poverty line and over 2US$ a day:** According to the Lewis perspective there is a significant part of the labor force willing to work and working for very low wages, called "subsistence wages"[13]. In that sense, I consider the poverty incidence rate for each economy an important indicator that gives some hint to identify the part of the population related to a "subsistence wage" and also the level of this respective wage. Formal definition: "Percentage of the employed

[13] "Subsistence wages" represent the cost of opportunity of working in less productive activities and occasional jobs. This "subsistent wage level" plus one additional amount determines the level of wage at which a great group of workers are willing to work.

population whose average per capita income is below the poverty and extreme poverty line." (CEPAL http://websie.eclac.cl/).

b. Vulnerable Employment phenomena: In SA-7 the unemployment rate is on average around 9% of the participation rate. Thus, the unemployment rate is not that relevant anymore for these economies and the international institutions such as CEPAL and ILO pay more attention now to the quality of employment. Vulnerable employment is part of the "employed" labor force with less favorable labor conditions, underpaid and sporadic jobs, and represents a part of the labor force that pressures real wages.

c. Real Minimum Wage growth rate and Labor Productivity: The real minimum wage data was compiled from the CEPAL database available on the internet[14]. For methodological reasons, the Labor productivity is to be calculated as the average productivity of labor. According to Lewis, the real wage does not equal the productivity of labor in economies with labor surplus. The real wage is constant until there is no more labor surplus left. The comparison allowed me to get some intuition about the pressure from the "subsistence sector", reflected on the almost zero growth rates of the minimum wages for each country.

Lewis considered that a permanent allocation of the redundant labor force from the agriculture or traditional sector to the capitalist sector of the economy induces a pressure on wages and hence the existence of an unlimited labor supply. Lewis established the existence of this so called *"institutional wage"* to be the minimum level of wage that a group of "redundant" labor force is willing to get paid for its work.

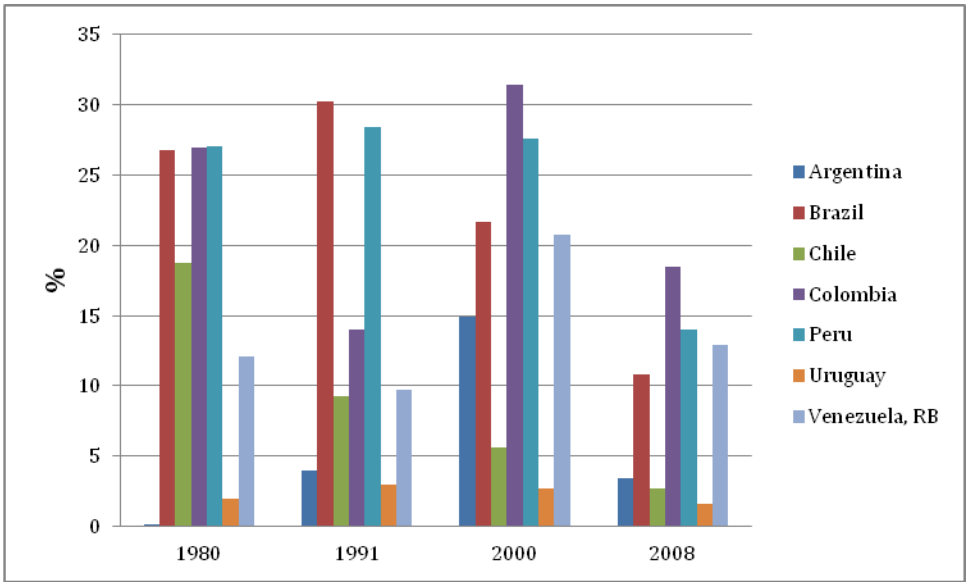
The former and legal *"minimum real wage"* in the correspondent SA-7 economies is plotted in Section 2.4.3 and is compared to the marginal productivity of labor in Section 2.4.4, in order to determine in which countries within the SA-7 present unlimited labor supplies. Let it be known that the Lewis *"institutional wage or CIW"* is to be represented by the legal minimum wage of the country.

[14] "Minimum wages (monthly or daily) coming from official sources are deflated with the consumer price index (CPI), calculating a monthly real index. The average of these indexes represents the annual index published" CEPAL

2.4.1. Poverty headcount rate at the national poverty line and at 2US$ a day by Sector

The World Bank database provides statistics of the poverty headcount rate at the national poverty line and those earning over 2US$, which correspond to the part of the total population that earns 2US$ a day or less. In *Graph 21* I show the poverty headcount rate at 2US$ a day reported for years 1980, 1991, 2000 and the latest 2008 (ten years period) in order to reproduce some important changes in a long -term analysis as Lewis proposes. In Chile the poverty headcount rate at 2US$ a day has been tremendously reduced permanently over the last three decades. Brazil has definitely reduced its poverty ratio mainly in the last two decades (since 1991) and Peru has obtained important results in a medium term period from 2000 to 2008. Argentina departed as the richest country within the SA-7 in terms of GDP per capita, but its poverty headcount ratio at 2US$ level of income a day has increased tremendously in the 90s and has also been reduced since the last decade.

Graph 21: Poverty headcount ratio at $2 a day (PPP) (% of population)



Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author´s graphs

Through 2008 Colombia, Peru and Venezuela could be considered the countries with the highest poverty headcount rate with the 2US$ of income a day definition.

According to the World Bank Data Base (see *Table 3*), Uruguay is the country with the lowest poverty headcount rate at the national poverty line in the period of 2000-2009. Within the SA-7, the countries with the lowest total poverty headcount rate at the national poverty line are Uruguay, Brazil and Chile.

Table 3: SA-7 Poverty headcount ratios at national poverty Line (% of population)

	1980	1985	1990	1995	2000	2005	2009
Argentina	--	--	--	--	--	--	--
Brazil	40,8(*)	42	41,9	35,1	35,3	30,8	21,4
Chile	--	45,1(*)	38,6	27,7	20,2	13,7(*)	15,1
Colombia	--	--	--	--	49,4(*)	45	40,2
Peru	--	--	--	42,7(*)	48,4	48,7	34,8
Uruguay	--	--	--	--	--	34,4(*)	20,9
Venezuela, RB	--	--	--	54,5(*)	46,3	43,7	28,5

Source: World Bank Database http://databank.worldbank.org/ddp/home.do and International Labor Office Database http://laborsta.ilo.org/sti/sti_S.html
(*) correspond to the data provided to the closest year

Over the last decade, 2000 – 2009, all SA-7 have experienced remarkable progress on poverty reduction. This might be related to more democratic political situations that have been taking place mainly in Argentina, Brazil and Peru.

In Brazil the poverty headcount rate at the national poverty line has been reduced from 35,3% in 1995 to 21,4% in 2009. Chile´s most important change was in the 80´s, as previously mentioned, and has even more reduced total poverty headcount rate from 45,1% in 1985 to 15,1% in 2009. Colombia and Peru dragged a poverty headcount rate of around 49% in the 80s, which has been reduced and has reached levels of 40,2% and 34,8% respectively. It has been an important result for Peru in the last decade in terms of poverty headcount rate. In Colombia the main changes in total poverty headcount rate were mostly explained by the urban poverty headcount rate that has been reduced from 41,1% to

35,8%[15], maintaining its rural poverty headcount rates at levels over 54% of the total rural population. The poverty headcount rate at the national poverty line diminution process in Chile happened in the 80´s, as explained by both rural and urban poverty headcount rate reduction, which have fallen from 51,5% in 1997 to 30,3% in 1995 and 43,6% to 22%, respectively. Uruguay has reduced its poverty headcount rate at the national poverty line also with a considerable percentage from 34,4% in 2005 to 20,9% in 2009. Venezuela shows a remarkable result in poverty headcount rate at the national poverty line reduction. Venezuela dragged a 54,5% total poverty headcount rate at the national poverty line level before 2000 and has been reduced, reaching levels of 20,5% in 2009.

2.4.2. Vulnerable Employment

In developing countries there are different and separated categories of employment. Therefore it is necessary to separate employees with less favorable labor conditions, underpaid and sporadic jobs. In developed economies there are already strong social protection measures, where workers who lose their jobs can move into unemployment. In many developing economies on the other hand, workers who lose their jobs do not have access to social protection schemes, for example. Rather than becoming unemployed, these workers often take up various forms of employment, working on their own accounts, or contributing to family businesses. This, in turn, results in an increase in the number of workers in vulnerable employment.

According to Lawrence Jeff Johnson, chief of the International Labor Office (ILO):

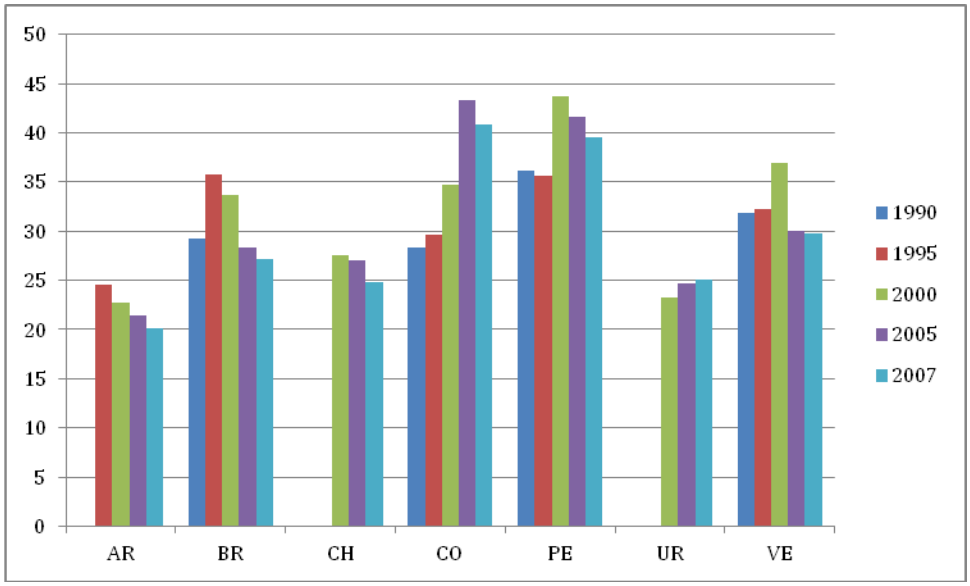
"…While monitoring unemployment provides a good starting point to assess the health of labor markets in developed economies, particularly in developing economies it is essential to consider decent work deficits among the employed. Before the onset of the current economic

[15] See appendix 1: Urban Poverty headcount rate is also released in the Database of the World Bank with the correspondent link http://laborsta.ilo.org/sti/sti_S.html.

crisis, there were large deficits reflected in high rates of vulnerable employment and working poverty in most of the developing world."[16]

As I present in *Graph 22*, in 1990 the SA-7, excluding Argentina, Chile and Uruguay had an average of 31,4% of the total employment in vulnerability. In 1990 Peru shows the highest rate of vulnerable employment 36,2% (as percent of total employment), followed by Venezuela with over 31%. Five years later in 1995, the SA-7 excluding Chile and Uruguay, show a vulnerable employment rate of about 31,54% of total employment on average. In 1995 the highest rates of vulnerable employment in percent of total employment are found in Brazil (35,8%) and Peru (35,6) and the lowest in Argentina (24,5%).

Graph 22: Vulnerable employment as % of total employment



Source: International Labor Office Database http://laborsta.ilo.org
Author´s graphs

[16] *Global Employment Trends, January 2010*, International Labor Office, Geneva, 2010. ISBN 978-92-2-123256-8 (print), ISBN 978-92-2-123257-5 (web pdf). http://www.ilo.org/global/about-the-ilo/press-and-media-centre/insight/WCMS_120470/lang--fr/index.htm

In 2000 the average of vulnerable employment rate in SA-7 decreased to 30,94% with notable increases of vulnerable employment in Peru (43,7%), Venezuela (36,7%) and Colombia (34,7%). In Brazil and Argentina the rate decreased by 2 percentage points. Uruguay appears with a relatively low rate of vulnerable employment in comparison within the SA-7. From 1990 to 2007 six countries of the SA-7 slowly decreased their rate of vulnerable workers, with Colombia being the only one that increased its rate of vulnerable employment tremendously, reaching the 43,3% of the total employment in 2005, the highest in the SA-7 in this 17 years period.

2.4.3. Minimum Annual Real Wage and Labor productivity in SA-7

According to Fei and Ranis (1997) page 263, *"... the real wage rises ($\eta_{wna} > 0$)... , ... In actually the real wage w_{na} is likely to increase slightly over time, even in the presence of an unlimited supply of labor condition, due to an upward creep in agriculture wage as* ***agriculture labor productivity rises****, plus possible increases in institutional interventions in non-agricultre, including* ***minimum wage legislation*** *and union pressure"*.

Following the methodology proposed by Lewis, Fei and Ranis in order to support the elasticity of the labor supply, I plot the real minimum wage growth rate and compare it with the labor marginal productivity growth rate for each SA-7 economy (for methodology the marginal productivity of labor will be considered as the average productivity of labor).

The minimum real wage growth rates[17] for the SA-7 plotted in the *graphs* below represent the nominal minimum wages deflated by the countries' CPI. (The minimum wage applies to legally employed workers in the formal sector). The data is calculated and posted in the Comisión Económica para America Latina y el Caribe (CEPAL) website (http://websie.eclac.cl), available for researchers, students and professors interested in the Latin American economies.

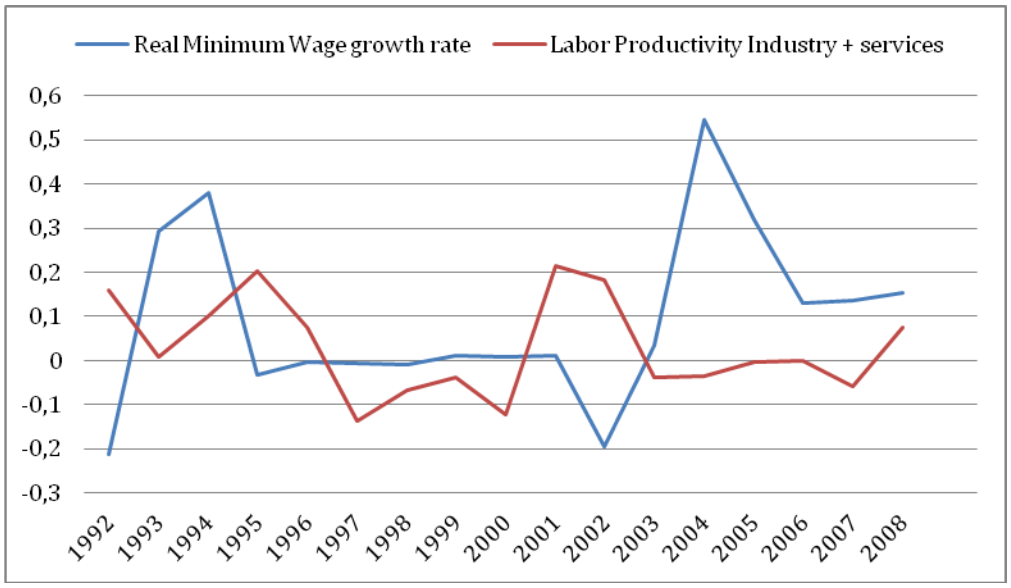
I compare the exposed real wage changes and compare them to the productivity of labor in each sector of the economy. Important topics for the analysis in the Lewis framework are to focus only on the increasing or maintenance of the real wage over time. I consider that for

[17] The real wage calculations are explained in detail in the glossary.

Lewis, the real wage was an indicator of development and it is supposed to grow as result of capital formation and increase of output of production.

In *Graph 23,* I plot the productivity of labor growth rate in the Argentinean modern sector that includes industry and services sector. Despite the low and changeable growth rates of its productivity of labor during 1992 and 1995, Argentina presented a tremendous increase of its real minimum wage growth rate. In 1997 the Asian financial crisis affected the Argentinean production and labor growth rates, now presented with a reduction of the productivity of labor and no changes on the real minimum wages. During the period of analysis, the first collapse of the minimum and average real wages growth rates was because of the political crisis in 2000 that lasted until 2002. Since 2003 Argentina presents a remarkable increase on its real minimum wage growth rate; without any support of increase of its labor productivity.

Graph 23: Argentina (PPP 2000)

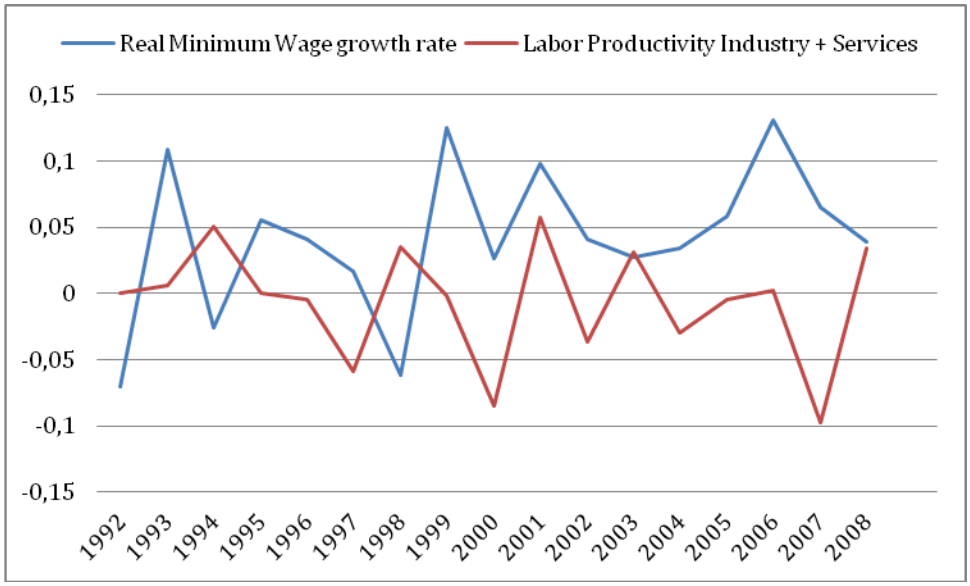


Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

In the case of Argentina, the similarity of patterns between the labor productivity growth rate and the minimum real wage growth rate is difficult to identify. Between 1991 and 2007 the growth rate of labor productivity has been in average close to zero.

In *Graph 24* the minimum real wage growth rates and the productivity of labor for Brazil are plotted[18]. It is difficult to determine some similarities with such changes on real wages in SA-7 in medium terms periods. Brazil presents similarities of patterns between the growth rates of labor productivity and real minimum wages in periods such as 1995 – 2004. Opposite patterns of behavior can be related between the Brazilian productivity of labor and real wage changes since 2004.

Graph 24: Brazil (PPP 2000)



Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

Chile (see *Graph 25*) growth rates patterns of labor productivity and real minimum wages are not similar in general, but are in the period of 1997-2002. Chile does not present any negative growth rate of real minimum wage during the period 1991 – 2007. In the 15 year *trend* analysis Chile´s productivity of labor and minimum real wage growth rates behave indeed with similar patterns (see decreasing growth rates in *Graph 25*).

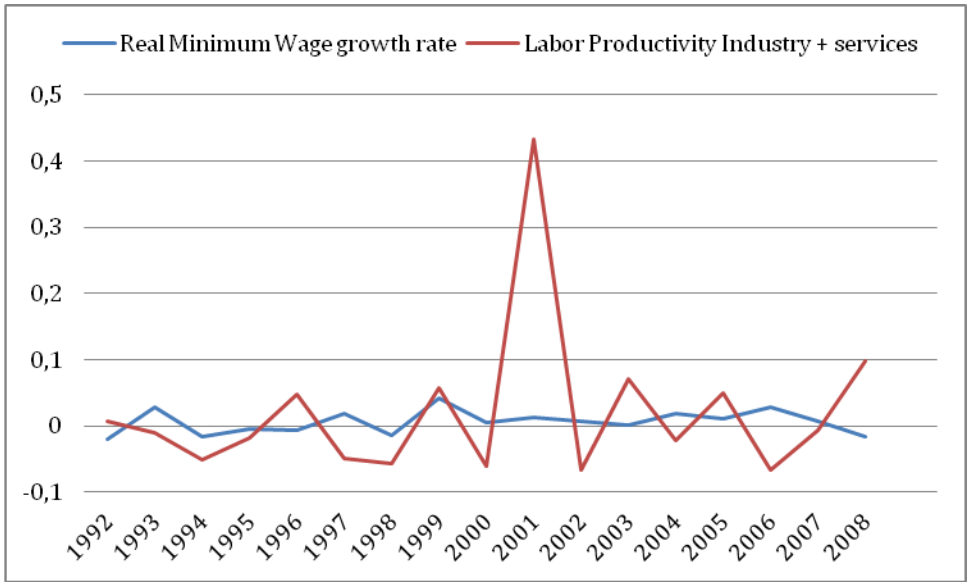
[18] The real minimum wage calculations are in detail explain in the Glossary

Graph 25: Chile (PPP 2000)

Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

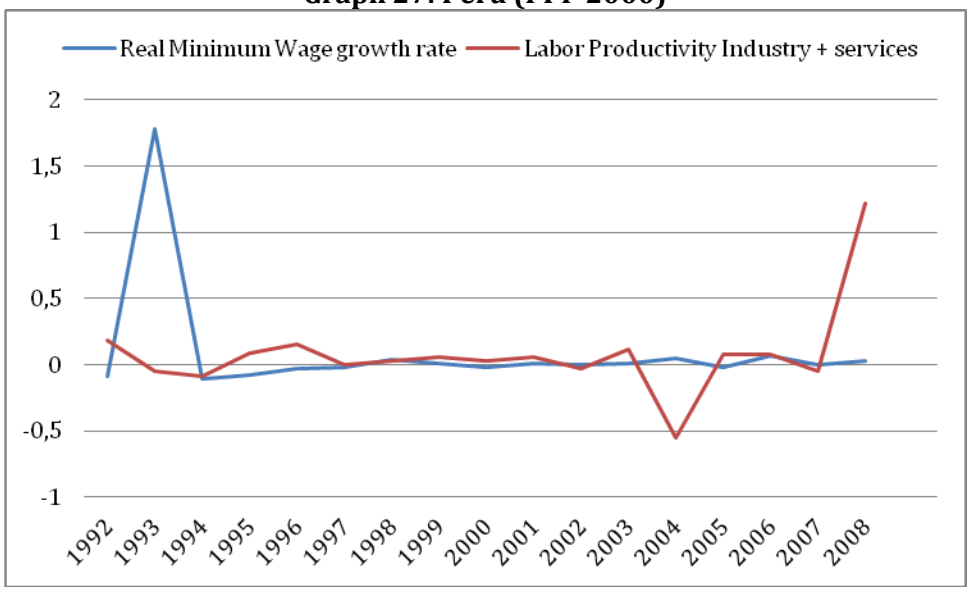
Colombia represents quite an important case in the dualistic economy perspective depicting the pressure on wages in the modern sector. In *Graph 26* it is observed that the real minimum wage growth rate is almost zero, despite continuous changes on labor productivity.

Graph 26: Colombia (PPP 2000)



Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

Graph 27: Peru (PPP 2000)



Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

Much is the same for Peru. (G*raph 27*) shows no important changes or increases of its minimum real wage between the years 1994 – 2007. On the other hand, Peru has non-increasing labor productivity.

For Colombia and Peru, growth rates do not show any similarities of patterns during the period of analysis. Colombia´s productivity of labor growth rate presents yearly changes, both positive and negative (see *Graph 26*), and changes on growth rates are definitely sharper than the growth of the real minimum wage that has not changed as the productivity of labor did. Colombia has the highest rate of underemployment and vulnerable employment within the SA-7 selected countries, which means that a non-increasing real wage affects (worsens) wellness for a great part of the labor force.

Uruguay (*Graph 28*) shows no similarities of patterns between the real minimum wage growth rates and the labor productivity. Uruguay´s positive labor productivity growth rates are accompanied with negative minimum real wages growth rates during the period of 1991 -2004. Since 2004 instead, the slowdown of the productivity of labor was accompanied with an increasing minimum real wage growth rates.

Graph 28: Uruguay (PPP 2000)

Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

Venezuela´s marginal productivity and real wages follow all of them similar patterns of growth (*Graph 28*). Negative growth rates indicate a decrease on the Venezuelans real minimum wage in the last years.

Graph 29: Venezuela (PPP 2000)

Source CEPAL Data Base: http://websie.eclac.cl.
Author´s calculations (in growth rates)
Labor Productivity is measured as the ratio between value added in industry and services and the number of employees in industry and services

From the analysis in chapter 2 one can summarize the following characteristics of the selected SA-7 economies in the Lewis model framework. There is an evident decline in agricultural sector value added (AVA) and its share in GDP in all SA-7. The industrial sector value added (IVA) share in GDP in Colombia and Peru has remained more or less at the same level over the period of 1960 – 2009. There were slightly increases of the IVA and its share in GDP in Chile and Venezuela; oppositely the IVA and its share in GDP has decreased slightly in Argentina, Brazil and Uruguay. The services sector value added (SVA) and its share in GDP increased in all SA-7 economies.

To some extent, the data provides the trends of the value added for each sector and its share in GDP in these SA-7 economies. These trends seem to be similar to those predicted by Lewis; such as the decreasing importance of the agriculture sector in value added terms and a much more important role of the modern sector (industrial and services sector). Not only are these activities important in volumes, but also in terms of employment. The industry and services sector employs on average 80% of the total labor force and in Argentina's case, it employs even more than 98% of the labor force. Specifying the employment in the industrial sector, the portion of labor force employed in the industrial sector in Argentina and Uruguay tends to decrease. In contrast, in Brazil, Colombia and Peru, the share of labor force employed in the industry tends to increase; and it is roughly unchanged in Chile and Venezuela.

The predictions of the Lewis model with respect to demographic changes, such as the transfer of labor force from the traditional sector to the modern sector seem be fulfilled in the selected SA-7 economies. In some cases (Brazil, Colombia and Peru) the initial scenario shows that the portion of population in the rural sector was greater than the portion of population in the modern sector; this situation has been reversed in the last 50 years.

Part of the new labor force in the modern (urban) sector is released from the rural (traditional or agriculture) sector, which represents the redundant labor force that causes pressure on wages (Lewis, 1954). The assumption about a flat real wage is empirically supported with the indicators given in section 2.4 such as high rates of vulnerable employment, the high poverty headcount rates and the close to zero growth rates of the real wage. Poverty headcount rate seems to be better off in some economies such as those of Brazil, Colombia, Chile and Peru as compared to 30 years ago, however seems to have worsened in countries such as Argentina, Venezuela and Uruguay. Vulnerable employment rate is often related to bad labor conditions. In this respect, the situation seems to be better in Argentina, Brazil and Chile, however, not in Colombia, Uruguay, Peru and Venezuela where labor conditions haven't improved at all.

All the characteristics and predictions of Lewis described above relates to the final and main idea of pressure on wages. In section 2.4.3 the depicted growth of real wages seem to be flat though slightly positive (growth rate close to zero) in all SA-7 economies and seem not to follow similar patterns in comparison with the labor productive growth rates. This

descriptive empirical analysis for these SA-7 economies encompasses the idea of the presence of a dualist economy, which are in a slow transfer process towards an industrialized economy.

The selected SA-7 economies seem to fulfill the Lewis assumptions and predictions such as the initial traditional economy and the demographic changes but without the essential response from the capitalist sector at all. In the next section some of main variables in the Lewis model are presented graphically together with an analysis of the condition for success, in order to determine the causes of the slow development in these SA-7 economies.

3. TESTING THE FEI AND RANIS SUCCESS CONDITION IN THE SEVEN SOUTH AMERICAN COUNTRIES

This third chapter is divided in three parts. The *first* part explains the derivation of the Fei and Ranis (1964) condition for success and growth equation. In the *second* part, I process the labor reallocation analysis based on employment and population growth rates in the capitalist sector in order to evaluate if the Fei and Ranis condition for success has been satisfied for long periods in these SA-7 economies (see tables 4-5). Finally, in the *third* part I work out the decomposition analysis of the employment growth rate according to Fei and Ranis, in order to determine which factor, such as growth rate of capital accumulation, technology changes and total factor productivity growth rate, has been more crucial in the development process of these SA-7 economies.

3.1. Deriving the Condition for Success

Fei and Ranis (1997, page 262) defined the condition for developmental success "…as the growth rate of the industrial labor force exceeding the growth rate of the total population or labor force…". When additionally combining the assumption of a constant institutional real wage in the Cobb Douglas production function, the following minimum labor reallocation condition for successful development holds:

$$\eta P < \eta w = \eta K + \frac{BL + J}{\epsilon LL}$$

where ηp is the growth rate of labor force or population, ηw is the growth rate of employment in the capitalist or modern sector, ηK is the growth rates of capital stock, J and B represent technological progress, and the technology biases, respectively, and ϵ_{LL} is the labor elasticity of total output.

In a static and dynamic production concepts, Fei and Ranis (1964) page 86 – 90, derived a system of growth equations where ηx denotes the rate of change of variable $x_{(t)}$ through time.

$$\eta x \equiv \frac{\frac{dx}{dt}}{x}$$

Now assume that in a general case $x_{(t)}$ is arbitrary function of variables $z_{(t)}\, y_{(t)}\, w_{(t)}$ that could be written as:

$$x = f(z, y, w)$$

Principle 1: The growth of x is related to the growth of variables z, y and w as following:

$$\eta x = \epsilon xz \,.\eta z + \epsilon xy \,.\eta y + \epsilon xw \,.\eta w$$

where $\epsilon xz, \epsilon xy \; and \; \epsilon xw$ are the elasticities of x with respect to each variable z, y and w.

According to Fei and Ranis, the production function in the industrial sector will be represented by the Cobb Douglas Production function

$$Q = A.\, K^{\alpha}.\, L^{1-\alpha}$$

this stated that the industrial output depends on capital K, Labor L and time t. Time t will be explicitly introduced to point out that the production function may vary through time as a result of innovation activities.

Applying principle 1 into the growth equation we get the following growth rate of output equation:

$$\eta Q = \eta A + \alpha \eta K + (1 - \alpha)\eta L$$

$$\alpha \eta L = \eta A + \alpha \eta K + \eta L - \eta Q$$

$$\eta L = \eta K + \frac{\eta A + \eta L - \eta Q}{\alpha}$$

Where ηL = growth rate of industrial employment, ηK = growth rate of industrial capital accumulation, $\eta A = J$ = intensity of innovation and (ηL - ηQ) = BL = labor using bias of innovation (Fei & Ranis, 1997:263) and α = ϵ = elasticity of marginal productivity of labor.

Defining the necessary condition for developmental success as the growth rate of the industrial employment $\eta L = \eta w$ exceeding the growth rate of labor force ηp, (Fei & Ranis 1997:262) we can arrange the previous equation as:

$$\eta P < \eta w = \eta K + \frac{BL + J}{\epsilon L L}$$

3.2. Employment Growth rates Analysis / the Fei and Ranis condition for Success

According to Lewis model, the "turning point" is going to be reached after periods of time where the growth rate of employment in the modern sector exceeds the labor force or population growth rate. ηi is the growth rate of employment in the industrial sector and ηs the growth rate of employment in the service sector; let both conform the "Modern Sector", and let ηp be the growth rate of the total labor force of the Economy.

I divided the Analysis of the Fei and Ranis "Condition for success"[19] in two different scenarios. The first one (*extended analysis*) is represented in *Table 4* in which I consider the growth rate of employment in the industry and services sectors together, i.e. $\eta i + s$. Table 5 presents results for what I called the "strict analysis", that considers only what Lewis argued to be the most important and the most productive activity - which has to be developed in order to grow- that is, employment growth in the "Industry" ηi.

[19] Details of conditions for success in Appendix 4

In tables 4 and 5 these two employment growth rates in the modern sector ($\eta i + s$ extended analysis and ηi strict analysis) together with the growth rate of the total labor force in the economy ηp are presented in a long term analysis, as the growth rate of employment in the modern sector is greater than the growth rate of the labor force $\eta i + s > \eta p$, the economy is following a development path and could be considered to reach the "Lewis turning point".

As for the extended analysis (see table 4), the condition $\eta i + s > \eta p$ over the period 1991 – 2000 is satisfied only in Chile, Colombia, Peru and Venezuela, with an average growth rate difference of +1,2% for Chile, Colombia +1,1%, Peru +0,5% and Venezuela +0,4%. On the other hand, Argentina, Brazil and Uruguay have not satisfied the condition, showing negative annual average growth rate differences. This negative impact could be in some way related to the Asiatic financial crisis in 1998 that has affected terms of trade in the biggest Latin-American economies including Argentina and Brazil within the SA-7.

For the period 2000 -2007, the condition of success is satisfied in Argentina, Brazil, Chile, Peru and Venezuela, being the most remarkable results in Venezuela with a annual average growth rate difference of +1,7%, Argentina +1,6%, Brazil + 1,5%, Chile +1,2 and Peru +0,1%; negative results are seen in Colombia -1,3% and Uruguay -0,1%.

Thus, in the 17 years analysis corresponding to the period 1991 – 2007, the Fei & Ranis condition for success in an extended version has been satisfied for Chile, Peru and Venezuela. Only Uruguay and Colombia have not satisfied the Fei and Ranis condition for success. Colombia experienced a devastating blow $\eta i + s < \eta p$ from 2000 to 2001, caused by a tremendous reduction on the employment growth rate; in part, due to the recession observed in these years with a respective GDP growth of 0,57% (1998) and -4,2% (1999)[20]. Colombian industry value added decreased tremendously between 1999 and 2001, especially in 1999 that decreased in -7,3% and -5,3% in 2000. Latin America suffered a recession in 1998 – 1999, particularly in Argentina, Brazil, Chile and Colombia, attributable to the Asian financial crisis (Thailand, March 1997).

[20] See Section 2.2

Table 4: Extended Fei and Ranis Condition for Success

Yearly Growth rates	Argentina		Brazil*		Chile		Colombia		Peru		Uruguay*		Venezuela	
	$\eta i + s$	ηp	$\eta i + s$	ηp	$\eta i +$	ηp	$\eta i + s$	ηp	$\eta i + s$	ηp	$\eta i + s$	ηp	$\eta i + s$	ηp
1991 – 1999	1,1%	2,2%	2,3%	2,8%	3,1%	2,3%	4,2%	3,1%	3,5%	3,0%	0,4%	0,9%	4,0%	3,6%
2000-2007	3,8%	2,2%	3,7%	2,2%	3,3%	2,2%	1,3%	2,6%	2,3%	2,2%	0,8%	0,9%	4,7%	3,0%

Source: World Bank Database http://databank.worldbank.org/ddp/home.do and International Labor Office Database http://laborsta.ilo.org/sti/sti_S.html
(*) Gradual growth rate calculation due to the lack of data for the respective year
Author´s calculations

In order to better analyze the impact of the industrialization processes in the economies, I present in *Table 5* the "strict analysis" of the condition for success of Fei and Ranis, which shows very interesting and positive results for Argentina, Brazil, Peru and Venezuela in the last 7 years. Let´s start by analyzing Peru and its +19% growth a year during 2000 – 2007, which was due to the tremendous change of the main sector employer from services to industry. In terms of number of persons employed, the Peruvian industry sector employed 1,322 million people in 2003 and more than double (3,161 million people[21]) in 2004, while the service sector reduced employees from 5,222 million people to 3,525 million people, showing a clear sudden transfer of workers from service to industry sector during 2004. This change can be caused due to the change of structure in the employment statistic, which is not considered relevant only in the strict analysis of the condition for success.

In general, in a strict analysis of the condition for success during the period 1990 – 1999 the selected SA-7 economies have not shown positive results, and have even shown negative growth rate of employment in the industry sector as is the case of Argentina (-2,8) and Uruguay (-2,4%). This negative growth rate has been caused by the strong recession in these two related economies extended from 1999 until 2002. Argentina GDP growth rate decreased sharply -3,4% (1999), -0,8% (2000), -4,4% (2001) and -10,9% (2002); as well in Uruguay the GDP growth rate decreased in -1,9% (1999), -1,9% (2000), -3,8% (2001) and -7,7% (2002).

[21] Data from the International Labor Office database

Table 5: Fei and Ranis Strict Condition for Success

Yearly Growth rates	Argentina		Brazil*		Chile		Colombia		Peru		Uruguay*		Venezuela	
	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp
1991 - 1999	-2,8%	2,2%	0,9%	2,8%	1,1%	2,3%	1,2%	3,1%	1,0%	3,0%	-2,4%	0,9%	2,1%	3,6%
2000-2007	4,3%	2,2%	4,6%	2,2%	2,9%	2,2%	1,8%	2,6%	19,4%	2,2%	-0,1%	0,9%	5,1%	3,0%

Source: World Bank Database http://databank.worldbank.org/ddp/home.do and International Labor Office Database http://laborsta.ilo.org/sti/sti_S.html
(*) Gradual growth rate calculation for this year, due to the lack of data for the respective year
Author´s calculations

Argentina and Brazil show interesting results for the period 2000 – 2007. Argentina and Brazil, with a similar yearly average growth rate of labor force of 2,2%, show a much greater yearly average industry employment growth rate (4,3% and 4,6%). A proudly satisfied condition for success presents Venezuela due to an increase of its industry value added during the years 2004 – 2007, reflected on its corresponding GDP growth in about 18.3% (2004), 10,32% (2005), 9,87% (2006) and 8,75% (2007).

In a strict analysis of the condition for success, Colombia and Uruguay were the countries within the SA-7 economies which have not satisfied the condition for success.

As result of the world financial crisis since 2007, Argentina, Brazil, Chile and Colombia have experienced a decrease of employment growth in the industry. Chile has been affected by the world financial crisis and has experienced a decrease in the employment growth rate in the modern sector (industry and services) from 2008 on. As a consequence the number of persons employed reduced from 4,218 million people in 2008 to 3,896 million people in 2009. In 2009, the Chilean labor force was reduced by about 162 thousand people, whereas employment decreased by more than 322 thousand people. Thus, more than 160 thousand people lost their jobs. Employees in the service sector were the most affected in terms of reduction for the case of Chile.

3.3. Decomposition Analysis of Employment Growth in the Dualistic Economy – Fei and Ranis analysis

From the Fei and Ranis condition for success, employment growth in the capitalist or modern sector of the economy, ηw, can be decomposed in terms of capital growth, ηK, labor bias of technical changes, BL, and total factor productivity, J, and is represented by the following equation:

$$\eta w = \eta K + \frac{BL + J}{\epsilon LL}$$

Thus, Fei and Ranis developed the so called "labor absorption analysis" (1997:109) that surged from the decomposition of the condition for success from their model proposed. The equation above shows that the industrial employment growth depends on the magnitudes of ηK, BL, J. Hence, the rapidity of capital accumulation, ηK, plays an important role (Fei & Ranis, 1997:113).

3.3.1. Methodology

The analysis starts with the Cobb Douglas production function,

$$Q = A. K^{\alpha}. L^{1-\alpha}$$

Output Q, is represented by the total value added in the industry. The data is given in US$ at constant prices 2000 and in growth rates as the model proposed by Fei and Ranis.

Capital K, is calculated using data on gross fixed capital formation including land improvements (fences, ditches and drain), plant, machinery and equipment purchases construction of roads, railways, etc. It also includes schools, hospitals, offices, private and residential dwellings and commercial and industrial buildings[22]. The capital stock is calculated by the Perpetual Inventory Method (PIM), assuming a service life of capital of 10 years, i.e. depreciation rate is assumed to be at 10%

[22] According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. http://unstats.un.org/unsd/class/default.asp

Labor L, is represented by the headcount of employment in the modern sector (industry services), according to the source provided by the national institutes of statistics of each country and the ILO database (http://laborsta.ilo.org/STP). The decomposition analysis was possible for Colombia only for a 6 years period, due to the lack of information on the gross fixed capital formation for the period 1991 – 2001.

Given the growth equation above one can derive the model in growth terms for econometric analysis,

$$\eta Q = \eta A + \alpha \eta K + (1 - \alpha)\eta L + e$$

Let´s denote that the "constant coefficient", **A**, represents in our model the intensity of innovation **J** and the coefficient of the gross fixed capital formation growth rate, **α**, represents the elasticity of labor productivity ϵ_{LL} (representing the law of diminishing returns to labor); and let´s be ***e*** the error term.

From the condition for success presented in part 3.1 we can deduce that the labor biased of technical changes $\mathbf{B_L}$ equals the elasticity of labor productivity **α** times the difference between the growth rate of employment in the modern sector and the growth rate of capital accumulation **($\eta w - \eta K$)** minus the intensity of innovation **J**.

$$B = \epsilon LL(\eta w - \eta K) - J$$

The Fei and Ranis Model suggests that the more technological change biased towards the factor –labor, $\mathbf{B_L}$, the better for the development of the dualistic economy.

My aim is to determine the significance of the Lewis, Fei and Ranis model for each economy and, therefore, consider the decomposition analysis of labor growth to determine the main sources that increase employment in the respective economy.

3.3.2. Econometric Regression of the growth Model and Decomposition Analysis of labor growth for the SA-7

I analyze the statically significance of the Lewis – Fei - Ranis Model for each economy in the two previous scenarios of the capitalist sector including only industry and a second scenario

considering industry and services. In Appendix 2 I plot the variables of the model through time.

3.3.2.1. Statistical Significance of the Lewis-Fei-Ranis Model

In *Table 6,* I show the results of the regressions of the Lewis-Fei and Ranis Model of the modern sector including industry and services. *Table 7* shows the results for the regression[23] including industry only.

Considering the results of *Table 6 (modern sector including services and industry)* almost all the SA-7 economies seem to be representations of the Lewis-Fei-Ranis Model proposal and the results for further decomposition analysis seems to be worthwhile to be analyzed. Only in the case of Peru and Venezuela, results are not statistically significant. Therefore, no significance on the results of a further decomposition analysis could be obtained for these countries.

Table 6: Regression Results for the model including industry and services

	Argentina	Brazil	Chile	Colombia	Peru	Uruguay	Venezuela
J	0,0051	0,0005	0,0055	-0,0775	0,0218	0,006	-0,008
	(0,7798)	(0,5665)	(0,6855)	(0,0319)**	(0,0711)*	(0,7385)	(0,6656)
α	0,3538	0,3404	0,0464	0,9908	0,0154	0,193	-0,149
	(0,3608)	(0,2723)	(0,7029)	(0,0030)***	(0,8606)	(0,0661)*	(0,0235)**
1-α	0,6462	0,6596	0,9536	0,0092	0,9846	0,807	1,149
	(0,1064)	(0,0447)**	(1,36e-06)***	(0,9620)	(1,68e-08)***	(8,52e-07)***	(1,37e-011)***
Teststatistic	5,210	3,6344	23,173	20,438	2,073	9,066	1,991
p-Value	0,0398	0,0808	0,0003	0,0107	0,1735	0,01003	0,1818

Database & Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author calculations. Gretl econometric s tool.
() p-value of the variable

* Weakly Statistical significance

** Statistical Significance

*** Strongly Statistical Significance

[23] Details of regression in Appendix 2-3

Table 7: Regression Results for the model including industry

	Argentina	Brazil	Chile	Colombia *	Peru	Uruguay	Venezuela
J	0,0215	0,0111	0,0074	-0,0769	-0,0240	0,0154	-0,01262
	(0,2459)	(0,2539)	(0,6218)	(0,0009)***	(0,2858)	(0,2130)	(0,4446)
α	0,4446	0,7019	0,2209	0,9581	0,9259	0,2570	0,01809
	(0,0680)*	(0,0031)***	(0,1101)	(2,77e-05)***	(4,72e-010)***	(0,0029)***	(0,7517)
1-α	0,5554	0,2981	0,7791	0,0419	0,0741	0,742959	0,98191
	(0,027)**	(0,1475)	(3,16e-05)***	(0,5524)	(0,2471)	(5,73e-08)***	(6,43e-011)***
Teststatistic	1,8980	0,9325	65,276	4,4382	124,026	2,2108	5,95631
p-Value	0,1915	0,3533	0,000002	0,1029	5,09E-08	0,1609	0,02974

Database & Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author calculations. Gretl econometric s tool.
() p-value of the variable

* Weakly Statistical significance

** Statistical Significance

*** Strongly Statistical Significance

The modern sector model of the SA-7 economies present an almost zero total factor productivity ***J*** (AR=BR=CH=0,005; PE=0,02, UR=0,006) and for Colombia and Venezuela it is negative (CO=0,08; VE=0,008). An almost zero total factor productivity ***J*** shows the scarce technology level in the modern sector and in the case of negative values they show the scarce and harmful technology level of the modern sector. When including industry only in the regression of the Lewis-Fei-Ranis model (see *Table 7*), the results become, for most of the countries such as Argentina, Brazil, Colombia*[24] and Uruguay, insignificant. For Chile, Peru and Venezuela, the industry sector model seems to fit the prediction of Lewis-Fei-Ranis[25]. For Chile the analysis including only the industry sector presents an almost zero total factor productivity ***J***; for Peru and Venezuela negative values of ***J*** in the industry sector model, show the scarce and harmful technology level of their industry. Due to the differences of the results of each specification (see Table 6 and Table 7), it is suggested that

[24] *Weakly significant (see p-value = 0,10 on table 7)

[25] Statistical significance of the Industry model (see p-values for Chile, Peru and Venezuela on table 7)

the industrial and services sectors follow quite different development paths (mostly in Argentina, Colombia, Uruguay and Venezuela). The econometric regression for Brazil, Chile and Peru suggests that the model follows different patterns depending on the scenario (1. Scenario: includes Industry + services; 2. Scenario: includes only Industry). Proof of this, are the coefficient values that change tremendously.

3.3.2.2. Lewis-Fei-Ranis Decomposition Analysis of the Employment Growth

Considering the Fei-Ranis condition for success, we have that employment growth rate, ηw, can be represented as follows:

$$\eta w = \eta K + \frac{\mathrm{B}L + \mathrm{J}}{\epsilon L L}$$

The decomposition analysis of employment growth according to Fei and Ranis, consists on determining the values of the variables of the condition for success, in order to identify the main variables that contribute positive or negatively to the employment growth, ηw, such as, capital growth or capital accumulation, ηK, labor bias of technical changes, $\mathrm{B}L$, and total factor productivity, J.

In *Table 8* the corresponding calculations regarding the decomposition of the employment growth rate for Argentina, Brazil, Chile, Colombia and Uruguay is depicted. For economies such as Peru and Venezuela, where the Lewis-Fei-Ranis model is non-statistically significant the decomposition analysis has not been calculated.

Argentina's decomposition of employment growth shows that capital formation or capital accumulation (ηK) plays an important role in the creation of employment and occasionally negative values of the labor biased technology ***B***, indicate that the bias of technical change are likely to save labor in the production process (against labor). Fei and Ranis suggest that the more technical progress labor biased the better it is for the development of the dualistic economy. Argentina has in the 16 years from 1991 – 2007 an accumulative negative value of labor biased technology factor ***B***, on the other hand capital accumulation growth rate ηK has been the most important factor towards employment for this period. In Argentina

from years 2002 to 2004 the labor biased technology factor has been positive and towards labor.

According to Fei and Ranis the corresponding calculus of the decomposition of the growth rate of employment for Brazil shows a positive factor biased toward labor ***B*** which has played an important role in employment. Capital accumulation ηK has played a less important role in employment creation over this period. The positive values of the labor biased technology factor ***B*** indicate that the bias of technical change is more likely to use labor in the production process (towards labor). Results for Chile indicate that capital accumulation ηK has played a strong important role in employment creation in the last 15 years. On the other hand, negative values of the factor bias indicate that the technical change bias is much more likely to save labor. Also in Colombia´s capital accumulation, ηK, has played a strong and important role in employment creation in this 7 years analysis. There is also evidence for the factor biased to be against labor. Finally, capital formation or capital accumulation ηK in Uruguay also plays an important role in employment creation and occasionally negative values of the labor biased technology ***B***, indicates that technical change bias is more likely to save labor in the production process (against labor).

Table 8: Decomposition analysis of Employment growth

Country / Year	ηw	ηK	J	α	B	(B+J)/α
Argentina						
1991-1999	0,011	0,044	0,005	0,354	-0,017	-0,033
2000-2007	0,038	0,022	0,005	0,354	0,001	0,016
Brazil						
1991-1999	0,027	0,014	0,005	0,340	-0,001	0,013
2000-2007	0,037	0,015	0,005	0,340	0,003	0,022
Chile						
1991 – 1999	0,031	0,093	0,005	0,046	-0,008	-0,062
2000-2007	0,033	0,085	0,005	0,046	-0,008	-0,052
Colombia						
2001 - 2007	0,010	0,127	-0,077	0,991	-0,038	-0,117
Peru						
1991-1999	0,035	0,084	Non-statistical significance			-0,050
2000-2007	0,023	0,069	Non-statistical significance			-0,046
Uruguay						
1991-1999	0,004	0,067	0,006	0,193	-0,018	-0,063
2000-2007	0,000	0,018	0,006	0,193	-0,009	-0,018
Venezuela						
1991-1999	0,040	0,113	Non-statistical significance			-0,073
2000-2007	0,047	0,130	Non-statistical significance			-0,083

Database & Source: International Labor Office Data Base http://laborsta.ilo.org/sti/sti_S.html
Author calculations. Gretl econometric s tool.

4. CONCLUSIONS

The trends and results that stand out from the selected SA-7 economies analysis above match the trends expected by Lewis fairly well. First of all, from section 2 a shift of the redundant agriculture labor force towards the urban or modern industrial sector can be clearly identified in these SA-7 economies. The empirical evidence for this is that the agriculture share of GDP has been maintained despite the decrease and lower growth rate of rural or agricultural labor force that has even been negative in the last decades. This is particularly the case for countries such as Brazil, Colombia and Peru, which presented a strong reduction of their labor force in agriculture. Hence, this suggests the presence of redundant labor force in the agriculture sector in these selected SA-7 economies.

The Lewis model argues that the modern sector plays an important role in employment (Lewis 1954:21). The redundant labor force from the agriculture sector is transferred towards the capitalist sector with people searching for jobs opportunities and better standards of living. The modern sector in these SA-7 economies indeed employs the greatest part of the labor force distributed in the industry and services sector. According to Valpy FitzGerald[26] this suggests that "…tertiary sector or services act as *"labor sponges"* with a large part of their workforce effectively underemployed." (FitzGerald, 2004: 13). Nevertheless, Lewis considers the modern sector (industry and services) as the core of the economic growth and development. In terms of employment in these SA-7 economies, the agriculture activity has lost importance as an employer with the industry[27] and services[28] becoming much more relevant.

Once the redundant labor is identified, it is necessary to identify the *pressure on wages* in the modern sector, as a consequence of the transfer of redundant labor from the agriculture sector of the economy. For this purpose three aspects have been analyzed: (i) poverty headcount rate (ii) vulnerable employment and (iii) real minimum wage growth rate and labor productivity. Vulnerable employment ratio embodies the employees with less favorable labor conditions such

[26] Valpy FitzGerald on his paper in July 2004 "the Lewis Model in Practice: Economic Development in Latin America during the Twentieth Century".

[27] Industry employs up to 26% of the total labor force for the case of Brazil (see section 2.3.2)

[28] Services employs up to 79% of the labor force for the case of Argentina (see section 2.3.2)

as underpaid and sporadic jobs, less social protection and no social benefits. In 2007, at least 19%[29] of the employment in SA-7 was in a situation of vulnerable employment. Critical ratios are shown for Colombia (41%) and Peru (39%). Growth rates of minimum real wages and labor productivity in the SA-7 do not follow similar patterns with the exception of short periods of time, where similar patterns were presented in Brazil, Chile, Uruguay and Venezuela (see 2.4.3). Growth rates of the real minimum wage are almost zero, without any steady increase despite sharp changes on the productivity of labor in the corresponding modern sector.

Following the Fei-Ranis growth model (section 3.1), the *condition for success* analysis has revealed interesting results[30] for the period 2000-2007 in countries such as Argentina, Brazil, Chile, Peru and Venezuela. The *condition for success* has been tested and analyzed considering two scenarios[31]. The *condition for success* needs to be satisfied for long periods of time in order to reach economic development and thus better standards of living. From the analysis above then, one can conclude that, as in the SA-7 economies condition for success is continuously interrupted; hence, there is no evidence over a long-term that the Lewis-Fei-Ranis condition of success is satisfied. Therefore, according to Lewis the economies have not reached the end of the 1st stage and the labor markets do not face a significantly positively sloped labor supply curve at all. Relatively flat real wages in these SA-7 economies are explained with the Lewis Model. The Lewis-Fei-Ranis growth model including industry and services sectors shows statistical significance in Argentina, Brazil, Chile, Colombia[32] and Uruguay. For Peru and Venezuela no statistical significance was found[33]. After determining the significance of the model and locating the SA-7 into the capitalist Lewis-Fei-Ranis economic model, the decomposition analysis of employment growth rate confirms that capital accumulation has been the main factor towards employment in all the SA-7 economies. Low and in some cases negative values of factor productivity enlighten the low level and lack of technology innovation in SA-7 economies, hence, against employment. The factor bias of technology is in most of these cases demonstrating that technology is most likely to save labor.

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[29] Argentina: 19% Brazil: 26% Chile24% Colombia: 41% Peru: 39% Uruguay: 24% Venezuela: 29%

[30] See table 4 section 3.2

[31] First scenario for the condition for success test includes industry and services / second scenario considers only industry

[32] Due to the lack of data about the employment rate for Colombia was only possible the analysis for 7 years.

[33] See table 6, section 3.3.2.1

Finally, the main Lewis-Fei-Ranis prediction about the almost flat real wages growth rates in the modern sector – caused by the release of redundant labor force from the traditional sector which disappears when the labor surplus coming from the traditional sector has been exhausted - has been identified and confronted to empirical data. A great part of the SA-7 labor force perceives low wages at a subsistence level and seem to prevail in the long-term. These SA-7 economies fit statistically in the neo-classical Lewis-Fei-Ranis growth model. According to the empirical results, these economies could not satisfy the *conditions of success* for long-periods of time as often being interrupted or affected by e.g. international crisis, political changes, etc. Medium-term growth in the industry and services are directly and positive related to employment. Some economies such as Brazil and Chile have increased tremendously in terms of income per capita due to investment and increase of its industry. In the new century, the poorest countries within the SA-7 such as Peru and Colombia have presented opposite results in terms of poverty reduction. Peru has outstandingly reduced its poverty headcount rate in the last 7 years as its economy has satisfied during 7 years the Lew-Fei-Ranis *condition for success*. Oppositely, Colombia has not satisfied the *condition for success* at all and has not achieved positive results in poverty reduction.

Through the analysis presented, I can conclude that these selected SA-7 economies fit in the context and framework of the proposed Lewis Model. Thereby, some disruptions in the extent of the Lewis growth path can be identified; one is related to the short-term satisfaction of the condition for success and the second one is about the low level of technology and productivity in the modern economy in this SA-7.

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GLOSSARY & KEY WORDS

The following definitions were compiled from the International Labor Office website (ILO) ttp://white.oit.org.pe/estad/laclispub/english/glosario.php. The following note was attached:

"IMPORTANT NOTE: The concept definitions provided below were copied from the International Labour Office website. According to the ILO "the concept definition provided below are based on international standards adopted for these concepts in the International Conferences of Labour Statisticians (ICLS). The national concept definitions which are used in the construction of variables and indicators presented in QUIPUSTAT may differ from the international standards. This is one factor which limits the international comparability of these variables and indicators".

- **Working-age population (WAP):** Includes persons of a specified age defined by the household survey of each country collecting statistical information on the labour force activity of the population. The age threshold used to define the working-age population may not coincide with the minimum legal working age established in the country
- **Employed persons:** The employed comprise all persons above a specified age who during a specified brief survey reference period, such as one week or one day, were in the following categories: (1) paid employment, either performing some work for wage or salary in cash or in kind, or temporarily not at work during the reference period and had a formal attachment to their job; or (2) self-employed having performed some work for profit or family gain, in cash or in kind, or with an enterprise but temporarily not at work during the reference period. For operational purposes, the notion of some work may be interpreted as work for at least one hour.
- **Unemployed persons:** The unemployed comprise all persons above a specified age who during the reference period were: (1) without work, (2) available for paid employment or self-employment during the reference period, and (3) seeking work, taking specific steps in a specified recent period to seek paid employment or self-employment during the reference period.
- **Economically active population (EAP) or labor force:** The economically active population comprises all persons of either sex who furnish the supply of labour for the production of economic goods and services as defined by the United Nations systems of national accounts and balances during a specified time-reference period. Two useful measures of the economically active population are the usually active population measured

in relation to a long reference period such as a year, and the labour force, measured in relation to a short reference period such as one week or one day. All these concepts refer to the sum of all persons above a specified age who are employed and those who are unemployed.

- **Labor force participation rate (LFPR**): Refers to the economically active population (EAP) as a percent of the working-age population (WAP).

$$LFPR = \frac{EAP}{WAP} * 100$$

- **Employment-to-population ratio (EP):** Refers to the employed population as a percent of the working-age population (WAP).

$$EP = \frac{Employed\ persons}{WAP} * 100$$

- **Unemployment rate (UR):** Refers to unemployed persons as a percent of the economically active population (EAP).

$$UR = \frac{Employed\ persons}{EAP} * 100$$

- **Real minimum wage (RMW**): This refers to the annual average of the nominal legal minimum wage deflated by the consumer price index (CPI) of the country. The majority of the countries have a single minimum wage. However, in some cases the minimum wage varies by economic activity, occupation or regional area.

$$RMW = [(NMW1 / CPI\ 1) * 100 + \ldots + (NMWn / CPIn) * 100] / n$$

where:

NMWi: nominal minimum wage in month i

CPIi: consumer price index in month i

n = 12 months

- **Employment by status in employment (ESE):** This refers to the distribution of the employed population by status in employment. The concept of status in employment describes the type of economic risk and authority which workers have in their jobs, as reflected in their explicit or implicit contract of employment. The status in employment categories are defined by the International Classification of Status in Employment adopted

in the fourteenth International Conference of Labour Statisticians, known as ICSE-93.

1. Employees or wage and salaried workers, who get a basic remuneration not directly dependent on the revenue of the employer and among whom countries may need and be able to distinguish "employees with stable contracts" (including "regular employees") from other workers.
2. Employers, who are self-employed (i.e. whose remuneration depends directly on the expectation of profits derived from the goods and services produced) and hire one or more persons to work for them as 'employees', on a continuous basis.
3. Own-account workers, who are self-employed and do not hire 'employees' on a continuous basis.
4. Members of producers' cooperatives, who are self-employed in a cooperative producing goods and services, where the members take part on an equal basis in making major decisions concerning the cooperative.
5. Contributing family workers, who are self-employed in an establishment operated by a related person, with too limited a degree of involvement in its operation to be considered a partner.
6. Workers not classifiable by status, for whom insufficient relevant information is available, and/or who cannot be included in any of the preceding categories.

ESEn = (Employed persons in status in employment category n / Total number of employed persons) * 100

where:
n: employees, employers, own-account workers, . . . , workers not classifiable by status

- **Employment by economic activity (EEA):** This refers to the distribution of the employed population by economic activity, that is, the productive activity in which the employed are engaged.

  In order to standardize the classification of the economic activities, activities are grouped based on the International Standard Industrial Classification of All Economic Activities (ISIC), Second Revision. The economic activities are the following: Agriculture, hunting, forestry and fishing, Mining and quarrying, Electricity, gas and water, Manufacturing, Construction, Wholesale and retail trade and restaurants and hotels, Transport, storage and communication, Financing, insurance, real estate and business services, Community, social

and personal services, Activities not adequately defined, EEAi = (Number of jobs in economic activity i / Total number of jobs) * 100.

where:

i: agriculture, hunting, forestry and fishing; mining and quarrying; electricity, gas and water; manufacturing, . . . , activities not adequately defined.

For operational purposes, in QUIPUSTAT the indicator is calculated as:

EEAi * = (Number of employed persons in economic activity i/ Total number of employed persons) *100

APPENDIX 1: Rural and Urban poverty headcount rate at the national poverty line

Rural and Urban Poverty Headcount rate at the national Poverty line (% population)													
		1987		1990		1995		2000		2005		2009	
Argentina	Rural	--		--		--		--		--		--	
	Urban				33,7		24,8		28,9		33,8		13,2
Brazil	Rural	--		--		--		--		--		--	
	Urban	--		--		--		--		--		--	
Chile	Rural		51,5		38,8		31		23,7		12,3		12,9
	Urban		43,6		38,5		27		19,7		13,9		15,5
Colombia	Rural	--		--		--		--			56,4		54,3
	Urban	--		--		--		--			41,1		35,8
Peru	Rural	--		--		--			70		70,9		60,3
	Urban	--		--		--			36,9		36,8		21,1
Uruguay	Rural	--		--		--		--		--			9,6
	Urban		35,6		29,7		17,4		17,8		29,2		21,4
Venezuela	Rural	--		--		--		--		--		--	
	Urban	--		--		--		--		--		--	

Source: World Bank Database http://databank.worldbank.org/ddp/home.do and International Labor Office Database http://laborsta.ilo.org/sti/sti_S.html

APPENDIX 2: Growth rates - Graphs of the variables of the Lewis, Fei and Ranis Growth Model.

k: growth rate net fixed capital formation

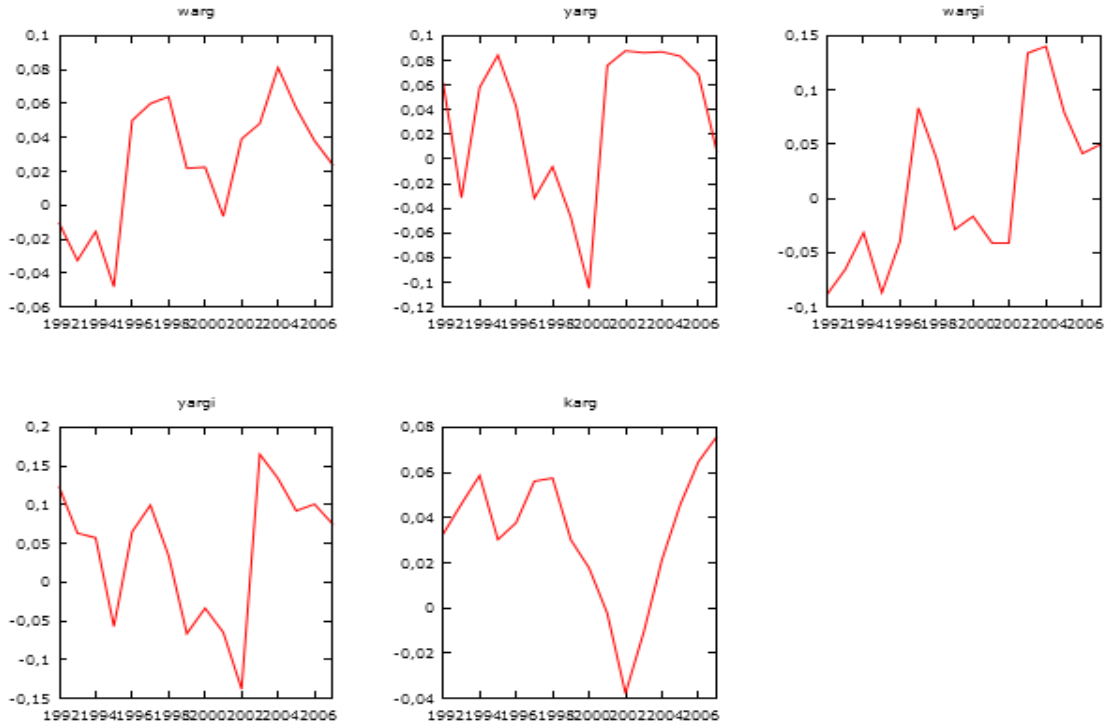
y: growth rate value added in the industry + services

w: growth rate of employment in industry + services

yi: growth rate value added in the industry

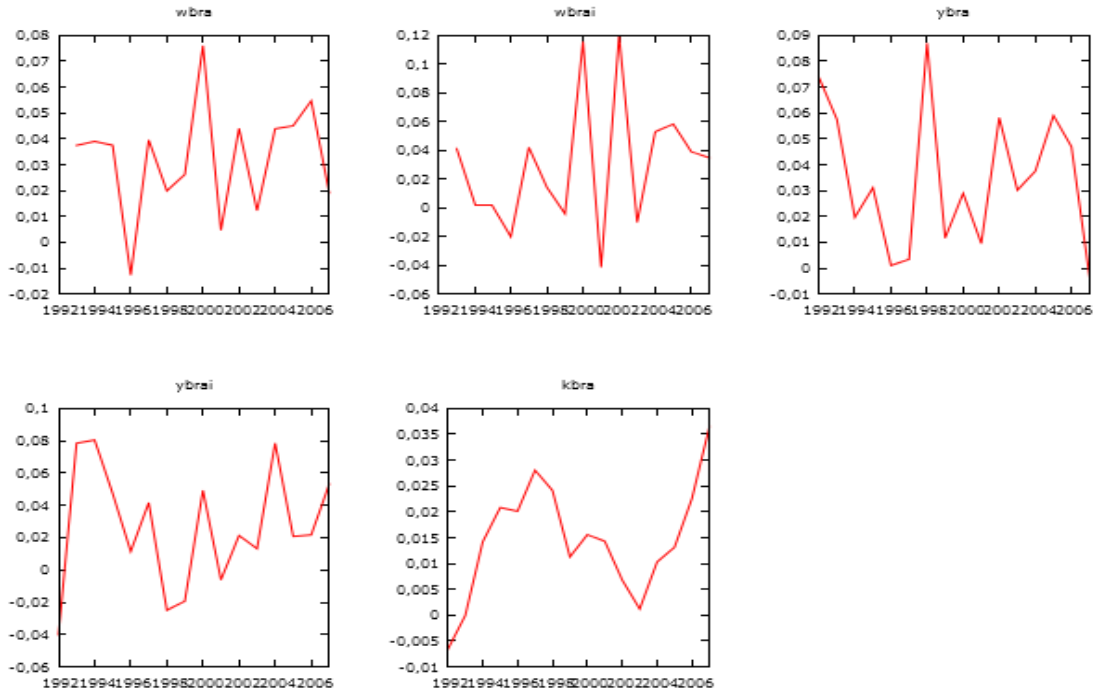
wi: growth rate of employment in the industry

Argentina:



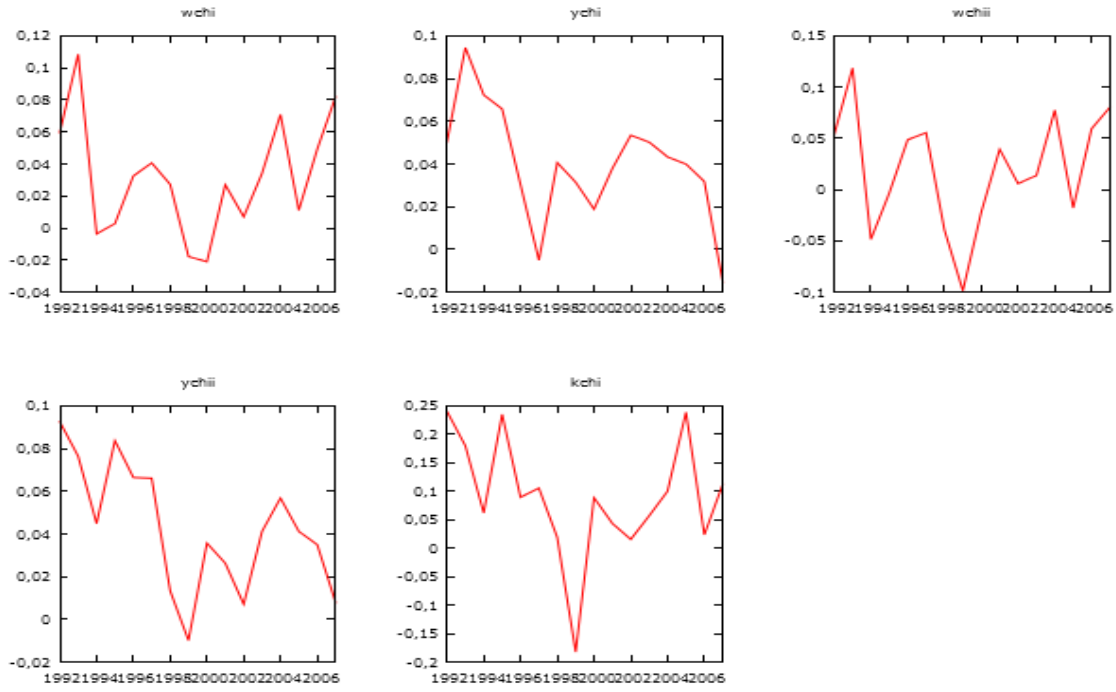
Author calculations. Gretl: Econometrics Software

Brazil:



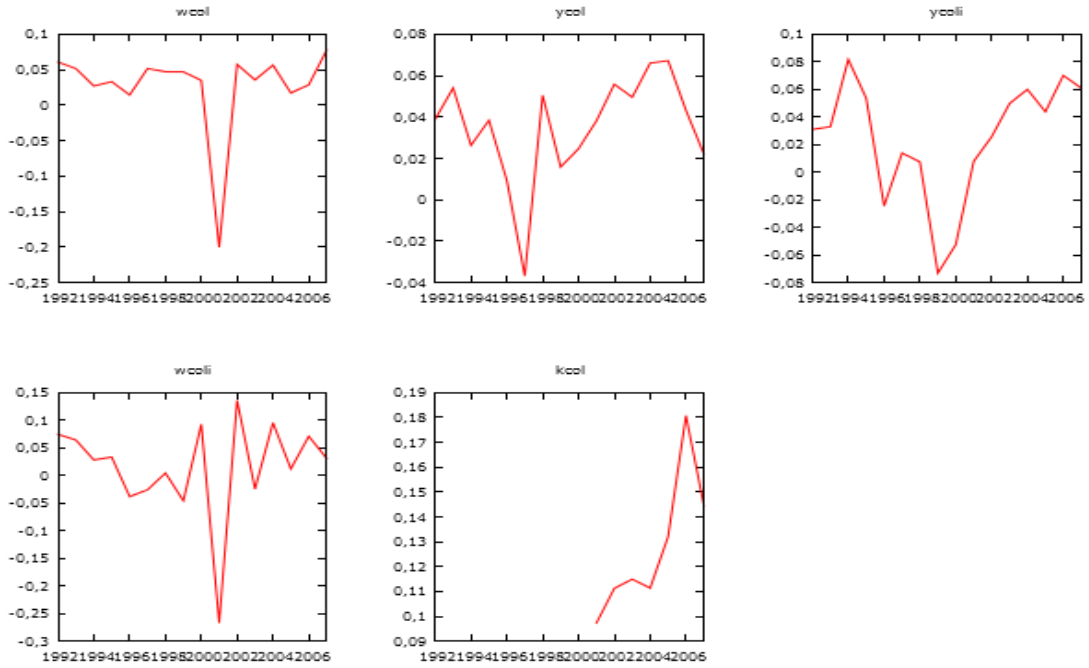
Author calculations. Gretl: Econometrics Software

Chile:



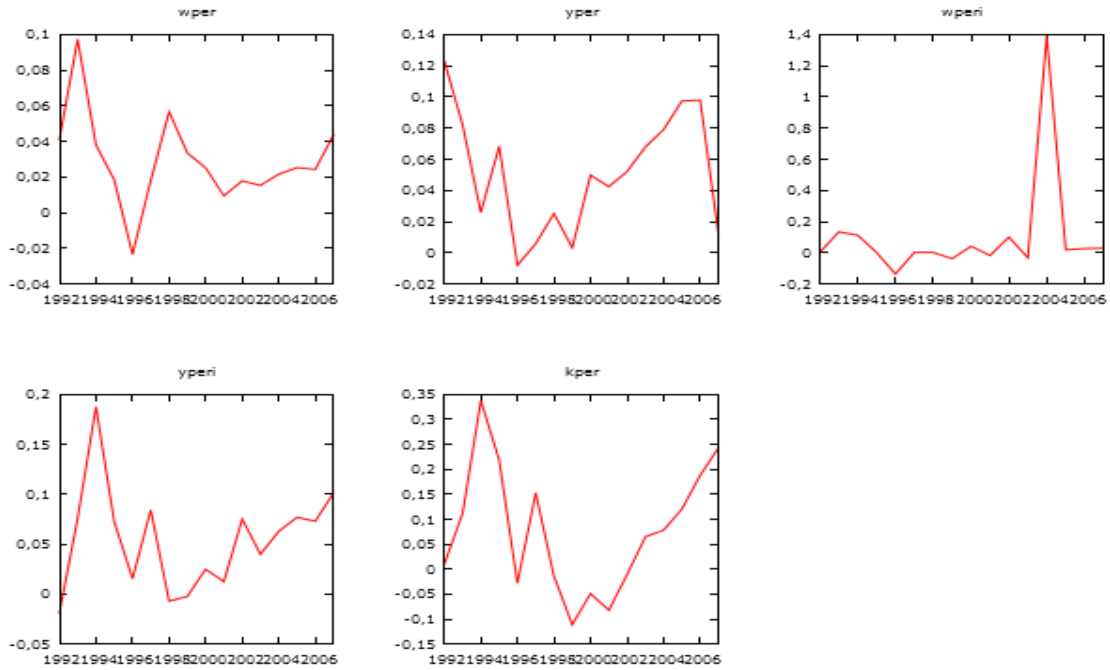
Author calculations. Gretl: Econometrics Software

Colombia:



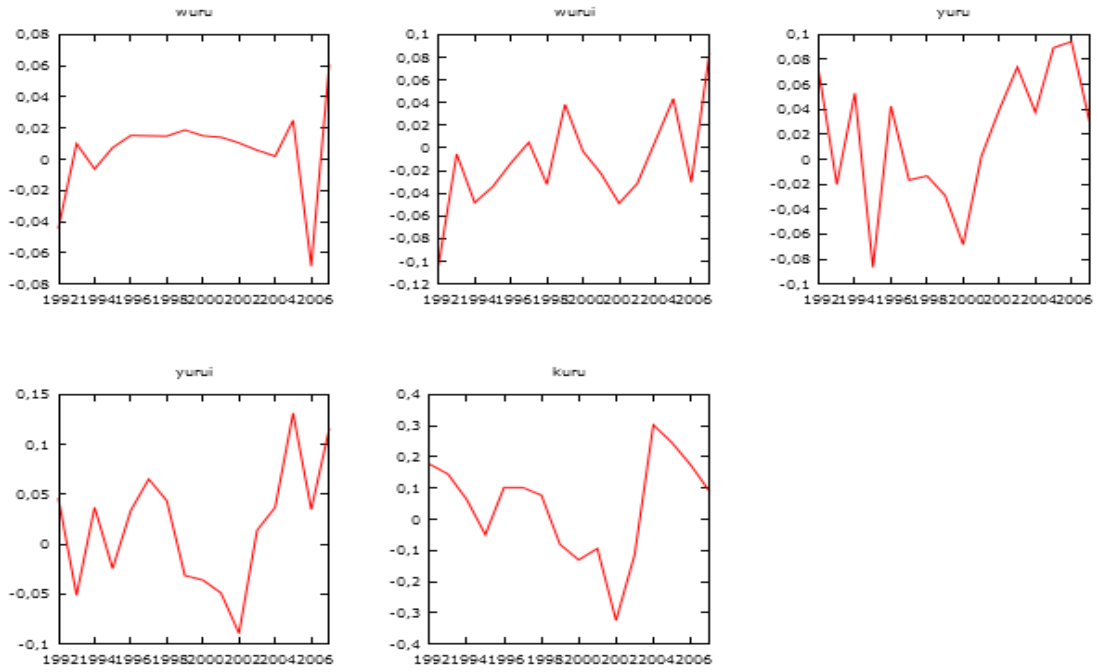
Author calculations. Gretl: Econometrics Software

Peru:



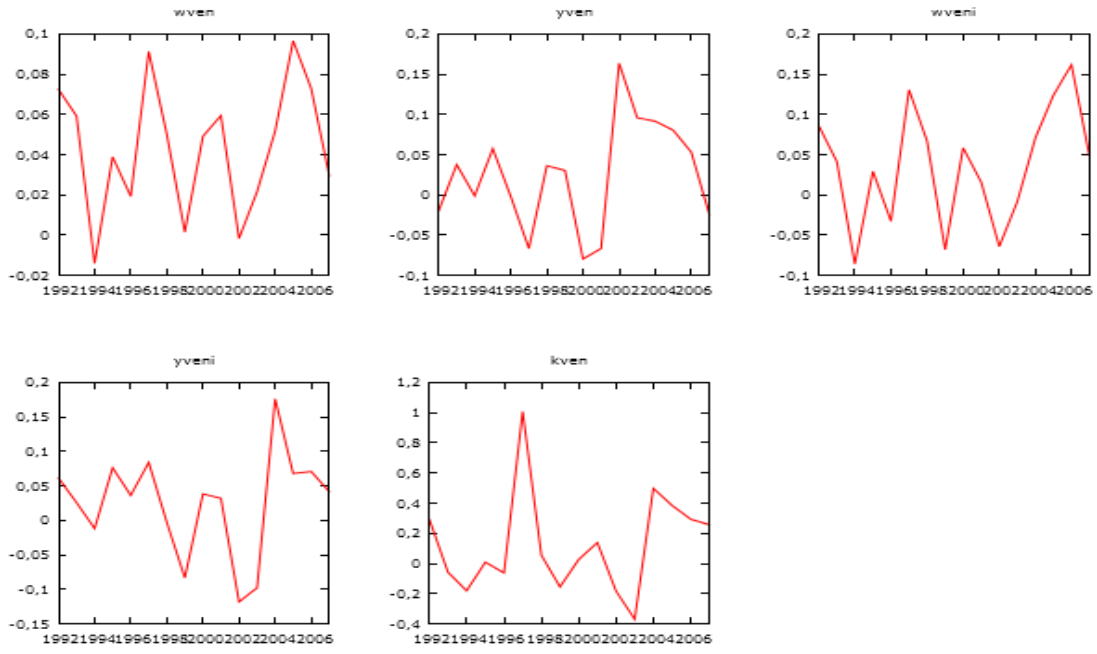
Author calculations. Gretl: Econometrics Software

Uruguay:



Author calculations. Gretl: Econometrics Software

Venezuela:



Author calculations. Gretl: Econometrics Software

APPENDIX 3: Regression Results – Fei & Ranis Growth Model SA-7

Argentina: OLS with restriction for α for the Industry

Restriktion:

b[karg] + b[wargi] = 1

Teststatistik: F(1, 13) = 1,89813, mit p-Wert = 0,191543

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,0214757	0,0177320	1,211	0,2459
karg	0,444611	0,224807	1,978	0,0680 *
wargi	0,555389	0,224807	2,471	0,0270 **

Standardfehler der Regression = 0,0673355

Author calculations. Gretl: Econometrics Software

Argentina: OLS with restriction for α for the Industry + Services

Restriktion:

b[karg] + b[warg] = 1

Teststatistik: F(1, 13) = 5,21682, mit p-Wert = 0,0398201

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,00510110	0,0178935	0,2851	0,7798
karg	0,353759	0,374459	0,9447	0,3608
warg	0,646241	0,374459	1,726	0,1064

Standardfehler der Regression = 0,0705149

Author calculations. Gretl: Econometrics Software

Brazil: OLS with restriction for α for the Industry + Services

Restriktion:

b[kbra] + b[wbra] = 1

Teststatistik: F(1, 12) = 3,63436, mit p-Wert = 0,0808239

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,00504129	0,00857193	0,5881	0,5665
kbra	0,340352	0,296885	1,146	0,2723
wbra	0,659648	0,296885	2,222	0,0447 **

Standardfehler der Regression = 0,0272351

Author calculations. Gretl: Econometrics Software

Brazil: OLS with restriction for α for the Industry

Restriktion:

b[kbra] + b[wbrai] = 1

Teststatistik: F(1, 12) = 0,932491, mit p-Wert = 0,353275

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,0110999	0,00929741	1,194	0,2539
kbra	0,701915	0,193566	3,626	0,0031 ***
wbrai	0,298085	0,193566	1,540	0,1475

Standardfehler der Regression = 0,0345088

Author calculations. Gretl: Econometrics Software

Chile: OLS with restriction for α for the Industry + Services

Restriktion:

b[kchi] + b[wchi] = 1

Teststatistik: F(1, 13) = 23,173, mit p-Wert = 0,000338346

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,00547612	0,0132410	0,4136	0,6855
kchi	0,0463946	0,119149	0,3894	0,7029
wchi	0,953605	0,119149	8,003	1,36e-06 ***

Standardfehler der Regression = 0,0453867

Author calculations. Gretl: Econometrics Software

Chile: OLS with restriction for α for the Industry

Restriktion:

b[kchi] + b[wchii] = 1

Teststatistik: F(1, 13) = 65,2759, mit p-Wert = 2,0068e-006

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,00739406	0,0146591	0,5044	0,6218
kchi	0,220919	0,129495	1,706	0,1101
wchii	0,779081	0,129495	6,016	3,16e-05 ***

Standardfehler der Regression = 0,0464752

Author calculations. Gretl: Econometrics Software

Colombia: OLS with restriction for α for the Industry + Services

Restriktion:

b[kcol] + b[wcol] = 1

Teststatistik: F(1, 4) = 20,4304, mit p-Wert = 0,0106583

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	-0,0774521	0,0262696	-2,948	0,0319 **
kcol	0,990750	0,184783	5,362	0,0030 ***
wcol	0,00924953	0,184783	0,05006	0,9620

Standardfehler der Regression = 0,0394772

Author calculations. Gretl: Econometrics Software

Colombia: OLS with restriction for α for the Industry

Restriktion:

b[kcol] + b[wcoli] = 1

Teststatistik: F(1, 4) = 4,43815, mit p-Wert = 0,102873

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	-0,0769290	0,0109216	-7,044	0,0009 ***
kcol	0,958081	0,0658455	14,55	2,77e-05 ***
wcoli	0,0419191	0,0658455	0,6366	0,5524

Standardfehler der Regression = 0,0199802

Author calculations. Gretl: Econometrics Software

Peru: OLS with restriction for α for the Industry + Services

Restriktion:

b[kper] + b[wper] = 1

Teststatistik: F(1, 13) = 2,0733, mit p-Wert = 0,173541

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,0218462	0,0111865	1,953	0,0711 *
kper	0,0153693	0,0859061	0,1789	0,8606
wper	0,984631	0,0859061	11,46	1,68e-08 ***

Standardfehler der Regression = 0,0416241

Author calculations. Gretl: Econometrics Software

Peru: OLS with restriction for α for the Industry

Restriktion:

b[kper] + b[wperi] = 1

Teststatistik: F(1, 13) = 124,026, mit p-Wert = 5,08959e-008

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	-0,0239539	0,0215834	-1,110	0,2858
kper	0,925859	0,0613773	15,08	4,72e-010 ***
wperi	0,0741408	0,0613773	1,208	0,2471

Standardfehler der Regression = 0,0861088

Author calculations. Gretl: Econometrics Software

Uruguay: OLS with restriction for α for the Industry + Services

Restriktion:

b[kuru] + b[wuru] = 1

Teststatistik: F(1, 13) = 9,06563, mit p-Wert = 0,0100261

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,00560397	0,0164535	0,3406	0,7385
kuru	0,193062	0,0968606	1,993	0,0661 *
wuru	0,806938	0,0968606	8,331	8,52e-07 ***

Standardfehler der Regression = 0,0642652

Author calculations. Gretl: Econometrics Software

Uruguay: OLS with restriction for α for the Industry

Restriktion:

b[kuru] + b[wurui] = 1

Teststatistik: F(1, 13) = 2,21075, mit p-Wert = 0,1609

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	0,0154036	0,0118048	1,305	0,2130
kuru	0,257041	0,0714366	3,598	0,0029 ***
wurui	0,742959	0,0714366	10,40	5,73e-08 ***

Standardfehler der Regression = 0,0445299

Author calculations. Gretl: Econometrics Software

Venezuela: OLS with restriction for α for the Industry + Services

Restriktion:

b[kven] + b[wven] = 1

Teststatistik: F(1, 13) = 1,99056, mit p-Wert = 0,181763

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	-0,00799100	0,0181029	-0,4414	0,6656
kven	-0,148518	0,0584497	-2,541	0,0235 **
wven	1,14852	0,0584497	19,65	1,37e-011 ***

Standardfehler der Regression = 0,0700755

Author calculations. Gretl: Econometrics Software

Venezuela: OLS with restriction for α for the Industry

Restriktion:

b[kven] + b[wveni] = 1

Teststatistik: F(1, 13) = 5,95631, mit p-Wert = 0,0297359

Restringierte Schätzungen:

	Koeffizient	Std.-fehler	t-Quotient	p-Wert
const	-0,0126181	0,0160390	-0,7867	0,4446
kven	0,0180890	0,0560529	0,3227	0,7517
wveni	0,981911	0,0560529	17,52	6,43e-011 ***

Standardfehler der Regression = 0,0611996

Author calculations. Gretl: Econometrics Software

APPENDIX 4: Fei and Ranis Condition for Success

Extended Fei and Ranis Condition for Success

Difference between the Employment growth rate in Industry + Services and the Labor force growth rate

ηi+s - ηp

Year	Argentina		Brazil		Chile		Colombia		Peru		Uruguay		Venezuela	
Growth rates	**ηi+s**	**ηp**	**ηi+s**	**ηp**	**ηi+s**	**ηp**	**ηi+s**	**ηp**	**ηi+s**	**ηp**	**ηi+s**	**ηp**	**ηi+s**	**ηp**
1992	-1,1%	0,6%		5,4%	6,0%	4,1%	6,1%	3,0%	4,1%	3,6%	-4,4%	0,4%	7,2%	3,4%
1993	-3,3%	1,3%	3,7%	2,3%	10,8%	4,2%	5,2%	3,2%	9,7%	3,1%	1,0%	1,0%	5,9%	3,6%
1994	-1,6%	1,3%	3,9%	2,7%	-0,4%	1,9%	2,7%	2,8%	3,8%	2,5%	-0,6%	0,5%	-1,4%	3,6%
1995	-4,8%	2,2%	3,8%	2,6%	0,3%	0,1%	3,3%	2,8%	1,8%	2,8%	0,7%	1,3%	3,9%	3,9%
1996	5,0%	2,5%	-1,3%	-0,1%	3,3%	1,7%	1,4%	3,2%	-2,3%	2,9%	1,5%	0,5%	1,9%	3,6%
1997	6,0%	2,4%	4,0%	3,5%	4,1%	2,3%	5,2%	2,8%	1,8%	2,7%	1,5%	1,3%	9,1%	3,2%
1998	6,4%	2,5%	2,0%	2,4%	2,7%	2,5%	4,7%	3,1%	5,7%	3,3%	1,5%	1,3%	5,0%	3,7%
1999	2,2%	2,5%	2,6%	3,4%	-1,8%	1,9%	4,7%	3,6%	3,3%	2,9%	1,9%	1,2%	0,1%	3,3%
2000	2,2%	2,4%	7,6%	1,7%	-2,1%	-0,4%	3,5%	2,9%	2,5%	2,8%	1,5%	1,0%	4,9%	3,3%
2001	-0,7%	2,4%	0,5%	1,8%	2,7%	1,8%	-20,0%	3,0%	0,9%	2,8%	1,4%	0,9%	5,9%	3,4%
2002	3,9%	2,4%	4,4%	3,2%	0,7%	1,2%	5,7%	3,0%	1,8%	2,4%	1,0%	0,5%	-0,2%	3,6%
2003	4,8%	2,4%	1,2%	2,0%	3,4%	2,5%	3,6%	2,7%	1,5%	2,3%	0,6%	0,5%	2,2%	3,2%
2004	8,1%	2,3%	4,4%	2,8%	7,1%	4,5%	5,6%	2,5%	2,2%	2,1%	0,2%	0,5%	5,2%	3,1%
2005	5,7%	2,3%	4,5%	2,7%	1,1%	1,0%	1,7%	2,5%	2,5%	1,9%	2,5%	0,7%	9,7%	3,0%
2006	3,8%	2,3%	5,5%	2,6%	4,9%	2,9%	2,9%	2,3%	2,4%	1,9%	-6,9%	0,9%	7,3%	2,9%
2007	2,4%	1,0%	1,9%	0,8%	8,2%	4,3%	7,8%	2,1%	4,4%	1,7%	6,0%	2,4%	3,0%	1,3%
Average year	**2,4%**	**2,0%**	**3,2%**	**2,5%**	**3,2%**	**2,3%**	**2,8%**	**2,8%**	**2,9%**	**2,6%**	**0,6%**	**0,9%**	**4,4%**	**3,27%**

Author calculations

Restricted Fei and Ranis Condition for Success

Difference between the Employment growth rate in Industry and the Labor force growth rate

ηi - ηp

Year	Argentina		Brazil		Chile		Colombia		Peru		Uruguay		Venezuela	
Growth rates	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp	ηi	ηp
1992	-8,9%	0,6%		5,4%	5,3%	4,1%	7,5%	3,0%	0,2%	3,6%	-10,3%	0,4%	8,6%	3,4%
1993	-6,5%	1,3%	4,1%	2,3%	11,9%	4,2%	6,4%	3,2%	13,3%	3,1%	-0,5%	1,0%	4,1%	3,6%
1994	-3,2%	1,3%	0,1%	2,7%	-4,9%	1,9%	2,8%	2,8%	11,2%	2,5%	-4,8%	0,5%	-8,6%	3,6%
1995	-8,7%	2,2%	0,1%	2,6%	-0,3%	0,1%	3,3%	2,8%	0,1%	2,8%	-3,4%	1,3%	2,9%	3,9%
1996	-3,9%	2,5%	-2,0%	-0,1%	4,9%	1,7%	-3,8%	3,2%	-13,7%	2,9%	-1,4%	0,5%	-3,3%	3,6%
1997	8,3%	2,4%	4,2%	3,5%	5,6%	2,3%	-2,6%	2,8%	0,2%	2,7%	-1,4%	1,3%	13,1%	3,2%
1998	3,7%	2,5%	1,4%	2,4%	-3,9%	2,5%	0,4%	3,1%	0,1%	3,3%	-1,4%	1,3%	6,7%	3,7%
1999	-2,9%	2,5%	-0,4%	3,4%	-9,9%	1,9%	-4,6%	3,6%	-3,8%	2,9%	3,8%	1,2%	-6,8%	3,3%
2000	-1,7%	2,4%	11,6%	1,7%	-2,2%	-0,4%	9,3%	2,9%	4,2%	2,8%	-0,3%	1,0%	5,8%	3,3%
2001	-4,1%	2,4%	-4,2%	1,8%	3,9%	1,8%	-26,7%	3,0%	-1,8%	2,8%	-2,3%	0,9%	1,5%	3,4%
2002	-4,1%	2,4%	12,0%	3,2%	0,6%	1,2%	13,6%	3,0%	10,0%	2,4%	-4,9%	0,5%	-6,4%	3,6%
2003	13,4%	2,4%	-1,0%	2,0%	1,4%	2,5%	-2,5%	2,7%	-3,3%	2,3%	-3,2%	0,5%	-0,8%	3,2%
2004	14,0%	2,3%	5,3%	2,8%	7,8%	4,5%	9,5%	2,5%	139,1%	2,1%	0,6%	0,5%	7,1%	3,1%
2005	7,9%	2,3%	5,8%	2,7%	-1,8%	1,0%	1,2%	2,5%	1,9%	1,9%	4,3%	0,7%	12,4%	3,0%
2006	4,1%	2,3%	3,9%	2,6%	5,9%	2,9%	7,1%	2,3%	2,7%	1,9%	-3,0%	0,9%	16,2%	2,9%
2007	5,0%	1,0%	3,5%	0,8%	8,0%	4,3%	3,1%	2,1%	2,8%	1,7%	8,3%	2,4%	4,7%	1,3%
Average year	**0,8%**	**2,0%**	**2,8%**	**2,5%**	**2,0%**	**2,3%**	**1,5%**	**2,8%**	**10,2%**	**2,6%**	**-1,2%**	**0,9%**	**3,6%**	**3,27%**

Author calculation

Abstract

Diese Arbeit analysiert die aktuellen Arbeitsmarktsituationen in sieben ausgewählten südamerikanischen Ländern (SA-7) basieren auf dem Modell von Lewis (1954). Die Arbeit fasst zunächst die wichtigsten Annahmen und Eigenschaften des Lewis-Modells zusammen, diskutiert darauf aufbauend die Erweiterung im Rahmen des Wachstumsmodells von Fei und Ranis (1964) und identifiziert somit die relevanten Prognosen des Lewis-Modells. Für die empirische Überprüfung des Modeels wurden aktuelle und vertrauenswürdige Makroindikatoren, die auf Websiten internationaler Organisationen veröffentlicht werden gesammelt, wobei die wichtigsten Quellen von der Weltbank- und der International Labor Office-Datenbank kommen. Die empirischen Ergebnisse bestätigen die Annahmen und Vorhersagen des Lewis-Modells für die ausgewählten sieben Wirtschaften wodurch sich die Entwicklungsphasen im Rahmen des Lewis-Fei-Ranis-Wachstumsmodells identifizieren lassen. Diese Forschung versteht sich grundsätzlich als eine wirtschaftliche positive Analyse und vermeidet eine politische Kritik oder Bewertung im normativen Sinne.

This research analyzes the current labor market situation in a selected group of seven South American countries (SA-7) in the framework of the Lewis model (Lewis, 1954). It summarizes the main assumptions and characteristics of the Lewis model in the SA-7 economies and the extensions as put forward the Lewis-Fei-Ranis growth model (1964). In doing so it identifies the main predictions of the Lewis model. The research is based on actual and authenticated economic indicators published by international organizations websites, the World Bank and the International Labor Office database being the main sources. Lewis assumption regarding the long term shape of the real wage curve is related to better labor conditions and thus, better standards of living for an economy. The final findings support the assumptions and predictions of the Lewis model for these selected seven economies and therefore they let determine the stages of development as argued in the framework of the Lewis-Fei-Ranis growth model. This research is strictly an economic analysis and avoids any evaluation or critics on politics.

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Keywords: Unlimited Labor Supply, South-America, Lewis Theory.

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