

Owings, Ashley

**Working Paper**

## Theoretical and empirical analysis of income inequality and wage differentials: A comparison between the United States and Guatemala

LIS Working Paper Series, No. 553

**Provided in Cooperation with:**

Luxembourg Income Study (LIS)

*Suggested Citation:* Owings, Ashley (2010) : Theoretical and empirical analysis of income inequality and wage differentials: A comparison between the United States and Guatemala, LIS Working Paper Series, No. 553, Luxembourg Income Study (LIS), Luxembourg

This Version is available at:

<https://hdl.handle.net/10419/95508>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# **Luxembourg Income Study Working Paper Series**

**Working Paper No. 553**

## **Theoretical and Empirical Analysis of Income Inequality and Wage Differentials: A Comparison between the United States and Guatemala**

**Ashley Owings**

**September 2010**



THEORETICAL AND EMPIRICAL ANALYSIS OF INCOME INEQUALITY AND  
WAGE DIFFERENTIALS: A COMPARISON BETWEEN THE UNITED STATES  
AND GUATEMALA

A Thesis

Presented to

The Faculty of the Department of Economics

California State University, Los Angeles

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

By

Ashley B. Owings

September 2010

© 2010

Ashley Owings

ALL RIGHTS RESERVED

## ABSTRACT

### Theoretical and Empirical Analysis of Income Inequality and Wage Differentials: A Comparison between the United States and Guatemala

By

Ashley Owings

With the current economic transformation, the widening gap between income and the accumulation of wealth becomes an important area of study. This study reviews wage differentials and a number of economic theories regarding wage determination and labor market incentives. To analyze the wage differential, the study examines empirical data from the United States and Guatemala across income levels via the Luxembourg Income Study data sets. The econometric model proposed examines multiple factors influencing wage rates at the household level including levels of education, household demographics, additional forms of income, transfers, and rates of taxation. Considering the different levels of development between the countries, the empirical data for Guatemala can be compared to the United States and analyzed to ascertain areas of focus to further develop Guatemala's economy by focusing on increasing gains in education and access of public resources across Guatemala.

## TABLE OF CONTENTS

Abstract.....	iii
List of Tables.....	vi
Chapter	
1. Introduction.....	1
2. Characteristics of Wage Differentials.....	7
3. Labor Market Theories.....	10
4. Economic Background of Guatemala.....	21
5. Economic Background of the United States.....	25
6. Income Inequality and Measurements of Income in LIS Dataset.....	27
7. Migration and Remittances in Guatemala.....	34
Figure 7.1 - Net Emigration from Guatemala.....	35
8. Macroeconomics and the Importance of Fiscal Policy.....	37
9. Job Characteristics, Wage Differentials and Labor Market Incentives.....	42
10. Theoretical Model and Empirical Data Sets.....	46

11. United States Empirical Results.....	50
12. Guatemala Empirical Results.....	61
13. Implications of Analysis and Policy Recommendations.....	68
Works Cited.....	76

## LIST OF TABLES

Table 6.1: Income Shares - United States.....	29
Table 6.2: Income Shares – Guatemala.....	30
Table 6.3 – Mean Wages and DPI.....	31
Table 6.4: Income Breakdown - United States.....	32
Table 6.5: Income Breakdown - Guatemala.....	32
Table 10.1 – Coefficient Expectations.....	49
Table 11.1 – United States Coefficient Results.....	50
Table 12.1 – Guatemala Coefficient Results.....	61



## CHAPTER 1

### **Introduction**

One definition of economic well being proposed by Adam Smith<sup>17</sup> is the ability of purchasing a defined basket of goods that allows one to appear in public without shame. This basket of goods has changed drastically over time. As the definition of this basket of goods changes over time, one must adjust their definition of the middle class and measurements of economic well being to adjust to the economic realities of an ever changing marketplace and income expectations. In recent years, this basket of goods has transformed to also include services and long term stores of wealth. With this economic transformation, one begins to see a widening gap between income and the accumulation of wealth. The effects of expectations of income growth are vitally important as there are increasing amounts of research to suggest that changing expectations can influence, and even create, economic booms and busts. Since the majority of income ultimately ends up in the hands of individual households by way of wages and salaries, the study of wages and the differences between wage rates within a population become remarkably descriptive in explaining variations in income. The total wages earned in a household often will determine the standard of living and define the consumption patterns of the population. The purpose of this paper is to examine the factors influencing income growth and inequality in wages at the household level and propose an econometric model to that will allow wage differentials to be compared across countries. The empirical

analysis will focus on data from the Luxembourg Income Study<sup>14</sup> using data sets from the United States and Guatemala.

The methods used to measure income and the interpretation of wage inequality, both objectively measured and subjectively perceived by the general public, become vitally important. Throughout this paper, we will examine a number of different measures of income and wage differentials and discuss their implications on economic well being and policy recommendations to promote increases in wages and income. In particular, this paper will focus on empirical evidence found in the US and Guatemala to highlight some striking difference between high and middle income countries. The United Nations Development Program<sup>21</sup> has identified the Latin American region as the most unequal in the world in regards to income equality, but has found that is possible to reduce inequality by the design and implementation of public policies to lift the region out of the inequality trap. The report has identified that factors at both a household level and within the political system serve to perpetuate this inequality.

This paper will draw upon this perspective to focus on objective measurements in analysis of wage differentials. In many circles, wage inequalities have been seen as economically legitimate forms of discrimination stemming from labor that is more efficient and/or valuable to an employer. Others suggest that wage equality appears from arbitrary discrimination and/or corruption. While the second form of discrimination is what one generally considers when discussing labor discrimination, this discrimination will not be discussed in detail as it is out of scope of the intention and analysis discussed

in this paper. However, it remains an interesting question to ponder as one considers wage inequalities across countries.

Economists define wages as the equilibrium price of labor when price demanded by the worker is equal to the price the employer is willing to pay for labor. In practice, the wages one receives varies wildly and sometimes it seems, without reason or logic behind the resulting income. These variances in individual income and wage rates are often masked by over aggregation of data reported only as an average of total income divided by the total amount of workers or sometimes just the total population (i.e. income per capita). When data as varied as wages and income is lumped together and reported as a single average number, it begs the question of what information one can truly infer from this single number. Yet this single number is used so extensively in economic research that it is often the basis of entire economic analyses and theories. Wages are often a large (if not the largest) portion of cost for a particular good as well as the main source of income used to purchase goods or services in an economy. Without wages, an economic market could not function; however, economists tend to assume over the dynamics of wages. Wage differentials address the differences between wages that exist within a group that can not be explained by other economic factors traditionally studied when looking at wages, prices, and output.

Many who study economics do so with the belief that material or societal phenomena rest on an underlying order which can be discovered through reasoning and experience.<sup>19</sup> This belief leads to the objective of economics, which is to identify those

natural laws that govern the material and social phenomena observed daily. Furthermore, Stirati notes that “[t]he fact that certain philosophical premises may be considered outdated does not necessarily rule out the scientific validity of studies carried out by their adherents.” It has also been said that current economic theory “sheds no light whatsoever on the economic principles of distribution and it is an amazing tissue of inconsistency and irrelevance.” The classical economists often referred back to a “[d]octrine of economic harmonies... [that] was not necessarily a hindrance in the early stages of the search for regularities or laws” (Taylor, 1929).<sup>19</sup> What economics lacks is a symmetrical explanation of income distribution that would account for the different levels of compensation for labor within varying different groups of workers.

When considering economic growth, it is important to examine how the increased income is being distributed. While there is no dispute that a country will benefit economically with an increase in GDP, it is disputable whether merely a basic increase in GDP is equivalent to an increase in the welfare of the country. Changes in income and distribution of income are also key factors to consider when examining the economy of a country. A country may be showing enormous economic growth, but if the benefit of economic growth is only benefiting a small portion of the population, one might argue that this economic growth is not seen as an improvement to the country.

One such instance where one might argue this point can be seen in the Nigerian economy with the introduction of the oil trade in the 1970's.<sup>1</sup> While Nigeria was showing steady economic growth of more than 3% prior to the discovery of oil in the

Niger Delta, the country experienced a significant boom in economic growth due to the oil discovery that doubled the rate of economic growth in a short period of time. This economic growth, however, did not last and by the 1980's, the economy of Nigeria was experiencing negative growth due to the country's inability to appropriately support the country's new found wealth. While the country is experiencing economic growth in the 21<sup>st</sup> century, the country's economic growth continues to be hampered by the inefficiencies and corruption within the government that has not yet learned to manage their resources and promote effective income distribution within the country.

When considering measures of income, economic growth, wellbeing, and a number of other economic variables, there are a number of differences and details that can be overlooked and ignored when wage differentials are not considered. When looking at GDP per capita, average income, and other such general aggregate income measures, the impacts and incentives created by the wage differentials can not be considered in this analysis. This can significantly hinder one's analysis of a nation's economy. These differentials create an important dynamic in the structure of the economy and can bring significant insight into the path of economic development within a country.

For example, when looking at GDP per capita for a country, this assumes that all residents are consuming the same proportion of goods throughout the country and have the same amount of money to live on. This assumption is highly unrealistic. Income distribution is highly unequal in most countries as noted by the UNDP in their

Development Report for Latin American & the Caribbean.<sup>21</sup> This inequality can create social unrest; put pressure on government and financial institutions; significantly impact trade and consumption patterns; and influence foreign direct investment and trade among nations. While one can use equivalency scales to adjust some per capita income to become slightly more realistic, this adjustment can not resolve many of the issues of using GDP per capita as it assumes the same weight to all individuals of a particular age group in all households.<sup>14</sup> Looking more closely at income shares at a household level has shown a number of varying expenditures. In the US, for example, researchers have seen that households with single mothers tend to skew the share of income consumed where the mothers tend to consume less of their own income in favor of their children.

Since the measurement of GDP is commonly calculated using the equation  $GDP = C + I + G + (ex - im)$ , measuring the collective changes and patterns in income of individual households' incomes will become significant. As it is the households that ultimately consume the goods and services sold in the market represented in the variables  $C$ ,  $ex$ , and  $im$ , as well as the private savings in the banks that allows for investment ( $I$ ), changes in earnings of the individual households can potentially create large boosts in GDP. By examining the changes in wages and household income, this increased household income can be assumed to carry over into increases in GDP by way of increased private consumption or increased savings that will allow banks to fund further investment in new business ventures. Without this constant interaction between commercial businesses and individual households, one can not expect to see significant sustainable increases in GDP.

## CHAPTER 2

### Characteristics of Wage Differentials

The determination of economic growth is often measured using the Solow model of  $y=f(k,l)$ . In this model, the major players of this analysis are GDP (income) and labor. However, this model assumes labor and GDP is homogeneous. While the measure of GDP for the country is one aggregate measure, the distribution of this GDP is highly disproportionate in most, if not all countries. There does not appear to be consistent movement in economic growth among countries of particular levels of GDP suggesting that there may be other factors that influence economic growth beyond the measures identified in Solow's model.

Some recently discussed additional factors can be seen in more detail when examining work done by David Weil.<sup>22</sup> Some factors that have shown promise in further explaining increased economic growth include education, technology, social capital, participation in the global marketplace, levels of available entertainment and leisure time, and natural resource abundance. By examining wage differentials and changing the measure of the income to take these wage differentials into consideration, we should be able to better examine the effects of these additional factors into an individual's income growth. As the individuals are able to increase their income, the economy as a whole should not only see nominal economic growth, this growth should be more sustainable over long periods of time and be beneficial to a larger proportion of the residents of the country.

The measurement of economic growth is vital not only because we need an object measurement of economics across countries, but also because the measurement and methods use to measure economic growth play an important role in shaping the perception of global economies and creates incentives for creating public policy in all countries across the globe. As the UNDP report highlights the importance of public policy in reducing the inequality seen in the Latin American region, measurement of income inequality becomes even more important. The level of information made available to the public is often limited as the public is not traditionally informed on how these measures are calculated or of what to expect from the publicly available economic and tax data.

The easiest and most traditional way to define the middle class in any given class is the middle 60% of the population when ranking the residents by total income. The remaining 40% of residents would be considered either rich (top 20%) or poor (bottom 20%). However, as times changes, the definition of the middle class needs revision. As found in research performed by Brandolini, total incomes tend to increase more often than they decrease.<sup>3</sup> Within this analysis, he also found a strong link between class and occupation and also observed that the majority of the middle class were not “capitalists in waiting.” But rather, the middle class tended to select steady, well paying jobs rather than take on unnecessary risks.

When looking at the middle class as a percentage of the median income, the size and shape of the middle class changes dramatically.<sup>3</sup> Not only does the overall shape



change when changing the measurement, but samples from different years between 1985 and 2004 show a change in the trends for income across countries. Overall, the income share lost to the middle class was shown to have moved into the higher end of the spectrum and the size of the middle class appears to be smallest within the US and Mexico.

The next question then becomes to be what are the implications of this movement between social classes? McCarty, Poole & Rosenthal have observed that the increasing polarization in voter patterns in recent decades has been preceded by parallel rise in income inequality.<sup>16</sup> If this relationship holds true over time and across countries, then the perception of income inequality and the determination of wage differentials becomes an important piece of the puzzle. We must therefore attempt to identify if the wage differentials and income inequality appears as a result of “legitimate” discrimination stemming from a more desirable set of skills and knowledge obtained at the initiative of the individual worker and valued more highly within the labor market or identify if these wage differentials appear as a result from arbitrary discrimination and/or corruption within the marketplace.

## CHAPTER 3

### Labor Market Theories

What economics lacks is a symmetrical explanation of income distribution that would account for the different levels of compensation for labor within varying different groups of workers.<sup>19</sup> There should ideally be one distinct principle that would explain prices, wages, and the allocation of capital and other resources. Profit and rent are considered by economists to be residual income even though it is recognized that capital and land in addition to labor contribute to production. While this overarching theory of economics is ambitious and well beyond the scope of this paper, this paper will attempt to use this final goal as motivation to pull principles from multiple theories that will give a more cohesive picture of wages, wage differentials, and their impact on economic growth.

On a high level, the two most well known theories are the Keynesian and classical economic theories. These theories focus on three separate but inter-connected markets: the product market, the money market, and the labor market.<sup>8</sup> This paper will focus on the labor market; however, wages play a key role in all three markets. On the product market, wages provide a large portion of the cost of producing the goods (more so when the goods tend to be more labor intensive) and provide the workers with the income to consume the goods being produced. In the money market, the income (or wages) of workers is a key driver in the demand for money, currency, and savings. The labor market, of course, is the market that most highly utilizes wages in its construction. This

paper will focus mainly on the labor market since it is primarily the labor market that determines the wage rate.

Wage rates in classical economics are said to depend on the relationship between a predetermined fund designated for wages and the size of the fully employed working population.<sup>19</sup> Classical economists propose that wages are then driven down to subsistence levels by the population changes in response to the difference between the current wage and subsistence using market forces. Others go further stating that wages must be set at a level of subsistence maintained by virtue of a minimum wage. This rationale states that the role of “common humanity” limits the fall of wages below the level of subsistence. This view contradicts virtually all economic theories. One of the major obstacles that economist have yet to resolve is the inability for a large portion of the world’s population to earn a living that will allow them to consume the basic necessities that one would require for subsistence. Some scholars regard Smith’s classical theory of wages as a compendium of many diverse incompatible and contradictory theories. For example, the bargaining power of workers in a capitalist economy is inconsistent with the theory of competition or a wage fund that are also used to explain the determination of wages.

Ricardo’s theory of wages while adding some additional components to consider when evaluating the distribution of wages.<sup>19</sup> The level of technology integrated into the product markets in Ricardo’s time was no where near where it is in the 21<sup>st</sup> century. However, even in his time, Ricardo was able to identify at the beginning of

industrialization that the introduction of machines would create unemployment and, therefore, effect wages. While his initial assumption that the effect machines would have on the supply and demand of labor would be short term, the continuing debate on globalization and unionization across the world highlights the significance of technology in the current labor market. As we have come to see over the years, new technology can create enhanced productivity that will permanently supersede the need for certain types of labor and thus, significantly reduce the demand and subsequently wages for that labor supply. The reason that Ricardo was not able to identify the long term effects of machines on employment is because he did not consider the corrective effects that the reduction in wages would have on long term unemployment rates. In future studies, the Industrial Revolution and the introduction of widespread use of machines in production have been considered major components of long term unemployment.

Classic economists often may not consider the inverse relationship between wages and unemployment.<sup>19</sup> It has been widely observed that higher wages will mean that less labor will be demanded by employers. As less labor is demanded, total employment will fall and, thus, one would detect the inverse relationship between wages and unemployment. This would tend to add an extra dimension to the classical view of wage determination. Different countries and cultures place various levels of significance on wages and unemployment. As such, one would perceive the central role that social norms and conventions would determine the national labor market and wages.

The most notable characteristics of the complexity in economic indicators is the apparent interdependence in influences of each market on the other, while remaining dichotomist in its construction,<sup>8</sup> often assuming wages to be constant, homogenous, or completely inconsequential. Wages in particular are often left to the sidelines of most economic analysis, yet wages appear to be highly influential in nearly all markets studied by economists. Keynesian models appear to place more significance on employment and wages, however, it has been widely acknowledged that the findings of the Keynesian model are more short term and appear to breakdown over longer periods of time. While he often refers to the short term increase in production being created only by an increase in labor, he fully discounts the labor supply as being non-existent and fully determined by employers in the long run.

More current views of economics has built off of these two theories and evolved into the more widely studied schools of thought; the neoclassical theory.<sup>8</sup> This theory focuses mainly on marginal analysis and maximization of utility and can be validated by high levels of mathematics. This theory assumes that the market has enough mechanisms built in to self-correct itself, as in the classical theory; however, it differentiates itself by creating a spot in the theory for unemployment that suggests that a certain level of unemployment is both unavoidable and necessary. When looking at both of these key models, one of the major assumptions made is that labor is homogenous. In fact, until the second half of the 20<sup>th</sup> century, relatively little research had been done to differentiate between any sources of labor at all. The importance of this theory can be seen in its

market adjustment often described as the “invisible hand.<sup>8, 17</sup>” This force of the “invisible hand” can be seen as a fundamental dimension that suggests social phenomenon is a result of the synergy between individual types of behavior that interact together as being guided by an invisible hand.

Using these assumptions, attempts to calculate an equilibrium wage that few will earn in reality leads to a discrepancy in the Solow Model that must be reconciled if economic growth can be accurately targeted and effectively monitored. In today’s world, most will agree that moving across the country for a job is neither fast nor easy and involves a large cost to transport one’s life and belongs to the new location. It is also widely believed that employers will not necessarily disclose what they are truly willing to pay to an employee in the hopes that employment can be found at a lower wage. It might even be possible to look at marginal analysis to identify a paradox within the logic in determining this equilibrium wage. The demand for labor is not constant, but sloped, sometimes more steeply than other depending on a number of factors. As such, the true elasticity of labor demand can never be truly identified, yet it is most often the employer who has significant more information regarding both the supply and demand for labor than the average job seeker. This disproportionate availability of information alone has led to a number of more practical theories in determining wage rates.

The theory of human capital introduced in the 1960’s provided a much needed insight into the formation of the labor market.<sup>8</sup> The key aspect that differentiates this theory from prior economic theory is the introduction of the idea that salaries should be

provided to individuals on the basis of investment. This investment is made according to ability and achievement and, more importantly, is not equal as it is meant to create a sense of competition and promote further development. The theory of human capital draws upon the employer's knowledge of the labor market and highlights the investment the company makes in an individual's professional growth that increases the economic efficiency of the company and, more importantly, the economical efficiency in the economy in general. Employers, therefore, use the labor market like a filter to identify the skills and/or traits that they find most desirable. From this perspective, it is the employers who make the main contribution in investing and determining the skill set and goals within the labor market.

While this theory may place the focus on the employer, yet it also places weight on the desires and inherent skills of the individuals as well. After all, this is *human* capital. While the employer can determine what skills it desires within the labor pool, the skills can not be forced without a worker who is both willing and able to perform them. It depends on the individual's innate talents and cultural values. One can not expect an individual without intelligence and extreme focus to perform brain surgery anymore than one can expect a highly intelligent, well educated, and well adjusted individual to be satisfied with an occupation performing simple manual labor. While the employer can foster the more desirable skills and credentials from its workers, it can not force a person to be something that they are not biologically able to provide. The amount of professional knowledge, skills and abilities together will influence an individual towards

the growth of his creative capacities, leading to an increase of income over the worker's lifetime.

The theory of human capital has provided important insight into the study of wages and income because it provides the first introduction to wage differentials and the impact of labor market incentives on the determination of wages across multiple skill and income levels. The movement of workers between companies, geographic regions, or occupations is then explained as a determination of the individual in locating a workplace that is agreeable to both the worker's values and abilities with the employer's demand for the worker's skill set and professional performance. This theory appears to provide additional insight into the more realistic view of labor at various wage rates and the influence that the employer's desired skill sets has on the educational and training sought by workers. However, this theory focuses mainly on drivers for the labor demand, while providing little insight on the key drivers of labor supply.

The theory of job seeking introduced approximately 10 years after the introduction of theory of human capital focuses mainly on the behavior of the labor force and thus, provides more insight behind the movement of the labor supply.<sup>8</sup> Specifically, it explains the concept of voluntary unemployment in more detail and strengthens the Keynesian view that a natural rate of unemployment exists due to the desire of the worker to earn a higher wage. The new theory discusses how a worker will refuse an offer of employment if they do not feel the wage and/or position is not adequate and that certain



individuals (especially individuals with higher professional competencies) will prefer continuous job seeking to find more suitable employment.

To take one step beyond the theory of job seeking, the theory of market segmentation takes a new approach to the labor market to drawing from the idea that labor is not homogenous and that there are certain characteristics that create a discriminatory market for labor.<sup>8</sup> In this case, the author identifies particular characteristics (possibly age, gender, geographical area, etc) that one believes creates the preferences for labor. The preferences come from both sides, both the demand by the employer and the supply of the workers. Characteristics such as age and education may be characteristics desired by the employer while wages and location may be characteristics desired by the workers. The contrast in labor power leads to discrimination in wages and job selection and analysis of these factors should provide insight into wage setting. The process of segmenting the labor market based upon elements which focus on rules and institutions within society that one believes are the underlying factors driving the changes in the wage rates. As such, the labor market naturally segregates itself into a primary and secondary labor market. The primary labor market is differentiated from the secondary market based upon the observable differences such as greater enterprise and innovation and long term commitments to employment both by workers and their employers. The primary market tends to have more job security and stability while the secondary market tends to be more vulnerable to unemployment, high turnover, and, in some cases, social exclusion. The key aspect of

labor market is to identify the few key characteristics that drive the preferences and wage rates. In addition, the theory clearly shows the role of discrimination within the labor market and separates the labor into two distinct markets often categorized by the privileged and disadvantaged.

While these theories address the relationship between supply and demand in the labor market, they do not necessarily address what exactly the calculated wage measures. In the most simplistic form, the wage a person earns is the price of the worker's labor, whether it is the people's labor in an hour, a year, or on a completed project and/or task. However, there has been other theory of wages that brings a new dimension to the study of wages that might provide more insight into how wages are determined. The basis of the Wage Fund Theory states that there is natural level of real wages in terms of a basket of goods that the market will gravitate towards at any particular point in time.<sup>19</sup> The focus of this theory is to calculate the single natural wage rate for the market. Since it is widely accepted that outside of a communist society wages are never steady but vary from worker to worker, this natural wage should be considered as the wage paid to workers in the secondary market. Another key concept that can be taken from this theory is that wages may not be determined so much by the value that a worker provides to an employer, but that wages are determined by how a finite wage fund will be distributed to a set population of workers.

The conflict then arises at whether wages should be determined by the total amount of money available to pay for the wages, or if the wages are paid based upon the

true value of the worker's labor. Many forms of wage analysis are derived using a wage fund mentality whereas they take total amount of available income and labor and use this information with a number of other variables to calculate the demand and supply curves that will then determine the equilibrium wage. Another theory that appears to conflict with this idea is the theory of the efficiency wage. While this was initiated in the 1950's it was further refined in the 1980's where the theory of an efficiency wage establishes a causal correlation between an individual's productivity and their real wage.<sup>8</sup> In the case of the efficiency wage, the wage paid is not paid based upon market forces, but is determined primarily by the value the firm places on the worker's productivity and objectives concerning the productivity and efficiency of the individual.

By approaching wage determination in this manner, one sees a defining moment in the concept of wages in economics. The wages paid are no longer a quantitative arbitrary price determined by detached and unbiased market forces, but become a more dynamic subject of study that draws upon both objective economic market forces and subjective values of companies that can be influenced by the will of companies and individuals. The analysis of wages then becomes both quantitative *and* qualitative focusing both on mathematical and graphical representation while drawing upon the values of societies and individuals focusing more on productivity than a marginal product of labor. The theoretical basis of the efficiency wage comes most notably from the Walrasian equilibrium that implies wages are determined by the potential for development of abilities and a worker's professional performance counterbalanced by the

stability of employment and the attachment and loyalty towards the employer. The efficiency wage can also significantly influence the cost of labor as word spreads throughout the labor market of the efficiency wages that one employer may offer if they are significantly higher than the average wage rate within the larger labor market as this may shift the balance of power in the labor and alter the length of voluntary unemployment an individual is willing to accept.

## CHAPTER 4

### **Economic Background of Guatemala**

When considering the labor market in Guatemala, it is commonplace for many workers to complain about indentured servitude while others cannot escape from debt because their employer creates barriers to keep them in debt through high rents, credit policies at the company store, and loans for emergency health care.<sup>23</sup> Across all sectors of the population, it is often reported by these sources that indigenous Guatemalans are being evicted from their ancestral homes without being paid the legally-mandated severance benefits. Further research into the economic history of Guatemala shows a “history of unfairness that has made Guatemala live since long ago with high and shameful poverty levels, extreme poverty and under nutrition.” Since the dawn of European colonial rule, the country has shown a “legacy of violence and vigilante justice” has become commonplace and “the administration... have developed only a limited capacity to cope with this legacy” which inhibits Guatemala from becoming a fully developed nation in the international market.<sup>1</sup>

The US State Department estimates that approximately 32% of the population lives on less than \$2 a day and 13.5% on less than \$1 a day.<sup>2</sup> It is also projected that at least 50 percent of the population engages in some form of agriculture, often at the subsistence level outside the monetized economy. While the GNI index was listed as 55.8 in 1998, shortly after the end of the civil war, the GNI decreased to 55.1 in 2007. In

research done by the World Bank, it has been identified that indigenous Mayan women tend to have the most unequal distribution of wages than of any other group.<sup>5</sup>

Guatemala's main economic concerns remain to be issues concerning trade that will allow the country to maintain the necessary levels of imports to sustain the country's basic needs: food, wages, etc. The president of Guatemala went so far as to declare a "Food Crisis" in September of 2009 and declared a national emergency as their concerns over insufficient access to food were so high.<sup>9</sup> The lack of access to food was exacerbated by the falling exchange rate of the dollar. While it may be open to debate regarding whether or not there was a true need to declare such an emergency for the country, the fact that there was even a question regarding the country's access to food, speaks volumes regarding the economic well being of the country.

Prior to the reported food crisis, many nations have already identified areas where Guatemala needs to show improvement.<sup>2</sup> Among these, some of the most critical items include: increased transparency and accountability in Guatemala's public finances; simplifying the tax structure; enhancing tax compliance; broadening the tax base; and financial sector reforms. Guatemala has shown interest in increasing security, development, and economic integration as the major priorities on the world stage and participates in a number of regional groups, focusing on trade and the environment. Guatemala has elevated its interest in improving the investment climate by simplifying regulations and procedures of imports and exports and adopting treaties to protect

investment, such as the U.S.-Central America Free Trade Agreement, commonly known as CAFTA.<sup>10</sup>

While Guatemala has lost its edge as a mass coffee producer to the Vietnamese, Guatemala now ranks in the amount of high grade coffee it produces, and it has the highest percentage of its crop classified as high quality.<sup>23</sup> More than 50% of its coffee is exported to the US. In the US, there has been a new initiative for Fair Trade coffee. In 1997, the fair trade price for coffee was \$1.26 per pound, while the general world market price was closer to 50 cents per pound. The increase in price for the coffee creates a direct benefit in the standard of living for the farmer, but creates significantly higher standards for the coffee that is being produced. It has been said that, “Fair Trade keeps farmers on their land. While low coffee prices have forced thousands of farmers to emigrate to Mexico and the U.S., none of our members [from the Manos Campesinas cooperative] have had to give up their land.<sup>23</sup>” It has also been said that “[t]he premiums we receive from fair trade help us send our children to school, and provide food and medicines for our families.”

As Guatemala has lost some of its market share in the global coffee market, it has looked into expanding into more nontraditional agricultural exports.<sup>2</sup> It has been asserted that the reason for Guatemala’s comparative advantage in nontraditional exports comes from the abundance of resource-poor smallholders (unskilled labor) throughout Guatemala because these exports are labor-intensive products that can absorb abundant family labor at below market wages. Many have perceived the growth of the

nontraditional export sector in Guatemala as a viable development strategy for rural farmers in Guatemala that would generate employment on smaller farms. While increased aid has been granted to Guatemala beginning in the 1980's to promote the production of nontraditional agricultural exports, one must also consider that productivity increases are not to be expected as the adoption of capital-intensive, high-risk, high-reward crop technologies among smallholders is limited by the constraints prevalent within rural Guatemala.

Rural farmers have a limited ability to bear risk of new technology of crops.<sup>3</sup> If a crop doesn't do well, it is unlikely that they have any savings or welfare payments to fall back upon. As such, they have an extremely limited access to credit or protection of assets, should the need arise. In addition, the majority of Guatemalan's do not have ready access to education much past the sixth grade severely restricting the availability of high skilled labor needed to modernize agricultural production. It has been estimated that 87% of the Guatemalans living in poverty are rural farmers who depend on agriculture either as day laborers or subsistence level farmers. In order to allow this labor pool to advance themselves, they will need to be provided with the means to succeed. The empirical data investigated further in this paper supports this claim as the LIS database shows more than 50% of its income sample to have no wage income present, with the majority of the income provided to residents as self employed income.<sup>14</sup>



## CHAPTER 5

### **Economic Background of the United States**

As contrast to the economic challenges seen in Guatemala, the United States is seen as one of Guatemala's largest trading partners. The culture and access to a number of important economics factors differ dramatically. The viability of the United States financial markets is a key contributor to financial stability around the world. When the US stock market crashed at the end of 2008, the entire world embarked on a Financial Crisis that we continue to experience today. When considering individual nations, the economy of the United States is considered the largest in the world.<sup>12</sup> When factoring in the European Union which integrates 27 European nations into one economy, the United States falls to second on two of three most cited sources reporting on the sizes of global economies.

Culturally speaking, the United States is often considered the land of opportunity. Education is widely and easily available to a much larger portion of the population. In fact, it is considered commonplace for any American citizen (and even many illegal immigrants) to have a high school education. The United States is also Guatemala's largest trading partner, providing 36% of Guatemala's imports and receiving 39.2% of its exports.<sup>2</sup> Traditionally, relations between the United States and Guatemala have been close. However, with the numerous human rights and civil/military issues that have plagued Guatemala's history, the relationship has been strained. Because the United States' economy is so large and closely integrated with the Guatemalan economy, the

U.S. has a unique ability to influence Guatemalan economic policy. U.S. policy

objectives in Guatemala include:

- Supporting the institutionalization of democracy and implementation of the peace accords;
- Encouraging respect for human rights and the rule of law, and the efficient functioning of the International Commission Against Impunity in Guatemala (CICIG);
- Supporting broad-based economic growth and sustainable development and maintaining mutually beneficial trade and commercial relations, including ensuring that benefits of CAFTA-DR reach all sectors of the Guatemalan populace;
- Cooperating to combat money laundering, corruption, narcotics trafficking, alien-smuggling, and other transnational crime, including through programs funded under the Merida Initiative; and
- Supporting Central American integration through support for resolution of border/territorial disputes.<sup>2</sup>

The majority of Guatemalan emigrants leave Guatemala with the intention of settling in the United States.<sup>10</sup> With these differences in economics, one might be surprised to note that Guatemala and the United States exhibit somewhat similar levels of income inequality. When comparing the Gini Index, there is a smaller difference between the United States (45) and Guatemala (55.1) than when one compares the United States and the United Kingdom (34). Furthermore, data suggests that the gap between Gini Index measures of the US and Guatemala may shrink in coming years as the income inequality appears to be increasing in the US but slowly decreasing in Guatemala.

## CHAPTER 6

### **Income Inequality and Measurements of Income in LIS Dataset**

Wages being the first column in the tables below are the focus of the econometric model proposed further in the paper. This variable is meant to capture cash wage and salary income (including employer bonuses, 13th month bonus, etc.), gross of employee social insurance contributions/taxes but net of employer social insurance contributions/taxes. The earnings column includes this wage income, but is expanded to include self employment income characterized as profit/loss from unincorporated enterprises. The third column labeled as factor income includes wages and self employment income, but is expanded to also include cash interest, rent, dividends, annuities, private individual pensions, royalties, etc. The fourth column labeled as market income includes all data in the previous columns, but also includes pension plan payments. This column in Guatemala is the same as the factor income column suggesting that this data is not collected or separated out by the source survey. The fifth column labeled as social transfers does not include any of the previous data and includes benefit data as specified by the LIS research team including benefits such as sick leave, unemployment, disability, and other forms of social assistance. The next column labeled as private transfers is a separate set of variables that captures alimony and/or child support received from non-household members and regular cash private transfers. This field would capture remittances from emigrated family members. Other cash income

captures all other miscellaneous income while the column labeled taxes captures all taxes paid by household.

In order to get a full picture of income within a country, income needs to be tracked at various levels of income distribution. This is because a person will chose to spend money at different rates depending on how much money they make in a given year. One million dollars earned by one individual will be spent very differently than one million dollars made by 100 individuals. One million dollars, even by American standards, is a large sum of money. One might expect a million dollars to spend on high income housing, luxury cars, vacations, with a small portion of the individual's income going to necessary expenditures such as food. However, if you took that same million dollars and split it amongst 100 people, the type of purchases made would tend to look drastically different. A large portion of this spend would mostly like involve basic necessary purchases like food and might include very little spend on luxury items. Furthermore, the spending patterns would be additionally affected by the household sizes as well. A child of three would not consume the same level of products and income as a 30 year old man that works in an office in the city but lives in the suburbs. While no two people would choose to spend their money in exactly the same way, there are a number of patterns that can inferred by simple demographic information such as ages and household size.

As the largest portion of a person's income is expected to come from employment wages, it is assumed that ranking this information by a person's wages was the best

indicator in determining patterns of income accumulation. To illustrate with data how this effect can be seen, the table below shows what happens when one decile of the population is removed from the sample. Thus, the ratios of gross income types to disposable income reported in the first row is the average income in the sample with the lowest decile of wages excluded from the sample. The usage of the data from the Luxembourg Income Study enables a convenient breakdown of income into 41 separate classifications that have been standardized across countries.<sup>14</sup>

**Table 6.1: Income Shares - United States**

Wage Decile Excluded	Wages as a share of DPI	Earnings (wages + SE income) as a share of DPI	Factor Income (earnings + cash property income) as a share of DPI	Market Income (FI + pensions) as a share of DPI	Social Transfers as a share of DPI	Private Transfers as a share of DPI	Other Cash Income as a share of DPI	Taxes as a share of DPI
1	1.073309	1.102282	1.130644	1.140391	.0764094	.0083741	.0019911	.2271652
2	1.030121	1.065241	1.095891	1.108617	.0993439	.0106866	.0025952	.2212429
3	1.018043	1.054188	1.085113	1.098401	.1061843	.0111293	.0027593	.2184737
4	1.010235	1.046897	1.077431	1.091081	.1106285	.0114163	.0027902	.2159164
5	1.004938	1.041906	1.072467	1.086276	.1131036	.0117715	.0028456	.2139964
6	1.000857	1.03913	1.068825	1.082872	.1143315	.0119137	.0028596	.2119767
7	.9955874	1.034376	1.064191	1.078385	.1160061	.0121282	.0029645	.2094837
8	.9905125	1.030054	1.059696	1.074005	.1170569	.0123177	.0029727	.2063521
9	.9850669	1.024686	1.053257	1.067672	.1176568	.0124297	.0030068	.2007657
10	.9723183	1.011616	1.039815	1.054348	.1190022	.0125272	.0030398	.1889175

Source: Luxembourg Income Study

**Table 6.2: Income Shares - Guatemala**

Wage Decile	Wages as a share of DPI	Earnings (wages + SE income) as a share of DPI	Factor Income (earnings + cash property income) as a share of DPI	Market Income (FI + pensions) as a share of DPI	Social Transfers as a share of DPI	Private Transfers as a share of DPI	Other Cash Income as a share of DPI	Taxes as a share of DPI
1	.7443173	.9379644	.944302	.944302	.020676	.0548326	0	.0198106
2	.7100396	.9304147	.9367834	.9367834	.0229411	.0602766	0	.020001
3	.6941725	.9260083	.9324926	.9324926	.0241184	.0634968	0	.0201078
4	.6841201	.92289	.9292127	.9292127	.0242056	.0659189	0	.0193372
5	.6802409	.9224589	.9288966	.9288966	.0236146	.0659039	0	.0184152
6	.677368	.9205685	.9270442	.9270442	.0237018	.0659039	0	.0180743
7	.6762566	.9207443	.9270292	.9270292	.023387	.0675027	0	.017919
8	.6768286	.9202038	.9263525	.9263525	.0239324	.0674732	0	.0177582
9	.672022	.9177306	.9235389	.9235389	.0233947	.0679416	0	.0148751
10	.6717739	.9167599	.9224782	.9224782	.0237468	.0679677	0	.0141927

Source: Luxembourg Income Study

The results show similar patterns in both countries regarding the proportion of their income coming from various forms of income and the proportion of their income paid in taxes as compared to the surrounding deciles when one decile is removed. As the wage deciles increase, the proportion of the household's income that comes from salaries or wages decreases. In both countries, social transfers appear to *increase* as the excluded wage deciles increase. This would support the common assumption that social transfers decrease as wages increase since one might assume that social assistance is less critical for higher income households.

While these tables show several similarities, there are also several conspicuous differences that may provide insight into the differing standards of living and levels of economic growth. This table displays that each wage decile has a unique and important influence on the distribution of income within a country and its effects on consumption

and economic growth. The below tables for both the United States and Guatemala provide additional insight regarding the income distribution between each country.

**Table 6.3 – Mean Wages and DPI**

Wage Decile	United States			Guatemala		
	Mean DPI	Mean Wages	Wages as a share of DPI	Mean DPI	Mean Wages	Wages as a share of DPI
1	22,643.11	6,271.02	28%	16,522.59	1,582.47	10%
2	25,774.44	16,842.25	65%	15,595.73	4,715.83	30%
3	30,895.32	5,050.76	81%	17,848.79	7,987.66	45%
4	36,710.66	33,061.98	90%	24,008.84	12,145.87	51%
5	43,767.87	42,137.82	96%	29,213.21	17,265.76	59%
6	50,816.43	52,027.64	102%	35,433.04	22,533.64	64%
7	59,438.02	63,717.21	107%	42,997.11	29,125.23	68%
8	69,787.33	78,784.90	113%	55,595.66	38,566.42	69%
9	85,689.12	101,256.60	118%	73,083.81	54,209.63	74%
10	148,824.10	194,457.90	131%	135,352.90	116,446.50	86%

Source: Luxembourg Income Study

The first and probably most noticeable difference comes when comparing the proportion of a person’s income arising from wages. In the US, the proportion of income received from wages is more than 80% for the 8 of the 10 deciles of the sample while in Guatemala, the percentage of their income initiated from stable employment is much lower, hovering somewhere around 45-75% of their total income for most deciles, suggesting that incomes are far less stable in Guatemala than in the United States. To analyze where the additional income is coming from, we then recreate the first table above with data only from the indicated deciles to show the share of DPI arising from different sources:

**Table 6.4: Income Breakdown - United States**

Wage Decile	Wages	Earnings (wages + SE income)	Factor Income (earnings + cash property income)	Market Income (FI + pensions)	Social Transfers	Private Transfers	Other Cash Income	Taxes
1	.4431837	.5491291	.5903956	.6361418	.3910712	.0382853	.0096387	.075137
2	.7911489	.8460057	.8663126	.887135	.203826	.0191811	.0046274	.1147694
3	.91578	.960085	.9783722	.9935531	.134847	.0146276	.0029979	.1460256
4	.9886667	1.028128	1.050181	1.062021	.093822	.0119524	.0027114	.1705072
5	1.03574	1.072419	1.094577	1.10511	.0729061	.0088324	.0022318	.1890805
6	1.075695	1.100191	1.129902	1.138014	.0589703	.0073242	.0020632	.2063722
7	1.114225	1.135482	1.164171	1.171524	.0493192	.0058829	.0012395	.2279658
8	1.159775	1.174271	1.204439	1.210698	.0392492	.0041539	.0011422	.2552431
9	1.21253	1.225683	1.265367	1.270468	.0318863	.0029469	.0007921	.3060929
10	1.337248	1.352486	1.395957	1.399669	.016697	.0017383	.0004151	.4185199

Source: Luxembourg Income Study

**Table 6.5: Income Breakdown - Guatemala**

Wage Decile	Wages	Earnings (wages + SE income)	Factor Income (earnings + cash property income)	Market Income (FI + pensions)	Social Transfers	Private Transfers	Other Cash Income	Taxes
1	.2479781	.809357	.814781	.814781	.0182359	.1444065		.003857
2	.5217949	.8700057	.8752051	.8752051	.0446695	.1007298		.0026657
3	.6462663	.9048622	.9092457	.9092457	.0267307	.075388		.0024927
4	.7191093	.9277585	.933377	.933377	.017859	.0578199		.0087428
5	.7605822	.9325791	.9370394	.9370394	.0175459	.0562054		.0145241
6	.7892354	.9500427	.9540945	.9540945	.0212793	.0429797		.0174875
7	.8057573	.9499012	.9556556	.9556556	.0204132	.0400304		.0189463
8	.8231134	.9615396	.9687699	.9687699	.0232602	.0352875		.0209939
9	.8633578	.9847571	.9955231	.9955231	.0169365	.0326925		.0513822
10	.9194919	1.016639	1.030015	1.030015	.0231666	.022622		.0708726

Source: Luxembourg Income Study

These tables further break out the differences between income shares between countries. While wages remain the primary source of income in both countries (everywhere other than the first decile), there also appears to be a number of differences in the trend that can be quite significant in explaining the varying economic landscapes between the US and Guatemala. The level of wages either meets or exceeds the total DPI in the US for most residents; however, nearly all residents in Guatemala appear to depend



on other sources of income beyond income earned from stable employment income. The relative amount of social transfers received from the government in Guatemala is much lower than the level of social transfers received by those received from the United States. The level of private transfers in the United States appears to be modest, raising the statistics roughly an additional .5-2% while the private transfers seen in Guatemala are roughly 2-3 times higher than the transfers received from the Guatemalan government. This data suggests that the Guatemalan government provides little support by way of social transfers to its citizens and depends on the expectation that their citizens will receive further assistance from private parties. However, once one looks at the tax rates in both the US and Guatemala, one may notice that the proportion of DPI consumed by taxes in the US is far greater than the level of transfers received by their residents while Guatemala appears to provide more assistance to their residence than taxes collected. These differences seen in the distribution of income show the level of involvement that the government takes in shaping the well being of its citizens and their priorities in making policy recommendations within the country.

## CHAPTER 7

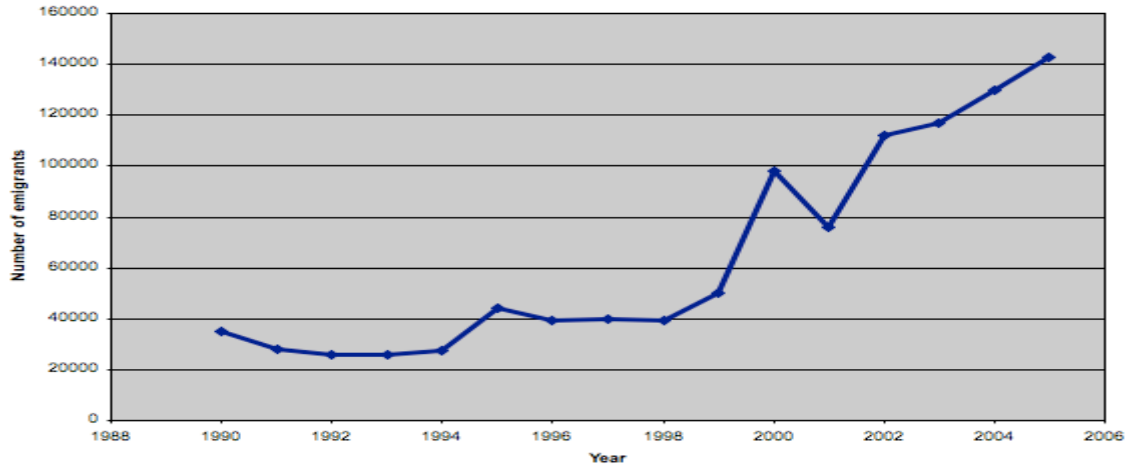
### **Migration and Remittances in Guatemala**

Considering the high level of private transfers seen in Guatemala as compared to the United States, one must then consider where this private transfer is coming from. Given this stark contrast in the standard of living between the wealthiest 10% of the population and the poorest 10% of the population, it is no surprise that overall, Guatemala's net migration is negative as inhabitants tend to look elsewhere for work. Remittances are considered vital to hundreds of thousands of urban and rural families throughout Guatemala.<sup>18</sup> By 2005, remittances amounted for over \$3 billion. Approximately 98% of those remittances come from the United States, average about \$306 per household, and make up approximately 9.5% of Guatemala's total GDP. Recent surveys have indicated that 48.7% of these remittances are used to supplement household budgets, mainly to purchase additional food for the family. While the remittances do help support households throughout the country, it does not appear that the remittances sent from abroad are effective at reducing the incidence of poverty or increasing the standards of living as much as one would expect.

The World Bank had estimated that the volume of remittances would create a reduction in poverty by as much as 6.4%, yet when looking at the poverty rate of Guatemala, the poverty rate fell by 2%, less than one third of the initial estimate.<sup>5</sup> The expatriate Guatemalan community in the United States sends the largest amount of

remittances back to its home country than immigrants from any other Central American country.

**Figure 7.1 - Net Emigration from Guatemala per Year, 1990 to August 2005**



Source: <http://www.migrationinformation.org/USfocus/display.cfm?ID=392>

This migration, while increasing GDP in the short term, reduces the amount of labor within the country. If residents perceive greater levels of opportunity abroad, this may suggest that the appropriate incentives are not in place to see large scale economic growth. The Guatemalans most well equipped to contribute to large scale efficiencies may opt to leave the country. In fact, a large portion of low and middle income countries tend to show large instances of “brain drain” where the brightest and most talented students are often sent abroad to study but fail to return to their home country due to few opportunities for the same level of advancement that might be available to them in the more industrialized nations.

The most important aspect of creating the means for Guatemalans to succeed in the global marketplace is a strong investment climate.<sup>7</sup> The investment climate can be defined as “the set of location-specific factors shaping the opportunities and incentives

for firms to invest productively, create jobs and expand.” Guatemala has elevated its interest in improving the investment climate by simplifying regulations and procedures of imports and exports and adopting treaties to protect investment.<sup>9</sup> However, it appears that the government’s focus has not been wide enough. Poverty and income disparities remain commonplace.

It has been argued that large international income disparities can be largely explained by examining differences in productivity.<sup>7</sup> To be more specific, the gaps in income have been correlated to differences and/or resistance to the adoption of new technology or more efficient use of current technologies that will allow greater output with less effort. It is further argued that use of technology is conditioned by the institutional and policy arrangements a society employs which are categorized as investment climate variables. When Latin American countries have been studied as a group, it has been observed that Latin American countries have not replicated Western success due to competitive barriers that have created this productivity gap.

## CHAPTER 8

### **Macroeconomics and the Importance of Fiscal Policy**

When considering classical economic theory, one would not consider individual or job characteristics at all, but mainly look at the standards within the labor market looking at factors such as unemployment rates and price levels. Classical economists consider wage differentials to remain stable over time. The ratio of the natural wage in comparison to the total wage differential is assumed to be constant. Many classical economists do not address that direct taxes on wages are often followed by an immediate adjustment of wages leaving the worker's real wage virtually unaltered.<sup>19</sup> While this view is highly simplistic, it provides a good foundation to begin looking at the overall patterns in wage rates over time.

According to the Wage Fund Theory, wage rates are said to depend upon the relationship between a predetermined pool of funds designated for wages and the total size of the working population. According to this theory, wages are then driven to subsistence level by the population changes in response to the difference between the current wage and subsistence level. In fact, some classical economists go so far as to assert that wages are set at the level of subsistence. Others suggest that there is no such cohesive theory at all and assert that Smith's theory of wages is nothing more than a "compendium" of numerous and diverse incompatible and contradictory theories. Amongst these contradictions one would note that the bargaining power of workers in a

capitalist society is completely inconsistent with the theory of the wage fund or the role of competition in determining wages.

When looking at average hourly rates in the United States and comparing them to the average length of unemployment, employment to population ratios, and total hours worked, many relationships assumed by the classical economic theory are supported at the macro level. Stirati discusses in detail the irrelevance of the demand curve for labor market demand in favor of a single ratio quantity that identifies the ratio of laborers currently employed.<sup>19</sup> When using only the ratio of employed labor to the size of the labor, the average length of unemployment, and the total available labor hours, a correlation of nearly 100% was. While this correlation can not be considered conclusive of any classical economic theory, it at least suggests that the tendencies of the labor market as a whole has a significant effect on wage rates. The analysis supports the hypothesis suggesting that wages would decrease when length of unemployment or employment to population ratios increased or total hours worked decreased was confirmed. The effects of population were deemed to be insignificant to determining the wage rates. There was no indication within the analysis regarding the determination of subsistence levels; however, this analysis may become more relevant when examining wages where large portions of the populations are living at or below the universally accepted subsistence level.

As income tax was often considered an elite tax in the US up until 1945, the view that tax rates did not have a strong effect on wage rates may have been more realistic in

the time of the most prominent classic economists who lived in the 18<sup>th</sup> and 19<sup>th</sup> centuries. Yet, as tax rates have become more complicated and fiscal policy has become more prevalent, one would be remiss not to take some time to look further into the effects of tax rates on wages and economic growth. Recent analysis on effective tax rates by Lim and Hyun has shown some interesting relationships between income and tax amounts via their calculation of effective tax rates.<sup>11</sup> When looking at seven countries with progressive tax structures, Lim and Hyun found that they could extrapolate data in a useful and practical way to determine and compare the relationships between income and tax amounts using the same LIS database used in the empirical analysis discussed in detail below.

The majority of countries around the world are now considered to have progressive income tax systems.<sup>11</sup> The calculation of actual and estimated tax rates provides a framework to evaluate income tax laws across countries. Their model is a fairly simple function that measures the relationship between tax amounts and income that creates a practical application to the data and tax rate analysis. In addition to creating a practical application to analyzing data within a country, the function also creates a straightforward methodology to compare tax rates and tax systems across countries. In this model, Lim and Hyun examine, utility (u), consumption (c), sacrifice (s), maximum effective tax rate (b), and a parameter (p) representing the elasticity of income where they believe that the average tax rate is a function dependent upon sacrifice and total income. Lim and Hyun assert that the function shows that tax rates are

correlated to an individual's willingness to work. With this function, then they impute a maximum effective tax rate and compare this tax rate to the actual tax rate to determine how effective the current tax policies in a country are in creating maximum output and economic growth.

In the original analysis, Lim and Hyun looked at Norwegian data from 1995, US data from 1997, as well as similar data sets from 5 other countries considered to have fairly progressive tax laws. The study showed considerable variation from country to country and determined that of the seven countries, Norway was one of the two countries in the data set that showed to have a higher actual average tax rate than the estimated maximum effective marginal tax rate. Norway showed to have the third highest residual income elasticity, meaning that only the USA and Korea had a tax rate system which created *less* income redistribution than the rest of the studied tax rate systems.

To contrast the methodology proposed by Hyun and Lim, another regression was run using aggregated time series data with US income data from the St Louis Federal Reserve Bank website instead of the individual cross-sectional data provided from the LIS database. This data was further aggregated so that the variation in the data was so closely correlated that the SPSS regression model could not even find a relationship between the data points. This result further confirms the assumption that in order to properly estimate a significant relationship between income and tax rates, one must be looking at a robust, disaggregated and varied cross-sectional data set. Further inference



to this result would suggest that there is a set “natural” level of utility that a country will adjust income and hours worked as tax policies change.

The challenges met in recreating the model with aggregated time series data highlights how important it is to focus on individual income data. The lack of variance in the aggregated data when adjusted for the opportunity cost of leisure time also highlights the importance in evaluating wage differentials. Without considering the different compensation rates individuals receive, one cannot fully comprehend the various disparities within a community, culture, country, etc that will create new and distinctive characteristics that bring about additional dimensions to economic analysis. Without considering these nuances, one can lose sight of the various elements that affect output and economic growth.

## CHAPTER 9

### **Job Characteristics, Wage Differentials and Labor Market Incentives**

Contemporary research on wage differentials often does not look at macroeconomic policy related variables, but instead examines seven main characteristics of the job and the individual: gender, job tenure, age, education, industry type, size of firm, and levels of unionization.<sup>20</sup> There are few who would dispute that there is definitely a relationship between wages and these characteristics. However, the main research currently outstanding shows only moderate correlation between wage rates and these characteristics. Other studies on wage differentials have noted that the expected correlation between earnings and particular qualifications as noted above are often studied by looking at average or aggregate incomes across occupation groups.<sup>13</sup> Even within these remarkably smaller segmented labor markets, the range of incomes within these groups are often much larger than the differentials between neighboring strata.

The lack of strong correlation amongst researchers suggests that these are not the most reliable indicators of existing wage differentials but, rather, that these are indicators that may show due correlation of other factors that may be more influential in determining wage rates. In fact, some research suggests that occupation/industry and education may in fact be double measures of a similar effect as certain industries/occupations often require and attract particular levels of education. Profit and rent are considered by many economists to be residual income and we will chose to adopt

this view even though it is recognized that capital and land in addition to labor contribute to production.<sup>19</sup>

As there are different factors that will influence different types of income, the model suggested in this paper will focus only on income earned as salaries and wages. As over 50% of the Guatemalan dataset shows no wages and relies more heavily on self employment income, we will also examine the same model on self employment income. Since we are focusing on income at the individual level, examination of productivity cannot be adequately discussed in this paper. The wage income earned via employment with a company highlights the dollar value placed upon a person as a bearer of their own human capital. As such, the theory of human capital attaches the individual's characteristics which last for the entire length of the individual's lifespan as well as comparing the individual's assimilation of knowledge via education, the applicability of this knowledge via the employer's demand for educated workers, and the individual's age. Therefore, the proposed model will integrate two of these main factors: age and education. These factors can also be tied back to the theory of Job Seeking and Market Segmentation. The model will consider the age and education of both the head of the household and the spouse to look at both the individual's contribution and the dynamics of the interpersonal relationships of the household as it might be telling to see if others within the household that may not be directly involved in the employment contract can significantly influence the desired wage rates.

To highlight the importance of the wage fund theory that discusses spreading a finite fund amongst a set of individuals, the model will examine the total number of individuals in the household and also the wage earners and the number of children in the household to see how additional household members and wage earners in the household affect the incentives in further income accumulation. One can also use this theory to suggest that since the amount of wages within a country is finite, a certain level of redistribution is necessary to ensure that the appropriate level of public goods (i.e. roads, law enforcement, government services, etc) is available. This redistributive effect can be measured by what the individual receives via social transfers and pays in taxes. Since tax amounts are calculated using wages, we will not look at the total amount of taxes paid, but rather, we will look at the rate at which an individual is taxed.

The theory of the efficiency wage pulls its basis as using higher wage rates to motivate workers to be more productive and committed to their employer. This incentive cannot be measured by looking a few different variables both in the current period and in the prior period. One must not forget that individuals work for an employer by choice. This choice is made often when considering the options not only in working for other employers, but may also chose to earn income in other ways via self employment, property, investments, or other such ventures. The model will investigate a few measurements of the other venues of earning income with measures of self employment income and other income. Other incentives discussed in the efficiency wage theory involve the worker's expectation in earning and their sense of value in their work. These

values can be quantified by looking at the difference in current year and prior year incomes as well as the average household income ages 1-16, adjusted for inflation.

While the characteristic of the individual's experience is important, the model must also consider the wage rates received in comparison with the purchasing power the wage brings. This means that a certain wage while in nominal terms is important; it is not the entire story. The largest portion of a household's income is often spent on housing, yet the cost of housing can vary drastically not only between countries, but also within countries. The differences between costs between urban and rural areas often differ drastically. In turn, in larger countries such as the US, show differing wage rates as the portion of the country changes. While there are multiple urban areas within the US, the cost of housing is not equal in all urban areas. Nor is the general cost of other necessary items the same. Housing in the Los Angeles metro area, will not cost the same as housing in the Atlanta metro. In turn, one might find the cost of living in a city such as New York City lower than the cost of living in Los Angeles if the increase in the housing prices in New York City were outweighed by the significant decrease in transportation costs allowed by the well-developed public transportation system and compact nature of the close proximity of the buildings. One might choose different measures or create their own index to compare the wage rates to the cost of living in the area of residence beyond a national measure of PPP or CPI.

## CHAPTER 10

### Theoretical Model and Empirical Data Sets

To combine these measures into a single forecasted econometric model, we can consider the model below:

$$\mathbf{Wages}_i = \beta_1 + \beta_2 (\text{Cost of Living Index}_i) + \beta_3 (\text{Age - head}_i) + \beta_4 (\text{Age - Spouse}_i) + \beta_5 (\text{Educational level - head}_i) + \beta_6 (\text{Educational level - spouse}_i) + \beta_7 (\text{Number of Earners}_i) + \beta_8 (\text{Number of Children under 18}_i) + \beta_9 (\text{Self Employment Income}_i) + \beta_{10} (\text{Other Income}_i) + \beta_{11} (\text{Social Transfers}_i) + \beta_{12} (\text{Tax Rate}_i) + \beta_{13} (\text{Wage Differential from Prior Year}_i) + \beta_{14} (\text{Average Household Income of Head of Household Age 0-16}_i) + \varepsilon_i$$

This paper will consider two different measures to segment the labor market. In a more traditional type of market segmentation, the paper will examine a regression on the total labor market first and then segment the labor market between low and high educated workers. As education expectations are culturally relative, the model will consider low education in the US as workers with 12 years or less and in Guatemala. The model will consider low education to be workers with 9 years or less. As the analysis focuses on individual characteristics and education appears in multiple theoretical models as a key indicator of economic growth and wage differentials, it would appear logical to differentiate the labor market by education level.

The paper will also briefly contrast the wage differentials coming from established employment with an employer to self employment income to evaluate how well the indicators might affect all levels of income. This segmentation should allow one to distinguish between the varying levels of incentives created in the structured

employment versus self employment labor markets to analyze whether or not one can use the same econometric methods of total income versus wage income. The variation between income types lends itself easily to empirical analysis due to the ease of available data of employment versus self employment income in the LIS database across countries as well as the prominence of self employment income present within Guatemala. While one might propose that the status of self employment is not the same in each country, one can easily differentiate those markets from each other and note many similarities between the levels of importance of the factors within the model. For example, one might expect that the number of years of education would be much more important in the more formal employment market than in the self employment market. This segmentation also allows for individuals who may be employed in both markets simultaneously or individuals who switch between markets within a single measured time period.

Therefore, the econometric model to adjust for the market segmentation would be slightly altered as follows:

$$\mathbf{Self\ Employment\ Income}_i = \beta_1 + \beta_2 (Cost\ of\ Living\ Index_i) + \beta_3 (Age - head_i) + \beta_4 (Age - Spouse_i) + \beta_5 (Educational\ level - head_i) + \beta_6 (Educational\ level - spouse_i) + \beta_7 (Number\ of\ Earners_i) + \beta_8 (Number\ of\ Children\ under\ 18_i) + \beta_9 (Wages_i) + \beta_{10} (Other\ Income_i) + \beta_{11} (Social\ Transfers_i) + \beta_{12} (Tax\ Rate_i) + \beta_{13} (Wage\ Differential\ from\ Prior\ Year_i) + \beta_{14} (Average\ Household\ Income\ of\ Head\ of\ Household\ Age\ 0-16_i) + \varepsilon_i$$

When looking at the labor market segmented in this fashion, the definition of the samples would be defined upon whether or not the household was receiving income within that particular segment of the market. The household may fall into either market or both

markets depending on the composition of the household's income. One might expect a more industrialized country to have a larger relative sample within the primary sector of the market defined by the measured employment income while the relative sample size of the secondary market defined by the measured self employment income would be much larger in middle income or developing countries.

The empirical data used to evaluate the theoretical model was pulled from the Luxembourg Income Study database.<sup>14</sup> The Luxembourg Income Study has been tracking cross-sectional income data sets since 1983 and has amassed data in nearly 40 countries worldwide and has a full-time staff that harmonizes the data to allow researchers to pull consistently comparable data sets from multiple countries for cross-national income analysis. As Guatemalan data was only available in the recent wave release of data, the income analysis is limited to 2004 (US) and 2006 (Guatemala) income data. The level of detail provided in this database is one of the few databases that allow us to study income distribution at the household level combined with demographic data often used in studying wage differentials. However, since this data is not captured for the same households in multiple years and confidentiality issues do not identify their location in a manner that will allow us to calculate a cost of living index; the empirical analysis will be run on a slightly modified version of the theoretical econometric models. The Guatemalan data is provided to the Luxembourg Income Study from the National Institute for Statistics (Instituto Nacional de Estadística – INE), Directorate of Censuses



and Surveys while the United States income data is provided from the US Census Bureau's Current Population Survey.

In order to run the regression the same fields are pulled from each file: Age (head of household/Spouse), Year of Education (head of household/spouse), Number of Earners in Household, Number of Children under 18 in household, Self Employment Income (calculation), Other Income (calculation), Social Transfers (calculation), and Tax Rate (calculation). Due to the survey method of the Guatemalan dataset, the Years of Education had to be recoded and imputed into a meaningful value to align with the US education data.

**Table 10.1 – Coefficient Expectations**

<b>Independent Variable</b>	<b>Expected Sign</b>
Age – Head	Positive
Age – Spouse	Positive
Educational Level – Head	Positive
Educational Level – Spouse	Positive
Number of Earners	Positive
Number of Children Under 18	Positive (US)/Negative (Guatemala)
Self Employment Income	Negative
Other Income	Positive
Social Transfers	Negative
Tax Rate	Positive

CHAPTER 11

**United States Empirical Results**

By using the model and data described above for the United States data set, the empirical results to the regression are as follows:

**United States**

*Entire sample where wage income data is available*

Number of observations: 39,091

$$\begin{aligned} \text{Wages}_i = & -85,912.99 + 108.724 (\text{Age} - \text{head}_i) + 171.0294 (\text{Age} - \text{Spouse}_i) + \\ & 2,840.602 (\text{Educational level} - \text{head}_i) + 2,168.66 (\text{Educational level} - \text{spouse}_i) + \\ & 8,111.058 (\text{Number of Earners}_i) + 8,734.518 (\text{Number of Children under 18}_i) - \\ & .5754578 (\text{Self Employment Income}_i) + 25,249.85 (\text{Other Income}_i) - .6905085 \\ & (\text{Social Transfers}_i) + 408,355.3 (\text{Tax Rate}_i) + \varepsilon_i \end{aligned}$$

<b>Source</b>	<b>SS</b>	<b>Df</b>	<b>MS</b>	<b>BIC</b>	962933.4
Model	6.7239e+13	10	6.7239e+12	<b>F( 10, 39080)</b>	2307.99
Residual	1.1385e+14	39,080	2.9133e+09	<b>Prob &gt; F</b>	0.00
Total	1.8109e+14	39,090	4.6327e+09	<b>R-squared</b>	0.3713
				<b>Adjusted R-squared</b>	0.3711
				<b>Root MSE</b>	53975

**Table 11.1 – United States Coefficient Results**

<b>Independent Variable</b>	<b>Expected Sign</b>	<b>Calculated Sign</b>	<b>P Value</b>
Age – Head	Positive	Positive	0.026
Age – Spouse	Positive	Positive	0.001
Educational Level – Head	Positive	Positive	0.000
Educational Level – Spouse	Positive	Positive	0.000
Number of Earners	Positive	Positive	0.000
Number of Children Under 18	Positive	Positive	0.000
Self Employment Income	Negative	Negative	0.000
Other Income	Positive	Positive	0.000
Social Transfers	Negative	Negative	0.000
Tax Rate	Positive	Positive	0.000

The most important point to notice is the calculated R squared of the models. If comparing the R squared for the entire labor markets across the US and Guatemala, the level of variation across samples are very close. Other studies have identified similar levels of correlation between similar sets of variables and income.<sup>20</sup> The fact that only 37% of the variation in wages can be attributed to the limitations in the dataset that allow measurements only within the current period and the lack of enough specificity in the region variable to allow for a cost of living adjustment to the model. As most have probably experienced in the United States, the wage one receives and/or is offered for employment is rarely based solely upon the experiences in one period. Prior research as referenced above has indicated a clear correlation of current period's wages as dependent upon prior period wages. Other research has indicated a clear relationship between an individual's income as based upon their parent's income while they were growing up. One might account for this relationship due to the fact that one's experiences in their childhood create a set of skills and expectations that one would carry through their lifetime. The regression above would suggest that only 37% of the wages received in a household are determined by the current period and the individual's characteristics measured in the model. The remaining variation would be accounted for in prior periods or general characteristics of the labor/product markets as a whole using variables which are not measureable in the LIS data.

In addition to looking at the R squared statistic, it is important to also consider the BIC statistic for best fit. Along with considering the amount of variation determined by

the model, the BIC statistic also considers the number of variables included in the model. As a model includes more variables, the R squared value usually becomes slightly higher. As such, it is important to counter-balance the additional variables with a secondary statistic of best fit to take the number of variables into consideration. This can be seen when looking at the research done by Ohtake's research in comparing wage differentials between the US and Japan.<sup>20</sup> The general approach taken by Ohtake is comparable to many other wage differential analyses, however, the first model shows 23 variables with an R squared of .3494 for the US. When Ohtake increases his model to include 33 variables, the R squared value only increases slightly to .4202. The BIC for the models is not discussed. The models differ mainly by variable approach. While both models consider age and education, the model proposed in this paper focuses on household and fiscal policy characteristics while Ohtake focuses on the job characteristics such as occupation and years of tenure. The fact that the R squared values of both models appear to be similar suggest that the individual's characteristics can only explain so much and that an explanation of 35-40% of the variation is a reasonable result of the model.

The fact that the model proposed in this paper can reach the same level of variation by looking at significantly variables suggests that wages may be more reasonably determined by one's situation than by one's career choice. The career choice may be more of a result of their situation rather than their career choice causing the difference in wage rates. If the career choice was significant, one would not see the similar levels of correlation between multiple countries with vastly different job markets.

This proposal becomes more important when looking at policy recommendations. If public policy can affect wages more so than the particular jobs made available, then the policies implemented within countries can potentially be quite useful in making long-term adjustments to wage rates across countries.

The hypothesis that other variables are needed to be considered is further validated by the negative constant assigned to the model. If all variation could be identified using the selected variables, the constant would be positive to suggest a starting point or average wage rate that all would receive without consideration of the other variables. The negative constant suggests that once all variables are considered, the model must always be adjusted for a year's wages by reducing the estimate by \$85,913. In addition, when considering the F statistic provided for the model and the p values assigned to each individual variable, we can determine that all statistics in the model are statistically significant in identifying the variation experienced in a household's wage income.

The directions of the signs of all variables are consistent with what one would expect from the variables in a developed industrialized nation. As age increases, so does income. While the econometric model cannot prove that it is the increasing age that causes the increase in wages, one can assume that it is the age that causes the increase in wages via most experiences as well as the assumptions used in the economic theories discussed previously in the paper. One additional year in age of the head of household increases the total income of the household by approximately \$109, while an additional

year in age of the spouse increases household income by approximately \$171. This indicates that an additional year in the age of a spouse is more than 50% more significant in indicating household incomes than the age of the head of the household. While it is unexpected to see the increase in wages seems to rely more heavily on the increase in age of the spouse than in the increase of the age in the head of the household, this increase in significance may indicate that the older spouse would suggest a more mature and rational household. With the increase seen in divorce in the US and the focus placed on youth, one may be pleased to note that an older spouse can tend to increase income. This increase may also highlight the importance of responsibility and stability in the household with respect to increased income. This correlation of ages to increases in wages appears to be consistent throughout the models in the US and in one of the models in Guatemala as well.

The correlation in increases seen in wages and education are as one might expect. The increase in wages, the relative importance of the head of household versus spouse and the magnitude of the impact as compared to age all appears to coincide with the assumptions of the Theories of Human Capital and Market Segmentation. As education is reliant upon the skill and effort of the individual, one would expect education to create more of an increase to the wages than an increase in wage as increase in age is inevitable. An additional year of education from the head of the household increases the household wages by slightly more than \$2,840 per year while an additional year of education of the spouse increases the household wages by \$ 2,168 per year. Since the designation of head

of household is made based upon who brings in the highest wage, it makes sense that the education of the head of the household would create a more significant increase in wages than the spouse. However, it does highlight the importance of education of both the head of household and the spouse. By comparison, if the spouse in the household were to gain a college degree instead of stopping their education after high school, one would see their income raised by nearly \$9,000 a year.

The increase seen as related to the number of earners is, perhaps, obvious and without the need of explanation. If there are more people working, then, of course, there will be more wage income in the household. In this model, one tends to see household income increase by \$8,111 per each additional earner. However, it is important to note that the statistics indicate that a high school educated spouse gaining a bachelor's degree would increase the yearly income *more* than entering the workforce straight out of high school.

The increase seen in wages as related to the number of children in the household may not be quite as obvious. While the other variables appear to be the drivers of increases in wages, the number of children in the household may be the first variable to show the reverse relationship. As lower income countries tend to have more children per household on average, more industrialized nations tend to have fewer children per household. This tends to occur as industrialized nations do not tend to rely upon their children to bring in wages or help with household work in a significant manner, but tend to consider having additional children when they have the resources to support the

children. The importance of education would tie very closely to this correlation. As the standards of education increase in the country, the level of support required to each child in the household then increases as well requiring additional income from the parents to support the child to be a successful functioning member of the society. In the US, it appears that an additional \$8,754 of yearly income on average is what an American considers to be necessary to raise another child in their household.

The last four variables measured in the empirical analysis measure the correlation between other forms of income distribution as an incentive or disincentive to wage income. There appears to be a correlation between increased wages and increased taxes and other income while increased wages appear to be correlated to a decrease in self employment and social transfers. These variables are meant to measure the level of incentive placed upon wages by the external factors of income sources and governmental based redistribution, but the direction of correlation cannot be determined looking only at the cross-sectional dataset. The fact that both other income and taxes move in the same direction with wages while self employment income and social transfers move in the reverse direction from wages suggests that there is an important interaction occurring between fiscal policy and free market forces that cannot separate the labor market from the financial and product markets.

An additional dollar of other income tends to see an increase in wages of \$25,250. This is a significant increase in wages. Other income would include income from property and other sources of wealth income, among others. This significant increase in



wages correlating with increases in other income highlights the significance of accumulated wealth and its effects on wages and income inequality. However, this increased correlation does not carry over to self employment income. An increase in self employment income of one dollar appears to decrease wages by 57.5 cents. This highlights the differing opportunity costs of salaried employment when compared to self employment. Since an increase of one dollar of self employment income has a proportionally lower decrease to salary income, one can assume that salaried employment overall creates higher incomes and is more significant in promoting economic growth than self employment. This is an important point to remember when looking at the pattern of employment in Guatemala. Similarly, there is a proportionally smaller decrease to wages when looking at social transfers. An additional dollar of social transfers only decreases income by 69 cents. When considering that the regression only shows statistical correlation and not causation, this merely indicates that lower incomes *correlate* to higher social welfare payments. In no way does this prove that welfare decreases income. As with self employment income, this also shows a lower proportional change to wages indicating that there is a much lower effect of social welfare on income than the conservative ideology might predict. This calculation appears to dilute the argument that welfare creates a disincentive to work.

The positive correlation between tax rates and wages further suggests that the disincentive created by increased tax rates may not be as significant as more right-wing political views propose. It is also important to keep in mind that the tax rate is measured

as a ratio and, therefore, a one percent increase in tax rate would correlate with a \$4,083.55 increase in the wage income of the household. Subsequent regressions will show much of the same effects as we measure segmented labor markets and other countries. Analysis of the remaining regressions will focus on how the new regressions differ from the more detailed regression analysis of the entire US wage income sample.

***Low Skill (Years of Education-Less than or Equal to 12)***

Number of observations: 26,574

$$\text{Wages}_i = -55,222.86 + 1,075.47093 (\text{Age} - \text{head}_i) + 171.0294 (\text{Age} - \text{Spouse}_i) + 779.0335 (\text{Educational level} - \text{head}_i) + 91.28378 (\text{Educational level} - \text{spouse}_i) + 10,040.05 (\text{Number of Earners}_i) + 7,026.442 (\text{Number of Children under 18}_i) - .7720194 (\text{Self Employment Income}_i) + 20,461.09 (\text{Other Income}_i) - .4230677 (\text{Social Transfers}_i) + 374,338.6 (\text{Tax Rate}_i) + \varepsilon_i$$

Source	SS	Df	MS	BIC	636051.6
Model	2.6212e+13	10	2.6212e+12	<b>F( 10, 26563)</b>	1810.23
Residual	3.8462e+13	26,563	1.4480e+09	<b>Prob &gt; F</b>	0.00
Total	6.4674e+13	26,573	2.4338e+09	<b>R-squared</b>	0.4053
				<b>Adjusted R-squared</b>	0.4051
				<b>Root MSE</b>	38,052

***High Skill (Years of Education-Greater Than 12)***

Number of observations: 12,517

$$\text{Wages}_i = -239,328.20 - 33.29594 (\text{Age} - \text{head}_i) + 368.6373 (\text{Age} - \text{Spouse}_i) + 12,176.07 (\text{Educational level} - \text{head}_i) + 3,961.021 (\text{Educational level} - \text{spouse}_i) + 7,248.393 (\text{Number of Earners}_i) + 10,195.49 (\text{Number of Children under 18}_i) - .4665325 (\text{Self Employment Income}_i) + 29,345.32 (\text{Other Income}_i) - 1.042037 (\text{Social Transfers}_i) + 440,271 (\text{Tax Rate}_i) + \varepsilon_i$$

Source	SS	Df	MS	BIC	316,905.9
Model	2.6362e+13	10	2.6362e+12	<b>F( 10, 12506)</b>	458.33
Residual	7.1930e+13	12,506	5.7517e+09	<b>Prob &gt; F</b>	0.00
Total	9.8292e+13	12,516	7.8533e+09	<b>R-squared</b>	0.2682
				<b>Adjusted R-squared</b>	0.2676
				<b>Root MSE</b>	75,840

When segmenting the labor market by years of education as a proxy for skill set, we can notice two important patterns. The first important pattern is that there is a higher correlation between wages and the variables when there are less years of education than when the years of increase beyond high school. This might be reflective of the diminishing marginal returns to additional years of education or highlight the effect of education on jobs with higher wage rates are less significant than other variables, such as perhaps, the environment that one grew up in. The effects of the individual's childhood environment would then be represented in the model by a variable representing the average household income of the individual's childhood years. In any country, there will be more low wage jobs available than high wage jobs. As the jobs become more specialized, there becomes more competition for these jobs which raises the wage rate, but also raises expectations of the employee's productivity, attitude, and commitment to their employer. While education can help teach people skills, it cannot as easily transfer abilities needed to fulfill the higher wage jobs. As such, one might consider that those abilities are more likely to be present in individuals who grew up in household with higher wages. This might be because those abilities are genetically inherited from their parents, or learned indirectly from their parents as they grew up.

The second important pattern noticed is the impact of the age of the head of the household on the increasing wages. In the econometric model overall, the age of the head of the household has a modest impact on increasing wages where each additional

year in age correlates to an increase in wages by \$108.72. When examining wages for low skill jobs, the impact of an additional year in age, this correlates with an increase in the wage by \$1,075.47. However, when evaluating households where the head of the household has been educated beyond high school, the increase in age correlates to a *lower* wage. An additional year in age correlates to a *reduction* of the wage by \$33.30. This pattern highlights an important premise of the Theory of Human Capital. This set of econometric models very clearly shows that increases in education are significantly more effective in increases wages and economic growth than increases in age (i.e. experience) or increases in the amount of people in the household. In other words, effectiveness of labor is more important than quantity of labor when considering increases in economic growth. These models also highlight the limitations an individual has in increasing their wage rates on their own. While their household and individual characteristics can be significantly correlated to their wage rate, there is more than 50% of their wages that are influenced by other factors. The original theoretical model suggests that other factors might include variables that would represent market conditions and luck of social status at birth.

CHAPTER 12

**Guatemala Empirical Results**

By using the model and data described above for the United States data set, the empirical results to the regression are as follows:

**Guatemala**

*Entire sample where wage income data is available*

Number of observations: 7,795

$$\text{Wages}_i = -5,431.242 + 179.9642 (\text{Age} - \text{head}_i) + 164.5966 (\text{Age} - \text{Spouse}_i) + 1,317.001 (\text{Educational level} - \text{head}_i) + 1421.572 (\text{Educational level} - \text{spouse}_i) + 7,465.739 (\text{Number of Earners}_i) - 191.378 (\text{Number of Children under 18}_i) + .0233327 (\text{Self Employment Income}_i) - 35,191.37 (\text{Other Income}_i) + .3327169 (\text{Social Transfers}_i) + 111,841.20 (\text{Tax Rate}_i) + \varepsilon_i$$

<b>Source</b>	<b>SS</b>	<b>Df</b>	<b>MS</b>	<b>BIC</b>	182,414.7
Model	3.9884e+12	10	3.9884e+11	<b>F( 10, 7784)</b>	473.16
Residual	6.5613e+12	7784	842,927,437	<b>Prob &gt; F</b>	0.0000
Total	1.0550e+13	7794	1.3536e+09	<b>R-squared</b>	0.3781
				<b>Adjusted R-squared</b>	0.3773
				<b>Root MSE</b>	29,033

**Table 12.1 – Guatemala Coefficient Results**

<b>Independent Variable</b>	<b>Expected Sign</b>	<b>Calculated Sign</b>	<b>P Value</b>
Age – Head	Positive	Positive	0.001
Age – Spouse	Positive	Positive	0.005
Educational Level – Head	Positive	Positive	0.000
Educational Level – Spouse	Positive	Positive	0.000
Number of Earners	Positive	Positive	0.000
Number of Children Under 18	Negative	Negative	0.281
Self Employment Income	Negative	Positive	0.000
Other Income	Positive	Negative	0.000
Social Transfers	Negative	Positive	0.000
Tax Rate	Positive	Positive	0.000

When considering the same econometric model with data from Guatemala, a country with drastically different economic conditions, standards of living, political history and cultural norms, one can notice a number of similarities. The level of correlation in the model for the entire Guatemalan sample is less than one percent different than the level of correlation of the model of the US. This suggests that the measured variables have similar effects in shaping the wage rates of the Guatemalan households as those in the United States. The significant decreases in constant can be traced back to the significant decrease in average incomes in Guatemala as compared to incomes in the United States.

While the variables as a whole appear to be contributing to the same amount of variation in wages in Guatemala, the direction of the changes are not consistent across countries. The effects of the individual variables may differ between the US and Guatemala, these differences can be accounted for by looking at the cultural norms and economic environmental differences. The first directional change is the effect of each additional child in the household. According to the proposed model, one additional child in the household corresponds to a drop of \$191 per year in income. This is a significant variance from the pattern seen in changes in family size observed in the United States. As Guatemala is considered a country less developed than the United States where the residents on average spend less years in the educational system, one would expect there to be more children in the Guatemalan household than in the American household.

As first proposed by Thomas Malthus in “An Essay on the Principle of Population,” population growth must be tightly controlled and reduced as much as possible for, if not, a Malthusian Catastrophe will occur where the amount of food grown throughout the world will not be enough to sustain the exponential population growth that would result.<sup>15</sup> As education increases within a given area, one tends to see a reduction in family size. As family size reduces, parents are able to provide a higher amount of monetary support per child. In turn, this also allows the child to spend more time in school since there is a lower economic burden on the household spent on support for the children. However, it is also important to note that the returns to education cannot be realized as quickly in Guatemala as it is in the United States. The returns to an additional year of education are less than half as those seen in the United States. An additional year of education is only worth an additional \$1,300-\$1,400 per year depending on whether the education is going to the head of household or the spouse as opposed to the \$2,800 increase seen in the United States. But when considering that the median income seen in Guatemala is 40% lower than the median income seen in the United States, the returns to an additional year of education appears to be considerably more comparable between countries. As such, if the median income is around \$30,000 for a household where the head has a high school education, a 4 year college degree would then increase their household income by nearly 20%.

The remaining differences in the directional changes in the model are connected to the fiscal policy and other income market variables. These differences can be traced

back to the previous discussion placed upon governmental policy and labor market incentives. In the US, one tends to observe a negative correlation between increases in social transfers or self employment with increases in wage income. However, in Guatemala, there is a positive correlation between all variables except for other income. This may indicate that those with immense wealth (i.e. – large amounts of property) have no incentive/ need to maintain stable employment as the stores of wealth may be more than sufficient to sustain the household's consumption. A one dollar increase in wages appears to correspond with a \$35,191 *decrease* in other income. Self employment income appears to have very little effect on wages at all. One additional dollar in wages appears to correspond with a 2 cent increase in self employment income. A 1% increase in the tax rate correlates with slightly over a \$1000 increase in income. However, few residents are likely to even see a 1% increase in taxes as the tax rates are significantly lower in Guatemala than the United States. A one dollar increase in wages also corresponds with a 33 cent increase in social transfers.

What this data suggests is that the development of the separate income types is not sufficient enough to create a trade-off between incomes. As the theory of Human Capital suggests, most people will tend to prefer employment with an employer to self employment as traditional employment reduces the risk when the employer absorbs the risk on the behalf of the employee. The fact that the negative correlation between self employment and traditional employment is not apparent in the Guatemalan sample suggests that the traditional employment market in Guatemala has not fully developed a



vehicle to sufficiently absorb the risks to the employee in the Guatemalan labor market. This would be further supported when looking at the entire sample size as compared to the sample used for this model. More than 50% of the entire sample shows no wage income at all. For the individual observations that were excluded due to no wage income, the offset to this income can be seen in the self employment fields instead.

***Low Skill (Years of Education-Less than or Equal to 9)***

Number of observations: 6,403

$$\text{Wages}_i = 3,373.326 + 32.7087 (\text{Age} - \text{head}_i) + 100.6345 (\text{Age} - \text{Spouse}_i) + 469.0129 (\text{Educational level} - \text{head}_i) + 497.0026 (\text{Educational level} - \text{spouse}_i) + 6826.631 (\text{Number of Earners}_i) - 390.2107 (\text{Number of Children under 18}_i) - .0109429 (\text{Self Employment Income}_i) - 25636.09 (\text{Other Income}_i) + .4787734 (\text{Social Transfers}_i) + 289706.9 (\text{Tax Rate}_i) + \varepsilon_i$$

Source	SS	Df	MS	BIC	140,941.2
Model	1.3489e+12	10	1.3489e+11	<b>F( 10, 6392)</b>	643.69
Residual	1.3395e+12	6392	209563154	<b>Prob &gt; F</b>	0.0000
Total	2.6885e+12	6402	419942675	<b>R-squared</b>	0.5018
				<b>Adjusted R-squared</b>	0.5010
				<b>Root MSE</b>	14476

***High Skill (Years of Education-Greater Than 9)***

Number of observations: 1,392

$$\text{Wages}_i = -135,262.9 + 832.1114 (\text{Age} - \text{head}_i) + 125.2631 (\text{Age} - \text{Spouse}_i) + 8527.552 (\text{Educational level} - \text{head}_i) + 1612.235 (\text{Educational level} - \text{Spouse}_i) + 17155.14 (\text{Number of Earners}_i) + 368.9551 (\text{Number of Children under 18}_i) + .0726037 (\text{Self Employment Income}_i) - 86517.3 (\text{Other Income}_i) + .1383832 (\text{Social Transfers}_i) + 66435.91 (\text{Tax Rate}_i) + \varepsilon_i$$

<b>Source</b>	<b>SS</b>	<b>Df</b>	<b>MS</b>	<b>BIC</b>	
Model	1.9981e+12	10	1.9981e+11	<b>F( 10, 1381)</b>	34,445.9 64.21
Residual	4.2974e+12	1381	3.1118e+09	<b>Prob &gt; F</b>	0.0000
Total	6.2955e+12	1391	4.5259e+09	<b>R-squared</b>	0.3174
				<b>Adjusted R-squared</b>	0.3124
				<b>Root MSE</b>	55784

The pattern in the R squared correlation values of the segmented labor markets in Guatemala mirrors the pattern seen in the models run for the United States. By segmenting the labor markets by years of education, one observes a model for the high skilled labor market in Guatemala that begins to be more comparable to the models seen in the United States. This would suggest that while those with more education are demographically more similar to industrialized countries than the less skilled. If those with less education have a different set of obligations at the household level (i.e. – more young children to support) one is less likely to observe increased education and income mobility to children in the future maintaining that the assumption that education decreases household size and increases wage mobility for future generations holds true.

The pattern of positive correlation between all income and tax variables (except other income) continues in the high skilled labor market, yet the correlation for self employment income for the low skilled labor becomes negative matching the self employment correlation seen in the models for the United States. The negative correlation observed would suggest that more stable wages creates a disincentive for self employment at the low skill level of Guatemala. Considering the differences observed in

the econometric models for the United States and Guatemala, one might want to further explore the relationships between the labor market, product market, financial market, and governmental policy.

## CHAPTER 13

### **Implications of Analysis and Policy Recommendations**

Although the empirical analysis is an incomplete assessment of the theoretical model, the results appear to support the hypothesis that the chosen variables help explain the variation in wage rates. At a sociological level, one might also want to address whether or not the wage inequality seen in labor markets exist due to “legitimate” forms of discrimination stemming from labor that is more efficient and/or valuable to an employer or arbitrary discrimination and/or corruption. What the empirical analysis appears to suggest that income inequality can appear from both “legitimate” and “arbitrary” forms of discrimination. The level of arbitrary discrimination could possibly be more easily identified by examining the variables that we were unable to quantify via the LIS datasets. By examining the fiscal policy variables examining transfers and tax rates along with separating out the different components of household income, we were able to start examining the effectiveness of fiscal policy in promotion of economic growth via the measurements of its effects on household income.

If one were to take the standard Guatemala model and replaced the mean Guatemalan values with the mean values from the United States, the average income would double. The average income using the calculated Guatemalan model with US mean values is calculated to be \$64,967.51, which is also significantly higher than the mean incomes experienced in the United States. This calculation further validates that the variables suggested in the paper are a good start at determining the policies that the

government can pursue to increase incomes and increase the residents' standard of living. The model presented in this paper suggests that the majority of the factors that determine a household's income are often beyond the control of the individuals within the household. As such, it is important to first focus on the few factors that are somewhat within the individual's control.

There are two main areas where the model suggests: education and household size. Of the two, education appears to be the most advantageous driver an individual can pursue when looking to increase their income. As referenced earlier, in both the US and Guatemala, an additional four years of education will increase the household's income by approximately 20%. This is a dramatic increase that few should ignore. It is widely accepted that increases in education create higher earning potential in any country. However, these increases can be highly dependent on the environment. In the US, one may gain a higher increase in income by earning a master's degree in business administration than receiving a PhD in history or music performance.

Therefore, it would seem logical that government should also make it a priority to ensure that all those who would like to pursue higher education have the opportunity to do so. This would entail a number of initiatives such as government funding for education available to all citizens. Ensuring that schools are built in as many regions of the country as possible, with transportation available from the regions where the schools are not available so that education is accessible to all. Parents should be provided financial incentives to keep their children in school so that they are not forced to pull

children out of school early to work in the fields to support the households. The current research suggests that there is a higher incentive to send their children/spouses/family to the United States than to keep the people in Guatemala to gain further education. As it appears that disparities in education are key drivers in disparities between incomes, the more educated the population can receive, the more income the country has the potential to earn.

As the research has further substantiated the link between education inequality and income inequality, the availability and accessibility of education is key to closing the gap in Guatemala. An illustration in concrete approach to increasing access to education, USAID has created new scholarships made available to youth in the more disadvantaged portions of Guatemala and awarded over 22,000 university scholarships belonging to nineteen different ethnicities.<sup>24</sup> USAID further specifies activities that they believe will increase educational investments that can improve efficiency of public expenditures, decentralize investments, increase community involvement and achieve better-managed and more transparent programs in relation to education within the country. USAID, along with multiple other agencies, highlights the need for Guatemala to increase its investment in people via basic health and educational assistance to advance socioeconomic development.

As the empirical model suggests using years of education to measure the levels of education within a country, one can use the number of years of education as a measure of how well educated the residents of a country are. USAID cites the average length of

school to be around four years with only 30% children graduating from sixth grade. The empirical research shows a similar statistic in its sample with the average level of education of 4.22 years as compared with the US's average 10.36 years of education. However, a promising sign is that over the 10 year period between 1991 and 2001, net primary school enrollment increased 13% with more than two million children that are not allowed the opportunity to attend school. Of those children who do not attend school are overwhelmingly female residing in the indigenous rural portions of the country. This finding from USAID also agrees with the empirical analysis that shows the spouse's average education level of only 3.32 years. This suggests that increases in education are possible, but also highlights the need of increased focus on granting more access to education to the female rural populations of Guatemala.

Weil also suggests that the marginal returns on education decrease with each additional year.<sup>22</sup> Not only does he suggest that the marginal returns on education decrease, but the rate at which this decrease occurs is dependent upon the level of industrialization experienced within the country. This can be related to the amount of jobs that a country has made available to highly educated workers. If 20% of the population of a lesser developed country had attained a college degree, but the unemployment rate of the country was 50% and the large portion of available employment was in manufacturing or agriculture, fields where higher level of education are not often required, it may be difficult to justify offering a higher wage to an employee simply due to his education level. If this level of education was supplied far beyond what

the market demands, then the education level can no longer demand a premium wage.

What this suggests is that education needs to be gained by the population, but industry, in turn, must be present to take advantage of this increase in skill.

The government, therefore, should take it upon themselves to create an environment that is conducive to industry and job creation. Countries such as the United States tend to be more economically successful because the business environment creates a fairly large proportion of jobs that make use of the higher levels of education. The government of Guatemala should take its cue from the United States to ensure the availability of funding and education to small business owners. The tax structures should be set up in a manner than creates incentives to gain education and start a new business. Rather than spending it's time in publicly asking for aid and focusing on the country's inability to manage itself, the country should be modernizing its lending regulations to create opportunities for entrepreneurs to take advantage of their education and create jobs that can hire more educated workers.

Government spending on education is one of the many ways that effective fiscal policy can influence and reduce income inequality. Other possible effective fiscal policies that Guatemala might chose to adopt might be agencies to regulate financial institutions to promote the availability of funds to small businesses, government agencies to maintain roads, utilities, and other essential public services (i.e.-law enforcement, sanitation, public health) that will enable citizens to be healthy, productive and honest. Of course, very strict ethical constraints will need to be present to ensure that the money



provided to the government is provided for these vital public services and not squandered in ineffective projects or bribes to corrupt officials. Honest dealings within the government will be essential for the citizens to reap the full benefit of fiscal policy. Effective use of fiscal policy can also make investment from foreign sources more appealing. Funding that the government may not be able to provide can also come from external sources that can come in the forms of microloans or foreign direct investment that creates factories or additional services that create jobs for Guatemalan citizens.

If the government is successful in promoting education and creating more jobs that require higher education, the reduction in the fertility rate is soon to follow. With the increased emphasis placed on education, the addition of each additional child will become more demanding on the household. New incentives will be placed on the household to support the child. The government might decide to provide tax incentives for keeping children in school or perhaps create tiered tax credits that create a higher financial burden on households who decide to have large families. Government programs might provide funding for health services that make birth control and education available to all household so that they can make more informed decisions regarding how many children they want to have.

However, these policies must be closely monitored. It is a slippery slope when looking at policies in reducing population growth. One would not want the policy go so far as to force sterilization as a few countries have done. The United Nations promotes contraception as opposed to widespread abortion. In addition, the country must be

careful in creating its fiscal policy as to not unfairly penalize large families that may be more common in the indigenous or rural populations that might perpetuate the cycle of poverty that is commonplace in these portions of the country. The obstacles Guatemala faces in reducing income inequality are immense. Any policy that provides a quick fix to the gaps in income equality should be immediately suspect. Increases in education and job creation will take time and money to foster, but the required time invested in creating jobs and educating its population can only bring more prosperity to the country. The policies pursued should be set up with a high focus on sustainability for future generations.

When merely comparing education level between countries, the gap seen in education suggests that incomes can increase and wage differentials decrease in the long run. While increasing education is hardly a short term decision and could potentially create more costs than gains initially, the data overwhelmingly suggests that more education will significantly benefit the economic growth of Guatemala. This increase in education will not only make Guatemalans more competitive in the labor market, but the increase in education will have farther reaching benefits. As discussed earlier, better educated populations have smaller families. Smaller families statistically increase income in Guatemala by \$191 per child.

More education will also allow residents to make more informed decisions and creates a sense of empowerment throughout the society. Studies by Poole & Rosenthal propose that the public opinion regarding the level of fairness as measured via voting

patterns appear to precede the occurrence of income inequality and disparities within developed countries. These observations can be directly applied to the econometric models proposed in this paper and highlight the importance of creating effective fiscal policy to promote income growth that allows for households to increase their income over time. Relationships between inequality and fiscal policy are interconnected in a perpetual cycle: perception of inequality influences the political system which creates redistribution by transfers that, in turn, influence perception of equality and effectiveness of the political system.

Key drivers of perception and policy stem from the material self interest of the constituents and the policymakers. Therefore, if constituents believe that inequalities are too large and Poole & Rosenthal's assumptions on polarization hold, inequality will continue to increase. Policymakers must therefore determine if the current transfers are truly redistributive and which factors should be measured to determine the level of redistribution in society. As one examines the correlation between different levels of income and taxes, one can begin to see how well the current policies are addressing these issues. The empirical data suggests that these issues are being more effectively handled in the United States than in Guatemala. In order for Guatemala to make further progress, the government must address the misguided incentives that place a higher significance on aid from outside countries to individuals than on aid to develop industries that would create more stable employment and opportunities for further education to enhance the economic growth within Guatemala.

## Works Cited

- <sup>1</sup> “An Overview of The Nigerian Economic Growth and Development.” Online Nigeria. 10 July 2010.: <http://www.onlinenigeria.com/economics/>
- <sup>2</sup> “Background Note: Guatemala.” Bureau of Western Hemisphere Affairs. February 2009. US Department of State. 2 December 2009. <<http://www.state.gov/r/pa/ei/bgn/2045.htm>>.
- <sup>3</sup> Brandolini, Andrea. “On the Identification of the “Middle Class.” June 2010. Luxembourg Income Study. 29 June 2010. <<http://www.lisproject.org/conference/papers/brandolini.pdf>>.
- <sup>4</sup> Carletto, Calogero, Benjamin Davis, Angeli Kirk, and Paul Winters. “Non-Traditional Crops, Traditional Constraints: The Adoption and Diffusion of Export Crops Among Guatemalan Smallholders.” September 2007. World Bank. 2 December 2009. <[http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000158349\\_20070924110555](http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000158349_20070924110555)>.
- <sup>5</sup> Cunningham, Wendy and Joyce P. Jacobsen. “Earnings Inequality Within and Across Gender, Racial, and Ethnic Groups in Four Latin American Countries.” April 2008. World Bank. 2 December 2009. <<http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=>

469372&piPK=64165421&menuPK=64166093&entityID=000158349\_20080414  
144634&cid=decresearch>.

<sup>6</sup> “Economy of Guatemala.” Wikipedia. 11 October 2009. Wikipedia. 2 December 2009.  
<[http://en.wikipedia.org/wiki/Economy\\_of\\_Guatemala](http://en.wikipedia.org/wiki/Economy_of_Guatemala)>.

<sup>7</sup> Escribano, Alvaro and J. Luis Gausch. “Assessing the Impact of the Investment Climate  
on Productivity Using Firm-Level Data: Methodology and the Cases of  
Guatemala, Honduras, and Nicaragua.” 26 June 2008. World Bank. 2 December  
2009. < [http://www-  
wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&  
theSitePK=523679&menuPK=64187510&searchMenuPK=64886411&theSitePK  
=6313037&entityID=000334955\\_20090225071728&searchMenuPK=64886411  
&theSitePK=6313037](http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64886411&theSitePK=6313037&entityID=000334955_20090225071728&searchMenuPK=64886411&theSitePK=6313037)>.

<sup>8</sup> Gherghel, Silvia. “Contemporary Economic Theories Regarding the Labor Market.”  
Annals of the University of Petroșani, Economics, 8(1), 2008, 213-218 213

<sup>9</sup> “Guatemala declares calamity as food crisis grows.” CNN. 9 September 2009. 2  
December 2009.  
<[http://www.cnn.com/2009/WORLD/americas/09/09/guatemala.calamity/index.h  
tml](http://www.cnn.com/2009/WORLD/americas/09/09/guatemala.calamity/index.html)>.

<sup>10</sup> “Guatemala Economy 2009.” Theodora.com. 11 June 2009. CIA World Fact Book. 2  
December 2009.  
<[http://www.theodora.com/wfbcurrent/guatemala/guatemala\\_economy.html](http://www.theodora.com/wfbcurrent/guatemala/guatemala_economy.html)>.

- <sup>11</sup> Lim, Byung In and Jin Kwon Hyun. “Comparative analysis of the effective income tax function: empirical evidence using LIS data.” Applied Economic Letters. 13 (2006): 117–121.
- <sup>12</sup> “List of countries by GDP (nominal).” Wikipedia. 10 July 2010. Wikipedia. 10 July 2010. <  
[http://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_GDP\\_%28nominal%29](http://en.wikipedia.org/wiki/List_of_countries_by_GDP_%28nominal%29)>.
- <sup>13</sup> Lovridge, Ray. and Mok, A. L. Theories of Labour Market Aegmentation : a Critique / R. Lovridge and A.L. Mok Nijhoff, The Hague : 1979
- <sup>14</sup> Luxembourg Income Study (LIS) Key Figures,  
<http://www.lisproject.org/keyfigures.htm> (28Feb 2010)
- <sup>15</sup> Malthus, Thomas Robert. An Essay on the Principle of Human Population. London: Reeves and Turner, 1888. Ninth edition.
- <sup>16</sup> McCarty, Nolan, Keith T. Poole and Howard Rosenthal. Polarized America: The Dance of Ideology and Unequal Riches. Cambridge, MA: MIT Press, 2006.
- <sup>17</sup> Smith, Adam. An Inquiry into the Nature and Causes of the Wealth of Nations. London: Methuen and Co., Ltd., ed. Edwin Cannan, 1904. Fifth edition.
- <sup>18</sup> Smith, James. “Guatemala: Economic Migrants Replace Political Refugees.” Migration Information Source. April 2006. 8 December 2009.  
<<http://www.migrationinformation.org/USfocus/display.cfm?ID=392>>.
- <sup>19</sup> Stirati, Antonella. Theory of Wages in Classical Economics. Brookfield, Vermont: Edward Elgar Publishing Company, 1994.

- <sup>20</sup> Tachibanaki, Toshaki. Wage Differentials: An International Comparison. edited by Toshiaki Tachibanaki Macmillan, Basingstoke : 1998.
- <sup>21</sup> UNDP: First Human Development Report for Latin America & the Caribbean. <  
<http://content.undp.org/go/newsroom/2010/july/pnud-presenta-el-primer-informe-regional-sobre-desarrollo-humano.en>>.
- <sup>22</sup> Weil, David. Economic Growth. Boston: Pearson Addison Wesley, 2009. Second edition.
- <sup>23</sup> “History of Coffee in Guatemala .” [equalexchange.coop](http://www.equalexchange.coop). 2009. Equal Exchange. 6 December 2009. <<http://www.equalexchange.coop/history-of-coffee-in-guatemala>>.
- <sup>24</sup> USAID. “Health and Education .” USAID. 12 September 2010.  
<[http://www.usaid.gov/gt/health\\_education.htm](http://www.usaid.gov/gt/health_education.htm)>.
- <sup>25</sup> “World Development Indicators.” World Bank. 12 September 2010.  
<<http://data.worldbank.org/indicator/SE.ADT.LITR.ZS>>.