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## The distribution of income in Central America

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February 2013

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## **ABSTRACT**

### **The Distribution of Income in Central America**

We document changes in income and earnings inequality in the five Central American countries from the early 1990s to 2009. In the 1990s Costa Rica had the most equal distribution of income in Central America, and one of the most equal distributions of income in Latin America. At the other extreme, Guatemala, Honduras and Nicaragua were among the most unequal countries in Latin America. Inequality in El Salvador was between these extremes. Then, in the first decade of the 21st century inequality in El Salvador and Nicaragua decreased while inequality in Costa Rica, Guatemala and Honduras increased. By 2009 levels of inequality in El Salvador and Nicaragua were similar to those in Costa Rica. In this paper, we examine why income and earning inequality differs between the five Central American countries, and why inequality decreased in El Salvador and Nicaragua but increased in Costa Rica, Guatemala and Honduras.

JEL Classification: O15, J31, O54

Keywords: income inequality, Central America, labour income

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## 1. The Distribution of Per Capita Household Income in Central America

Latin America has the sad reputation of being one of the most unequal regions in the world. All Latin American countries exhibit levels of income inequality that exceed the average of each of the regions of the world except sub-Saharan Africa, and 10 Latin American countries are among the 15 most unequal in the world (CEPAL 2011; Gasparini and Lustig 2011). The Central American countries reproduce the high levels of inequality in the region. Medina and Galvan (2008) use the statistical technique of optimum stratification to classify Latin American countries into groups according to their Gini index of per capita family income (for around 2005). Costa Rica and El Salvador are located, along with Uruguay, among the countries with the lowest inequality in Latin America. At the other extreme, Guatemala and Honduras are located among the Latin American countries with the highest levels of inequality.

There are many difficulties in comparing the distribution of family income between countries, or within countries over time. The levels of inequality, and their changes, may be affected by the type of survey (employment, income and expenses or living standards), the collection period (monthly, annual or continuous), the coverage of items included in measured income and their terms of reference, and different processing of the data to address problems such as extreme values, non-response, omission of items measured, underreporting of amounts, the presence of zero or negative income and regional differences in prices. In addition, changes in sample designs and data collection instruments can affect comparisons over time within a country. To maintain the highest level of comparability, we report estimates from a long-running series of estimates constructed by the *Comisión Económica para América Latina* (CEPAL 2012), and a more recent series of estimates constructed by Socio-economic Database for Latin America and the Caribbean (SEDLAC 2012). Both institutions use the same primary sources (household surveys) and report inequality in the distribution of household income per capita, where each household member is assigned the income per capita of the household to which they belong. However, the results can differ slightly because of different adjustments carried out to maintain comparability.<sup>1</sup>

Another difficulty in analyzing the evolution of inequality is that the use of specific years might

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<sup>1</sup> CEPAL imputes income for those who do not respond or for whom it is not measured. CEPAL also includes the rental value of owner-occupied housing income, and makes adjustments to reduce underreporting in such a way that reported incomes correspond to per capita income as it is reported in the national income accounts. CEPAL estimates also include zero incomes in the calculation of the Gini. The SEDLAC estimates do not adjust for nonresponse or for underreporting, except the rental value of owner-occupied housing. SEDLAC also excludes zero income and outliers, and increases rural incomes by 15% to take into account possible regional price differences.

misrepresent overall trends. To avoid this, it is useful to begin with the greatest number of years available in the data. Figure 1 shows the evolution of the Gini coefficient (or index) for Central American countries in the 1990s and 2000s using all of the surveys available in the CEPAL and SEDLAC data sets.<sup>2</sup> Dotted lines indicate years for which there is no data or where there were significant methodological changes in the surveys.<sup>3</sup> Only four data points are available for Nicaragua (1993, 1998, 2001 and 2005) and Guatemala (1989, 1998, 2002 and 2006). The series for the other three Central American countries are largely complete.

There have been important changes in the distribution of income in Central America in the last two decades. Starting in the early 1990s, Costa Rica exhibited the lowest Gini coefficient, followed by El Salvador and Honduras, with Guatemala and Nicaragua exhibiting the highest inequality in Central America. The Gini coefficient increases consistently in Costa Rica throughout the 1990s. In Honduras, the Gini coefficient increases from 1991 to 1996, and then remains relatively stable for the rest of the decade. In the rest of Central America the Gini coefficients remained relatively stable in the 1990s. Then in the first decade of the 21st century income inequality fell in El Salvador and Nicaragua, while it rose in Costa Rica, Guatemala and Honduras. These changes resulted in a lower Gini in El Salvador compared to Costa Rica by 2009. At the other extreme, increasing inequality in Honduras and Guatemala means that, by 2009, these two countries have the highest level of inequality in Central America.

Another limitation in the analysis of inequality is that the use of a single indicator may give only a part of the story. As the Gini is more sensitive to changes in the central part of the distribution, it is useful to add other indicators that are more sensitive to the top of the distribution, such as the Theil index, or bottom of the distribution, such as the variance the logarithm of income. Table 1 summarizes the changes in these three indicators based on estimates from CEPAL (2012). These data show that only in Costa Rica do all measures of inequality increase in both the 1990s and 2000s. In El Salvador and Guatemala, measured inequality increases or decreases in the 1990s, depending on the measure considered. Then, in the 2000s, inequality in El Salvador falls, while inequality in Guatemala increases, no matter the measure we consider. Honduras exhibits a decline in all measures of inequality in the 1990s, followed by increased inequality in the 2000s. However, the decrease in measured inequality in Honduras in the 1990s may be misleading, as the household survey from 1990 measured only labour income. If one excludes the 1990 survey, and compares

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<sup>2</sup> The Gini coefficient or index is the summary indicator of inequality used most often in the literature. The value of the Gini index ranges between zero (perfect equality) and one (perfect inequality).

<sup>3</sup> For example, between 2000 and 2001 in Costa Rica the reported increase in inequality was due in part to changes in the survey weights (because of new census data).

1991 to 1999, measured inequality increased in Honduras in the 1990s (as is also shown in figure 1). In Nicaragua, although the Gini coefficient remained practically unchanged in the 1990s, other indicators showed an increase in inequality. Then all three indices show a reduction of inequality in Nicaragua in the first half of the 2000s, which more than offset any increases in the 1990s. Over the entire two decade period, all indices show that inequality increased in Costa Rica and fell in El Salvador and Nicaragua. On the other hand, depending on the measure of inequality considered, measured inequality may have increased or decreased in Guatemala and Honduras between 1990 and 2009.

There is a growing literature on recent changes in income distribution in Latin America that tends to be in agreement that inequality increased in the region in the 1980s and 1990s and then decreased in the 2000s (see the regional average in table 1). In Central America, this trend is observed in Nicaragua and El Salvador, but not in Costa Rica, Guatemala or Honduras (where inequality increased in the 2000s). There is a growing consensus in the literature that the recent fall in inequality in Latin America is due to a combination of factors that include: macroeconomic improvements (especially the commodity price boom) that have increased employment, the wage premium for more educated workers has fallen, and public social spending, especially increased cash transfers to the poor, have increased (Lustig, et al. 2011; CEPAL 2011; Gasparini and Lustig 2011; Cornia 2012). Next, we discuss how public social spending affects income inequality in Central America, and how changes in social spending may help to explain changes in inequality in Central America in the 2000s. We discuss the role of changes in the wage premium for more educated workers later.

## **2. The impact of public spending and remittances**

Table 2 presents the results of a recent study that used microsimulation techniques to characterize inequality in the distribution of income in Central America, using the Gini index excluding and including income due to public social spending (Barriex, Bés and Roca 2009).<sup>4</sup> In all Central American countries, the overall impact of public social spending is progressive. Public social spending has a large equalizing impact in

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<sup>4</sup> To estimate the amount of income received by each individual due to public social spending, Barriex, Bés and Roca (2009) take total public spending on each social program and distribute this amount equally among all individuals who report receiving this public service. For example, for each person in the survey who is in primary school, the mean per-recipient public social spending on primary education is added to income. Barriex, Bés and Roca (2009) note that this methodology has some important limitations. For example, it assumes that each person receives the same amount from each social transfer, while the actual amount received by each person (as well as the quality of that service) may differ depending on income, where the person lives (i.e. rural or urban) and other considerations. This simulation methodology also assumes that all public social spending is received by households, and that there are no costs for capital (buildings, equipment, etc.), nor is any money lost to inefficiency or corruption. Finally, this method does not take into account the possible behavioral responses to public transfers such as a reduction in labour supply, which will lower primary income.

Costa Rica (where the Gini index falls from .5770 to .5042 when public social spending is included in income), Honduras (where the Gini index falls from .5697 to .5087) and Nicaragua (where the Gini index falls from .5963 to .5657). Public social spending is also equalizing in El Salvador and Guatemala, but the effect is smaller in these countries compared to the Costa Rica, Honduras and Nicaragua. Considering the different types of social spending separately, Barriex, Bés and Roca (2009) find that social spending on health care, primary and secondary education and transfer programs targeted toward the poor (such as conditional cash transfer programs) have a progressive impact on inequality, while contributory public pensions and subsidies to university education are generally not progressive.<sup>5</sup>

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After slow growth or retrenchment in the 1980s and 1990s, public social spending increased in all Central American countries in the 2000s. From 1999 to 2009 public social spending increased from 15.92% to 22.44% of GDP in Costa Rica, from 8.52% to 13.01% in El Salvador, from 6.95% to 8.07% in Guatemala, from 6.93% to 12.22% in Honduras and from 9.26% to 13.00% in Nicaragua (CEPAL 2012). Given that public social spending in Central America has a progressive impact on the distribution of income, it is likely that higher public social spending in Central America in the first decade of the 21st century contributed to reduced income inequality.<sup>6</sup> However, given that total public social spending increased more in Costa Rica than in El Salvador or Nicaragua, it is not likely that patterns of public social spending can explain why inequality fell in El Salvador and Nicaragua yet rose in Costa Rica in the first decade of the 21<sup>st</sup> century.

Falling income inequality in El Salvador and Nicaragua may be related to the role of remittances. Remittances are not only a significant source of income in many Central American countries, but increased between 2000 and 2010: from 13% to 16% of GDP in El Salvador, from 3% to 10% in Guatemala, from 6% to 16% in Honduras and from 8% to 12 % in Nicaragua, while in Costa Rica remittances fail to exceed 1% of GDP (SIMAFIR 2012).<sup>7</sup> Unfortunately, almost none of the household surveys in Central America adequately capture these transfers and therefore we are not able to explicitly measure the impact of remittances on our measures of inequality. However, Cornia (2012), using country-level data on remittances

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<sup>5</sup> While public social spending has a progressive impact on inequality, taxes do not. Not only is the tax burden in Central America limited, 17% of GDP on average including social security contributions or 14% without them, but also it does not reduce the inequality of primary income (Barreix, et al. 2009).

<sup>6</sup> The literature on falling inequality in Latin America has specifically pointed to the role of Conditional Cash Transfer (CCT) programs in reducing inequality. While all Central America countries introduced CCTs in the 2000s, the extent and coverage of these programs is limited (Cecchini and Madariaga 2011). According to Barreix, et al. (2009), transfers, in cash and in kind, to the poorest groups accounted for 0.1% of GDP in Guatemala (2000), 0.18% in Nicaragua (2001) and less than 0.02% of GDP in El Salvador. In Costa Rica (1.7% of GDP for 2004) and Honduras (1.5% of GDP for 2005) these programs are more active, although for Honduras this estimate also includes subsidies to prices. It is therefore not likely that CCTs played a large role in the reduction in inequality in El Salvador and Nicaragua.

<sup>7</sup> Another observation that highlights the importance of remittances in El Salvador is that in the 2000s the real Gross National Income increased despite falling real earnings per worker.



and inequality, presents evidence that remittances help to reduce income inequality in countries where they are significant. Similar results are presented by Klasen, et al. (2012) in a study of Honduras between 2005 and 2007. According to Klasen, et al. (2012), in this period the Gini coefficient in Honduras fell, with half of the reduction explained by non-labour income and 44% by remittances. This is because an increasing number of households in the poorest quintiles of the distribution received remittances over this period.

### **3. The Distribution of Labour Income in Central America**

In order to study the causes of the differences in inequality between countries and over time, we focus on the distribution of labour income. This is done for three reasons: first, labour income contributes a very high proportion of total income, and reflects a similarly high proportion of inequality.<sup>8</sup> Second, whereas the household surveys measure total family income with differences in coverage as regards the items measured in each country and year, labour income is measured in a more consistent manner in each country. In particular, none of the household surveys includes a comprehensive measure of capital income,<sup>9</sup> Finally, economic theory, and especially the progress made in econometric techniques, makes it possible to analyze more accurately the causes of changes in the distribution of labour income. Thus, in order to examine inequality in labour income, we can make use of well-developed theories of labour economics (such as the theory of human capital) and econometric techniques (such as earnings equations).

Table 3 presents three indicators of labour income inequality for employed persons aged 15 or more with known incomes for around 1990, 2000 and 2009, calculated by the authors using household survey data in each country. The levels of inequality and the relative rankings among countries that we calculate when using labour income are similar to those found when we use total income. In the 1990s, three groups of countries can be identified in the table. The first group includes Costa Rica, which in the 1990s was the country with most equal distribution whatever the measure of inequality used. The second group includes El Salvador, with a moderate level of inequality. The last group corresponds to countries with high levels of inequality and includes Guatemala, Honduras and Nicaragua.

The first panel of figure 2 illustrates changes in labour income inequality in the 1990s in each Central

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<sup>8</sup> Székely and Hilgert (1999a), for example, calculate that labour income is responsible for a high proportion of total income inequality: 83% in Costa Rica (1997), 76% in El Salvador (1995) and 73% in Guatemala (1998). Also according to Székely and Hilgert (1999b), the changes associated with labour income can explain 100% or more of the changes in total income inequality in Costa Rica (1989-1997), El Salvador (1995-1998) and Honduras (1989-1998).

<sup>9</sup> Capital income tends to be concentrated in the very top of the income distribution. Therefore, by not considering capital income it is likely that our measures underestimate the true level of income inequality in some Central American countries where the top 1% may be very rich.

American country. In the 1990s, inequality in the distribution of labour income unambiguously increased only in Costa Rica and Guatemala, since only in these countries did all three indicators of inequality increase. In this group, Guatemala displayed the biggest increase in inequality. In El Salvador, Nicaragua and Honduras inequality either increased or decreased in the 1990s, depending on the indicator used.

The second panel of figure 2 illustrates changes in inequality in the 2000s. In the 2000s, inequality in the distribution of labour income decreased in El Salvador and Nicaragua, while inequality increased in Costa Rica, Guatemala and Honduras. This is true no matter what measure of inequality we consider. Among the countries where inequality increased, the increase is greatest in Guatemala and Honduras (and moderate in Costa Rica).

Because of the changes in the 1990s and 2000s, by the end of the first decade of the 21<sup>st</sup> century the distribution of labour income in El Salvador became more equally distributed than that in Costa Rica. By around 2009 we can still identify three groups of Central American countries according to their level of inequality, but the composition of the groups changed somewhat since 1990. The first group, with the lowest inequality, now includes both Costa Rica and El Salvador. Guatemala and Honduras still compose the group of countries with the most unequal distribution, while in Nicaragua inequality has fallen to a moderate level between the most equal and least equal Central American countries.<sup>10</sup> These rankings, as well as changes in labour income inequality in the 1990s and 2000s, reflect the changes in total income inequality that we discussed in the first section.

### **3.1. Sources of inequality; the Fields' decomposition**

In this section we extend the analysis of Gindling and Trejos (2004) to identify some of the causes of income inequality and its changes in Central America, using a regression-based technique developed by Fields (2003) which makes it possible to decompose monthly earnings inequality into components attributable to changes associated with personal and job characteristics of workers.<sup>11</sup> This decomposition technique is

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<sup>10</sup> By 2009, the Nicaraguan labour force surveys indicate that inequality in labour income in Nicaragua had fallen to a level comparable to Costa Rica and El Salvador. Unfortunately, we cannot use the 2009 Nicaraguan labour force survey in our analysis because this survey does not include information on institutional sector and firm size (and therefore we cannot estimate earnings equations comparable to other countries or other years in Nicaragua).

<sup>11</sup> Gindling and Trejos (2004) used these same earnings-based decomposition techniques to examine changes in labour income inequality in Central America in the 1990s. We extend the analysis in Gindling and Trejos (2004) by adding data from around 2009 in order to examine changes in labour income inequality in the 2000s. In addition, in the present paper we do not consider the potential contributions of industry sector to changes in income inequality because in many of the countries that we study the definitions of the industry sector variables changed between 1999 and the late 2000s, making comparisons across these time periods impossible.

based on the estimation of semi-logarithmic earnings equations, which are standard in the labour economics literature:

$$\ln Y_{it} = \sum_j B_{tj} * X_{itj} + E_{it} = \sum_j B_{tj} * Z_{itj} \quad [1]$$

where  $\ln Y_{it}$  is the logarithm of monthly labour income and  $X_{itj}$  are the variables  $j$  associated with person  $i$  in period or country  $t$  which can affect earnings. The coefficients  $B_{tj}$  measure the “prices,” or wage premiums, for each variable  $X_j$  in country/year  $t$ . Thus, for example, the coefficient on the variable “education” (years of schooling) measures the percentage increased the wage that an employer must pay for a worker with one more year of schooling (this is also often referred to as the “return” to one more year of education). The residual  $E_{it}$  is the part of the variation in earnings between workers which cannot be explained by the variables included in the equation.

Fields (2003) derives a simple formula to measure the proportion of earnings inequality explained by each variable  $j$  in country or year  $t$ :<sup>12</sup>

$$\sum_j \text{Cov}(B_{tj} * Z_{itj}, \ln Y_{it}) / \text{Var}(\ln Y_{it}) = \sum_j S_{jt} \quad [2]$$

The measure of earnings ( $Y_{it}$ ) that we use is monthly labour income. The labour market variables that we consider are: the logarithm of hours worked and two binary dummy variables representing the contribution or wage premium of working in the public vs. private sector (institutional sector), or working in formal or large enterprises (size of establishment). The personal characteristics that we consider include variables associated with human capital, such as years of formal education and years of potential experience, as well as two binary dummy variables which reflect the wage premium received by men over women (sex) and residence in urban areas (zone).

Table 4 presents the proportion of earnings inequality that can be explained by each variable in each

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<sup>12</sup> The derivation of Fields’ decomposition can be illustrated by using the variance of the logarithm of earnings as a measure of dispersion. In the light of the earnings equation, the variance of the logarithm of earnings can be written as follows:

$$\text{Var}(\ln Y_{it}) = \text{Cov}(\ln Y_{it}, \ln Y_{it}) = \text{Cov}(\sum_j B_{tj} * Z_{itj}, \ln Y_{it}) = \sum_j \text{Cov}(B_{tj} * Z_{itj}, \ln Y_{it})$$

Dividing this equation by the variance of the logarithm of earnings results in equation [2]. Shorrocks (1982) has shown that if income (or the logarithm of income) can be described as the sum of different components, the  $S_{jt}$  measure the contribution of each component (in this case variable)  $j$  to inequality for a wide range of measures of inequality, including the log variance, the Gini coefficient and the Theil index.

country (the  $S_{jt}$  from equation 2) for around 1990, 1999, and 2009. In all countries and years, differences between workers related to education are the main source of measured inequality in labour income, since education explains between 14% and 26% of total inequality. For most countries, differences in hours worked between different workers occupies second place as an explanatory factor. Also important in explaining inequality in most countries and years are differences between large (formal) and small (informal) enterprises, and differences between urban and rural areas. This is true especially for Guatemala and Honduras, where urban/rural and large/small firm differences are a generally more important source of inequality than they are in the other three Central American countries.

Differences between men and women, public and private employees, and experience all have a small impact on inequality in all countries and years. Individually, none of these characteristic explains even 5% of total inequality in any of the countries or years.

Taken together, the inequality associated with all measured characteristics explains a maximum of 55% of total inequality (Costa Rica in 2009) and a minimum of 26% (Nicaragua in 1998), with the remainder being due to the residual of the earnings equation. The proportion of inequality due to this residual is the result of inequality between persons with the same education, sex, area of residence, hours worked, institutional sector, size of establishment and experience.

### 3.2. Sources of changing inequality in the 1990s

Although the  $S_{jt}$  can be used to measure the contribution of each variable  $j$  to the level of inequality, in order to measure the impact of each variable on the differences in inequality between countries or over time it is necessary to use something more than the  $S_{jt}$ . This is because the magnitude of the differences in inequality between countries or over time will depend on the measure of inequality used and how much that measure of overall inequality changes. Thus, in order to measure the contribution of each variable to the change in inequality, it is necessary to multiply the  $S_{jt}$  in each period or country  $t$  by the corresponding measure of inequality. Specifically, if  $I(t)$  is the measure of inequality in period or country  $t$ , the change in inequality between periods or countries 1 and 2 can be written as follows:

$$I(2) - I(1) = \sum_j \{I(2)*S_{j2} - I(1)*S_{j1}\} \quad [3]$$

Table 5 shows the contribution of each variable to the change in the 1990s in one of the measures of inequality: the variance of the logarithm of labour income. In this table, a negative value indicates that variable or phenomenon contributed to reduced inequality in that country in the 1990s, while a positive value means that variable or phenomenon contributed to increased inequality in that country in the 1990s.

In all the countries except Nicaragua three phenomena promoted increases in labour income inequality in the 1990s: changes related with education, hours worked and the residual. In Guatemala, the changes related with the worker's gender also contribute to the increased inequality. In contrast, changes related with size of enterprise and urban/rural residence promoted a reduction in inequality in Guatemala and Nicaragua. The other variables have only a slight impact on changes in inequality in the 1990s.

Each variable can contribute to the differences in total inequality over time in two ways: because the "prices" (coefficients  $B_j$ ) of those characteristics differ over time, or because the dispersion of those characteristics (changes in the dispersion of  $Z_j$ ) differ over time. Table 6 presents the coefficients, standard deviations and means for each independent variable, for each country and for all three years that we consider. Table 6 allows us to examine in more detail why changes related with education and hours worked contributed to increased inequality in the 1990s throughout Central America. For example, the increase in inequality related to changes in education could be due to either an increase in the "price" that employers pay for more educated workers (returns to education) or because the distribution of education among workers became more equal. Table 6 shows that both these phenomenon occurred: both inequality in the distribution of education and the "price" of educated workers (measured as the coefficient on education in the earnings equation) increased in almost all countries in the 1990s. For example, the coefficient of years of education in the earnings equations indicate that returns to an additional year of education increased from 9.0% to 9.3% in Costa Rica and 6.8% to 8.7% in El Salvador in the 1990s. The standard deviation of education among workers (a measure of inequality in the distribution of education) increased in Guatemala, Honduras and Nicaragua, while it remained the same or fell slightly in Costa Rica and El Salvador.

Inequality in the number of hours worked was the other significant factor contributing to increased inequality in the 1990s. Gindling and Trejos (2004) show that the inequality in the number of hours worked increased because the proportion of workers with a full working day went down in each country, while the proportion of those with part-time and overtime employment increased. The decline in the

number of workers working full-time was due partly to a decline in the proportion of workers in the public sector, where full-time workers predominate. This decline was a result of the economic reforms adopted in the region in the 1980s and 1990s. The increase in overtime jobs was mainly among workers in the larger private sector firms. In most of the countries the proportion of workers with overtime went down in the public sector, and in some countries in small enterprises too. The greater proportion of workers with overtime in large private sector firms may also be the result of the economic reforms, which made it necessary to improve the productivity of the workers and the competitiveness of those firms. At the other extreme, the increase in part-time workers was mainly in small enterprises (the informal sector). In the two countries where inequality of hours worked increased most—Costa Rica and Guatemala—there was a considerable increase in the proportion of women who work in small enterprises. This increase in the proportion of women workers and in the informalization of the labour force in Central America in the 1990s is described in Trejos (2002).

### **3.3. Sources of changing inequality in the 2000s**

In the first decade of the 21<sup>st</sup> century inequality in labour income decreased in El Salvador and Nicaragua, while inequality increased in Costa Rica, Guatemala and Honduras. What explains the different patterns in El Salvador and Nicaragua compared to the rest of Central America (especially Costa Rica)? Table 7 shows that the most important measurable factors contributing to falling inequality in El Salvador and Nicaragua in the 2000s were changes related to education. In addition, in El Salvador there were smaller equalizing changes related to gender, region of residence, working in a small or large firm, and working in the public or private sector (residuals, which capture the effect of unmeasured factors, also contributed to falling inequality in El Salvador and Nicaragua). On the other hand, changes related to education caused inequality to increase in Costa Rica, Guatemala and Honduras. In Costa Rica virtually the entire increase in inequality in the 2000s is due to changes related to education, while in Guatemala and Honduras there were also disequalizing changes related to urban/rural region of residence, working in a small or large firm, and hours worked.

Education was the most important measured factor causing the changes in inequality in the 2000s in all Central American countries. As we can see in table 6, changes in the distribution of education among workers were disequalizing in all countries in the 2000s (the standard deviation of years of education

increased in every country).<sup>13</sup> Therefore, while changes in the distribution of education can help explain the increase in inequality in Costa Rica, Guatemala and Honduras, they cannot explain why changes related to education were equalizing in El Salvador and Nicaragua. Education had an equalizing effect on inequality in El Salvador and Nicaragua because the coefficients on the years of education variables fell in these two countries. The results presented in table 6 suggest that returns to an additional year of education fell in El Salvador from 8.7% in 1999 to 8.1% in 2009, and from 10.4% in 1998 to 8.5% in 2005 in Nicaragua. On the other hand, returns to education increased in Costa Rica and Guatemala. Returns to an additional year of education increased most in Costa Rica, from 9.3% in 1999 to 10.6% in 2009.

As we have seen, the returns to an additional year of education increased throughout Central America in the 1990s. On the other hand, in the 2000s the returns to education fell in El Salvador and Nicaragua, while they continued to rise in Costa Rica. This was the most important measurable reason why inequality increased in Costa Rica in the 2000s, while inequality fell in El Salvador and Nicaragua in the 2000s. Returns to education can be interpreted as the “price” that employers pay for more-educated workers. As with any price, changes in returns to education are the result of changes the relative supply and relative demand for more-educated workers vs. less-educated workers. Increases in the relative supply of more-educated workers (brought about by educational expansion) would put pressure on returns to education to fall, while increases in the relative demand for more educated workers would put pressure on returns to education to rise (Katz and Murphy, 1992). Lopez-Calva and Lustig (2010), among others, argue that changes in returns to education in the 1990s and 2000s in Latin America were the result of a “race” between increases in the relative supply of more-educated workers and increases in the relative demand for more educated workers caused by skill-biased technological change. They present evidence that in Latin America in the 1990s skill-biased technological change dominated increases in the relative supply, and therefore returns to education increased. It is likely that skill-biased technological change was also the cause of increasing returns to education throughout Central America in the 1990s. Gaspirini, Galiani, Cruces and Acosta (2011) present evidence that the relative demand for skilled workers increased in the 1990s in Costa Rica, El Salvador, Honduras and Nicaragua. Robbins and Gindling (1999) also present evidence that increases in the relative demand for more-skilled workers increased in Costa Rica in the 1990s. Sauma and Sanchez (2003) present evidence that this increase in the relative demand for more-skilled workers in Costa Rica in the 1990s was

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<sup>13</sup> This is the opposite of the pattern in much of South America, where educational expansion at the primary and secondary levels, driven by substantial increases in public spending, led to a reduction in inequality in the distribution of education in the 2000s (Lopez-Calva and Lustig 2010; Cornia 2012).

driven by an increase in imported capital that embodied skill-biased technological change.

Lopez-Calva and Lustig (2010) hypothesize that in the 2000s skill-biased technological change slowed, allowing the increase in the relative supply to dominate and causing returns to education to fall in Latin America. This may have occurred in El Salvador and Nicaragua in the 2000s. Gaspirini, Galiani, Cruces and Acosta (2011) present evidence that, after increasing in the 1990s, the relative demand for more-educated workers fell in El Salvador and Nicaragua in the 2000s. On the other hand, the relative demand for skilled workers continued to increase in Costa Rica throughout the 2000s, suggesting that skill-biased technological change was actually accelerating in Costa Rica, leading to continuing increases in returns to education and labour productivity in that country.<sup>14</sup>

The fall in returns to education in El Salvador and Nicaragua does not necessarily mean that low-skilled workers became better off in those countries. For example, in El Salvador the mean real earnings of workers at all education levels fell between 1999 and 2009; returns to education in El Salvador declined because the earnings of the least-educated workers fell by less than the real earnings of workers with a secondary or higher education (table 8). In Nicaragua the real earnings of workers with secondary or higher education also fell between 1998 and 2005, while the real earnings of the least-educated workers increased. On the other hand, in Costa Rica returns to education increased because the real earnings of highly-educated workers increased while the earnings of less-educated workers essentially remained constant (table 8). The increase in the real earnings of highly-educated workers in Costa Rica is likely related to the ability of Costa Rica to export high-technology goods and services. Bashir, Gindling and Oviedo (2012) and INCAE (2010) show that in Costa Rica recent export growth has been concentrated in high productivity skill- and knowledge-intensive goods and services, while in El Salvador and Nicaragua the bulk of recent export growth has been in unskilled labour-intensive products.<sup>15</sup> Luque and Moreno (2011),

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<sup>14</sup> Note that the fall in demand for more-educated workers in El Salvador and Nicaragua could also be due to falling quality of education in those countries (Bashir, Gindling and Oviedo 2012). Aedo and Walker (2012) present evidence that rising real minimum wages in Nicaragua and El Salvador may also have contributed the fall in returns to skill (and education) in the 2000s. Also note that education levels increased at a much greater rate in Costa Rica than in El Salvador or Nicaragua, indicating that falling returns to education in El Salvador and Nicaragua, compared to Costa Rica, were not due to more rapid increases in the relative supply of more-educated workers in El Salvador and Nicaragua.

<sup>15</sup> Further, the increase in exports of unskilled labour-intensive products in El Salvador and Nicaragua is likely related to the world-wide boom in commodity prices, and will probably not be sustainable when the boom ends. Costa Rica is the only country in Central America where high-technology manufacturing makes up a significant proportion of exports (Bashir, Gindling and Oviedo 2012). Costa Rica is one of the largest exporters of microchips in the world, and the fourth largest exporter of medical devices. High-technology manufacturing exports from Costa Rica are partly the result of that country's success in attracting high-technology foreign direct investment (e.g. an Intel microchip production facility, which is responsible for 20% of all Costa Rican exports). Knowledge-intensive services in Costa Rica include finance, insurance, business, real estate, communications,



using the methodology developed in Autor et al. (2003), divide the evolution of jobs in Costa Rica and Nicaragua between 2001 and 2009 into five categories of occupations: three higher-skill, new economy occupations (non-routine cognitive analytical, non-routine cognitive interpersonal and routine cognitive) and two lower-skill, old economy occupations (routine manual and non-routine physical).<sup>16</sup> They find that in Nicaragua there has been almost no growth in higher-skill, new economy occupations. Costa Rica, on the other hand, achieved impressive growth in higher-skill, new economy occupations that use non-routine cognitive analytical and routine cognitive analytical skills. The high levels of quality education available to Costa Rican workers, which is related to much higher per student public expenditures on education in Costa Rica compared to the rest of Central America, was a necessary precondition underlying Costa Rica's ability to upgrade the skill level of employment and production (Bashir, Gindling and Oviedo 2012).

Other important contributors to changing inequality in the 2000s were changes related to region of residence and size of firm, both of which were equalizing in El Salvador and disequalizing in Guatemala and Honduras. An examination of table 6 shows that these changes were due to changes in the coefficients and not the distribution of these variables. Specifically, the results presented in table 6 suggest that the urban/rural earnings gap fell from 23.4% to 13.8% in El Salvador, while rising in Guatemala and Honduras (from 33.6% to 68.8%, and 40.8% to 54.9%, respectfully). Similarly, the large firm/small firm earnings premium fell from 24.4% to 6.2% in El Salvador while rising in Guatemala and Honduras (from 28.7% to 77.6% and 42.2% to 56.3%, respectfully).

### **3.4 Sources of differences in labour income inequality among Central American countries**

In this section, we will compare the sources of labour income inequality in Costa Rica with the corresponding sources in the other Central American countries. We use Costa Rica as a point of reference because in all years it is in the low inequality group. Table 9 shows the results of the Fields decomposition of the difference between Costa Rica and the other countries of the region in terms of inequality, in 1999 and 2009. In this table, a negative value indicates that that variable or phenomenon helps to reduce the inequality in that country compared with Costa Rica, while a positive value means that

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community, social and personal services and computer and information technology services (with notable growth in employment in "call centers").

<sup>16</sup> Examples of occupations using new economy non-routine cognitive skills are teachers, medical professionals, lawyers, programmers and training and development managers. Examples of occupations using low-technology manual and physical skills are construction carpenters, industrial truck operators, machine operators and tenders, cutting and slicing machine setters, operators and tenders and food cooking machine operators and tenders (Luque and Moreno 2011).

that variable or phenomenon helps to increase the inequality in that country compared with Costa Rica. We first discuss why Costa Rica was the most equal of Central American countries in 1999, and then discuss how the differences between Costa Rica and the rest of Central America changed between 1999 and 2009.

There are three important elements which explain why earnings were distributed more equally in Costa Rica than in any other Central American country in 1999: education, urban-rural wage gaps and the impact of residuals.

The differences in education cause less inequality in Costa Rica than in the other Central American countries in the 1990s for two reasons. First, education is distributed more equally in Costa Rica than in any other Central American country (table 6). Second, in 1999 returns to an additional year of education (the “price” of education) are lower in Costa Rica than in any other country except El Salvador. In El Salvador, lower returns to education compared with Costa Rica are more than offset by the more unequal distribution of education, so that the overall effect of education in El Salvador is that that country is more unequal in that respect than Costa Rica. It is worth noting that the wage gap between more and less educated workers is smallest in those countries where average education levels are highest. This is expected; as the relative supply of more educated workers increases, we would expect the “price” paid by employers for those educated workers to fall. The levels and quality of education in Costa Rica is higher than the rest of Central America because the Costa Rican government spends substantially more on education than does any other Central American country.<sup>17</sup>

Rural or urban residence is also a contributory factor in the greater inequality in the rest of the Central American countries in 1999, compared with Costa Rica, because in those countries the wage premium received by urban workers is higher than that in Costa Rica. Gindling and Trejos (2004) show that the urban-rural earnings gap is narrower in Costa Rica for five related reasons. First, wage gaps between agriculture and other industry sectors are smaller in Costa Rica than the rest of the region. Second, the proportion of workers on small farms is lower in Costa Rica than in the rest of Central America. Third, the wage gap between workers in large non-agricultural rural enterprises and large urban enterprises is smaller in Costa Rica than in any other country. Fourth, the wage gap between workers in large urban enterprises and

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<sup>17</sup> For example, in 1999 public spending on education in Costa Rica was \$177 (2005 US dollars) per person, compared to \$76 in El Salvador, \$56 in Guatemala, \$52 in Honduras and \$31 in Nicaragua (CEPAL, 2012). Although public spending on education increased in all Central American countries in the 2000s, by 2009 Costa Rica still spends much more than any other Central American country on education (\$364 in Costa Rica vs. \$113 in El Salvador, \$78 in Guatemala, \$169 in Honduras, and \$56 in Nicaragua).

those in agricultural enterprises, whether large or small, is narrower in Costa Rica than in any other country of the sub-region. Finally, the proportion of workers in large non-agricultural rural enterprises, which form the best-paid rural sector, is higher in Costa Rica than in any other Central American country. López and Valdés (2000), in a study that summarizes studies on rural poverty in various Latin American countries, including El Salvador, Guatemala and Honduras, show that there is a correlation between the proportion of non-agricultural rural jobs with high productivity and higher average levels of education and better rural infrastructure (such as roads, electricity, telephones, etc.). This suggests that Costa Rica's public policies of providing even the remotest rural communities with electricity, telephones, education, health and transport infrastructure (all closely related with high-productivity non-agricultural and agricultural rural activities) is an important reason why inequality is lower in Costa Rica compared to the rest of Central America.

The second panel of table 9 presents the sources of differences in labour income inequality between Costa Rica and other Central American countries around 2009. The biggest change between the two panels of table 9 is that in 2009 differences related to education contribute to a more equal distribution of labour income in El Salvador and Nicaragua compared to Costa Rica. This occurred because between the 1990s and late 2000s returns to education rose in Costa Rica but fell in El Salvador and Nicaragua (table 6).

#### **4. Conclusions**

Income inequality is generally high in Central America when compared to the rest of the world. In 1990, the lowest level of inequality in Central America was exhibited by Costa Rica, followed by El Salvador, with Guatemala, Honduras and Nicaragua exhibiting the highest inequality. Income inequality was lower in Costa Rica than in the rest of Central America because education is distributed more equally in Costa Rica, and because rural-urban wage gaps are lower in Costa Rica than in the rest of Central America. Rural-urban wage gaps are lower in Costa Rica, in part, because of the larger prevalence of well-paid non-agricultural employment in rural areas, which in turn is related to the Costa Rican government's commitment to provide education, health and public infrastructure to even the most remote rural areas. The more equal distribution of education in Costa Rica is likely related to much higher public spending on education in Costa Rica compared to the rest of Central America. Higher levels of total social spending in Costa Rica are also responsible for the more equal distribution of income in Costa Rica. Social spending in all Central

American countries, especially in education, health and social assistance, is strongly equalizing, and public social spending is substantially higher in Costa Rica than in any other Central American country.

In the 1990s only Costa Rica exhibited a clear and consistent increase in income inequality. In all other Central American countries the direction of the measured change in inequality during the 1990s can be positive or negative depending on the measure of inequality used, the measure of income used, and/or the specific years which one compares. Underlying these trends (or lack of trends) in income inequality were several labour market trends common to almost all Central American countries in the 1990s. In all countries except Nicaragua two phenomena were at work to increase inequality: returns (or wage premia) to education increased and the dispersion of hours worked increased. Returns to education increased because of an increase in the relative demand for more-educated labour, which in turn was probably caused by skill-biased technological change. The dispersion of hours worked increased because of an increase in the proportion of overtime work in large, formal private sector firms and an increase in the proportion of part-time workers in small, informal sector firms. Both the increase in overtime work in large, private formal sector firms and skill-biased technological change were probably related to the economic reforms of the 1980s and 1990s, which forced private sector firms to increase productivity in order to compete in a competitive global market.

During the first decade of the 21st century, inequality in El Salvador and Nicaragua decreased, while inequality in Costa Rica, Guatemala and Honduras increased. These patterns are the same no matter the measure of inequality is used. By 2009, levels of inequality in El Salvador and Nicaragua were similar to those in Costa Rica. We identify one important source of the fall in income inequality in El Salvador and Nicaragua: declining returns (or wage premia) to education in those countries. Falling returns to education in El Salvador and Nicaragua were not due to more rapid educational expansion, but rather to a decline in the relative demand for more-educated workers, which led to a fall in the real earnings of workers with secondary and higher education in those countries. On the other hand, the relative demand and the real earnings for workers with secondary and higher education continued to increase in Costa Rica throughout the 2000s, suggesting that skill-biased technological change was actually accelerating in Costa Rica, leading to continuing increases in returns to education and labour productivity in that country. Continuing skill-biased technological change in Costa Rica, in turn, is due to the availability of a highly-educated work force, to that country's ability to export high-technology goods and knowledge-intensive services, and to Costa Rica's success in attracting foreign investment in high-technology products.

As a result of changes in the 1990s and 2000s, the ranking of Central America countries in terms of income inequality has changed since the early 1990s. At the end of the first decade of the 21<sup>st</sup> century, Costa Rica has been joined by El Salvador as the countries with the most equal distribution of income in Central America, with Nicaragua close behind. Costa Rica and El Salvador are both now ranked among the countries in Latin America with the lowest income inequality. At the other extreme, Guatemala and Honduras are the two least equal countries in Central America, and are currently among the countries with the most unequal distributions of income in all of Latin America.

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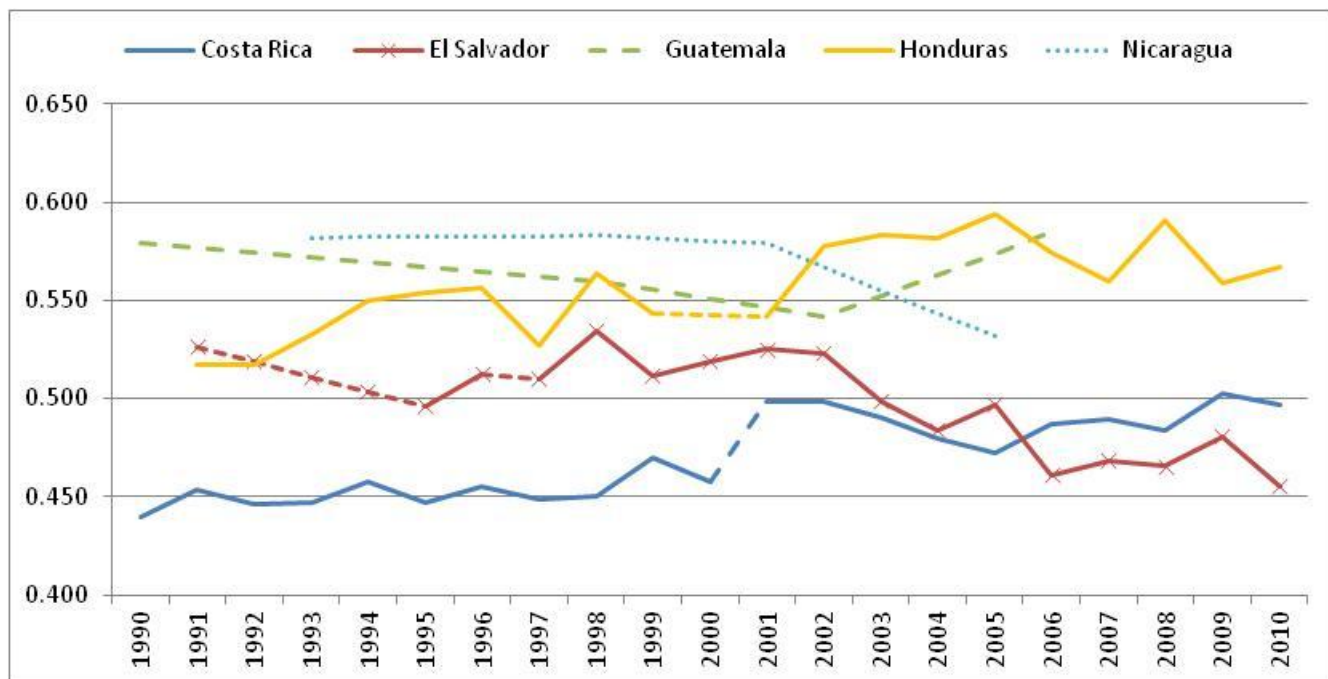
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**Figure 1: Central America: Evolution of inequality in the distribution of family income, 1990-2010**  
*(Gini coefficients of the distribution of per capita family income among persons)*



Source: prepared by the authors on the basis of SEDLAC (2012) and CEPAL (2012).

**Table 1: Central America: Family income inequality, by countries, around 1990, 1999 and 2009**

Indicator	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Latin America
Value of the indicator around 1990 <sup>a</sup>						
Gini Coefficient	0.438	0.507	0.582	0.615	0.582	0.535
Theil index	0.328	0.502	0.736	0.817	0.671	0.613
Variance of logarithm of income	0.833	1.192	1.476	1.842	1.598	1.287
Variation 1990-1999 <sup>b</sup>						
Gini Coefficient	0.035	0.011	-0.022	-0.051	0.001	0.012
Theil index	0.067	-0.006	0.024	-0.181	0.060	0.011
Variance of logarithm of income	0.141	0.356	-0.294	-0.282	0.202	0.129
Variation 1999-2009 <sup>c</sup>						
Gini Coefficient	0.028	-0.040	0.025	0.016	-0.051	-0.029
Theil index	0.079	-0.056	0.013	0.014	-0.117	-0.074
Variance of logarithm of income	0.081	-0.616	0.293	0.403	-0.613	-0.191
Variation 1990-2009 <sup>d</sup>						
Gini Coefficient	0.063	-0.029	0.003	-0.035	-0.050	-0.017
Theil index	0.146	-0.062	0.037	-0.167	-0.057	-0.064
Variance of logarithm of income	0.222	-0.260	-0.001	0.121	-0.411	-0.062
Value of the indicator around 2009 <sup>e</sup>						
Gini Coefficient	0.501	0.478	0.585	0.580	0.532	0.518
Theil index	0.474	0.440	0.773	0.650	0.614	0.550
Variance of logarithm of income	1.055	0.932	1.475	1.963	1.187	1.,25

a/ 1990 for Costa Rica and Honduras, 1989 for Guatemala, 1993 for Nicaragua and 1995 for El Salvador.

b/ 1990 - 1999 for Costa Rica and Honduras, 1989 - 1998 for Guatemala, 1993-1998 for Nicaragua and 1995 -1999 for El Salvador.

c/ 1999-2009 for Costa Rica and El Salvador, 1998-2006 for Guatemala, 1998-2005 for Nicaragua and 1999-2007 for Honduras.

d/ 1990-2009 for Costa Rica, 1995-2009 for El Salvador, 1989-2006 for Guatemala, 1993-2005 for Nicaragua and 1990-2007 for Honduras.

e/ 2009 for Costa Rica and El Salvador, 2006 for Guatemala, 2005 for Nicaragua and 2007 for Honduras

Source: prepared by the authors on the basis of CEPAL (2012).

**Table 2: Central America: Family income inequality, by countries, excluding and including the impact on income of public social spending**

<b>Gini coefficient</b>	Costa Rica 2004	El Salvador 2006	Guatemala 2000	Honduras 2005	Nicaragua 2001
<b>Income without public social spending</b>	<b>.5770</b>	<b>.5034</b>	<b>.5957</b>	<b>.5697</b>	<b>.5963</b>
Including all public social spending	.5042	.4902	.5827	.5087	.5657
Including public social spending on health care only	.5504	.5008	.5937	.5537	.5793
Including public social spending on pre-school, primary and secondary education	.5464	.4879	.5867	.5565	.5804
Including public social spending on higher education only	.5765	.5031	.5957	.5707	.5957
Including public pensions only	--	--	--	--	.5962
Including public assistance targeted to low income families only	.5603	--	--	.5587	.5954

Source: Barreix, Bés and Roca (2009), tables 33, 34, 35, 36, 38 and 40.

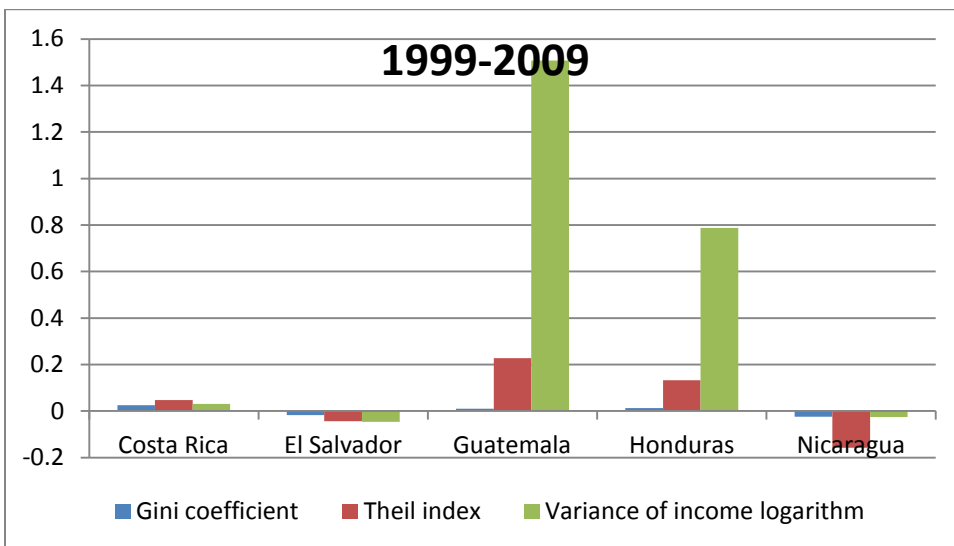
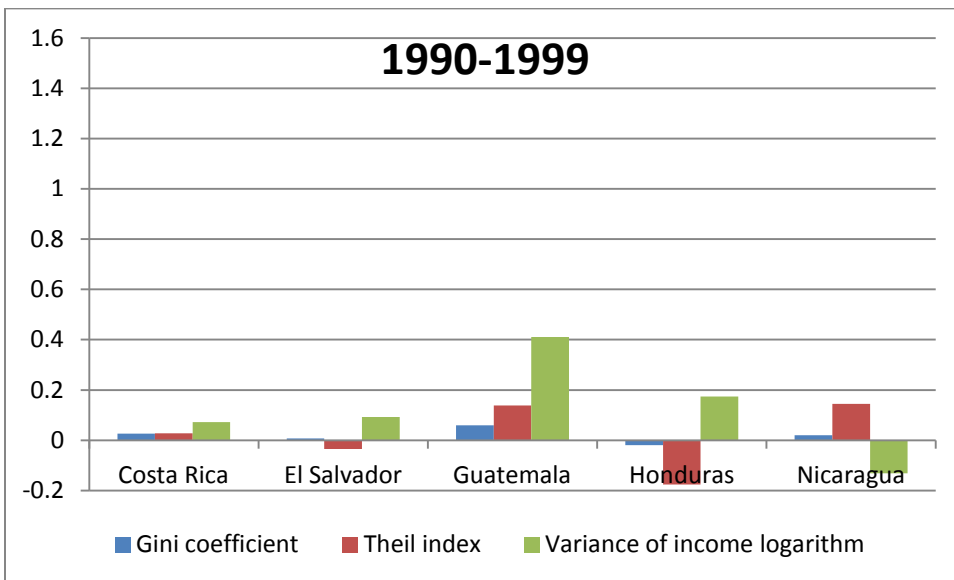
**Table 3: Central America: Labour income inequality, by countries, around 1990, 1999 and 2009**

(For employed persons aged 15 or more with known income and hours worked)

Indicator	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua
Year of survey					
Around 1990	1990	1995	1989	1990	1993
Around 1999	1999	1999	1998	1999	1998
Around 2009	2009	2009	2006	2007	2005
Gini coefficient					
Around 1990	0.410	0.462	0.517	0.562	0.542
Around 1999	0.436	0.469	0.577	0.543	0.562
Around 2009	0.461	0.451	0.587	0.555	0.538
Theil index					
Around 1990	0.319	0.447	0.563	0.759	0.560
Around 1999	0.347	0.412	0.701	0.583	0.705
Around 2009	0.394	0.368	0.928	0.716	0.547
Variance of income logarithm					
Around 1990	0.703	0.686	1.025	1.029	1.171
Around 1999	0.775	0.779	1.436	1.203	1.039
Around 2009	0.805	0.732	2.943	1.990	1.013

Source: Gindling and Trejos (2004) and prepared by the authors on the basis of household surveys of the respective countries and years. The household surveys used are: Costa Rica (Household Surveys for Multiple Purposes, Instituto Nacional de Estadística y Censos, 1990, 1999, 2009), El Salvador (Household Surveys for Multiple Purposes, Dirección General de Estadística y Censos, Ministerio de Economía, 1995, 1999, 2009), Guatemala (Encuesta Nacional Socio-Demográfica de 1989, Encuesta Nacional de Ingresos y Gastos Familiares de 1998 y Encuesta Nacional de Condiciones de Vida – ENCOVI del 2006, Instituto Nacional de Estadística), Honduras (Encuesta Permanente de Hogares de Propósitos Múltiples, Instituto Nacional de Estadística, 1990, 1999, 2007) and Nicaragua (Encuesta Nacional de Hogares sobre Medición de Niveles de Vida, Instituto Nacional de Información de Desarrollo, 1993, 1998, 2005).

**Figure 2: Central America: Variation in labour income inequality indicators in the 1990s and 2000s**  
*(For employed persons aged 15 or more with known income and hours worked)*



**Table 4: Central America: Fields' decomposition of labour income inequality, by countries, around 1990, 1999 and 2009**

(For employed persons aged 15 or more with known income and hours worked)

<i>Proportion of inequality explained by each characteristic (<math>S_j</math>)</i>	Costa Rica 1990	El Salvador 1995	Guatemala 1989	Honduras 1990	Nicaragua 1993
<b>All characteristics</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
Education (years)	0.18	0.19	0.24	0.26	0.19
Sex (men = 1)	0.02	0.04	0.01	0.04	0.00
Zone (urban = 1)	0.02	0.07	0.05	0.05	0.09
Hours worked (log)	0.14	0.06	0.03	0.04	0.02
Institutional sector (public = 1)	0.03	0.04	0.02	0.01	0.00
Size of establishment (6 or more = 1)	0.06	0.03	0.08	0.08	0.05
Experience (age-education-6)	0.01	0.00	-0.02	-0.01	-0.01
Residual	0.55	0.57	0.59	0.53	0.66

<i>Proportion of inequality explained by each characteristic (<math>S_j</math>)</i>	Costa Rica 1999	El Salvador 1999	Guatemala 1998	Honduras 1999	Nicaragua 1998
<b>All characteristics</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
Education (years)	0.18	0.24	0.26	0.24	0.18
Sex (men = 1)	0.03	0.03	0.04	0.03	0.01
Zone (urban = 1)	0.01	0.03	0.03	0.07	0.05
Hours worked (log)	0.19	0.07	0.10	0.06	0.01
Institutional sector (public = 1)	0.01	0.03	0.00	0.00	-0.01
Size of establishment (6 or more = 1)	0.06	0.05	0.03	0.07	0.02
Experience (age-education-6)	0.00	0.00	0.00	-0.01	0.00
Residual	0.52	0.55	0.53	0.54	0.74

<i>Proportion of inequality explained by each characteristic (<math>S_j</math>)</i>	Costa Rica 2009	El Salvador 2009	Guatemala 2006	Honduras 2007	Nicaragua 2005
<b>All characteristics</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
Education (years)	0.25	0.21	0.14	0.18	0.15
Sex (men = 1)	0.03	0.01	0.00	0.00	0.01
Zone (urban = 1)	0.01	0.02	0.06	0.08	0.04
Hours worked (log)	0.19	0.17	0.06	0.08	0.07
Institutional sector (public = 1)	0.02	0.02	0.00	0.01	0.00
Size of establishment (6 or more = 1)	0.07	0.01	0.09	0.08	0.03
Experience (age-education-6)	-0.01	-0.01	0.02	0.00	-0.01
Residual	0.45	0.56	0.62	0.56	0.71

Source: Prepared by the authors on the basis of household surveys of the respective countries and years.

**Table 5: Central America: Contribution of each variable to changes in the variance of logarithm ( $S_j * \text{VarLogY}$ ) from around 1990 to 1999 for each country**  
*(For employed persons aged 15 or more with known income and hours worked)*

Variables	Costa Rica 1990/1999	El Salvador 1995/1999	Guatemala 1989/1998	Honduras 1990/1999	Nicaragua 1993/1998
<b>Change in the variance of the logarithm</b>	<b>0.08</b>	<b>0.10</b>	<b>0.41</b>	<b>0.17</b>	<b>-0.13</b>
Education (years)	0.02	0.08	0.13	0.03	-0.04
Sex (men = 1)	0.00	0.00	0.05	0.00	0.01
Zone (urban = 1)	-0.01	-0.01	-0.01	0.03	-0.06
Hours worked (log)	0.05	0.02	0.12	0.04	-0.01
Institutional sector (public = 1)	-0.01	0.00	-0.02	-0.01	-0.01
Size of establishment (6 or more = 1)	0.00	0.02	-0.03	0.01	-0.04
Experience (age-education-6)	0.00	0.00	0.03	-0.01	0.01
Residual	0.02	0.09	0.17	0.13	0.01

*Source:* Prepared by the authors on the basis of household surveys of the respective countries and years.

**Table 6: Central America: Basic statistics of the earnings equations, by countries, around 1990, 1999 and 2009***(For employed persons aged 15 or more with known income and hours worked)*

Variables	Costa Rica			El Salvador			Guatemala			Honduras			Nicaragua		
	1990	1999	2009	1995	1999	2009	1989	1998	2006	1990	1999	2007	1993	1998	2005
<b>Coefficients of the earnings equations</b>															
Education (years)	0.090	0.093	0.106	0.068	0.087	0.081	0.106	0.116	0.118	0.118	0.111	0.106	0.094	0.104	0.085
Sex (men = 1)	0.285	0.279	0.295	0.320	0.257	0.108	0.177	0.413	-0.166	0.477	0.428	0.216	0.046	0.283	0.269
Zone (urban = 1)	0.146	0.100	0.072	0.350	0.234	0.138	0.316	0.336	0.688	0.295	0.408	0.549	0.530	0.344	0.319
Hours worked (log)	0.594	0.591	0.577	0.433	0.456	0.564	0.524	0.572	0.618	0.362	0.415	0.514	0.252	0.187	0.539
Institutional sector (public = 1)	0.186	0.121	0.129	0.334	0.291	0.210	0.260	0.008	0.073	0.143	0.033	0.181	-0.031	-0.243	-0.083
Size of establishment (6 or more = 1)	0.281	0.272	0.288	0.194	0.245	0.062	0.430	0.287	0.776	0.387	0.427	0.563	0.390	0.220	0.290
Experience (age-education-6)	0.034	0.027	0.024	0.031	0.039	0.037	0.034	0.055	0.035	0.047	0.040	0.033	0.041	0.043	0.033
Experience <sup>2</sup>	-0.0004	-0.0003	-0.0003	-0.0004	-0.0005	-0.0004	-0.0004	-0.0007	-0.0006	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005	-0.0004
R <sup>2</sup>	0.472	0.493	0.556	0.432	0.463	0.421	0.409	0.434	0.434	0.442	0.434	0.421	0.349	0.283	0.331
Number of observations	9704	13152	18037	10365	20277	13280	12747	11615	21574	12293	10778	28951	4806	5978	11297
<b>Standard deviation of the independent variables</b>															
Education (years)	4.06	4.06	4.29	5.14	5.05	5.06	4.33	4.61	4.90	4.21	4.47	4.49	4.64	4.66	4.82
Sex (men = 1)	0.45	0.47	0.48	0.49	0.50	0.50	0.44	0.48	0.48	0.46	0.48	0.48	0.49	0.48	0.48
Zone (urban = 1)	0.50	0.50	0.49	0.47	0.46	0.44	0.50	0.50	0.49	0.50	0.50	0.50	0.48	0.49	0.48
Hours worked (log)	0.46	0.56	0.57	0.41	0.47	0.54	0.35	0.58	0.59	0.47	0.56	0.62	0.58	0.55	0.46
Institutional sector (public = 1)	0.39	0.34	0.36	0.32	0.31	0.29	0.28	0.23	0.25	0.30	0.27	0.27	0.39	0.32	0.28
Size of establishment (6 or more = 1)	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.48	0.49	0.48	0.48	0.47	0.49	0.49	0.49
Experience (age-education-6)	14.36	14.12	14.09	15.68	16.01	15.78	16.25	17.20	17.09	16.23	16.26	16.82	15.15	15.52	16.62
<b>Mean value of the independent variables</b>															
Education (years)	7.33	7.81	9.20	5.88	7.01	7.98	3.83	4.55	5.52	4.48	5.45	6.14	5.47	5.81	5.56
Sex (men = 1)	0.71	0.68	0.63	0.61	0.56	0.54	0.74	0.64	0.64	0.70	0.63	0.64	0.62	0.64	0.66
Zone (urban = 1)	0.46	0.49	0.62	0.67	0.69	0.73	0.44	0.48	0.57	0.48	0.52	0.52	0.64	0.61	0.55
Hours worked (log)	3.76	3.74	3.70	3.77	3.72	3.66	3.80	3.65	3.64	3.77	3.74	3.58	3.74	3.80	3.77
Institutional sector (public = 1)	0.18	0.13	0.15	0.11	0.11	0.09	0.09	0.06	0.06	0.10	0.08	0.08	0.19	0.11	0.08
Size of establishment (6 or more = 1)	0.57	0.51	0.56	0.53	0.50	0.47	0.39	0.35	0.38	0.35	0.36	0.34	0.40	0.40	0.38
Experience (age-education-6)	20.49	22.86	22.61	24.10	23.10	23.68	26.57	26.80	25.47	25.80	24.57	25.10	24.29	23.91	16.70

Source: Gindling and Trejos (2004) and prepared by the authors on the basis of household surveys of the respective countries and years.



**Table 7: Central America: Contribution of each variable to changes in the variance of logarithm ( $S_j * \text{VarLogY}$ ) from around 1999 to 2009 for each country**

*(For employed persons aged 15 or more with known income and hours worked)*

Variables	Costa Rica 1999/2009	El Salvador 1999/2009	Guatemala 1998/2006	Honduras 1999/2007	Nicaragua 1998/2005
<b>Change in the variance of the logarithm</b>	<b>0.03</b>	<b>-0.14</b>	<b>1.50</b>	<b>0.74</b>	<b>-0.03</b>
Education (years)	0.06	-0.05	0.05	0.06	-0.04
Sex (men = 1)	0.00	-0.01	-0.06	-0.03	0.00
Zone (urban = 1)	0.00	-0.02	0.13	0.08	0.00
Hours worked (log)	0.00	0.06	0.02	0.09	0.05
Institutional sector (public = 1)	0.00	-0.01	0.01	0.02	0.01
Size of establishment (6 or more = 1)	0.01	-0.04	0.21	0.07	0.01
Experience (age-education-6)	-0.01	0.00	0.06	0.01	-0.01
Residual	-0.05	-0.07	1.06	0.44	-0.06

*Source:* Prepared by the authors on the basis of household surveys of the respective countries and years.

**Table 8: Mean monthly labour income by education level, 2010 U.S. dollars for Costa Rica, El Salvador and Nicaragua**

	<b>Low Education</b> (0-8 years of schooling)	<b>Mid-level Education</b> (9-13 years of schooling)	<b>Higher Education</b> (14 years or more of schooling)
<b>Costa Rica</b>			
1999	452	667	1359
2009	446	667	1493
Percent change	-1.4	0.0	9.8
<b>El Salvador</b>			
1999	236	391	810
2009	208	309	690
Percent change	-11.8	-20.9	-14.8
<b>Nicaragua</b>			
1998	127	218	632
2005	143	205	518
Percent change	12.5	-6.0	-18.1

Source: SEDLAC (2012).

Notes: Nominal local currencies were translated into 2010 values using the yearly mean of the Consumer Price Index in each country, then 2010 currencies were translated into US dollars using the mean of the official exchange rate for 2010.

**Table 9: Central America: Contribution of each variable to the differences in labour income inequality compared with Costa Rica, 1999 and 2009**

*(For employed persons aged 15 or more with known income and hours worked)*

Variables	Costa Rica 1999	El Salvador 1999	Guatemala 1998	Honduras 1999	Nicaragua 1998
<b>Difference in the variance of the logarithm</b>		<b>0.10</b>	<b>0.67</b>	<b>0.47</b>	<b>0.26</b>
Education (years)		0.07	0.23	0.15	0.04
Sex (men = 1)		0.00	0.04	0.01	-0.01
Zone (urban = 1)		0.02	0.04	0.08	0.04
Hours worked (log)		-0.08	0.00	-0.07	-0.13
Institutional sector (public = 1)		0.02	-0.01	-0.01	-0.02
Size of establishment (6 or more = 1)		0.00	0.01	0.05	-0.02
Experience (age-education-6)		0.00	0.01	-0.02	0.00
Residual		0.08	0.36	0.27	0.37

Variables	Costa Rica 2009	El Salvador 2009	Guatemala 2006	Honduras 2007	Nicaragua 2005
<b>Difference in the variance of the logarithm</b>		<b>-0.07</b>	<b>2.14</b>	<b>1.19</b>	<b>0.21</b>
Education (years)		-0.05	0.22	0.15	-0.05
Sex (men = 1)		-0.01	-0.02	-0.02	-0.01
Zone (urban = 1)		0.01	0.17	0.16	0.04
Hours worked (log)		-0.03	0.02	0.01	-0.08
Institutional sector (public = 1)		0.00	-0.01	0.01	-0.02
Size of establishment (6 or more = 1)		-0.05	0.21	0.11	-0.02
Experience (age-education-6)		0.00	0.07	0.00	0.00
Residual		0.05	1.46	0.76	0.36

*Source:* Prepared by the authors on the basis of household surveys of the respective countries and years.