Factor Shares from Household Survey Data[*]

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Abstract

This paper proposes a method for estimating the factor shares of labor and capital using cross sectional household survey data containing detailed information on household income by source. It then applies the method to the case of Mexico, a country where factor shares are almost the opposite of those in the United States. The application of this method using data from every available household survey that is representative at the national level, corresponding to the years 1968, 1977, 1984, 1989, 1992, 1994, 1996, 1998, 2000 and 2002, yields the following results: (i) factor shares in Mexico are much closer to those in the United States than the National Income and Product Accounts (NIPA) data suggest, with labor accounting for approximately 60% of income and capital for the other 40%; and (ii) factor shares in Mexico have been relatively constant over the time period analyzed. The paper then develops some implications of the differences between factor shares obtained from the NIPA data and the household survey data in several areas of economic research, including growth accounting and the analysis of the sources of growth.

Keywords: Factor Shares, National Income and Product Accounts, Household Survey Data, Functional Distribution of Income, Growth Accounting.

JEL Classification: E25, O47, E13

1 Introduction

One of the best known empirical regularities in economics is that the shares of income accrued to labor and capital are relatively constant over long periods of time.[1] In particular, for developed countries over the last half century, the income share of labor has been between two thirds and three quarters, and the income share of capital has been between one third and one quarter.[2] This fact can be seen in Figure 1, which depicts these two factor shares for the case of the United States during the period 1959-2003:

[INSERT FIGURE 1]

It is also well known that there are significant differences across countries in factor shares obtained using data from the National Income and Product Accounts (NIPA). Furthermore, these shares differ in a systematic way, with higher per capita income countries tending to have a higher share accruing to labor. These two facts are presented in Figure 2 and Tables 1a-1c, which show the income share of labor for a sample of 81 countries and the income share of capital for different groups of countries, respectively. As can be seen, high per capita income countries have, on average, a higher (lower) labor (capital) share than low per capita income countries:

[INSERT FIGURE 2]
[INSERT TABLES 1a, 1b AND 1c]

The fact that factor shares have been relatively constant over time has led several authors to postulate that the production possibilities of an economy can be adequately described by a Cobb-Douglas aggregate production function of the form:

$$Y_t = A_t F(L_t, K_t) = A_t L_t^{\alpha} K_t^{\beta} \tag{1}$$

where Y_t is output, A_t is total factor productivity (TFP), L_t is labor, K_t is capital, and α and β are constant parameters. It can be easily shown that with competitive factor markets these two parameters correspond to the shares of income accrued to labor and capital, respectively.[3] As a result of its empirical support and analytical tractability, the Cobb-Douglas production function has

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[1] Whether factor shares are exactly or approximately constant over time is a matter of controversy. This is a key issue given the implications that a unitary elasticity of substitution between labor and capital has for several economic models. The recent contributions of Duffy and Papageorgiou (2000), Bentolila and Saint-Paul (2003) and Antras (2004) provide evidence against the hypothesis of a unitary elasticity of substitution and, thus, constant factor shares. This paper is concerned with explaining the significant differences across countries in factor shares, rather than with the related question of whether factor shares are exactly or approximately constant over time for any given country.

[2] The terms "income shares" and "factor shares" are used indistinctly throughout this paper.

[3] Furthermore, under the assumption of constant returns to scale the two shares must add up to one, so $\beta = 1 - \alpha$.

been one of the most widely used functional forms in economics, both in applied and theoretical work.[4]

It has been argued and commonly assumed in the literature that technology should be the same across countries. Thus, given that factor shares are fundamental technological parameters in this functional form, it is puzzling that factor shares obtained from the NIPA data differ significantly across countries.

Even if the production possibilities of an economy are described more accurately by an aggregate production function with a constant elasticity of substitution (CES) different than one, it is still puzzling why these shares vary so much across countries since they are the main categories of the functional or factorial distribution of income. Thus, the variation across countries in factor shares obtained from the NIPA data also implies vast differences in the way income is distributed between the two main factors of production.

A solution to the puzzle of the cross-country variation in factor shares has been proposed by Gollin (2002), who showed that once the NIPA data are adjusted for the differences in how the income from the self-employed is classified, the differences in factor shares across countries are greatly reduced. Furthermore, once factor shares obtained from the NIPA data are adjusted, the variation that remains is not related to the level of per capita income.

The method Gollin used to adjust the NIPA data requires that all income from the self-employed be classified in a category denominated Operating Surplus of Private Unincorporated Enterprises, or OSPUE. He then proposed three ways of adjusting the NIPA data to account for the income from the self-employed: (i) attribute all OSPUE to labor income; (ii) divide OSPUE into labor and capital income according to the shares implied by the NIPA data; and (iii) use data on the composition of the workforce and impute wages to the self-employed using the average wage from the NIPA employee compensation data.

Unfortunately, the OSPUE category is not available for every country that has the NIPA data, so there are some countries for which it is not possible to make the adjustments proposed. Furthermore, even if the OSPUE category were available for every country with the NIPA data, it is possible that the income from the informal employees might not be included either as part of Employee Compensation or as part of OSPUE, but rather as part of capital income.

This paper proposes an alternative method for estimating factor shares that explicitly takes into account the problem posed by the income from employers, the self-employed, as well as from informal employees. This method uses repeated cross sectional household survey data, representative at the national level, which contain detailed information on household income by source.

In particular, the method relies on the fact that some household surveys collect data on all sources of income (i.e., the classification of income sources from labor and capital is exhaustive), and that the occupational choice of every

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[4]At a theoretical level, the Cobb-Douglas production function has been shown to be quite general. For example, Houthakker (1955) proved that this type of aggregate production function can be obtained by aggregating firm- or plant-level technologies with fixed coefficients that are distributed according to a Pareto distribution.

member of the household is known. Thus, the shares obtained from these data should not be affected by the income of the informally employed, given that they are still captured by the household survey. Furthermore, labor income for the self-employed can be imputed based on individual observable characteristics contained in the survey such as age, sex, education, potential experience, etc.

The paper then applies this method to the case of Mexico, a country where the factor shares of labor and capital are almost the opposite of those in the United States. In particular, it uses data from every available household survey representative at the national level, corresponding to the years 1968, 1977, 1984, 1989, 1992, 1994, 1996, 1998, 2000 and 2002. It then compares the factor shares obtained using the NIPA data and the household survey data.

The results from applying the method proposed in this paper show that: (i) factor shares in Mexico are much closer to those in the United States than the NIPA data suggest, with labor accounting for approximately 60% of income and capital for the other 40%; and (ii) factor shares in Mexico have been relatively constant over the time period analyzed.

Thus, this paper's results are consistent with Gollin's (2002) finding that the variations across countries in factor shares are largely due to differences in measurement and accounting practices (i.e., how the income from employers, the self-employed and those informally employed is classified) and to differences in the structure of the labor force across countries, rather than to differences in technology.

The paper then develops the implications of the differences between factor shares obtained from the NIPA data and from the household survey data in four areas of economic research: (i) the functional or factorial distribution of income; (ii) growth accounting, development accounting and the analysis of the sources of growth; (iii) the calibration of static applied general equilibrium models and dynamic stochastic general equilibrium models, and the computational experiments obtained from them; and (iv) the speed of convergence to the steady state in the neoclassical growth model and to the balance growth path in a class of endogenous growth models. It is shown that the differences between the factor shares obtained from the NIPA data and from the household survey data have far-reaching consequences in all four areas of economic research.

The rest of the paper is organized as follows: The next section discusses the method used to obtain factor shares from the NIPA data. Section 3 then describes the methodology proposed to estimate factor shares using the household survey data, as well as some of its limitations. Section 4 contains the empirical results for the case of Mexico. Section 5 develops some of the implications of the differences between factor shares obtained from the NIPA data and the household survey data in terms of the factorial distribution of income, growth accounting, the calibration of economic models and the speed of convergence. Section 6 summarizes the main findings of this paper. Finally, the Appendix describes in more detail the data used in the paper.

2 Factor shares from NIPA Data

In principle, Gross Domestic Product (GDP) can be obtained through three different methods: (i) the production approach; (ii) the expenditure approach; and (iii) the income approach. The first method sums the value added at different stages of production of all market goods and services across all sectors of the economy. The second method aggregates expenditures in all final goods and services, and classifies these expenditures according to their nature or use into private consumption, gross investment, government expenditure, exports or imports.

The third method sums all payments to the factors of production and classifies them as either payments to labor (Employee Compensation) or capital (Corporate Profits). The fraction of income paid to each factor is called its income or factor share. In fact, this third method yields a measure of Net National Income (NNI) rather than a measure of GDP. Thus, in order to obtain factor shares from GDP one must first obtain NNI. In theory, to obtain factor shares from GDP, the next steps should be followed:

1. Obtain Net Domestic Product (NDP) as the difference between GDP and Depreciation (δ) :

$$NDP \equiv GDP - \delta \qquad (2)$$

2. Obtain Net National Product (NNP) as the difference between Net Domestic Product (NDP) and Net Factor Payments (NFP) from abroad:[5]

$$NNP \equiv NDP - NFP \qquad (3)$$

3. Obtain Net National Income (NNI) as the difference between Net National Product (NNP) and Net Indirect Taxes (NIT) :

$$NNI \equiv NNP - NIT \qquad (4)$$

4. Classify Net National Income as either Employee Compensation (EC) or Corporate Profits (CP) :

$$NNI \equiv EC + CP \qquad (5)$$

In practice, though, in order to obtain GDP most countries use one or both of the first two methods (the production or the expenditure approach), while only a few countries obtain an independent measure of Net National Income using the third method (the income approach). The main reason for this is that data on Corporate Profits, one of the two main categories into which Net National Income is classified, are scant or absent altogether for most countries.[6]

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[5] Net Factor Payments is the difference between payments received by residents for factor services rendered abroad and payments made to other countries for factor services rendered by nonresidents.

[6] Incidentally, the absence of data on Corporate Profits is a major drawback for policy makers in these countries. It is important to highlight that for those countries that do have

Despite the above, most countries still produce and report a classification of GDP between labor and capital income. In order to obtain this division, countries typically obtain Employee Compensation directly and obtain a measure of capital income as a residual. Thus, capital income is defined as the difference between GDP, obtained using one of the first two methods, and Employee Compensation (EC), Depreciation (δ), and Net Indirect Taxes (NIT).[7] In practice, to obtain factor shares from GDP most countries follow the next steps:

1. Obtain GDP through either the production side or the expenditure side.

2. Obtain Employee Compensation (EC) and Net Indirect Taxes (NIT) directly.

3. Obtain a measure of capital income, called Gross Operating Surplus (GOS), as the difference between GDP, Employee Compensation and Net Indirect Taxes:

$$GOS \equiv GDP - EC - NIT \qquad (6)$$

Gross Domestic Product is then classified into Employee Compensation, Gross Operating Surplus, and Net Indirect Taxes (net of Indirect Subsidies). The measure of capital income from the NIPA data obtained in this way is a residual, so by definition it includes Corporate Profits as well as all income that is not explicitly classified as Employee Compensation.

Given that in low per capita income countries a large share of the labor force are typically either employers, self-employed or informal employees, their incomes are likely to be incorrectly classified as part of the Gross Operating Surplus. The fact that the higher per capita income countries have, on average, a lower share of their labor force as either employers, self-employed or informal employees is shown in the following figure:

[INSERT FIGURE 3]

Thus, once the differences in accounting methodologies and in the composition of the labor force across different countries are clear, it becomes evident why countries with low per capita income have, on average, a lower labor share than high per capita income countries in the NIPA data. The question that arises naturally then is how to adjust these data to correct for these differences in accounting.

In order to solve this measurement problem, Gollin (2002) proposed adjusting the NIPA data for the difference across countries in the share of income from the self-employed. In particular, all income from the self-employed should in principle be included in a category of the NIPA denominated Operating Surplus of Private Unincorporated Enterprises, or OSPUE. By convention of the

measures of Corporate Profits, the data on which they are based are typically obtained through random sampling of tax return forms. Thus, the measure of Corporate Profits obtained from NIPA's data is actually an estimate.

[7] In fact, countries also differ in this regard, since some subtract depreciation and others do not.

System of National Accounts, income from the self-employed is not to be classified as labor income but instead should be classified in the OSPUE category.

Gollin (2002) then proposed three methods for adjusting the NIPA data to account for the income from the self-employed: (i) attribute all OSPUE to labor income; (ii) divide OSPUE into labor and capital income according to the shares implied by the NIPA data; and (iii) use data on the composition of the workforce and impute wages to the self-employed using the average wage in the NIPA employee compensation data.

Once these adjustments are made to the NIPA data, the cross-country variation in factor shares is greatly reduced. Furthermore, the differences that remain after the adjustments to the data are not related to per capita income. This suggests that differences across countries in factor shares are largely due to differences in measurement and accounting practices (i.e., how the income from employers, the self-employed and those informally employed is classified in the NIPA data) and to differences across countries in the composition of the labor force, rather than to differences in technology.

Unfortunately, many countries do not have or report the OSPUE category, so it is impossible to adjust the NIPA data. Moreover, it is possible that some of the remaining differences across countries in factor shares after the NIPA data have been adjusted for differences in how the income from the self-employed is classified could be due to related measurement and accounting problems, such as differences across countries in the income from those informally employed.

2.1 The Case of Mexico

Mexico is one of the countries for which the OSPUE category is not available. Instead, a classification is provided in the NIPA data according to which GDP is divided into three categories: Employee Compensation, Gross Operating Surplus, and Net Indirect Taxes.[8]

While several other countries provide a similar breakdown of GDP, Mexico is a particularly interesting case for several reasons. First, despite its geographical proximity and its strong commercial and investment ties to the United States, the factor shares of these two countries obtained from the NIPA data differ substantially. In fact, as the following table and figure show, Mexico's shares are almost the opposite of those in the United States:

[INSERT TABLE 2]
[INSERT FIGURE 4]

Moreover, despite the increasing integration of the Mexican and the U.S. economies over the past decade, beginning in 1994 with the enactment of the North American Free Trade Agreement (NAFTA), there is no evidence in the

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[8]In Spanish, these three categories are known as *Remuneración de Asalariados, Excedente Bruto de Operación* and *Otros Impuestos a la Producción.*

NIPA data that the factor shares of the two countries have become more similar.[9] The discrepancy in factor shares between Mexico and the U.S. has in fact been noticed for some time in the literature, as exemplified by the following quote from Kehoe and Kehoe (1997):

> "One disturbing feature of the Mexican data compared to the U.S. data is the difference between the share of returns to capital in the national income of the two countries. In Mexico, this number is about 70 percent (330 trillion out of total factor income of 460 trillion), whereas in the United States, it is about 25 percent. (...) One approach to handling these data—the one taken in the models discussed here—is to accept the data at face value and to calibrate the production functions accordingly. Another approach is to look for reasons why the two capital shares are so different. Some possibilities are different treatment of the earnings of self-employed workers in the two countries, different composition of national output, higher monopoly rents in Mexico, and more black market labor in Mexico. Whatever the cause or causes, the comparability of data across countries is obviously a serious issue that requires more research."

Given that factor shares are key technological parameters, as well as the two main categories of the functional or factorial distribution of income, it is puzzling why they differ so much across these two countries. In the words of Gollin (2002), "Why ... would the production technology differ so greatly between the United States and Mexico, whereas it differs so little between the United States and Germany or Japan?"

It is well known that self-employment and informal employment in Mexico are widespread. For example, during the period 1998-2004, close to 24.3% of the labor force in the country was self-employed, another 4.3% were employers or entrepreneurs, while around 34.8% of salaried workers were employed informally.[10] According to the official statistics, the magnitude of the informal sector of the Mexican economy averaged 12.4% of GDP during 1993-2002, and was relatively constant over this period.[11] These facts are depicted in the next figures:

[INSERT FIGURE 5]

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[9] For evidence about the increasing integration and synchronization of the U.S. and Mexican economies after 1994, see Chiquiar and Ramos Francia (2004), Cuevas, Messmacher and Werner (2002) and Torres and Vela (2003).

[10] See *Encuesta Nacional de Empleo* (ENE), or National Employment Survey. Instituto Nacional de Estadística, Geografía e Informática (INEGI). Self-employed workers are termed *Trabajadores por Cuenta Propia*, employers or entrepreneurs are termed *Patrones*, while those considered as informal employees work without a written contract or with a temporary contract. While this last definition is arbitrary, other alternative definitions such as the absence of social security benefits yield a similar share.

[11] In fact, the relative constancy over time of the share of the informal sector is consistent with the relative stability of the income shares of Employee Compensation and Gross Operating Surplus in the NIPA's data. See INEGI (2004). Cuenta Satélite del Subsector Informal de los Hogares.

[INSERT FIGURE 6]

Thus, given the accounting methodology followed in constructing Mexico's NIPA, and given the magnitude of self-employment and informal employment in the labor force, it is not puzzling why employee compensation as a share of GDP is relatively small in Mexico. In fact, the low share of employee compensation, and the correspondingly high share of Gross Operating Surplus in GDP, is a common phenomenon in other countries in Latin America with similar characteristics to Mexico, including similar per capita income levels and accounting methodologies. This fact, which can be seen in Table 1b, is also depicted in the following figures, which show these shares for the case of Argentina, Brazil and Chile for the most recent years for which the NIPA data are available:

[INSERT FIGURE 7]
[INSERT FIGURE 8]
[INSERT FIGURE 9]

Unfortunately, Mexico and various other countries do not provide data on OSPUE and only divide GDP into Employee Compensation, Gross Operating Surplus and Net Indirect Taxes. As a result, the problem of how to adjust the factor shares obtained from the NIPA data remains. The following section outlines a method for obtaining factor shares from household survey data that explicitly takes into account the problem of the income from the self-employed as well as from those employed informally.

3   Factor shares from Household Survey Data

The interaction between household survey data and aggregate data is not new. Household survey data are typically collected less frequently than the NIPA data (e.g., every two to five years). Thus, they are not used directly in putting together the quarterly and yearly NIPA data.

Nevertheless, household survey data are regularly used to check the consistency of the NIPA data. In particular, the growth rate of total expenditures obtained from the household survey data is regularly compared to the growth rate of consumption from the NIPA data, as is the composition of expenditures by categories with the composition of consumption.

Conversely, the NIPA data are used to complement the household survey data in the construction of consumer price indices, particularly in the estimation of the expenditure shares of certain items that are known to be underreported in the household survey data such as alcohol and tobacco.

The choice of whether to use microdata (such as the household survey data or firm or plant-level data) or aggregate data (such as the NIPA) in order to obtain estimates of the parameters needed to calibrate different economic models has been largely data-driven. In particular, some parameters have been obtained from the NIPA data given that they are readily computable from them. This

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has been the case, up to now, with the labor and capital shares of income. More complicated parameters which cannot be directly obtained from the NIPA data are either estimated from microdata, or are obtained from previous microeconometric studies. This is the case, for example, with the intertemporal elasticity of substitution.[12]

There is in principle no reason why factor shares cannot be estimated from microdata. Whether the NIPA data or the household survey data are used to obtain a given parameter, the results obtained from each type of data may differ significantly. Moreover, the computational experiments from calibrated models are sometimes highly sensitive to the actual choice of that parameter. Thus, factor shares are important parameters whose measurement deserves careful attention.

The theoretical basis behind this methodology is straightforward. The first part relies on the fundamental identity of national income and product accounting, according to which total output or production of an economy should be identical to total expenditure of the economy, which in turn should be identical to total income of the economy. This identity is typically depicted in the circular flow model, which shows that given that all factors of production are ultimately owned by the household sector in a market economy, total output is identical to total expenditure and to total income.[13]

The second part is statistical sampling theory. In particular, household survey data collected through random or stratified sampling that are representative of the population at the national level in principle can be used to obtain unbiased and consistent estimates of any population parameter of interest. In this case, the population parameters of interest that need to be estimated are the fractions of total income that accrue to labor and capital.

We next propose three different estimators of the share of labor in total income. Under constant returns to scale, income should be exhausted between payments to labor and capital, so the capital share can be obtained as a residual once the labor share has been estimated. Thus, under this assumption one need only estimate the parameter corresponding to the share of income that accrues to labor.

The reason why three estimators of a single parameter are proposed is twofold. First, when using microdata there are typically many ways of obtaining an estimate of a single parameter, and this paper is no exception. The approach taken here is to present as many estimates as the data allow one to obtain and let the reader or user decide which one is more appropriate.

Second, the presence of a large fraction of households that report having zero income, something typical in household survey data, greatly increases the

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[12] Regarding the latter approach, Hansen and Heckman (1996) have criticized the calibration methodology, since there is a wide variety of point estimates of the same parameter available in different studies. Thus, one cannot speak of *the* elasticity of substitution.

[13] As explained in Section 2 above, income is not identical to output and to expenditure. In particular, Net Factor Payments, Net Indirect Taxes and Depreciation have to be subtracted from GDP in order to obtain Net National Income. For the sake of simplicity, in the following sections we ignore this difference and refer indistinctly to income and output.

standard error of the estimates. To address this issue, we proposed an estimator that excludes households in the top and bottom of the income distribution so that these households will not skew the mean. We next describe each estimator.

Let w_i be total household income from all labor sources, y_i be total household income and θ_i be the weight of expansion factor, where i is the index of households, $i = 1, ..., n$. We can then obtain three different estimates of parameter $\hat{\alpha}$, namely, the share of labor in total income. The first estimator is given by:

$$\hat{\alpha}_1 = \frac{\sum_{i=1}^{n} w_i \theta_i}{\sum_{i=1}^{n} y_i \theta_i} \tag{7}$$

This estimator adds up total labor income across all households and then divides it by the sum across all households of total income.[14] In this sense, the first estimator we propose for the labor share is the one that more closely resembles the way this share is calculated using the NIPA data. One of the drawbacks of this estimator is that it is equivalent to weighting each household's labor share by that household's income as a share of the total income of all households.[15] As such, it gives disproportionate weight to households with high income, most of which typically have a lower labor share than the average household.

In order to address this problem, we also use the following estimator:

$$\hat{\alpha}_2 = \sum_{i=1}^{n} \left(\frac{w_i}{y_i} \right) \theta_i \tag{8}$$

This second estimator first computes the labor share for each household and then averages these shares across all households, giving the same weight to each household. In this sense, this estimator gives a better estimate of the labor share of the typical or representative household. Unfortunately this estimator

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[14] Given that the first estimator is a ratio of sample means, the variance of this estimator may be found using the delta method. In particular, its variance is given by the following expression:

$$var(\hat{\alpha}_1) = \left(\frac{1}{\bar{y}} \right)^2 \left[var(w) + \left(\frac{\bar{w}}{\bar{y}} \right)^2 var(y) - 2 \left(\frac{\bar{w}}{\bar{y}} \right) cov(w, y) \right]$$

For more details see Goldberger (1991).

[15] In order to see this, let Y be the total income of all households. One can then multiply and divide the numerator of the estimator by the total income of each household, y_i, to obtain:

$$\hat{\alpha}_1 = \frac{\sum_{i=1}^{n} w_i \theta_i}{\sum_{i=1}^{n} y_i \theta_i} = \frac{\sum_{i=1}^{n} \left(\frac{w_i}{y_i} \right) \theta_i y_i}{\sum_{i=1}^{n} y_i \theta_i} = \sum_{i=1}^{n} \left(\frac{w_i}{y_i} \right) \theta_i \left(\frac{y_i}{\sum_{i=1}^{n} y_i \theta_i} \right) = \sum_{i=1}^{n} \left(\frac{w_i}{y_i} \right) \theta_i \left(\frac{y_i}{Y} \right)$$

is also affected, although to a lesser extent than the first one, by the presence of a large number of households who report an income of zero.

In order to address this problem, we also use the following estimator:

$$\hat{\alpha}_3 = \sum_{i \in A} \left(\frac{w_i}{y_i} \right) \theta_i \tag{9}$$

where A is the set of households located between the 45th and the 55th percentiles of the income distribution.[16] This last estimator of the share of labor in total income is identical to the second one, except that the average is taken just for those households located in the middle of the income distribution. The purpose of this last estimator is that the estimate will not be affected by extreme observations, particularly by those households that report zero income, so that the standard errors of the estimates may be more reasonable.

3.1   Limitations of the Proposed Methodology

When dealing with household survey data, it is necessary to address certain problems which do not arise when using aggregate data such as the NIPA. There are at least four reasons why the factor shares obtained from these estimates could differ from those in the population. These reasons should be seen as limitations of the data and the proposed methodology. The four main problems are: (i) sampling error; (ii) missing or incomplete data; (iii) measurement error; and (iv) differences in the reference period. We next describe each of them briefly and discuss how they may affect the results of the estimation.

In the case of sampling error, it is well known that all sampled data have a statistical error associated with the fact that they are subsets of the population. The magnitude of this error can be quantified through the standard error, which is a function of the variance and of the size of the sample used.

To the extent that the sample sizes of the household surveys used were chosen to ensure the representativeness of the sample, the standard errors should not affect the significance of the estimates. Nevertheless, the prevalence in this type of survey of households who report an income of zero greatly increases the standard error of the estimates. In order to address this issue, the paper proposes three alternative estimators, the third of which is an average over households in the middle of the income distribution and is thus not affected by the prevalence of zeroes.

In the case of missing or incomplete data, this could be due either to the respondent, the interviewer or the coding process. The most troublesome is the case of non-response by the respondent. As long as non-responses are random, this should not be a problem other than reducing the effective size of the sample. Nevertheless, if certain types of households are more likely not to respond than others, so that non-responses are non-random, then the estimates may be biased.

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[16]If Y represents the random variable for total income, we select the values $\hat{y}$ and $\check{y}$ such that $Pr\{Y \geq \hat{y}\} = 0.55$ and $Pr\{Y \leq \check{y}\} = 0.45$, and then find the mean for households whose income lies in the set $A = \{i | \check{y} \leq Y_i \leq \hat{y}\}$.

It is well known that in this type of survey the higher the income the less likely households will collaborate in the survey. Thus, if higher income households have a smaller labor share, this will imply an upward bias in the estimate. This is an example of the more general problem of selection bias or self-selection bias.

In the case of measurement error, it is well known that household survey data are typically measured with error, due either to the respondent, the interviewer or the coding process. Unless the data generating process of this measurement error is described by a mean zero normal distribution (classic measurement error), the errors will not cancel out and the resulting estimates may be biased.

Finally, there is the problem of the reference period. The concepts of GDP or national income refer to flow variables for a given period, typically a year. For example, GDP refers to all final market goods and services produced in a given year. In contrast, the data collected by a household survey refer to a shorter period, typically referred to as the reporting period, which is not necessarily the period in which the fieldwork was performed.

In particular, the surveys typically ask questions about the income accrued during a period of several months before the survey, while in the case of expenditures the reference period is much more recent, usually a few week before the survey. In the case of the ENIGHs, the survey questionnaire has a reference period between one and six months, depending on the question asked. If seasonality is important for a variable, such as wages, then the results of the two methods need not coincide unless the reference period is the same.

4 Empirical Results

The following table and figure present the main results of the paper. Table 3 contains the three estimates for each of the surveys considered. The standard errors are in italics below each point estimate. As can be seen from the table and the accompanying figure, factor shares in Mexico estimated from the household survey data have been relatively stable over the period considered (1968-2002). More importantly, these shares are much closer to the shares of developed countries, including the United States and the other OECD countries, than those obtained using the NIPA data.

[INSERT TABLE 3]
[INSERT FIGURE 10]

The last column in Table 3 shows that on average over the period 1968 to 2002, the share of labor in total income obtained from the household survey data using the first two estimators has been around 57%, while the share of capital in total income has been around 43%. In fact, the average of the results obtained using the first two estimators are very similar. As mentioned above, the standard errors of the estimates are disproportionately large, mainly due to the large fraction of households that report zero income.

In contrast, the results obtained using the third estimator are significantly higher, and the standard errors are an order of magnitude smaller. This should

not be surprising given the was the third estimator was constructed. Again, it is left to the reader to decide which estimate is more appropriate.

Thus, the results support the hypothesis that it is differences in measurement practices and in the composition of the labor force across countries, rather than differences in technology, that explain the differences reported in factor shares between developed and developing countries. In this sense, these results are consistent with Gollin's (2002) findings, although the methods used by the two papers are completely different. As will be argued in the next section, the implications of these differences in at least four areas of economic research are far reaching.

5   Implications

This section develops some of the implications of the differences in factor shares from the NIPA data and those obtained from the household survey data. As mentioned before, there are at least four areas of economic research where the differences in factor shares have important implications: (i) the functional or factorial distribution of income; (ii) growth accounting, development accounting and the analysis of the sources of growth; (iii) the calibration of static applied general equilibrium models, dynamic stochastic general equilibrium models and the computational experiments obtained from them; and (iv) the speed of convergence to the steady state in the neoclassical growth model or to a balanced growth path in a certain class of endogenous growth models.

5.1   Factorial Distribution of Income

The most direct implication of the differences in factor shares obtained from the NIPA data and from the household survey data concerns economic inequality. In particular, the factor shares of labor and capital are the main categories of the factorial or functional distribution of income. While most of the attention in the economics literature has been centered on the personal distribution of income, the functional distribution of income is often used in assessing how growth is "shared" among workers and capitalists. The differences in factor shares implied by the NIPA data, taken at face value, imply that the share of labor is much lower in countries with low per capita income. This has sometimes been interpreted as evidence that capital is more "exploitative" in poorer countries, since it accrues a higher fraction of income.

As a result, the conventional wisdom has been that in Mexico –as in much of the rest of Latin America– capital is much more exploitative than in developed countries since it obtains or "extracts" a larger share of income as "corporate profits." As argued above, the share of capital in total income obtained from the NIPA data does not correspond to corporate profits. The direct implication of the factor shares obtained using the household survey data is that capital and labor in fact receive about the same share of income as in countries with

higher per capita income. Thus, there is no evidence that capital is any more exploitative in developing countries than it is in developed countries.

5.2   Growth Accounting

In the growth accounting literature and the sources of growth methodology, the results of these accounting exercises crucially depend on the factor shares used. In fact, Caselli (2004) has shown using a numerical example that these growth and developing accounting exercises are most sensitive to the income share parameter (the others being the initial capital stock, the depreciation rate, etc.). In this section we quickly review the growth accounting methodology and reexamine the results of the sources of growth exercises for Mexico in light of the results obtained above.[17]

It is useful to begin with a general production function of the form:

$$Y_t = A_t F(L_t, K_t) \tag{10}$$

By taking the logarithmic derivative of the function above, one can obtain an expression for the growth rate of output as a function of the growth rates of TFP, labor and capital:

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \frac{\partial F(L_t, K_t)}{\partial L_t} \frac{L_t}{F(L_t, K_t)} \frac{\dot{L}_t}{L_t} + \frac{\partial F(L_t, K_t)}{\partial K_t} \frac{K_t}{F(L_t, K_t)} \frac{\dot{K}_t}{K_t} \tag{11}$$

Assuming competitive factor markets and the absence of externalities, so that social returns to each factor coincide with the observed private returns, the marginal products of labor and capital should be equal to their rental prices:

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}_t}{A_t} + \left(\frac{w_t L_t}{Y_t}\right) \frac{\dot{L}_t}{L_t} + \left(\frac{r_t K_t}{Y_t}\right) \frac{\dot{K}_t}{K_t} \tag{12}$$

According to this expression, the growth rate of output can be decomposed into a part that is attributable to the growth rate of TFP, a part that is attributable to the growth rate of labor, and a part that is attributable to the growth rate of capital, where the growth rate of each factor is weighted by its respective share in output.

In the expression above, the growth rates of output and labor are readily observable from the data. In the case of capital, a series can be constructed from data on investment using several methodologies, including the perpetual inventory method. Finally, one can obtain the growth rate of TFP as the difference between the growth rate of output and the growth rates of labor and capital weighted by their respective shares in output:

$$\frac{\dot{A}_t}{A_t} = \frac{\dot{Y}_t}{Y_t} - \left(\frac{w_t L_t}{Y_t}\right) \frac{\dot{L}_t}{L_t} - \left(\frac{r_t K_t}{Y_t}\right) \frac{\dot{K}_t}{K_t} \tag{13}$$

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[17]Some recent and influential examples of these growth accounting exercises are Mankiw, Romer and Weil (1992) and Bernanke and Gürkaynak (2002), among others.

These last two expressions are important since they show that factor shares, even if they are not constant over time, are key in obtaining the growth rate of TFP. Thus, even if one does not assume a Cobb-Douglas production function, factor shares partly determine the results of the growth and development accounting exercises.

An alternative form of decomposing the growth rate of output, termed the dual approach, obtains the growth rate of TFP from the observed growth rates of factor prices. [18]This approach begins with the identity of output and factor income payments:

$$Y_t \equiv w_t L_t + r_t K_t \tag{14}$$

Differentiating both sides of this identity with respect to time yields:

$$\dot{Y}_t = \dot{w}_t L_t + w_t \dot{L}_t + \dot{r}_t K_t + r_t \dot{K}_t \tag{15}$$

Dividing both sides of this last equation by Y_t gives an expression for the growth rate of output as a function of the share-weighted growth rate of inputs and the share-weighted growth rate of factor prices:

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{w}_t}{w_t}\left(\frac{w_t L_t}{Y_t}\right) + \frac{\dot{L}_t}{L_t}\left(\frac{w_t L_t}{Y_t}\right) + \frac{\dot{r}_t}{r_t}\left(\frac{r_t K_t}{Y_t}\right) + \frac{\dot{K}_t}{K_t}\left(\frac{r_t K_t}{Y_t}\right) \tag{16}$$

Regrouping terms one can obtain an expression for the growth rate of TFP as a function of the growth rate of factor prices, where each factor price is weighted by that factor's share in output:

$$\frac{\dot{A}_t}{A_t} = \frac{\dot{Y}_t}{Y_t} - \left(\frac{w_t L_t}{Y_t}\right)\frac{\dot{L}_t}{L_t} - \left(\frac{r_t K_t}{Y_t}\right)\frac{\dot{K}_t}{K_t} = \left(\frac{w_t L_t}{Y_t}\right)\frac{\dot{w}_t}{w_t} + \left(\frac{r_t K_t}{Y_t}\right)\frac{\dot{r}_t}{r_t} \tag{17}$$

Thus, it is important to notice that factor shares are also key in determining the growth rate of TFP when the dual approach is used.

Given the empirical evidence provided above both from the NIPA data and from the household survey data that factor shares have been relatively constant over time, and without loss of generality, it is helpful to work with a Cobb-Douglas production function of the form:

$$Y_t = A_t L_t^\alpha K_t^\beta \tag{18}$$

From this expression one can obtain the level of TFP as a function of output, labor and capital, as well as of factor shares:

$$A_t = \frac{Y_t}{L_t^\alpha K_t^\beta} \tag{19}$$

In this case, factor shares are constant over time and equal to the exponents of labor and capital in the production function. The expression for the growth

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[18]See Barro and Sala-i-Martin (2004).

rate of TFP as a function of the growth rates of output, the two inputs and the factor shares can be obtained by taking the logarithmic derivative of equation (19) or by substituting the constant factor shares into equation (13):

$$\frac{\dot{A}_t}{A_t} = \frac{\dot{Y}_t}{Y_t} - \alpha \frac{\dot{L}_t}{L_t} - \beta \frac{\dot{K}_t}{K_t} \tag{20}$$

Under the assumption of constant returns to scale, the expression simplifies further to:

$$\frac{\dot{A}_t}{A_t} = \frac{\dot{Y}_t}{Y_t} - \frac{\dot{L}_t}{L_t} + \beta \left(\frac{\dot{K}_t}{K_t} - \frac{\dot{L}_t}{L_t} \right) \tag{21}$$

Define output per capita and capital per capita as $y \equiv Y/L$ and $k \equiv K/L$. We can then rearrange and express the equation above in intensive or per capita terms as:

$$\frac{\dot{A}_t}{A_t} = \frac{\dot{y}_t}{y_t} - \beta \frac{\dot{k}_t}{k_t} \tag{22}$$

According to this equation, the growth rate of TFP is equal to the growth rate of output per capita minus the growth rate of capital per capita weighted by the share of capital in total output. It is evident from this equation that if the share of capital is overestimated, then the growth rate of TFP will be underestimated.

This fact would explain why in Mexico and other Latin American countries the growth rate of TFP has been found to be negative for several periods. It would also solve the difficulty in interpreting a sustained fall in TFP, which implies a "literal forgetting of technology" in the words of Barro and Sala-i-Martin (2004). To explore this issue further, equation (22) will be used in the next section to assess the differences in the results of the growth accounting exercise using factor shares from the NIPA and from the household survey data for the case of Mexico.

5.2.1   The Case of Mexico

In the case of Latin America, Elías (1992) provides a comprehensive analysis of the sources of growth for seven economies in the region, including Mexico. One of the main conclusions reached is that capital was the main source of growth over the period 1940-1985 in all of the countries analyzed. The results he obtained were largely confirmed by Santaella (1998), who performed a similar analysis for the case of Mexico. In particular, the latter documents Mexico's growth experience during the period 1940-1997, and reaches similar conclusions in the sense that capital accounted for most of the growth rate of per capita output. In particular, he found that capital per capita accounted for close to 60% of the growth rate of real GDP per capita over the period 1950-2000, while TFP accounted for the other 40%.

Another key fact documented by Elías for the Latin American countries analyzed, and Santaella in the case of Mexico, is that there has been a major slowdown in the growth rate of the region's real GDP after 1982. In the case of Mexico, from 1950 until 1981 real GDP per capita grew at an average of 3.19% per annum. In contrast, from 1982 until 2000, real GDP per capita grew at an average of 0.45% per annum.[19] The evolution of real per capita GDP is depicted in the next figure:

[INSERT FIGURE 11]

Given this sharp slowdown in the growth rate of real GDP per capita, some of the questions that naturally arise are: What produced this slowdown? Which factor or factors of production were responsible, or was TFP the culprit?

The received knowledge derived from the growth accounting methodology and sources of growth exercises using the factor shares from the NIPA data is twofold. First, capital has been the largest contributor to output growth in Latin America. Second, the slowdown or fall in the growth rate of per capita GDP after 1982 was mainly the result of a sharp fall in the growth rate of TFP. In fact, for several years the growth rate of TFP is found to be negative. Both conclusions largely rest on the relatively large income share of capital in Mexico and other Latin American countries, which according to the NIPA data has been around 60% on average.

We next repeat the growth accounting exercise described in the previous section but using the factor shares obtained from the household survey data. The data for output, labor and capital for this exercise were obtained from the Penn World Table Version 6.1, so it can be easily replicated.[20] The total population in the country is used as a proxy for the labor force, while capital is constructed from the investment series using the perpetual inventory method.[21] As the next table and figure show, the results from the growth accounting exercises using the NIPA data and the household survey data stand in sharp contrast.

[INSERT TABLE 4]
[INSERT FIGURE 12]

The two main implications of using the factor shares obtained from the household survey data in this growth accounting exercise are as follows. First, capital per capita has accounted for less than 30% of the growth rate of real GDP per capita in Mexico over the period 1950-2000, while TFP has accounted for around 70%.

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[19] These growth rates are calculated using the data in the World Penn Table Version 6.1, by Heston, Summers and Aten (2002).

[20] See Heston, Summers and Aten (2002).

[21] We assume an annual depreciation rate of 5%, and an initial capital-ouptut ratio of approximately 2.9. Under these assumptions, the time series for the Investment Share of Real Gross Domestic Product (CI) implies an average capital-output ratio of 1.75 during the period 1960-2000.

Second, the slowdown observed in Mexico during the 1980s was indeed mainly the result of a sharp fall in the growth rate of TFP after 1982 which continued up until 1995. Nevertheless, rather than exhibiting a negative growth rate in the 1988-1995 period, TFP growth was in fact positive. Moreover, TFP grew at about 4.9% per annum in the period 1996-2000, which is higher than the average of 4% for the whole sample period.

Thus, in contrast to the growth miracles experienced by several South East Asian economies during the 1960s and 1970s, which were mainly the result of capital deepening, in Mexico the main driver of growth during the same period was TFP. The fall in the growth rate of per capita GDP in Mexico during the 1980's –a period commonly known as the lost decade– was also largely the result of a fall in TFP. Nevertheless, the growth rate of TFP was positive in the period 1988-1995, and grew rapidly in the period 1996-2000.[22]

5.3 Calibration

Many calibrated economic models and the numerical experiments obtained from them rely on an aggregate production function, typically of the Cobb-Douglas form. Thus, factor shares are key parameters in the calibration of static applied general equilibrium (SAGE) models[23] as well as stochastic dynamic general Equilibrium (SDGE) models.[24] Furthermore, the results of these calibration exercises and the numerical experiments obtained from them are often highly sensitive to the factor shares used.

As mentioned above, there is no widely agreed methodology about which is the most appropriate method to obtain the key parameters needed to calibrate these models. In some instances they are obtained from the NIPA data, such as with the factor shares. In others, they are obtained from the household survey data, such as with the intertemporal elasticity of substitution.

The implication of the factor shares obtained using the household survey data is that the conclusions drawn from these calibration exercises may be either reinforced, debilitated or overturned, depending on each model. We next look at a very simple model and explore the consequences of the differences in factor shares obtained with the NIPA data and the household survey data.

5.3.1 Factor Shares and the "Lucas Paradox"

In a very influential paper, Lucas (1990) argued that the observed differences in per capita income across countries imply differences in rates of return to capital that are far too large to be consistent with observed capital flows

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[22]See Young (1995) for evidence on the South East Asian growth experience.

[23]See, for example, Kehoe and Serra (1983, 1986) and Kehoe and Kehoe (1994a, 1994b). The models in these papers are calibrated using the factor shares obtained using the NIPA data from Mexico, despite the significant differences with the parameters obtained using the NIPA data from the U.S.

[24]See, for example, Bergoeing, Kehoe, Kehoe and Soto (2002a, 2002b). The model in these papers is calibrated using as factor shares the typical parameters obtained using the NIPA data from countries with high per capita income, such as the U.S.

under the assumption that there is capital mobility. In particular, he used a simple numerical example which assumed a common constant returns to scale technology across countries. This observation, termed the "Lucas Paradox", has led to a series of potential explanations that could account for this apparent puzzle.

In this exercise, one begins with a common Cobb-Douglas production function of the form:

$$y_t = A_t k_t^{\beta} \qquad (23)$$

Assuming competitive factor markets, the rate of return to capital must equal the marginal product of capital:

$$r_t = \beta A_t k_t^{\beta-1} \qquad (24)$$

Substituting for capital from equation (23), one reaches an expression for the rate of return on capital as a function only of output per capita:

$$r_t = \beta A_t^{1/\beta} y_t^{(\beta-1)/\beta} \qquad (25)$$

Given the assumption of a common technology across countries, the above expression implies that the ratio of the rates of return to capital between two countries i and j is a function of the ratio of outputs per capita and the (common) share of capital in output (β) :

$$\frac{r_t^i}{r_t^j} = \left(\frac{y_t^i}{y_t^j} \right)^{(\beta-1)/\beta} \qquad (26)$$

Although Lucas assumed the same technology across countries, in his numerical example he avoided the issue of the differences in factor shares obtained from the NIPA data by taking a simple average of shares in India and the U.S. This implicitly assumes that neither country's shares are correct, and uses instead an "average" technology.[25]

The main implication of factor shares obtained using the household survey data is that if these shares are in fact very similar across countries, then the Lucas Paradox becomes even harder to resolve. This is, if factor shares across countries are similar, and they are actually closer to those of high per capita income countries, then the paradox might be harder to solve since the implied differences in rates of return are even larger than previously obtained.

To illustrate this point, we obtain the differences in rates of return to capital implied by the observed differences in real output per worker in the United

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[25]Rather than questioning the assumptions that lay behind the exercise (e.g. a common technology, complete capital markets, perfect capital mobility) there has been a series of papers with explanations which may account for the paradox. See, for example, Reinhart and Rogoff (2004).

States, Mexico and India. All the data are obtained from the Penn World Table Version 6.1, and correspond to averages during the period 1950-2000.[26]

[INSERT TABLE 5]

As can be seen from this simple exercise, the conclusion reached by Lucas (1990) that the observed capital flows are far too small to be consistent with the predictions of the neoclassical growth model (under the assumptions of a common technology and full capital mobility) is reinforced if one uses the factor shares of the high per capita income countries rather than the average of the low and high per capita income countries. Given that factor shares from the household survey data suggest that this is in fact the case, another implication is that the Lucas Paradox might be harder to explain so the attempts thus far may have to be revised.

5.4   Speed of Convergence

One final implication that can be derived from the differences in factor shares obtained using the NIPA data and the household survey data concerns the speed of convergence. In particular, the speed of convergence to the steady state in the neoclassical growth model and to the balanced growth path in a class of endogenous growth models depends, among other parameters, on the capital share.[27] Recall that the concavity of a Cobb-Douglas production function in which output and capital are expressed in per capita terms is given by the capital share. Thus, the higher the share of capital, the less concave the production function and the slower the speed of convergence.

The empirical evidence from cross-country growth regressions shows that the speed of absolute $\beta-$convergence between Latin American countries and the group of advanced capitalist countries, when there is evidence of convergence at all, has been very slow. Moreover, convergence in per capita GDP stopped altogether or even reversed after 1982. The fact that per capita GDP in Latin America has been falling for some time relative to that in the United States, and that this decline accelerated after 1982, is depicted in the following figure:

[INSERT FIGURE 13]

The main implication of the factor shares estimated using the household survey data, for which the capital share obtained is lower than when the NIPA data were used, is that the lack of convergence in per capita GDP is not due to differences in technology. This fact in turn suggests that Latin American may

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[26] One important difference between the exercise presented here and in Lucas (1990) is that he uses observed differences in GDP per capita while this paper uses differences in output per worker. This is so since presumably foreign investors are interested in differences in the productivity of capital, rather than in differences in living standards across countries.

[27] See Ortigueira and Santos (1997) for a class of endogenous growth models in which the speed of convergence to the balanced growth path depends only on technological and not on preference parameters.

be converging to a lower level steady state or to a lower growth balanced growth path, in which case the appropriate convergence concept would be conditional $\beta-$convergence. Alternatively, it may suggest that an endogenous growth model for which there is no convergence in per capita GDP may be a better description of the process of the evolution over time of per capita GDP across regions.

6   Conclusions

The paper attempted to explain why factor shares differ so significantly across countries and proposed a method for solving the problem posed by the income from the self-employed and those employed informally. As such, it builds upon the work of Gollin (2002) by providing an alternative method to obtain factor shares. The results of the paper confirm Gollin's conclusion that it is differences in accounting methodologies and in the composition of the labor force, rather than technology, that explain the difference in factor shares across countries.

This paper first reviewed in some detail the methodology used in constructing the NIPA data across countries. It was argued that once the differences in the methodologies are understood, and given the large share of employers, self-employed and informal employees in the labor force in developing countries, it is not puzzling why factor shares from the NIPA data differ so much across countries.

The paper proposed a methodology consisting of using repeated cross sectional household survey data representative at the national level which contain an exhaustive classification of income by source. It then estimated these shares from these microdata using three different estimators.

The methodology was applied to the case of Mexico using every household survey available representative at the national level during the period 1968-2002. It was argued that Mexico is a particularly interesting country since factor shares from the NIPA data were almost the opposite of those in the United States, despite their geographical proximity and strong commercial and investment ties.

In all three cases it was found that there are large differences in the factor shares obtained using the NIPA data and those obtained using the household survey data. In particular, it was found that factor shares in Mexico are much closer to those in the United States than the NIPA data suggest, with labor accounting for about 60% and capital for about 40% of income. Moreover, it was found that factor shares in Mexico have been relatively constant over time during the period analyzed (1968-2002).

These results are consistent with Gollin's (2002) findings that the variation across countries in factor shares are due to differences in how countries account for the income from the self-employed and those employed informally. It is important to highlight that the same result is obtained using a different methodology. As shown before, the differences in the factor shares obtained from the NIPA data and from the household survey data have far-reaching im-

plications in at least four areas of research, including the functional distribution of income, growth and developing accounting, calibration of economic models and the speed of convergence to the steady state or to a balanced growth path.

7 References

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8 Appendix

This appendix describes in more detail the different household surveys on which the estimations are based. The paper uses data from three groups of household surveys: (i) the 1968 Survey on Family Incomes and Expenditures in Mexico;[28] (ii) the 1977 National Household Income and Expenditure Survey;[29] and (iii) the series of National Household Income and Expenditure Surveys, or ENIGHs for their acronym in Spanish, corresponding to the years 1984, 1989, 1992, 1994, 1996, 1998, 2000 and 2002.[30] In every case, the surveys are representative at the national level. It is important to underscore that these are not the only income and expenditure household surveys in Mexico. Nevertheless, they are the only household surveys representative at the national level with the data available at the household and the individual levels. In contrast, older surveys typically only provide tabulations. Furthermore, these surveys are the most similar in terms of methodology and, therefore, the most useful for the purpose of comparing factor shares across different time periods.[31] We next explain each group of surveys in more detail.

The 1968 Survey on Family Incomes and Expenditures in Mexico was conducted by the Bank of Mexico, Mexico's central bank.[32] Its main purpose was to collect data in order to estimate income and price elasticities for certain agricultural products. The 1977 Survey was carried out by the Department of Programming and Budget,[33] with the collaboration of the Bank of Mexico. Although it has the exact same name as the subsequent ENIGH surveys carried by the National Statistics Institute, or INEGI, it is treated separately since they do not have the same structure.[34] These two surveys were the precedent of the ENIGH surveys. They use the same methodology although, in general, they contain less information. For the purpose of this paper all the data needed are contained in every survey. We next describe the ENIGH surveys in more detail.

The ENIGHs are a series of household surveys collected approximately every two years by INEGI, since 1984. They provide information on the socio economic characteristics of the household, including budgetary data, as well as information on the characteristics of the dwelling. They constitute the longest-running household surveys collected using a common methodology (sampling scheme and questionnaire).

Regarding the sampling scheme, all surveys use a stratified, two-stage sampling scheme. In the first stage there is a random selection of localities, whereas in the second stage the sampling units are the private dwellings, while the units of observation are the households and their members. In all cases, the sample

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[28] *Encuesta sobre Ingresos y Gastos Familiares en México, 1968.*

[29] *Encuesta Nacional de Ingreso y Gasto de los Hogares.*

[30] ENIGH stands for *Encuesta Nacional de Ingreso y Gasto de los Hogares.*

[31] These are not the only household income and expenditure surveys available in Mexico. Nevertheless, they are the most comparable in terms of methodology and, therefore, the most useful for the purpose of analyzing the evolution of income shares over time.

[32] *Banco de México.*

[33] *Secretaría de Programación y Presupuesto.*

[34] *Instituto Nacional de Estadística, Geografía e Informática.*

is representative at the national level, as well as at the rural (less than 2,500 inhabitants) and urban (2,500 inhabitants or more) levels.

These surveys use as sampling frames the most recent decennial census or the mid-census count.[35] The sampling proportion varies across surveys, but is around 1/10,000. The definitions of what constitutes a *private dwellings* and a *household* are consistent across surveys. The average response rate for the survey is around 85%.

All surveys were collected during the third quarter of the corresponding year, typically between the second week of August and the second week of November. This characteristic of the surveys ensures their comparability over time to the extent that income seasonal patterns are constant.

Most information is collected through a direct personal interview with the head of the household over a seven-day period. The reference period depends on the particular question asked. In the case of labor income, all questions refer to each of the six-month period prior to the month when the person was interviewed.

As mentioned before, the categories of income included are exhaustive and their definition is consistent over time. Household income is divided into two main divisions: (i) net household income; and (ii) financial and capital income.[36] Net household income is then divided into the following categories: income from work, income from one's own businesses, income from cooperatives, income from companies, income from firms that work as companies, income from the rent of property, and transfers and other income.[37] The work category is further divided in the following categories: (i) wages, salaries or daily pay; (ii) piece-rate pay; (iii) commissions and tips (iv) overtime pay; (v) year-end bonus; (vi) incentives; (vii) awards; (viii) rewards or prizes; (ix) bonus; (x) extra-wage, vacation bonus, other cash benefits and share of profits.[38]

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[35] *Censo General de Poblaión y Vivienda* and *Conteo de Poblaión y Vivienda 1995,* respectively.

[36] *Ingresos netos del hogar* and *Percepciones financieras y de capital.*

[37] *Ingresos netos por remuneraciones al trabajo, Ingresos netos de negocios propios, Ingresos netos por cooperativas, Ingresos netos por renta de la propiedad, Transferencias,* and *Otros ingresos corrientes.*
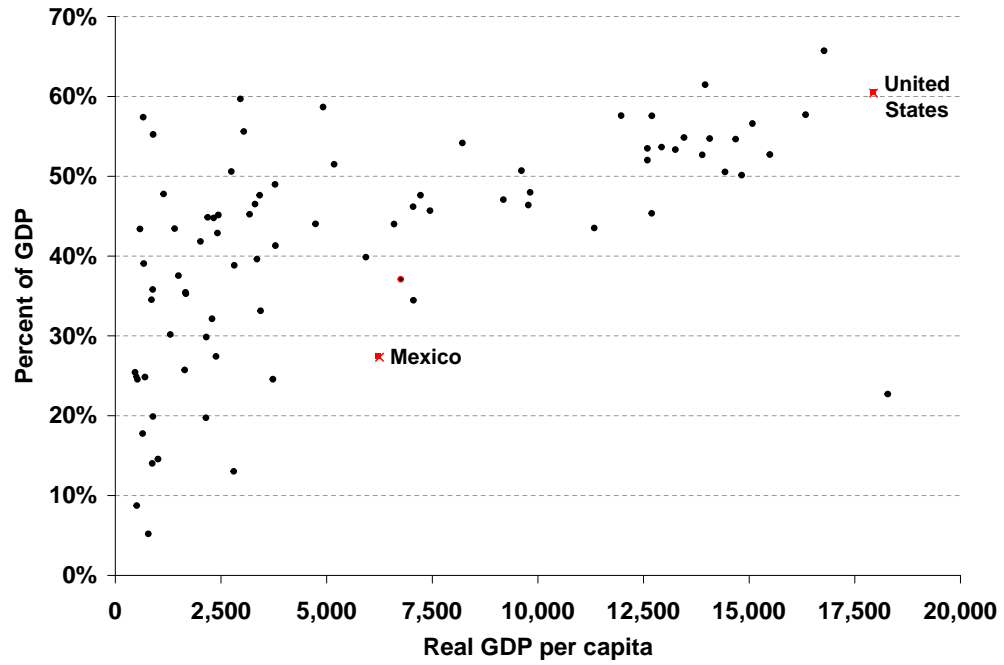
[38] *Sueldos, Salarios o Jornal, Destajo, Comisiones y Propinas, Horas Extras, Aguinaldo, Incentivos, Gratificaciones o Premios, Bono, Percepción Adicional o Sobresueldo, Primas Vacacionales y Otras Prestaciones en Efectivo,* and *Reparto de Utilidades.*

Figure 1
Compensation of Employees and Corporate Profits as a
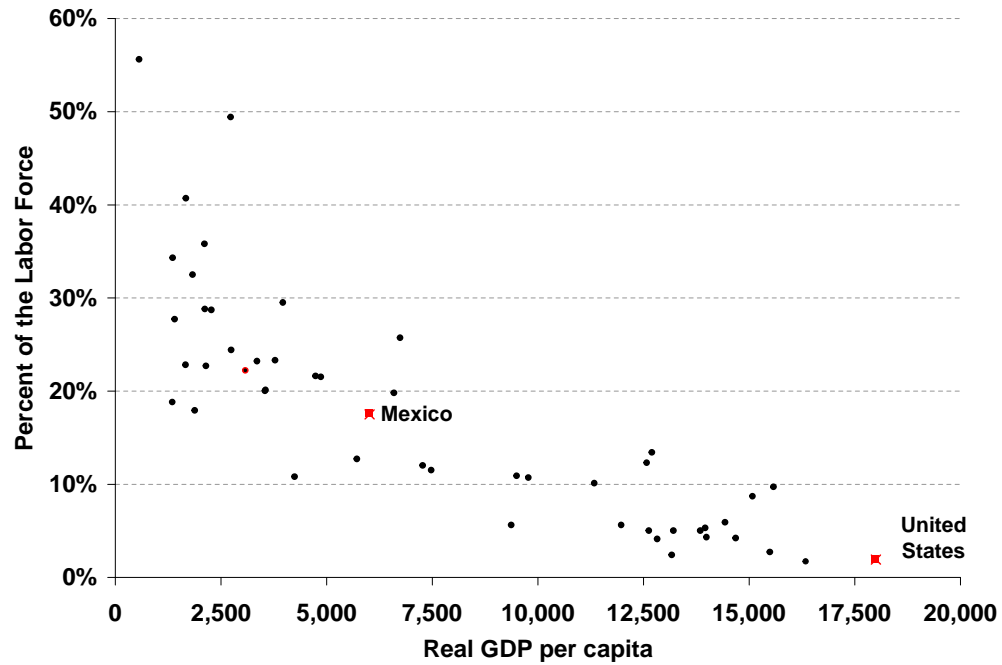**share of National Income in the United States: 1959-2003**
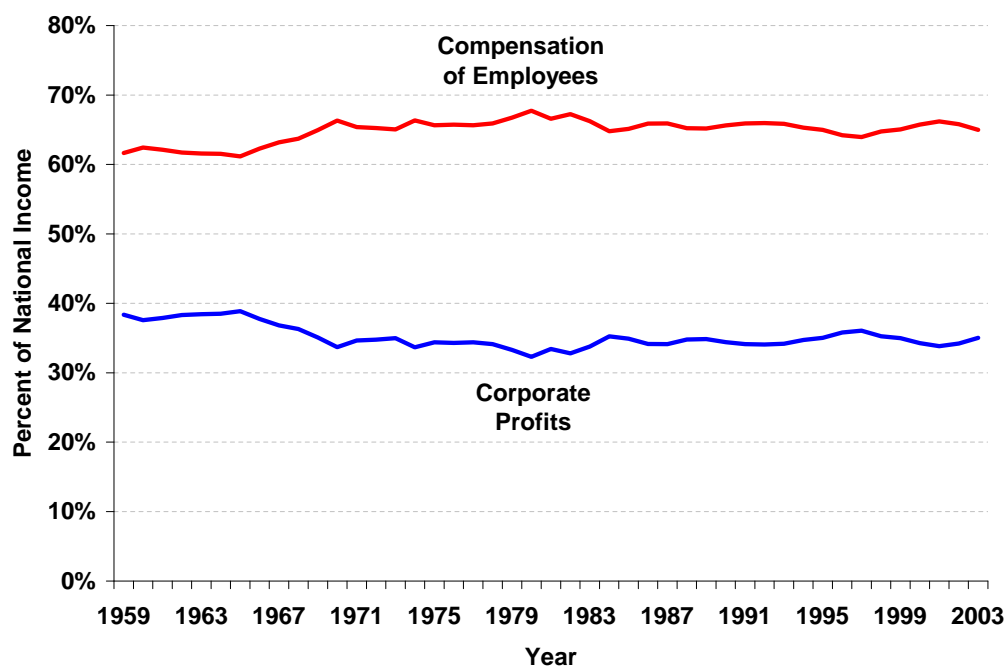
Figure 2
Compensation of Employees as a share of GDP and real GDP per
capita in a sample of 81 countries, most recent years available:
1987-1992

Figure 3
Employers and Self-Employed Workers as a share of the Labor Force
and real GDP per capita in a sample of 50 countries, most recent
years available (around 1992)

Source: Gollin (2002)., Figure 3, p. 466.

Table 1a

Capital's Share of Income (β)	
OECD Countries: 1947-1973	
Canada	0.44
France (1950-1973)	0.40
Germany (1950-1973)	0.39
Italy (1952-1973)	0.39
Japan (1952-1973)	0.39
Netherlands (1951-1973)	0.45
U.K. (1955-1973)	0.38
U.S.	0.40
Average	0.41

Table 1b

Capital's Share of Income (β)	
Latin American Countries: 1940-1980	
Argentina	0.54
Brazil	0.45
Chile	0.52
Colombia	0.63
Mexico	0.69
Peru	0.66
Venezuela	0.55
Average	0.58

Table 1c

Capital's Share of Income (β)	
East Asian Countries: 1966-1990	
Hong Kong	0.37
Singapore	0.49
South Korea	0.30
Taiwan	0.26
Average	0.36

Source: Panels A, C and D of Table 10.1, Barro and Sala-i-Martin (2004), pp. 439-440.

N.B.: All averages reported are simple (i.e., non-weighted) averages.

Table 2

	Compensation of Employees		Capital Income[39]	
Year	Mexico	U.S.	Mexico	U.S.
1988	0.324	0.652	0.672	0.348
1989	0.322	0.652	0.674	0.348
1990	0.323	0.656	0.672	0.344
1991	0.338	0.659	0.656	0.341
1992	0.360	0.659	0.633	0.341
1993	0.378	0.658	0.615	0.342
1994	0.384	0.653	0.610	0.347
1995	0.340	0.650	0.655	0.350
1996	0.317	0.642	0.678	0.358
1997	0.327	0.639	0.668	0.361
1998	0.335	0.647	0.661	0.353
1999	0.341	0.650	0.654	0.350
2000	0.345	0.657	0.650	0.343
2001	0.359	0.662	0.635	0.338
2002	0.356	0.658	0.638	0.342
2003	0.350	0.650	0.644	0.350
Average	0.344	0.653	0.651	0.347

Factor Shares Calculated from the NIPA data

Sources: Cuenta de Producción, Sistema de Cuentas Nacionales de México, Instituto Nacional de Estadística, Geografía e Informática (INEGI); and Table B–28. National income by type of income, 1959–2004. 2005 Economic Report of the President.

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[39]Capital income corresponds to Gross Operating Surplus in Mexico and to Corporate Profits in the United States.

Figure 4
**Compensation of Employees and Gross Operating Surplus as a share
of GDP in Mexico, and Compensation of Employees and Corporate
Profits as a share of National Income in the United States:
1988-2003**

Figure 5
Employers, Self-Employed and Informal Employees as a share of the
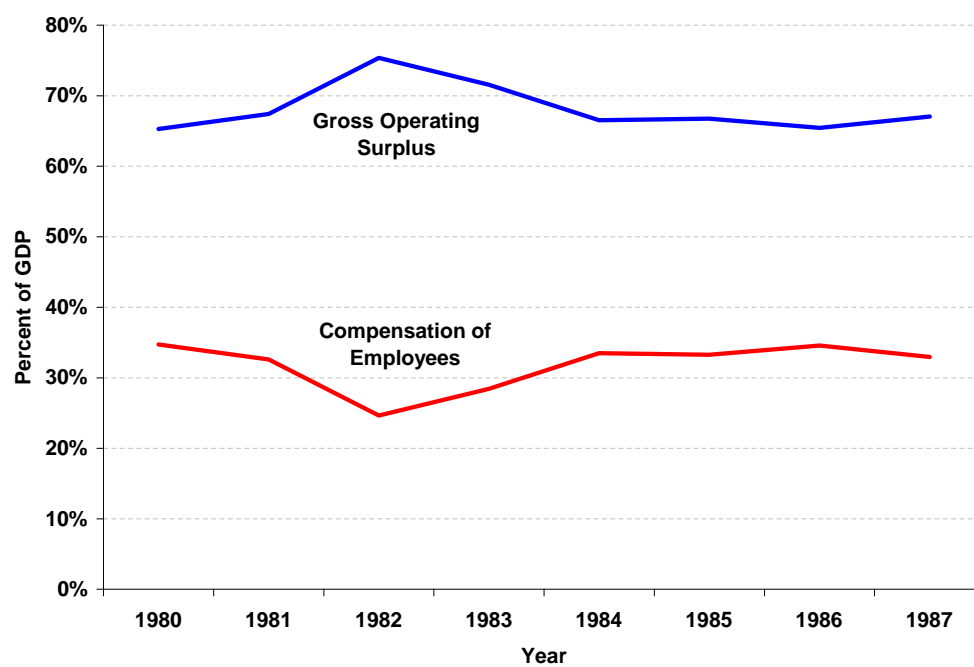**Labor Force in Mexico: 1998-2004**
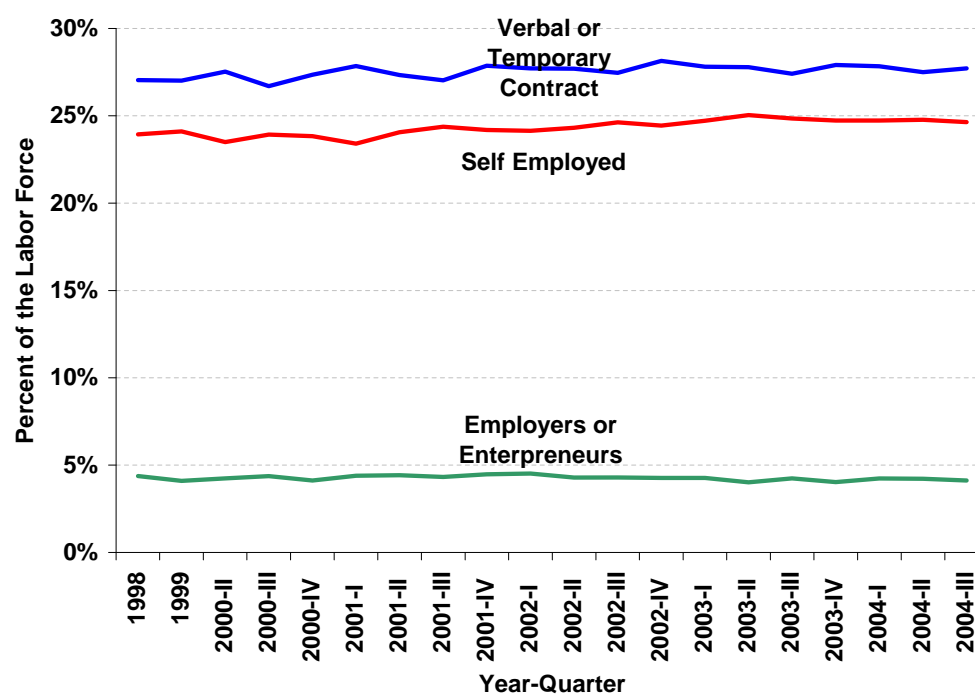
Source: Encuesta Nacional de Empleo (ENE). INEGI.

Figure 6
**Informal Sector of the Mexican Economy as a share
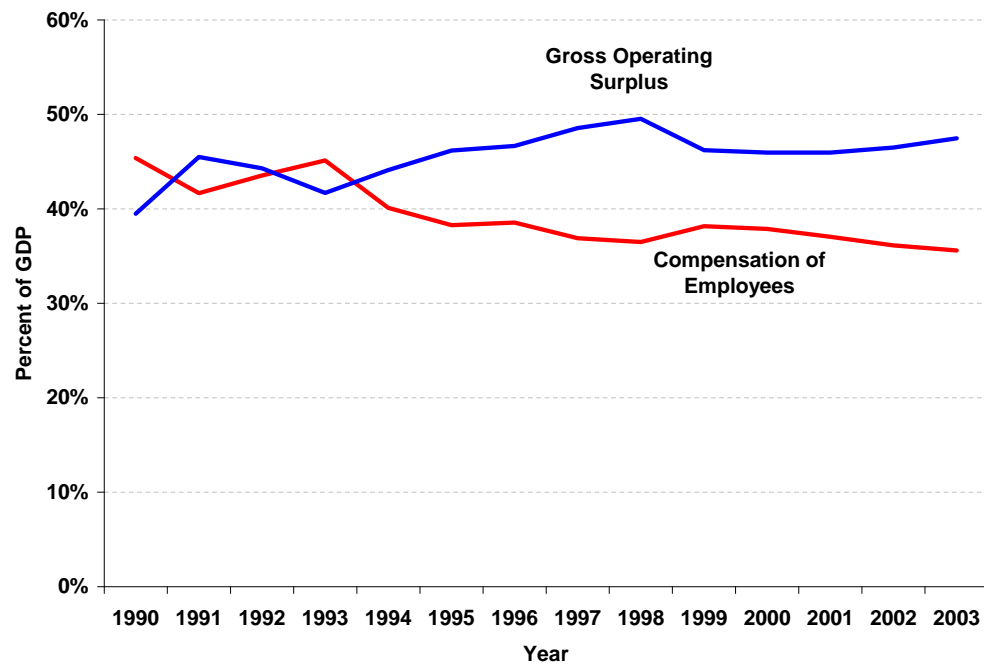of the Total Value Added of the Economy: 1993-2002**
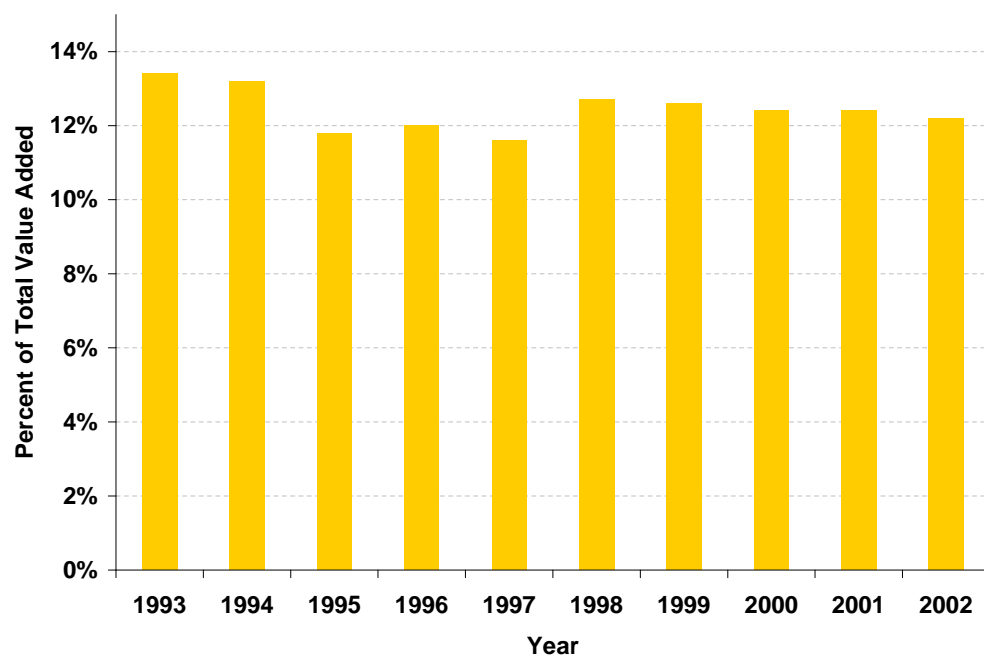
Source: Cuenta Satélite del Subsector Informal de los Hogares. INEGI.

Figure 7
Compensation of Employees and Gross Operating Surplus
as a share of GDP in Argentina: 1980-1987

Figure 8
Compensation of Employees and Gross Operating Surplus
as a share of GDP in Brazil: 1990-2003

Sources: Conta da Renda, Diretoria de Pesquisas, Departamento de Contas
Nacionais, Instituto Brasileiro de Geografía e Estadística (IBGE).

Figure 9
Compensation of Employees and Gross Operating Surplus
as a share of GDP in Chile: 1985-2001
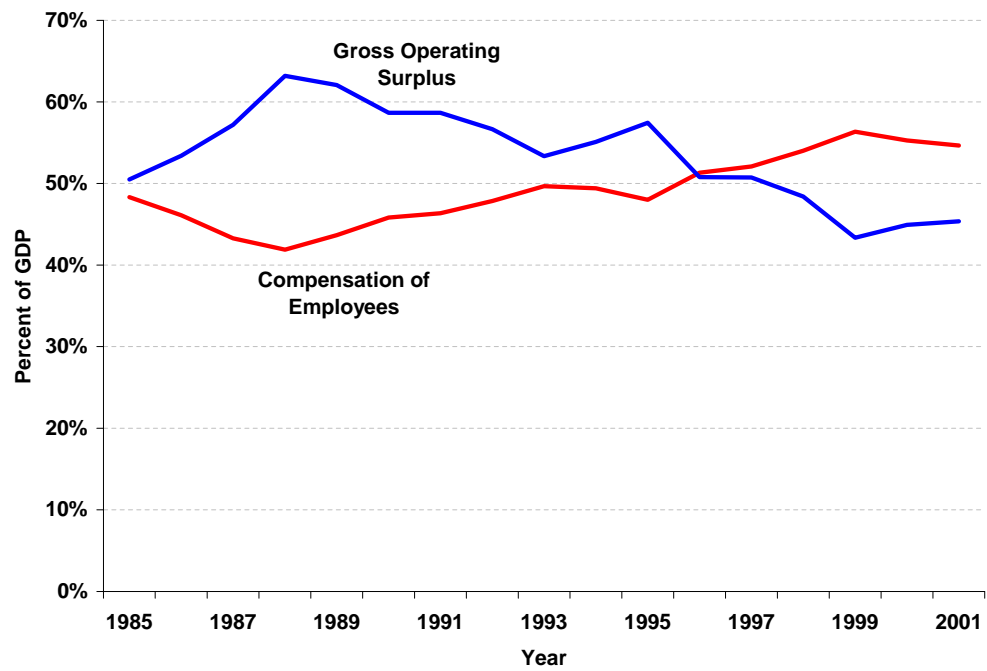
Sources: Cuenta de Generación del Ingreso, Cuentas Económicas Integradas,
Anuario de Cuentas Nacionales (various years), Departamento de Cuentas
Nacionales, Gerencia de Información e Investigación Estadística, Banco
Central de Chile.

Figure 10

**Figure 10**
Labor's Share of Income from Household Survey Data: 1968-2002
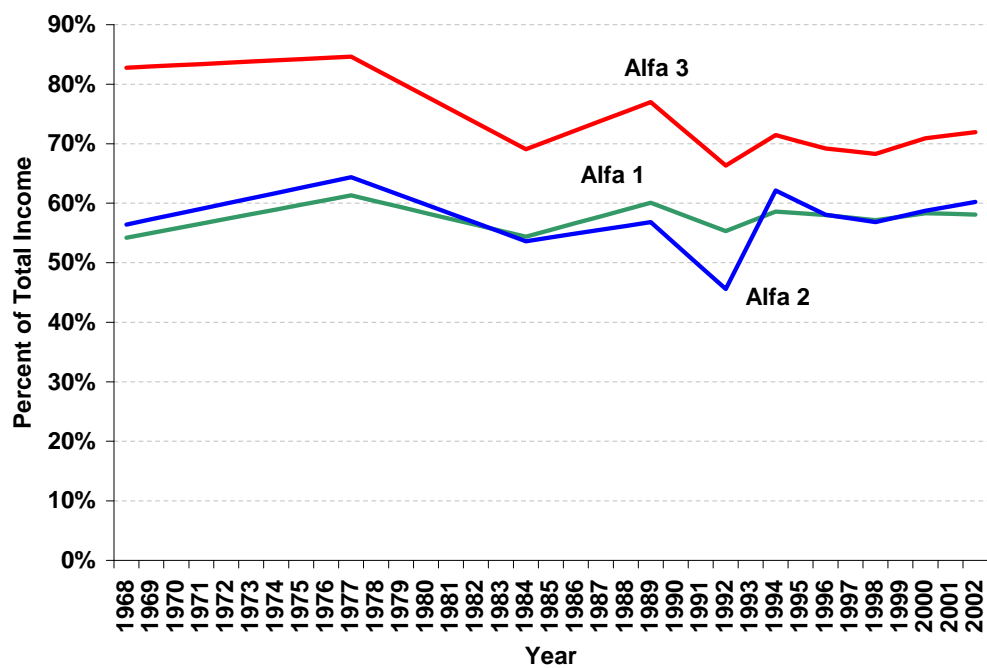
Source: Own calculations using data from the National Income and
Expenditure Household Surveys for the years 1968-2002.

Table 3

Labor's Share from
Household Survey Data: 1968-2002

Year / Estimate	$\hat{\alpha}_1$	$\hat{\alpha}_2$	$\hat{\alpha}_3$
1968	0.542	0.564	0.828
	0.409	*0.732*	*0.019*
1977	0.613	0.644	0.846
	0.421	*0.771*	*0.037*
1984	0.544	0.536	0.691
	0.430	*0.830*	*0.063*
1989	0.601	0.568	0.770
	0.422	*1.272*	*0.056*
1992	0.553	0.456	0.663
	0.408	*1.118*	*0.054*
1994	0.586	0.621	0.714
	0.427	*0.881*	*0.058*
1996	0.580	0.581	0.692
	0.420	*1.372*	*0.056*
1998	0.571	0.568	0.683
	0.422	*0.860*	*0.058*
2000	0.583	0.587	0.709
	0.421	*0.826*	*0.058*
2002	0.581	0.602	0.719
	0.419	*0.719*	*0.052*
Average	0.5755	0.5728	0.7315

Source: Own calculations using data from the National Income and
Expenditure Surveys for the years 1968-2002

N.B.: Standard errors are below the estimates in italics.

**Figure 11**
Real GDP per capita in Mexico: 1950-2000
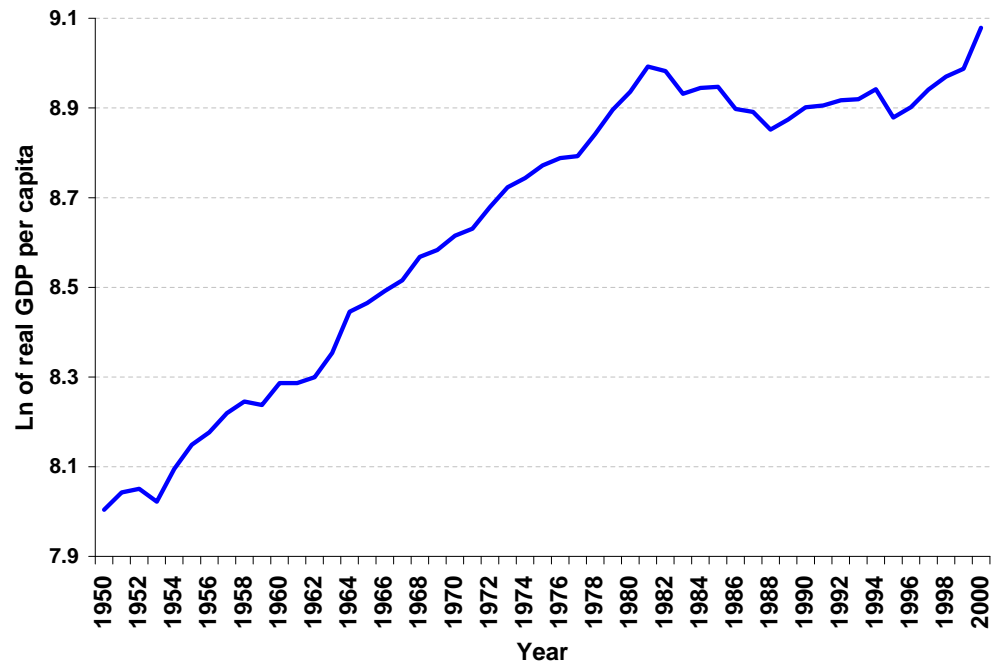
Source: World Penn Table Version 6.1, by Heston, Summers and Aten (2002).

<div align="center">

Table 4

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Sources of Growth in Mexico: 1950-2000					
Capital Shares		$\beta = 0.66$		$\beta = 0.34$	
Period / Growth Rates	$\dfrac{\dot{y}_t}{y_t}$	$\dfrac{\dot{k}_t}{k_t}$	$\dfrac{\dot{A}_t}{A_t}$	$\dfrac{\dot{k}_t}{k_t}$	$\dfrac{\dot{A}_t}{A_t}$
1950-2000	0.056	0.049	0.024	0.049	0.040
	100%	*53.6%*	*46.4%*	*30.0%*	*70.0%*
1950-1980	0.072	0.051	0.039	0.051	0.055
	100%	*47.9%*	*52.1%*	*26.8%*	*73.2%*
1982-1987	0.011	0.039	-0.015	0.039	-0.003
	100%	*72.9%*	*27.1%*	*46.7%*	*53.3%*
1988-1995	0.024	0.048	-0.007	0.048	0.008
	100%	*69.8%*	*30.2%*	*36.1%*	*63.9%*
1996-2000	0.065	0.047	0.034	0.047	0.049
	100%	*57.5%*	*42.5%*	*29.7%*	*70.3%*

<div align="center">

Source: Own calculations using data from the World Penn Table Version 6.1,
by Heston, Summers and Aten (2002).

N.B.: Percent contributions are below the growth rates in italics.

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Figure 12
**Total Factor Productivity in Mexico: 1950-2000**
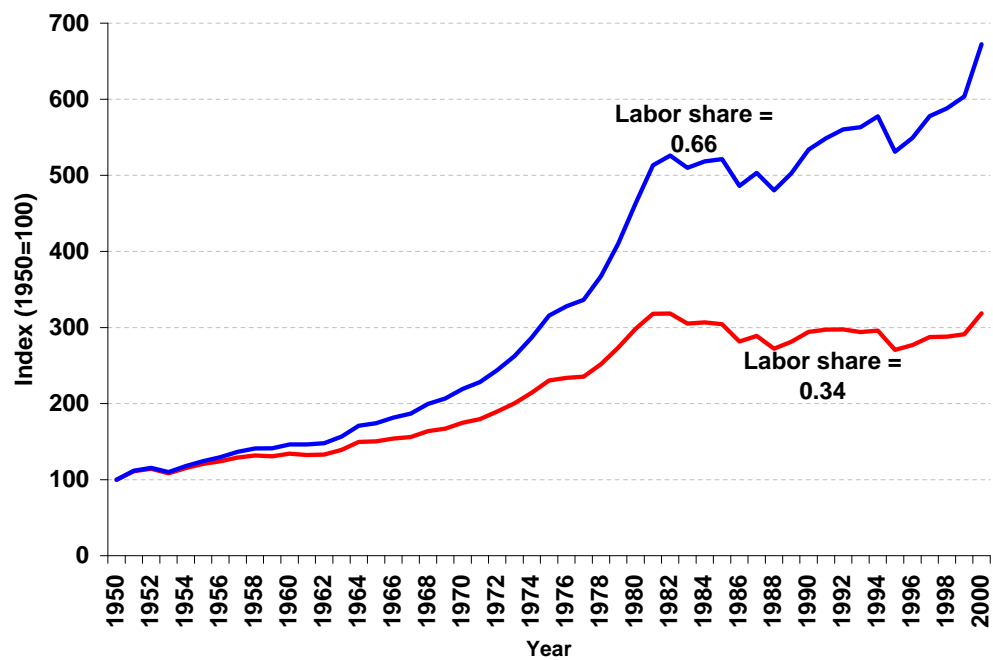
Source: Own calculations using data from the World Penn Table Version 6.1,
by Heston, Summers and Aten (2002).

Table 5

Differences in Rates of Return Implied by the Observed Differences in Real Output Per Worker between the U.S. and India and between the U.S. and Mexico: Average 1950-2000				
Difference in ROR / Capital Share	**0.50**	**0.40**	**0.35**	**0.30**
U.S.-India	14.32	54.55	142.20	511.88
U.S.-Mexico	2.28	3.47	4.69	7.04

Source: Own calculations using data from the World Penn Table Version 6.1, by Heston, Summers and Aten (2002).

Figure 13

Real GDP per capita in various countries as a percentage of real GDP per capita in the United States: 1950-2000
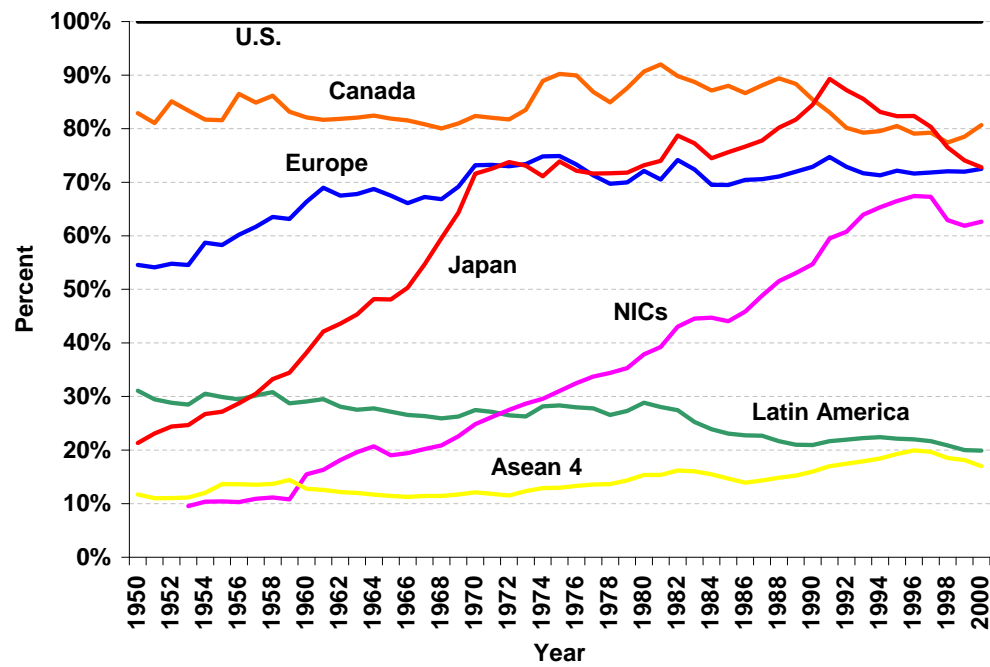
Source: World Penn Table Version 6.1, by Heston, Summers and Aten (2002). N.B.: Latin America is an unweighted average of real GDP per capita in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, Peru, Uruguay and Venezuela. NICs is an unweighted average of real GDP per capita in Hong Kong, Korea, Singapore and Taiwan. ASEAN 4 is an unweighted average of real GDP per capita in Indonesia, Malaysia, Philippines and Thailand.