Unemployment and Economic Growth in Peru: 2001-2012

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Abstract

The purpose of this project is to calculate the Okun’s coefficient to measure the impact of the economic growth on the unemployment rate in Peru. At the beginning of the 1990s, the country began to experience a steady output growth as a result of corrective macroeconomic policies. The labor market reforms that went along with these policies increased labor mobility\(^1\) as well as informal employment. The informal labor market accounts today for nearly 80 percent of the employment which makes difficult to assess the real situation of employment in the country. In order to obtain a more precise estimate of the unemployment situation, the scope of this study ranges from the years 2001 to 2012, because it uses monthly surveys for the whole country which are available since 2001. The study compares results for Lima and Peru and results confirm a negative association between unemployment and economic growth in both cases. In spite of these findings, the level of underemployment is still very high although it has ceded in the past 12 years. This study also realizes that the inverse relationship between economic growth and unemployment vary from one department (state) to another and is not proportional to the population in each state.

\textit{Keywords:} economic growth, Okun’s law, unemployment rate, underemployment

\(^{1}\) (Herrera, 2003)
INTRODUCTION

By the end of the 1980s, Peru was immersed in a catastrophic political crisis, financial debt and hyper-inflation. This situation put the country in the path of the International Monetary Fund (IMF) which borrowed money to the government in order to stabilize the economy. In return, the country was obligated to implement an austerity plan to cut the spending and open the economy to trade. These policies killed off the already wrecked national industry and many lost their jobs as the result of privatizations. In these years, many Peruvians were pushed to either work or to create their own work in the informal market. Informality was not anything new in the country (De Soto, 1987) and the government was prone to combine authoritarian tactics with its opponents, and a lenient manner with those who step aside the law in order to survive. The annual GDP growth went from minus five percent in 1990 to five percent in 1993. In 1997 the GDP was minus one percent in the aftermath of the Latin America crisis that year. However, after 2002 the GDP growth has increases regularly at a 6.5 percent a year as shown in figure 1.

This project attempts to answer if the economic growth has contributed to bring down the unemployment rate in Peru and if so, what the magnitude of such impact in the employment situation. In spite of the economic growth, social conflict has arisen in many parts of the country. One explanation is that the economic growth does not bring prosperity because the government is not capable of adequately distributing wealth. Informality has created a parallel market where certainly many have found their path to prosperity but not everybody feel part of the economic bonanza. According to the Economic and Social Research Consortium CIES (Gamero, 2011) approximately 80 percent of the economic active population works in the informal market in Peru. This paper shows that between 2005 and 2009 the informality was reduced in five percentage points, from 84 to 79 percent. This state of affairs make difficult to assess the
unemployment situation in the country since official statics, collected from those that are legally employed, do not reflect the real condition of unemployment as showed in figure 2.

Figure 1. GDP growth in Peru from 1990 to 2012

Statistics to create this graph were collected from World Bank Data

To assess the real situation of unemployment, this study will use data collected from national monthly surveys. Sample surveys are normally used to measure the unemployment rate of a country because they distinguished people working “off the books” and people who are unemployed but have either not applied for unemployment insurance or their benefits has ran out, and in consequence there are not official records about the real employment status for these
individuals. On the other hand, monthly surveys also offer statistics about the conditions of employment of their respondents, such as how many hours they work, how many jobs they have, their income, demographic information such as their age, education, gender, as well as other characteristics whose awareness are crucial to design effective labor policies and for an accurate interpretation of the reality.

Figure 2. Total Unemployment in Peru from 1990 to 2012

![Unemployment Graph](image)

Statistics to create this graph were collected from World Bank Data

Another reason to use monthly surveys is that the Okun’s coefficient will be estimated to explore the relationship between economic growth and unemployment. The Okun’s coefficient

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represents the elasticity of the unemployment rate with respect to economic output. The National Institute of Statistics (INEI) has monthly information available on unemployment for Lima Metropolitan Area\(^3\) since 2001 and nationwide since 2004. Previous works have calculated the Okun’s coefficient using either annual data for the country or monthly data for Lima and Callao. The unemployment rate of Lima is normally presented as the official record for the country because the capital comprises about 2/3 of the population, more than half of the industry, and most services including the financial sector. Since time series data are very sensitive to manipulation and adjustments, this study will use the original first difference model to calculate this relationship using recent available monthly data and contrast these results with previous research.

Overall, this study finds a negative association between the GDP growth and the unemployment rate, at the country level and in Lima metropolitan area; however the impact of the output growth on unemployment is rather modest. Descriptive statistics also show that this inverse relation is not consistent in all the 24 “departments” (states) in Peru, and the development level of the infrastructure\(^4\) of some regions may behind this reality. Despite the evident economic growth and the decrease of the unemployment rate across country, there are other social indicators that also have improved in the past 12 years which imply that the country is experience an exceptional moment and that is not necessarily consequence of the increase of the GDP. The local participation movement of the 1990s, the propagation of non-governmental organizations across country to help with poverty reduction, and the political decentralization started in 2002 could be behind this particular period.

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\(^3\) Included the city of Lima and the seaport of Callao

\(^4\) Infrastructure here refers to a broad array of legal and physical structures that ranges from accountability mechanisms over government institutions to basic services such as road and railroad networks.
LITERATURE REVIEW

In 1962 economist Arthur Okun presented a paper where he examined the inverse relationship between the unemployment rate and the economic growth for the post-war years in the United States. His estimations showed that a three percentage point increase in the quarterly change in real GDP was associated with a one percentage point decrease in the rate of unemployment. This statistical relationship between unemployment rate and the change in output is widely known as Okun’s law and is particularly interesting because it is based on statistical evidence and not in the economic theory.

There are two different versions presented by Okun. One of them can be described as:

$$\Delta U_t = a - b \times \Delta \log GDP_t$$

where $\Delta U_t$ is the change in unemployment rate, $\Delta \log GDP_t$ is the change in Real GDP, $a$ is the intercept coefficient or the level above the natural rate of unemployment, and $b$ is the Okun’s coefficient and represents the elasticity of the unemployment rate with respect to output (Balakrishnan, 2010). Okun estimated that a three percentage point increase in the GDP was associated to one percentage point decrease in the unemployment rate. Current versions have adjusted the output gap-unemployment ratio estimates to 2:1 for the United States (Abel, 2008).

Hence, the relationship between the unemployment rate and the change in output can be directly observed through the Okun’s coefficient. However, the instability of this coefficient over time, regions, and business cycles has been largely debated. According to Gordon (2010, p.3), “the last three recessions in America (1990-91, 2001, and 2007-09) have been followed by jobless recoveries.” He claims that a structural shift has been transforming the relationship between output and unemployment since the 1980s, which can be attributed to several factors.
such as the increase in income inequality, the surge of managerial power, the decline of unions, the destruction of jobs product of low-cost imports, the competition with low-skilled immigrants\textsuperscript{5} and the increased labor market flexibility in general.

The instability of the Okun’s coefficient is related to delayed responses of the unemployment rate to changes in output. A fall in the economic growth does not lead to an instantaneous increase in the unemployment rate because there are other factors intervening in this relationship such as rigid labor policies or uncertainty. Knotek (2007) argues that if the instability of the Okun’s law is taken into account this relationship constitute a useful forecasting tool. After the financial crises of 2008, the Okun’s coefficient was dramatically disrupted in some developed countries. Scholars believed that social, technological and normative transformations of the past 30 years are behind the erratic behavior of the coefficient during the last recession in the United States (Daly et al. 2010). Comparing the Okun’s coefficient across different countries, the unresponsiveness of unemployment to growth may be credited to intensive flexibilization of the labor markets, deunionization, technological change and the like. Many scholars are still trying to understand the variability of the Okun’s coefficient and some have argued that this coefficient varies because technological change and social infrastructure differs from one region to another. Neely (2010) noted that industrialized countries with less regulated labor markets tend to have smaller Okun’s coefficients. This is because unemployment is more sensitive to changes in output since it is easier to lay off workers. He adds, “The Okun’s coefficient can change over time because the relationship of unemployment to output growth depends on laws, technology, preferences, social customs, and demographics”.

\textsuperscript{5} Despite incomplete data, it would be interesting to observe whether during the 1990s, when extreme new liberal policies were implemented in many countries in Latin-American, such as the opening up of their economies and subsidies ban; brought about a similar transformation in the relationship between output growth and unemployment as described by Gordon.
These findings make of Okun’s law a solid statistical evidence between unemployment and output growth, and that its coefficient captures social and normative differences cross-countries. Studies of Okun’s law worldwide have increased in recent years as more reliable data became available in more countries. These studies have tried to evaluate differences across countries to observe how the coefficient responds to diverse factors such as financial crises or labor market policies (Bartolucci, 2011; Cazes, 2011; Naimy, 2005). There is an unlimited potential in using Okun’s law to analyze social elements that affects the relationship between unemployment and growth, especially through comparative studies.

In Latin America, the absence of reliable data for unemployment and the volatility of the economic growth in the last decades of the past century have led some researchers to investigate how the Okun’s law could be applied in the region. Due to the lack of quarterly data for unemployment and the fact that official numbers do not take into account the informal labor market, Gonzales (1999) proposed the use of annual survey data to evaluate the real behavior of variables such as unemployment. He verified that most of the data on the United States were available quarterly so lags are introduced to calculate the change in output. Nevertheless, since lags longer than four quarters are not significant, he discarded their use with annual data in the Latin American context. He also demonstrates that it would be more accurate to use real wages instead of the unemployment rate due to the fact that in high inflationary contexts real wages can be easily pushed down the rate of inflation, avoiding laid offs. Gonzales found that large wage Okun’s coefficients in Latin American were on the order of 0.1 while in the U.S. the comparable number is close to 0.5, indicating that the magnitude of the unemployment coefficients in Latin America is closer to those in Europe and Japan. Specifically for Peru, he calculated the Okun’s coefficient in 0.13 estimating the data available between 1960 and 1996.
Garavito (2002) finds a negative relationship between the GDP and the unemployment rate. The estimated Okun’s coefficient for Peru was 0.085, ratio very low. This work analyzes primarily the data collected through surveys for Lima metropolitan area due to the lack of data nationwide and the fact that half of the industry and most services are located in the capital. The researcher remarks that her findings are more applicable to large companies but unclear for the rest of the economy. Garavito explains that the low sensitivity of the coefficient could be a consequence of the pro-cyclical behavior of the labor force and the fact that after losing their jobs, workers leave the labor market.

Recently, Bartolucci (2011) estimates the Okun’s coefficient for Peru to be 0.13 but he did not provide information about the sources used in his calculations for this country and worldwide. He was studying the effect of financial crisis passing through of a declining GDP, on the unemployment rate. He evaluated the role of uncertainty in financial crises, investment and the demand of labor across countries, finding that during these periods, uncertainty has an extra effect on the unemployment rate.

**DATA AND SOURCES**

In order to establish the impact of the economic growth on the unemployment rate, this project will use the Gross Domestic Product (GDP) provided by the Central Reserve Bank of Peru to corroborate the increase in the economic growth, and the data collected by the National Household Survey (ENAHO) to calculate the unemployment rate. Since the GDP is given quarterly and further calculations are not needed, this study will only manipulate the data collected from ENAHO to estimate the unemployment rate and pattern its performance in the past years. Besides that, data from the National Institute of Statistics (INEI) will be used to
implement a descriptive analysis with the purpose of helping in the interpretation of the results of this study.

**Independent Variable: Gross Domestic Product GDP**

The Gross Domestic Product is the market value of the goods and services produced by labor and property located in the country and during a specific period of time. According to the Central Reserve Bank of Peru, the Growth Rate is the percentage variation of the output and is measured through the real GDP. This assignment will use the data given for the real GDP ($PBI_{real}$) which refers to price adjusted after discounting the effects of inflation and is expressed in local (Peruvian) currency.

**Dependent Variable: Unemployment Rate**

The unemployment rate is the proportion of the labor force that is not employed but is actively seeking for a job (INEI, 2007) and is calculated in this study using data extracted from the National Household Survey (ENAHO). This survey collects information about employment and other social components of the population and is implemented by the National Institute of Statistics (INEI), the governing body of the National Statistical System of Peru. The survey is cross-sectional with a panel component and continuous. Its coverage includes private residences and their inhabitants in urban and rural areas across the country, and its sampling is probabilistic, random, stratified, and multi-staged. The frequency of this survey is annual and had been performed monthly since 2004. Between 2004 and 2012 the number of respondents has ranged between 59,014 and 72,959.

To classify the population according to its employment status, the ENAHO follows national criterion which is mainly based on international standards but conditioned to Peruvian
In Peru, the legal age to work is 14 years of age. In this group any respondent that either has a job (employed) or does not have a job but is actively seeking for a job (unemployed) is considered part of the labor force. Those who do not work because they produce services for their dwellings (especially retirees, students, people with disabilities) and those who do not work and would like to have a job but do not seek actively for a job are not considered part of the Labor Force.

The module 500 of ENAHO gathers all information related to employment. This section contains the variable ocu500 that categorize the respondent’s employment status according to his/her previous answers. The population is divided in four groups: employed, open unemployed no labor force, and hidden unemployed. Open unemployed corresponds to those who do not have a job but belong to the labor force. Hidden unemployed refers to those who do not have a job and do not belong to the labor force. This variable will be used to calculate the unemployment rate monthly.

**Unemployment, Underemployment and Informal Market**

The impact of globalization in the working place, the increasing flexibility of the working hours, the rise of part time, contracts and informal markets features makes the studies on labor markets to go beyond the employment and unemployment traditional analysis. The International Labour Organization (ILO) provides some standard definitions which are basic for further assessment and comparison between countries.

**Unemployment:** The unemployment population and the labor force definitions are rather close to that used by the INEI “the unemployed population is made up of persons above a specified age who are available to, but did not; furnish the supply of labour for the production of

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6 See ILO definition on unemployed population.
goods and services… The sum of the employed and the unemployed population measured for a short reference period is equivalent to the labour force, also known as the current economically active population.”

**Underemployment:** This happens when work is not as productive as possible and the employees have not the freedom to choose the job that most suit them. In consequence they end up working fewer hours than the legal minimum and the salary is not commensurate with their responsibilities.

**Informal Economy:** It is characterized for “lack of protection in the event of non-payment of wages, compulsory overtime or extra shifts, lay-offs without notice or compensation, unsafe working conditions and the absence of social benefits such as pensions, sick pay and health insurance.”

**DESCRIPTIVE STATISTICS**

The progress of the real GDP and the unemployment rate in Lima and Peru are portrayed in figures 3 and 4 respectively. The unemployment rate in the capital is consistently higher if compared to the rate for the country but also, the real GDP for the country increases proportionally more rapidly than for Lima, which may imply some slightly differences between the capital and the country. On the other hand, even though the unemployment rate for males is lower than for females, the unemployment rate by gender in the country seem to share a similar decline pattern for the same period of time.

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8 Ibid.
Figure 3. Annual Real GDP in Peru and Lima from 2001 to 2012

Statistics to create this graph were collected from the INEI
Figure 4. Evolution of the unemployment rate in Peru, Lima, and by gender in Lima (from the first quarter of 2004 to the last quarter of 2012)

Statistics to create this graph were collected from the INEI

The differences between the unemployed population by their level of education and gender are more noteworthy. The unemployment rate for people with elementary education is remarkably lower if compared with people with secondary and college-or-more education. For this last group the differences in the rate of unemployment by gender is also higher with men
scoring about three percentage point less in the unemployment rate if compared with women.

Unexpectedly, the unemployment rate between individuals with secondary and superior education is very similar and show a faster decline over the period observed if compared to people with primary education only.

Table 1. Unemployment Rate by Gender and Education

<table>
<thead>
<tr>
<th>Year</th>
<th>Women with primary education or less</th>
<th>Women with secondary education</th>
<th>Women with superior education</th>
<th>Men with primary education or less</th>
<th>Men with secondary education</th>
<th>Men with superior education</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1.80</td>
<td>8.26</td>
<td>9.46</td>
<td>2.08</td>
<td>5.98</td>
<td>5.95</td>
</tr>
<tr>
<td>2005</td>
<td>1.64</td>
<td>8.89</td>
<td>8.18</td>
<td>2.19</td>
<td>6.07</td>
<td>6.45</td>
</tr>
<tr>
<td>2006</td>
<td>1.77</td>
<td>7.69</td>
<td>8.05</td>
<td>1.73</td>
<td>5.23</td>
<td>4.53</td>
</tr>
<tr>
<td>2007</td>
<td>2.04</td>
<td>7.15</td>
<td>7.58</td>
<td>1.62</td>
<td>5.35</td>
<td>5.39</td>
</tr>
<tr>
<td>2008</td>
<td>1.48</td>
<td>7.55</td>
<td>7.14</td>
<td>1.07</td>
<td>4.97</td>
<td>5.25</td>
</tr>
<tr>
<td>2009</td>
<td>1.60</td>
<td>6.65</td>
<td>6.01</td>
<td>1.75</td>
<td>5.19</td>
<td>5.00</td>
</tr>
<tr>
<td>2010</td>
<td>1.31</td>
<td>6.18</td>
<td>6.82</td>
<td>1.08</td>
<td>4.53</td>
<td>4.26</td>
</tr>
</tbody>
</table>

Concepts such as “visible underemployment” and “invisible underemployment” are important distinctions that INEI delivers in order to describe accurately the situation of the labor force in Peru. Visible underemployment is the “underemployment per hours” which relates to employed people working less than 35 hours a week and would like to work more hours.

Invisible underemployment is “underemployment per income” and happens when employed people work 35 hours or more but their income is not enough to satisfy their basic needs. This
information is based on numbers extracted by the ENAHO but also on other INEI sources. Unfortunately the information available about the characteristics of the underemployed population is restricted to Lima and Callao.

**Table 2. Conditions of Employment in Lima and Callao**

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage of active population adequately employed</th>
<th>Percentage of active population under employed</th>
<th>Percentage of active population under employed per hours</th>
<th>Percentage of active population under employed per income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>23.79</td>
<td>71.16</td>
<td>10.40</td>
<td>60.76</td>
</tr>
<tr>
<td>2002</td>
<td>23.83</td>
<td>70.48</td>
<td>8.79</td>
<td>61.69</td>
</tr>
<tr>
<td>2003</td>
<td>24.54</td>
<td>70.27</td>
<td>8.24</td>
<td>62.03</td>
</tr>
<tr>
<td>2004</td>
<td>25.92</td>
<td>68.78</td>
<td>8.20</td>
<td>60.58</td>
</tr>
<tr>
<td>2005</td>
<td>24.62</td>
<td>70.01</td>
<td>8.48</td>
<td>61.53</td>
</tr>
<tr>
<td>2006</td>
<td>28.79</td>
<td>66.53</td>
<td>9.19</td>
<td>57.34</td>
</tr>
<tr>
<td>2007</td>
<td>33.65</td>
<td>61.61</td>
<td>10.06</td>
<td>51.55</td>
</tr>
<tr>
<td>2008</td>
<td>36.35</td>
<td>59.03</td>
<td>8.97</td>
<td>50.06</td>
</tr>
<tr>
<td>2009</td>
<td>38.69</td>
<td>56.84</td>
<td>9.00</td>
<td>47.84</td>
</tr>
<tr>
<td>2010</td>
<td>41.33</td>
<td>54.56</td>
<td>8.56</td>
<td>46.00</td>
</tr>
</tbody>
</table>

In general, the unemployment rate for Peru has fall considerably in the past 12 years and probably due to the improvement of the macroeconomic performance. Nevertheless, the data gather for this study shows that the employment situation is still far from optimal even though the level of underemployment has been reduced between 2004 and 2012. Moreover, Lima has been for decades and still is the final destination of inner country migrants, which looking for
better opportunities moved to the capital in the most precarious conditions; not surprisingly the level of unemployment for this area is bigger if compared to the rate for the country.

The INEI define the activity rate as the proportion of the labor force related to the working-age population. The problem with the definition of the labor force is that it only considers people actively seeking for jobs. It could be that individuals do not seek for jobs because they have no hope in getting one, making them to leave the labor force. In special contexts, it is plausible that situations of political unrest, economic crisis or social discrimination, could end with a low unemployment rate while many people lose their jobs at the same time. This is because those who lose their jobs do not look for one due to special circumstances but are not considered as unemployed. Table 3 shows that between 2004 and 2007, the activity rate is lower in Lima when compared to the rest of the country; however, the activity rate for the country has grown at a slower pace if compared to the growth in the activity rate in Lima. This suggests that even though the unemployment rate in Lima is higher, the proportion of working-age people that joins the labor force has increase which is normally due to people’s perception that their chances of getting a job have increased. The difference in the activity rates between females and males living in Lima and in the rest of the country is also worth mentioning. The gap of the activity rate between both sexes has declined in both cases but is still significant with more than a 15 percent differences in gender for both geographic areas. Considering the increase in the activity rate for both sexes, the activity rate gap between females and males in Lima has been reduced in about 3.42 percentage points while the difference in the gap between females and males countrywide has been reduced in only 1.72 percentage points.
Table 3. Activity Rate (Percentage)

<table>
<thead>
<tr>
<th>Year</th>
<th>Lima</th>
<th>Peru</th>
<th>Female (Lima)</th>
<th>Male (Lima)</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>66.98</td>
<td>72.04</td>
<td>57.09</td>
<td>77.48</td>
<td>62.49</td>
<td>81.64</td>
</tr>
<tr>
<td>2005</td>
<td>64.48</td>
<td>71.12</td>
<td>54.26</td>
<td>75.29</td>
<td>61.22</td>
<td>81.05</td>
</tr>
<tr>
<td>2006</td>
<td>67.22</td>
<td>72.32</td>
<td>57.37</td>
<td>77.71</td>
<td>62.77</td>
<td>81.93</td>
</tr>
<tr>
<td>2007</td>
<td>70.25</td>
<td>73.80</td>
<td>61.34</td>
<td>79.81</td>
<td>64.70</td>
<td>82.97</td>
</tr>
<tr>
<td>2008</td>
<td>70.67</td>
<td>73.82</td>
<td>61.57</td>
<td>80.45</td>
<td>64.70</td>
<td>83.01</td>
</tr>
<tr>
<td>2009</td>
<td>70.27</td>
<td>74.00</td>
<td>61.08</td>
<td>80.16</td>
<td>65.01</td>
<td>83.05</td>
</tr>
<tr>
<td>2010</td>
<td>70.83</td>
<td>74.14</td>
<td>61.88</td>
<td>80.49</td>
<td>65.67</td>
<td>82.67</td>
</tr>
<tr>
<td>2011</td>
<td>70.85</td>
<td>73.91</td>
<td>62.69</td>
<td>79.66</td>
<td>65.23</td>
<td>82.66</td>
</tr>
</tbody>
</table>

Note: These statistics from INEI are based on the ENAHO and the Census of 2007

The faster economic growth of the country with respect to the capital has to be taken with caution. Peru is geographically divided in 24 departments and the country GDP includes principally the output produced in Lima metropolitana. Between 2001 and 2011, the country Real GDP grew in local currency from 121,317 millions to 224,624 millions –which reflects an increase of 185 percent-, while Lima grew from 56,250 millions to 108,606 millions –which represents a 193 percent increase. Figure 5 shows that Lima almost double its Real GDP while not other department perform such that or better.
Figure 5. Graph displays the GDP in 2001 and 2011 per departments.

Statistics to create this graph were collected from the INEI.

The GDP per capita divides the GDP in a region by the area's population. This allows measuring the real economic performance of a country and makes of the GDP per capita an important tool when comparing living standards between two or more regions. Figures 6 and 7 presents the GDP per capita and per department in 2001 and 2011 respectively. The graphs divide the GDP per capita in five equal ranges for both years. In 2001, Moquegua had a GDP per capita of 10,450 soles followed by Lima with 6,451 soles and Tacna with 6,004 soles. Also, five departments produced between 4,000 and 6,000 soles and only three departments had GDP per capita of less than 2,000 soles with Apurimac at the lowest point with 1,216 soles. In 2011, five departments (Lima, Ica, Arequipa, Moquegua and Tacna) produced more than 8,000 soles in
GDP per capita with Moquegua reaching the 13,890 soles, two departments produced between 6,000 and 8,000 soles, 10 departments produced between 4,000 and 6,000 soles and none department produced that or less than 2,000 soles.

INEI has available the unemployment rate per departments from 2004 until 2011 as shown in figures 8 and 9. In 2004, the unemployment rate in Lima and Arequipa exceed the eight percent; Ica and Pasco surpass the six percent; other six departments were above the four percent; and only four departments below the two percent. In 2011, only Moquegua had an unemployment rate superior to six percent; Lima, Ica, Arequipa, Tacna, and Tumbes were over the four percent but only three departments had unemployment rates below the two percent.

In 2011, Moquegua was the department with the highest GDP per capita and the highest unemployment rate, which had increased from 5.1 percent in 2004 to 6.25 percent in 2011. Lima, Ica, Arequipa and Tacna, are also other four states with GDP per capita superior to 8,000 soles in 2011 and the highest unemployment rate after Moquegua, even though their unemployment rates ceded between 2004 and 2011. In 2004, the unemployment rate of Amazonas, Cajamarca, Huancavelica and Puno were below the two percent but in 2011, only Amazonas, Cajamarca and San Martin had unemployment rates below the two percent. Hence, some departments show a solid inverse trend between their GDP per capita and the unemployment rate, but other departments seem to follow an unsystematic path, such as Moquegua, Amazonas or Cajamarca. These varied results are supported by the hypothesis that other factors affect decisively the relationship between economic growth and unemployment.

Since there is no unemployment protection in Peru, it should be interesting to compare the evolution of other social indicators to observe any relationship with the unemployment rate and the GDP per capita.
The poverty gap is a concept used by the INEI to measure how poor are the poor and represents the average difference between the spending per capita of each person considered poor (in percentage) with respect to the poverty line. The value assigned to the difference between the spending per capita of the non-poor and the poverty line is zero. In 2004, the gap poverty of the country was 16.2 percent, which means that the average spending per capita of the poor was 16.2 percent below the poverty line. In 2010 the poverty gap for the country had decreased to 8.8 percent, almost half its previous value eight years before. The differences in ranges between the poverty gap for both years were such, that contrarily to the maps representing the GDP per capita, the unemployment rate and education, which were analyzed through same ranges for both years, the maps for the poverty gap had to be divided in different ranges and colors in order to note the evolution of this rate. In 2004, Huancavelica was the department with the highest poverty gap, 43.1 percent. Huánuco followed in second placed scoring 34.5 percent and Puno in third place with 33.2 percent. Huancavelica and Puno were two of the four departments with the lowest unemployment rate that year and their GDP per capita –although not at the bottom- were considerably low: 2697 and 2270 respectively. Lima and Arequipa were two of the six departments with the lowest poverty gaps and also the two departments with higher GDP per capita after Moquegua, which had a poverty gap of 12.4 percent. In 2010, Huánuco had the highest poverty gap, 20.4 percent. Other five departments more also score a poverty gap superior to 10 percent. Curiously, none of these departments had unemployment rates over four percent but five of these six departments had GDP per capita at the bottom of the performance in 2010 (a very similar to their performance in 2011). Even though some departments do not show a consistent relationship between their GDP per capita and the unemployment rate, it was expected a stronger association between the unemployment rate and the poverty gap.
Apparently there is not a consistent relation between these two social indicators and this could be due to the fact that in some departments, the bad perspective of the economy makes individuals to retire from the labor market while their families take care of them. Furthermore, the presence of some programs of social assistance or community organizations would explain in part that lack of connection. In any case, although there is not a clear link between the unemployment rate and the poverty gap, both have been drastically reduced between 2004 and 2011. The economic growth could explain alone the improvement of such indicators if the government had channels to distribute wealth in an efficient and coordinated manner, which seems not to be the case of most institutions in Peru. This could imply implies that, besides the economic growth, the country could be living an exceptional renascence period but further exploration is necessary to support such assumption. Figures 12 and 13 display the average years of education per department in 2001 and 2011. Those graphs are fairly convincing that during that lapse of time an important progress in the years of education has happened in the country, though this is not entails advancement in the quality of the education. In 2001, the average of years of education in 18 departments did not reach the nine years, the minimum average was the 7.1 years of education and no department reach in average the 11 years of education, which is the number of years required to graduate from high school in Peru. Ten years later, the average of years in education in Lima reach the 11 years of school, only seven departments did not reach the nine years of education and no department had an average of education inferior to the eight years. In general, the country appears to have improved its living standards and this should have taken into account when analyzing the impact of economic growth on unemployment.
Figure 6. GDP per capita in soles (2001)

Figure 7. GDP per capita in soles (2011)
Figure 8. Unemployment rate per departments (2004)

Figure 9. Unemployment rate per departments (2011)
Figure 10. Poverty Gap in percentage (2004)

Figure 11. Poverty Gap in percentage (2010)
Figure 12. Years of education (2001)

Figure 13. Years of education (2011)
METHODOLOGY

The first step to measure the impact of the GDP on the unemployment rate, it is to calculate the unemployment rate monthly. Variable *ocu500* is a labor force indicator that is constructed by ENAHO using the answer of its respondent to multiple questions about their employment status.

**Table 4. Variable OCU500: Indicator of the Labor Force**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employed</td>
<td>52,314</td>
<td>71.57</td>
<td>71.76</td>
</tr>
<tr>
<td>2. Open Unemployed</td>
<td>1,794</td>
<td>2.45</td>
<td>74.21</td>
</tr>
<tr>
<td>3. Hidden Unemployed</td>
<td>1,099</td>
<td>1.50</td>
<td>75.72</td>
</tr>
<tr>
<td>4. Non Labor Force</td>
<td>17,750</td>
<td>24.28</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>73,092</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

The variable *fac500a*, is the adjusted factor of expansion of employment and is constructed by the INEI to expand the estimated population per geographic area, age and sex. Both variables *ocu500* and *fac500a* will be used to estimate the unemployment rate.

Since the labor force is the sum of the employed and unemployed population, the employment rate will be gotten by dividing the number of people who have a job over the number of population that compound the labor force and the unemployment rate will be:

\[
\text{Unemployment Rate} = \frac{1 - \text{Employed Population}}{\text{Labor Force}}
\]

Once the unemployment rate is estimated the evolution of this parameter and of the GDP can be graph to observe that the GDP growths in time as the unemployment rate decays.
The first difference model is one version commonly used to calculate the elasticity of the unemployment rate with respect to output. This model is very useful because it works as a standard fix-up of spurious association in time series. Hence, the data collected will be examined to prevent any problem before running the series. Autocorrelation tests were run for the unemployment rate and the GDP, for Lima and the country. In the case of the GDP, the decay in trend suggests this series is non-stationary but that is not clear for the unemployment rate, which apparently follows a random walk.
The dynamic between time series variables have to be explored further to model the series appropriately. For instance, the correlation between the series is negative for both at the country level (-0.789) and Lima (-0.765) but that could be due to non stationarity. A cross-correlogram may be used to check how the spikes of the GDP are distributed in time with respect to the spikes of the unemployment rate. Figures 15 and 16 suggest a negative trend in the correlation between the two series at the country level and for Lima and they both peak at lag zero to decay constantly and smoothly.

Figure 15. Cross-correlogram for the GDP and the Unemployment Rate in Peru
Figure 16. Cross-correlogram for the GDP and the Unemployment Rate in Peru

The Dickey-Fuller test is used to ensure the time series variables are stationary, otherwise a significant regression can wrongly indicate that the two series are associated when in fact the regression was related to two stochastic trends. Additionally, the augmented Dickey-Fuller test is used to check if the errors of the two series are uncorrelated. Results in table 5 verify that the unemployment rate and the GDP have unit roots. The augmented Dickey-Fuller test shows that the series are cointegrated. Although with different values, table 6 presents similar results for Lima; in both cases the series are cointegrated at one percent significant level.
Table 5. Dickey-Fuller and Augmented Dickey Fuller test for Unemployment Rate and GDP (Peru)

<table>
<thead>
<tr>
<th></th>
<th>Test statistic</th>
<th>p-value for Z(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment Rate</td>
<td>-0.834</td>
<td>0.809</td>
</tr>
<tr>
<td>GDP</td>
<td>0.323</td>
<td>0.978</td>
</tr>
<tr>
<td>Unemployment Rate and GDP</td>
<td>-5.860</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 6. Dickey-Fuller and Augmented Dickey Fuller test for Unemployment Rate and GDP (Lima)

<table>
<thead>
<tr>
<th></th>
<th>Test statistic</th>
<th>p-value for Z(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment Rate</td>
<td>0.855</td>
<td>0.996</td>
</tr>
<tr>
<td>GDP</td>
<td>1.787</td>
<td>0.998</td>
</tr>
<tr>
<td>Unemployment Rate and GDP</td>
<td>-3.579</td>
<td>0.006</td>
</tr>
</tbody>
</table>

The first difference model implies that the errors are stationary when two series share similar stochastic trends. To ensure that the series are cointegrated the augment Dickey_Fuller test can be run on the first differences of the series. The Tau statistics in this test is largely smaller than the critical values for Peru as shown in table 7 and confirms that the series are cointegrated. Similar results are presented for Lima. The tau statistic for Lima is also smaller than the critical values and the series are also cointegrated. The Durbin Watson test is also commonly used to test if the residuals are stationary and its values ranges from zero to four.
Table 8 shows the Durbin Watson statistic for the first differences of the series for the country is 2.28 and for Lima 2.18 which implies that the series are cointegrated in both cases.

**Table 7. Cointegration test for first differences model**

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>p_value for Z(t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-21.960</td>
<td>0.000</td>
</tr>
<tr>
<td>-6.598</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 8. Durbin Watson test for first differences model**

<table>
<thead>
<tr>
<th></th>
<th>D Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peru</td>
<td>2.280</td>
</tr>
<tr>
<td>Lima</td>
<td>2.182</td>
</tr>
</tbody>
</table>

The Dickey Fuller test and the Durbin Watson test constituted solid evidence that the residuals between the unemployment rate and the GDP are not auto correlated. Hence both time series share a stochastic trend which is negative correlated and even though they are not stationary series, their first differences can be regressed to estimate the elasticity of the unemployment rate with respect to output for both geographic areas Peru and Lima.

Additionally, a spatial analysis will be performed at the departmental level to explore the behavior of the GDP and the unemployment rate across the country and observe if there is a spatial effect for these variables. Finally, this result will be compared with the findings achieved through the first difference model.
RESULTS

The original first difference technique presented by Okun (1962) stated that quarterly changes in the unemployment rate are related to quarterly percentage changes in real GDP. That can be expressed as follow:

\[ U_t - U_{t-1} = a - b \times \Delta \log GDP_t \]

where \( U \) is the unemployment rate, \( \Delta \log GDP \) is the change in real GDP and \( t \) is time. This formula states that if the GDP grows one percentage point then the unemployment rate will decrease \( b \) percentage points.

These calculations were applied to data collected from Peru and Lima. Results at the country level, results were as displayed in the table below.

<table>
<thead>
<tr>
<th>GDP</th>
<th>Std. Err.</th>
<th>R-squared</th>
<th>F</th>
<th>t</th>
<th>N. Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.119**</td>
<td>0.054</td>
<td>0.181</td>
<td>4.860**</td>
<td>2.2</td>
<td>24</td>
</tr>
</tbody>
</table>

Note: \( p<.1 \) * \( p<.05 \) ** \( p<.01 \) *** (All results are displayed in absolute values)

The Okun’s coefficient is 0.12 which is akin to a prior calculation (Gonzales 1999) that found the coefficient for Peru to be around 0.13. Although this coefficient is below countries such as the United States, whose coefficient was estimated to be around 0.5, these results could be a consequence of the period selected for the calculations. The years analyzed in this study correspond to one decade after the macroweckonomic restructuration initiated at the beginning of the nineties. Considering the literature that support that the unemployment rate starts decreasing steadily after the economic output has revealed a stable growth pattern for some time, it was
expect a higher Okun coefficient that the one obtained because the elasticity of unemployment with respect to output is supposed to be more sensitive than in previous years. How long it takes to the economic output affect the unemployment rate is something that scholars cannot predict with certainty because there are other factor involved such as the labor policies of the country, the gravity of an economic crisis, the characteristics of the economic sectors that would need new employees due to the economic growth, the certainty that the economic growth is solid so employers can hire, and so forth. Nonetheless, Okun’s coefficients calculated in the short run are notably smaller than those calculated in longer periods of time (Beaton 2010) so that could also explain the small coefficient calculated in this assignment. Figure 17 shows the linear prediction between GDP and the unemployment rate in the country.

Figures are not so convincing in the case of the calculations for Lima Metropolitan Area. The Okun’s coefficient is similar to previous calculations; however it is not statistically significant and the R-squared is low. As this region embraces more than half of the industry and almost all the services, in the absence of quarterly data for the Real GDP of Lima, the GDP for the country was used to get the estimates. Even though both series passed the Dickey Fuller and the Durbin Watson test, previous exploration to the annual Real GDP for Lima shows that this series growth slower than the national GDP because Lima GDP represents an important share of the country output. The low R-squared and the fact that the coefficient is not statistically significant may imply that although sharing similar stochastic trends these series has not a strong relation.
Figure 17. Linear prediction of the Unemployment Rate given the GDP in Peru

![Okun's Linear Prediction](image)

Table 11. First Differences Regression: Unemployment Rate on GDP (Lima)

<table>
<thead>
<tr>
<th>GDP</th>
<th>Std. Err.</th>
<th>R-squared</th>
<th>F</th>
<th>t</th>
<th>N. Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.183</td>
<td>0.118</td>
<td>0.099</td>
<td>2.410</td>
<td>1.55</td>
<td>24</td>
</tr>
</tbody>
</table>

*Note: p<.1 * p<.05 ** p<.01 *** (All results are display in absolute values)*

The number of observations is very important in time series to get precision in the estimation. Unfortunately for both cases the number of observations did not reach the number of
50. The annual data for Lima only reach 12 observations and significant results are not expected. However, the Okun’s coefficient for these series is 0.13, similar to prior works but observations should been added in years to come to confirm these results.

Table 12. First Differences Regression: Unemployment Rate on GDP (Lima annual)

<table>
<thead>
<tr>
<th>GDP</th>
<th>Std. Err.</th>
<th>R-squared</th>
<th>F</th>
<th>t</th>
<th>N. Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.131</td>
<td>0.183</td>
<td>0.054</td>
<td>0.510</td>
<td>0.71</td>
<td>11</td>
</tr>
</tbody>
</table>

Note: p<.1 * p<.05 ** p<.01 *** (All results are display in absolute values)

Figures 16 and 17 show the linear prediction between the GDP and the Unemployment Rate in Lima for the series distributed in quarters and per years. In Figure 16, the GDP values correspond to those of the country real GDP (in 2012 the maximum values surpass the 61 billion. In figure 17, the GDP values are the annual real GDP for Lima (In 2012 the GDP peaks to 112 billion). The linear prediction in both cases confirm the negative trend between the GDP and the Unemployment rate which suggest that even though a final calculation of the Okun’s law cannot be reached with so few observations, the negative association between both variables in time exists.
Figure 18. Linear prediction of the Unemployment Rate in Lima given the country GDP (Quarterly observations)
Figure 19. Linear Prediction of the Unemployment Rate in Lima given the GDP from Lima (Annual observations)

These findings are strong but they do not say much about the situation of the unemployment and the economic growth across the country. The public perception has associated at large that the poor economic performance of some departments to specific regions, such as the South Andes and the Rain Forrest. Unfortunately, the variables studied in this project are not available at the municipal level and the small number of departments reduces the statistical power of the calculations. In spite of this, a spatial analysis was performed to observe if the variables observed in the descriptive section appear to be correlated regionally. Applying
the Univariate Local Moran’s I technique for the years 2004 and 2010, the unemployment rate, the poverty gap and the GDP per capita appear not to be spatially correlated between neighbor departments but the Real GDP and education seem to be correlated between departments in both years.

Table 13. Univariate Local Moran’s I in 2004

<table>
<thead>
<tr>
<th>Unemp. Rate</th>
<th>Edu</th>
<th>Gap</th>
<th>GDP</th>
<th>GDP per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.083</td>
<td>-0.161*</td>
<td>-0.092</td>
<td>-0.141***</td>
<td>0.089</td>
</tr>
</tbody>
</table>

Note: p<.1 * p<.05 ** p<.01 *** Observations from 2004

Table 14. Univariate Local Moran’s I in 2010

<table>
<thead>
<tr>
<th>Unemp. Rate</th>
<th>Edu</th>
<th>Gap</th>
<th>GDP</th>
<th>GDP per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.142</td>
<td>0.259**</td>
<td>-0.016</td>
<td>-0.143**</td>
<td>0.017</td>
</tr>
</tbody>
</table>

Note: p<.1 * p<.05 ** p<.01 *** Observations from 2010

Although results suggest that the GDP is spatially correlated in both years, one the reason for such result could be in the fact that Lima is an outlier. In effect since Lima is responsible for almost half of the product, most probably all its neighboring departments may have significant smaller GDP coefficients. In figure 20, all departments with low-high relations between their GDP coefficients are located around the department of Lima. Ancash is the only exception with a high-high GDP production. In that case, the proximity to Lima can explain the productivity level of this department but why the other departments around the capital do not benefit from their closeness to Lima is an important puzzle to solve still.
Figure 20. Cluster Map of the GDP in Peru (Annual observations for 2004 and 2010)

Whether the OLS model assesses the effect of independent variables on a dependent variable, the spatial lag dependent variable model assumes that dependencies exist among the levels of the dependent variable; in this case, that the unemployment rate of a department would depend not only on the GDP but also it would be associated to the unemployment rate of its neighboring departments and this spatial effect should be controlled in a statistical analysis. A spatial lag model such that has the form:

\[ \text{Unemployment} = \rho W (\text{Unemployment}) + XB + \varepsilon \]
where $\rho$ is the spatial autoregressive parameter, $W$ the spatial weight matrix, and $B$ a vector of parameters GDP, Education (in years), Poverty GAP or any other parameter that may be included in the equation.

The results of the Moran I test indicate that such model does not apply in this case because the unemployment rate is not spatially dependent. In cases like this, a regular OLS model can be run. A departmental model including GDP, education (in years) and the poverty gap as explanatory variables was run twice, one with the observations from 2004 and another with observations from 2010. In both cases the variable education was statistically significant but the variables GDP and poverty gap were only significant in 2004. Also, the sign of the coefficients made no sense in both regressions, as education and GDP were expected to be negative correlated to the unemployment rate and the poverty gap to be positively associated. This outcome could be explained by either the few observations included in the model or because a series of transformations and an outlier like Lima could be affecting the estimation. It is difficult to elucidate the real causes of the arbitrary behavior of the variables and their inconsistency through the years. Perhaps in the future these variables could be observed at the municipal level and more substantial results may be catch as it is very likely that at such level more trends could be observed to enrich the results.

**Table 15. OLS Regression: Unemployment Rate on GDP, Education and GDP (2004)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Constant</th>
<th>Edu</th>
<th>GAP</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>-0.463</td>
<td>0.632 ***</td>
<td>-0.071 **</td>
<td>4.410e-008 *</td>
</tr>
<tr>
<td>Std. Error</td>
<td>1.403</td>
<td>0.152</td>
<td>0.030</td>
<td>2.542e-008</td>
</tr>
</tbody>
</table>

*Note: p<.1 * p<.05 ** p<.01 ***  
Obs: 25  
$R^2$: 0.623  
F: 11.585
Table 16. OLS Regression: Unemployment Rate on GDP Education and Poverty Gap (2011)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Constant</th>
<th>Edu</th>
<th>Gap</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
<td>-8.908 *</td>
<td>1.284 ***</td>
<td>0.013</td>
<td>6.198e-009</td>
</tr>
<tr>
<td>Std. Error</td>
<td>4.312</td>
<td>0.412</td>
<td>0.052</td>
<td>1.1126e-008</td>
</tr>
</tbody>
</table>

Note: p<.1 * p<.05 ** p<.01 ***

Obs: 25  R^2: 0.591  F: 10.109

LIMITATIONS

The series for the country include quarterly data collected in nine years and twelve years for Lima metropolitan area. The problem with small sample size (usually less than 50 observations) is that the autocorrelation estimates may be biased. In those cases some techniques such as the first differences may be applied in order to get precise estimations (De Carlo et al. 1993). Nonetheless, although the results for the country are statistically significant and different techniques were used in order to prevent problems with the estimation, the period of time when the observations where obtained correspond to a specific moment of growth and stability not only for the country but also for most of the Latin American region. The Okun’s coefficient is a very sensitive estimate that can be altered for economic or political disturbances. Normally, in early recessions and during expansions, it has been observed that the unemployment rate respond strongly to the economic output while that in the middle of recessions and in recoveries the response tends to be weak (Jardin, 2012). However, the Okun’s coefficient obtained for the country is not as high as expected maybe due to the small number of observations. This coefficient should be newly tested in years to come to confirm if that is the country pattern for the relationship between the GDP and the unemployment rate or just a behavior expressed during a specific period of time.
Even though the Okun’s coefficient obtained for Lima is based on annual observations is similar to those obtained in previous research, in this case the limited number of observations yields a very poor estimation. Although the linear prediction for these observations may be correct, in this particular case more observations should be added in the future to corroborate these calculations.

Finally, the spatial analysis shows that the unemployment rate and probably the GDP per departments are not spatially correlated with their neighboring peers. Those results may be due to the small number of observations. A spatial analysis at municipal level could enrich and bring to light patterns that are not obvious at the departmental level.

**CONCLUSIONS**

The several techniques applied in this study demonstrate soundly that there is a negative association between the Real GDP and the unemployment rate. This conclusion is not only supported by the first differences model known as the Okun’s law, but also for a series of descriptive analysis and spatial explorations that reinforced such findings.

The years analyzed for this project correspond to a decade later of initiated the economic reforms that would bring macroeconomic growth and financial stability. Since the unemployment rate reacts strongly to periods of expansion, it was expected a higher Okun’s coefficient than those previously calculated. However, the coefficients projected are alike to previous estimations, the Okun’s coefficient for the country is 0.12, and for Lima is around 0.1 and 0.2.

One explanation for these small coefficients may be due to the short run of the calculations. In both cases the period studied do not surpass the eight years for the country and
eleven years for Lima metropolitan area. Higher coefficients can be normally obtained in long runs because as more years are included, business cycles’ features are present in the calculation, especially during economic crisis and expansions, where the unemployment rate changes abruptly due to shocks in the market. In both cases, the unemployment rate switches strongly and that disruption is caught by the first difference model.

In any case, it is hard to think that in a long run Peru could reach a coefficient close to 0.5, similar to the United States. Hence, the low elasticity of unemployment to output should be explained by the particularities of the Peruvian labor market. Normally, the low response of the unemployment rate to changes in output has been attributed to the fact that workers leave the labor market as soon as the employment perspectives are not promising. However, as seen in the descriptive section, the activity rate (or the percentage of the working age population that makes part of the labor force) has increased between 2004 and 2010. Furthermore, the Okun’s coefficient in this analysis in particular was calculated in a period of expansion, where workers were expected to start looking for jobs and join the labor market. In other words, after a recession period starts, companies begin firing employees in an attempt to reduce costs and risks. The same happens once a period of expansion is perceived to be strong; when corporations decide to increase their productivity and more workers have to be hired as a result. This last assumption does not match with the current results.

Considering that in Peru almost 80 percent of the employment belongs to the informal market, it is not difficult to understand that in times of economic distress, workers either may accept a reduction in the number of hours they work, or negotiate a reduction in their salaries in order to preserve their jobs. On the other hand, the lack of controls over employment benefits and protection and the flexibility of a labor market such the Peruvian should encourage
employers to hire more workers during periods of expansion. These both cases represent solid arguments to expect a bigger response of the unemployment rate to the consistent economic growth registered in the 2000s. In line with this, the low Okun’s coefficient shown in Peru during this period reinforces the hypothesis that it is necessary more than a rise in economic output to ameliorate the employment rate and working condition in general.

These conclusions are strengthened for three findings in this study. First, the negative and the positive trend of the unemployment rate and the real GDP per departments respectively, and through the past years, is strong perhaps due also to the period of expansion of the economic output in the country. Nonetheless, this trend is not regular across the country and some departments show a random behavior which can be explained for the different level of economic and social infrastructure across the country. Traditionally, some regions has been associated to poor economic performance due to the lack of physical structure such roads, rail networks, transportation, communication, public services, power, water supplies, and the like, which make difficult the investment in such areas. Also, the lack of efficient governmental institutions to safeguard new investment and channel the new wealth into the society, the shortage of human resources to make possible such ventures, and the and non-existence of social organizations capable to exert as a counterbalance for public and private affairs, are some of the reasons why the increase of GDP some departments is not reflected in their social indicators.

Secondly, besides the reduction of the unemployment rate along the country, other social indicators such as the years of education and the poverty gap has shown a consistent advancement over the years studied and across the country. This should be due not only to the economic growth but also to other factors that could be transforming this country in past years. The local participation movement that invigorated during the 1990s, specially in the form of
communal organization to provide the most basic services such as food during the worst years of the crisis of the 1990s, the political decentralization that started in 2002 and that has in some way reorganized the distribution of resources across the country, and the propagation of non-governmental organizations along the country with the mission of reducing the level of poverty and the social distress caused by the economic crisis and the years of terror of the 1980s and beginning of the 1990s, may be in part behind the improvement of the level of education and the reduction of the poverty. These transformations could also explain why these indicators at the departmental level do not show a logical association when regressed in an OLS model.

Finally, in the descriptive section, the quality of employment is far from optimal. Even though the level of underemployment has been reduced during the 2000s, still almost 55 percent of the employed population is underemployed. The economic growth surely explains the macroeconomic stability, but the improvement of the quality has not increased dramatically in 12 years because that depends on appropriate public policies. Most employment does not translate into positive sign because underemployment—in hours and income—is still at large the working base of the country. Moving from unemployment to underemployment, from eight years of education to nine years of education, or living with two dollars a day instead of one dollar a day (which is the difference between extreme poverty and poverty according to the World Bank) implies that the country has progress in the past 10 years but it is little for a country that had been growing at 6.5 percent a year during the past 12 years. The economic performance may be, in part, behind the intense transformations in the country in the past years. Nonetheless, whether the economic growth, public policies, civil organizations, or the geography of the interdepartmental structures are the responsible for such change that is matter that deserve
further investigation. Ultimately, the Okun’s coefficient and the social progress need some help to respond better to the economic growth.
References


