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A hot wheels idea for looking at the distribution of household wealth in Mexico 1984-2010

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Abstract
It is clear that how well off people are, is not only a matter of income, but also a matter of wealth, in both absolute and relative terms. Using an almost non-observed data approach, Davies et al. (2006) estimated the household wealth and its distribution for a basket of countries for the year 2000. For this year, the reported wealth Gini for Mexico was 0.748. Using information from *automobiles* and other consumer durables from each of the electronically available *National Survey of Household Income and Expenditure*, we approximated wealth Ginis for each sample. We obtained almost equal figures for 2000, which is a welcomed statistical coincidence. The rest of wealth Ginis allowed us to find out its trend for the analyzed period. It suffices to say that, statistically speaking, we live in an almost perfectly unequal world, of which Mexico is a clear example.

JEL classification: D31, E01, C43

Keywords: wealth Gini, automobiles, consumer durables, statistical measurements of economic well-being

Quotations
"Average measures of income, consumption and wealth should be accompanied by indicators that reflect their distribution. Median consumption (income, wealth) provides a better measure of what is happening to the 'typical' individual or household than average consumption (income, wealth)… It is also important to know what is happening at the bottom of the income/wealth distribution, or at the top." Joseph E. Stiglitz, Amartya Sen and Jean-Paul Fitoussi (2009, pp. 13-4).

"The study of the distribution and composition of household wealth is a flourishing research field. Empirical analysis must, however, cope with considerable weaknesses in the available data. Household surveys of assets and debts, for instance, typically suffer from large sampling errors due to the high skewness of the wealth distribution as well as from serious non-sampling errors. In comparative analysis, these problems are compounded by great differences in the methods and definitions used in various countries. Indeed, in introducing a collection of essays on household portfolios in five countries, Guiso, Haliassos and Jappelli (2002, pp. 6-7) mention 'definitions' as the 'initial problem' and warn the reader that 'the special features and problems of each survey … should be kept in mind when trying to compare data across countries'." Markus Jantti, Eva Sierminska and Tim Smeeding (2008, p. 5).

"Stretching somewhat my argument about the value of data, endless billions of dollars have been spent on space exploration by the United States government just to collect a few observations of some lumps of rock and gas (with incidental kudos, 'technical spin-off' and tenuous 'defence' advantages). What government anywhere has spent one-thousandth as much in deliberately observing (experimentally or non-experimentally) or trying to understand an economic system of at least equal importance to our lives?" David F. Hendry (1980, p. 398)

1. Introduction

Tension prevails between the current statistical measurements of economic well-being and people's perception. Its consequence is obvious and inevitable: citizens are suspicious of

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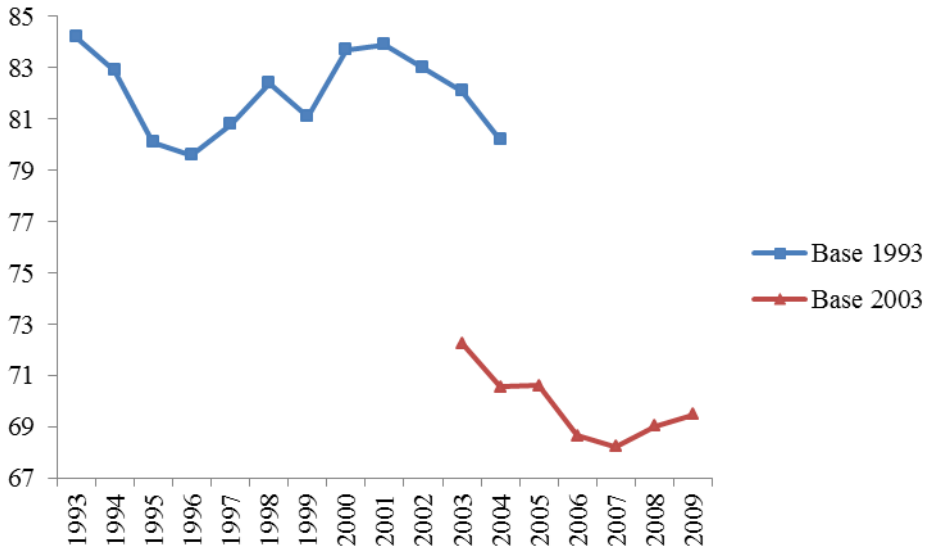
official numbers.[1] Certainly, this seriously erodes the economic and social cohesion in Mexico, among other countries. One clue to this problem is that both early and modern national accounts were designed to "provide quantitative frameworks for war-time resource mobilization and peacetime reconstruction" (Lequiller and Blades 2007, p. 398). In simpler words, accounting systems were designed to measure market production.

The gap between the government's point of view about economic performance and societal opinions is caused not only by national account statistics, but also by the measurement of consumer prices (CPI). According to Deaton (1998, p. 43), American CPI weights are correct for households that lay at the 75th percentile of the expenditure distribution. In Spain, the applicable percentile is the 61st (Izquierdo, Ley and Ruiz-Castillo 2003, p. 149), and for Mexico, the percentile in question is the 86th (Guerrero 2010, p. 2). It is unreasonable to expect that one single plutocratic index could adequately reflect the consumption pattern of the majority in Mexico, among other countries.

The following figure shows household disposable income as a percentage of the Mexican economy, measured by the Gross Domestic Product (GDP) between 1993 and 2009, using information from the National Account System, at current prices, bases 1993 and 2003. There is no information for the first variable before 1993.

Figure 1 Household disposable income as a percentage of the Mexican economy (GDP), 1993-2009

(Percentages)



Source: own calculations using data from National Account System, INEGI.

First, it is worth emphasizing that changing from base 1993 to base 2003 involves a reduction of ten points of household income participation in the economy. Second, there is a slightly negative slope in the proposed measure of overall well-being or, in other words, it seems that the paths of household disposable income and the economy diverge. Incidentally, figure 1 does not address income distribution considerations. Third, the exercise was done using current and not constant Mexican pesos, because of the lack of information. Schreyer (2009) reminds us that, in current terms, income and production are equal, but "real income" and "volume of production" are not equal. Assuming that price indices are correct, volume is the

[1] According to Stiglitz, Sen and Fitoussi (2009, p. 7), "in France and in the United Kingdom only one third of citizens trust official figures, and these countries are not exceptions".

quantity of goods and services coming out of the "national factory door", and real income is how many goods and services (some of them produced abroad) can be purchased with the income generated in the factory. It would be desirable to evaluate the proposed ratio using constant figures.[2]

Our concern here refers to the measurement of economic well-being. It is clear that how well off people are, is not only a matter of income, but also a matter of wealth, in both absolute and relative terms.[3] The major difficulties are that not only is wealth far from being correctly measured, but distributional measures are typically focused in income, and not on wealth.[4]

In section 1 we will review an ambitious paper recently written by Davies, Sandstrom, Shorrocks and Wolff (2006), retrieved from the website of the World Bank. The goal of the paper is to estimate the household wealth and its distribution for almost every country in the world in the year 2000. In doing so, the authors exercise what it is correct to call "an almost non-observed data approach". They make use of, among other resources, limited available information, regression analysis, a wealth per capita imputation method and a large set of assumptions.

In Mexico, there are two small, but relevant, pieces of wealth information. The first one describes non-financial assets at a disaggregated level, basically consumer durables. The second set of data contains financial net wealth at an aggregated level. Here we will propose a sort of a "shortcut" based on micro data, recorded in the *National Income and Expenditure Household Surveys* from 1984 to 2010. Specifically we will approximate for each sample three Gini coefficients of wealth. Attempting to put the exercise carried out into perspective, the last section presents some final remarks.

2. Wealth Gini: an almost non-observed data approach

As usual, economists have more than one definition of, in our case, household's wealth. In a broad sense, wealth is the value of all family resources, both human and non-human, over which people have command. According to a second definition, relevant to the current discussion, wealth is a net worth: the value of physical and financial assets less liabilities. In this sense wealth represents the ownership of capital.

Unfortunately a warning applies here in the following senses (Kennickell, 2007, pp. 3-4):

[2] In the words of Stiglitz, Sen, and Fitoussi (2009, p. 11): "capturing quality change is a tremendous challenge, yet this is vital to measuring real income and real consumption, some of the key determinants of people's material well-being. Under-estimating quality improvements is equivalent to over-estimating the rate of inflation, and therefore to under-estimating real income. The opposite is true when quality improvements are overstated."

[3] In 2001 household net wealth as a percentage of nominal disposable income in Canada, France, Germany, Italy, Japan, United Kingdom, and United States was 503, 552, 536, 742, 744, 714, and 557, respectively (OECD, 2009). According to Davies et al. (2006), in 2000 wealth Gini for the same countries was, in the same order, 0.663, 0.730, 0.671, 0.609, 0.547, 0.697, and 0.801.

[4] A broader definition of economic wealth is implied by Lequiller and Blades (2007, pp. 37-8): "it may seem strange that GDP rises if there are more road accidents. This is partly because of greater activity by emergency services. On the contrary, one would intuitively like to see GDP diminishing in such circumstances. But this would be to confuse a measure of output (GDP) with a measure of welfare, which GDP is not. At most, GDP is a measure of the contribution of production to welfare… Undoubtedly, major calamities destroy part of the economic wealth (buildings, houses, roads and infrastructure), but they do not, *per se*, constitute negative production and so do not directly contribute to a decline in GDP. Destruction can indirectly affect production in a negative or positive way."

> "The measurement of even the most straightforward concepts of wealth poses substantial technical and cognitive problems. Values of some assets, such as a personal business or a residence, may not be clear unless they are actually brought to the market; even then, there is a question of the conditions under which such a transaction might take place… Some assets and liabilities may be poorly understood, even by people who hold them."

Commonly there are two sources of information, "household balance sheets" (HBS) and "wealth surveys" (WS).[5] According to Davies et al. (2006) around the world only twenty two countries have "complete" financial and non-financial data, eighteen based on HBS (Canada, United States, Denmark, France, Germany, Italy, Netherlands, Portugal, Spain, United Kingdom, Australia, Taiwan, Japan, New Zealand, Singapore, Czech Republic, Poland, and South Africa), and four based on WS (Finland, China, India, and Indonesia); sixteen countries have incomplete information, among them Mexico.[6] Using an almost non-observed data approach, Davies, Sandstrom, Shorrocks and Wolff (2006) estimated the level of wealth per capita and its distribution among households for 229 countries in the year 2000. Unfortunately, they only reported on 26 countries, leaving 12 countries with available data off of the study. Putting its strategy schematically, the authors followed a two-step process:

A. In order to impute per capita wealth Davies et al. (2006) estimated three log-log regressions. The dependent variables were non-financial wealth, financial wealth, and liabilities, accordingly. The sample for the first one consisted of eighteen countries with HBS data and five with WS, and for the second and third regressions the sample consisted of thirty four countries with HBS data or financial balance sheet data, and four with WS. Based on the existence of a strong correlation between wealth and disposable income (0.958), and wealth and consumption (0.860), the selected independent variable was the real consumption per capita. From a theoretical perspective it is difficult to argue that the relationship between income and wealth, and consumption and wealth, are linear, but for Davies et al. (2006) it was a sufficient approximation for the empirical work.[7]

Davies et al. (2006) also considered five other independent variables: population density, market capitalization rate, public spending on pensions as a percentage of GDP, income Gini, and domestic credits available to the private sector. We are sure that the variables were selected at least in part due to a lack of data. In the non-financial assets regression, OLS were used, and in the financial assets and liabilities regressions the SUR estimation method was used. The authors only reported the standard errors and the "R^2". It is worth mentioning that the income Gini turned out to be insignificant, and goodness of fit reached almost one in

[5] Davies et al. (2006, pp. 8-9) reminds us the following: "like all household surveys, wealth surveys suffer from sampling and non-sampling errors. These are typically more serious for estimating wealth distribution than e.g. for income distributions. The high skewness of wealth distributions makes sampling error more severe. Non-sampling error is also a greater problem since differential response (wealthier households less likely to respond) and misreporting are generally more important than for income. Both sampling and non-sampling error lead to special difficulties in obtaining an accurate picture of the upper tail, which is of course one of the most interesting parts of the distribution… In order to offset the effects of sampling error in the upper tail, well-designed wealth surveys over-sample wealthier households."

[6] It is worth noting that even a project such as the *Luxemburg Wealth Study* has been able to analyze wealth distribution exclusively in five countries (Jantti, Sierminska and Smeeding, 2008).

[7] Similarly, Jantti, Sierminska and Smeeding (2008, p. 26) conclude that "net worth and disposable income are highly, but not perfectly, correlated in the countries we look at… Part of the positive association of disposable income and net worth is associated to observable characteristics of the household, such as age and education. Once this part is taken into account, a sizeable correlation remains."

each regression. Unfortunately the "statistical adequacy" of regressions was not tested.[8] In this sense the authors made use of the "axiom of correct specification" (Leamer, 1983).

B. To estimate wealth distribution shares for countries for which no direct information existed, the authors made use of income distribution data for 145 countries recorded in the WIID dataset. Specifically, what Davies et al. (2006, pp. 23-4) did was the following:

> "The common template applied to the wealth and income distributions allows Lorenz curve comparisons to be made for each of the 20 reference countries… In every instance, wealth shares are lower than income shares at each point of the Lorenz curve: in other words, wealth is unambiguously more unequally distributed than income. Furthermore, the ratios of wealth shares to income shares at various percentile points appear to be fairly stable across countries, supporting the view that income inequality provides a good proxy for wealth inequality when wealth distribution data are not available. Thus, as a first approximation, it seems reasonable to assume that the ratio of the Lorenz ordinates for wealth compared to income are constant across countries, and that these constant ratios (14 in total) correspond to the average value recorded for the 20 reference countries. This enabled us to derive estimates of wealth distribution for 124 countries to add to the 20 original countries on which we have direct evidence of wealth inequality."

Davies et al. (2006, p. 26) concluded the following: "our wealth Gini estimates for individual countries range from a low of 0.547 for Japan, to the high values reported for the USA (0.801) and Switzerland (0.803), and the highest values of all in Zimbabwe (0.845) and Namibia (0.846). The global wealth Gini is higher still at 0.892. This roughly corresponds to the Gini value that would be recorded in a 10-person population if one person had $1000 and the remaining 9 people each had $1."[9]

3. Wealth Gini: a sort of a "shortcut" based on observed-data

The Mexican *National Income and Expenditure Household Surveys* (ENIGH) include information about some durables goods, among others, the number of personal computers (PCs), vacuums and vehicles owned by each family. The surveys do not distinguish between laptops and desktops, so the record includes both types. Somewhat the same applies for the vacuums. The wealth variable "vehicles" includes three types: cars, closed vans, and open vans. The following tables contain information about the number of PCs, vacuums and vehicles as percentages of the total households. Please note that the information is presented in physical units, not in monetary values, because of the lack of information.

[8] According to Spanos (1989, p. 151): "a *statistical model* constitutes a set of probabilistic assumptions related to random variables giving rise to the data chosen by a theory. Such a model is said to be *statistically adequate* when the underlying assumptions are tested and not rejected by the data in question."

[9] Davies et al. (2010, p. 223) reported slightly different figures: "the top decile owned 71% of world wealth and the global Gini value was 0.802."

Table 1. Number of PCs as a percentage of total households

Year	0	1	2	3	4	5	6	7	8	Sum
1992	97.99	1.96	0.05							100
1994	96.71	3.21	0.07	0.00	0.01					100
1996	96.90	2.93	0.17							100
1998	94.18	5.56	0.25	0.01						100
2000	89.49	9.99	0.51	0.01						100
2002	86.29	13.01	0.54	0.06	0.06	0.04				100
2004	83.22	15.93	0.70	0.11	0.03	0.00	0.01			100
2005	81.56	17.40	0.83	0.16	0.02	0.03				100
2006	80.20	18.16	1.30	0.29	0.04	0.00	0.01	0.00	0.01	100
2008	77.51	20.31	1.67	0.34	0.12	0.03	0.01			100
2010	74.12	22.03	2.69	0.76	0.30	0.06	0.02	0.01		100

Source: own calculations using data from ENIGHs.

Over the years, there is a decrease in the percentage of families that do not have a PC, going from 97.99 percent in 1992 to 74.12 percent in 2010. In other words, there is a significant increase in the percentage of households that have a PC, from 1.96 percent in 1992 to 22.03 percent in 2010, which means an increase of nearly twenty one points within the period under review.

Table 2. Number of vacuums as a percentage of total households

Year	0	1	2	3	4	5	Sum
1992	92.06	7.85	0.10				100
1994	92.10	7.75	0.14	0.01			100
1996	93.48	6.45	0.07				100
1998	92.06	7.87	0.06	0.01			100
2000	91.41	8.48	0.12				100
2002	93.06	6.80	0.14				100
2004	92.17	7.60	0.22	0.01			100
2005	91.48	8.38	0.14				100
2006	91.01	8.76	0.22	0.01			100
2008	91.05	8.66	0.24	0.03	0.01	0.01	100
2010	92.89	6.91	0.17	0.01			100

Source: own calculations using data from ENIGHs.

The case of vacuums is quite different from that of PCs and with that of vehicles as we will see in a moment. As time goes by, as a constant less than ten percent of households own a vacuum.

Table 3. Number of vehicles as a percentage of total households

Year	0	1	2	3	4	5	6	7	8	9	10	Sum

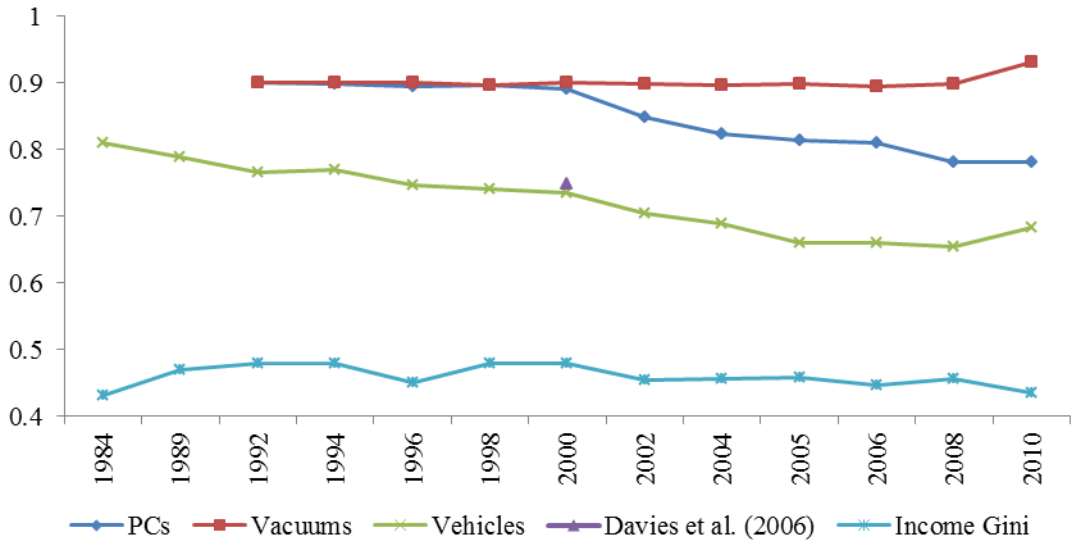
1984	81.07	14.95	3.60	0.36	0.01	0.01						100
1989	76.74	18.24	3.93	0.73	0.25	0.03	0.05	0.02				100
1992	73.59	20.73	4.28	1.10	0.23	0.01	0.06					100
1994	73.84	19.95	4.94	0.93	0.24	0.11						100
1996	70.64	22.81	5.34	0.92	0.24	0.02	0.02	0.02				100
1998	68.22	24.58	5.65	1.20	0.30	0.04	0.01					100
2000	67.09	24.29	6.69	1.62	0.27	0.04						100
2002	64.36	26.54	6.93	1.58	0.45	0.13	0.01	0.01				100
2004	61.88	27.81	7.94	1.68	0.46	0.08	0.15	0.01				100
2005	58.45	30.72	8.29	1.91	0.36	0.17	0.08	0.01				100
2006	58.34	30.20	8.75	2.05	0.49	0.13	0.02	0.01			0.01	100
2008	57.97	31.29	8.36	1.74	0.46	0.13	0.03	0.01	0.00	0.00	0.01	100
2010	60.35	29.81	7.67	1.54	0.42	0.10	0.05	0.00	0.01	0.00	0.04	100

Source: own calculations using data from ENIGHs.

In 1984, the vast majority of families did not own a vehicle. However, in 2010 almost one third of households in Mexico owned at least one vehicle. It is also clear that, as time goes by, the number of families that may have access to a greater number of vehicles has also increased.

The following figure shows Gini coefficients for PCs, vacuums and vehicles that may be derived from the ENIGHs, the wealth Gini reported by Davies et al. (2006), and the official income Gini for Mexico between 1984 and 2010.[10]

Figure 2. Wealth Gini and income Gini coefficients for Mexico 1984-2010



Source: own calculations using data from ENIGHs, and Davies et al. (2006, p. 48).

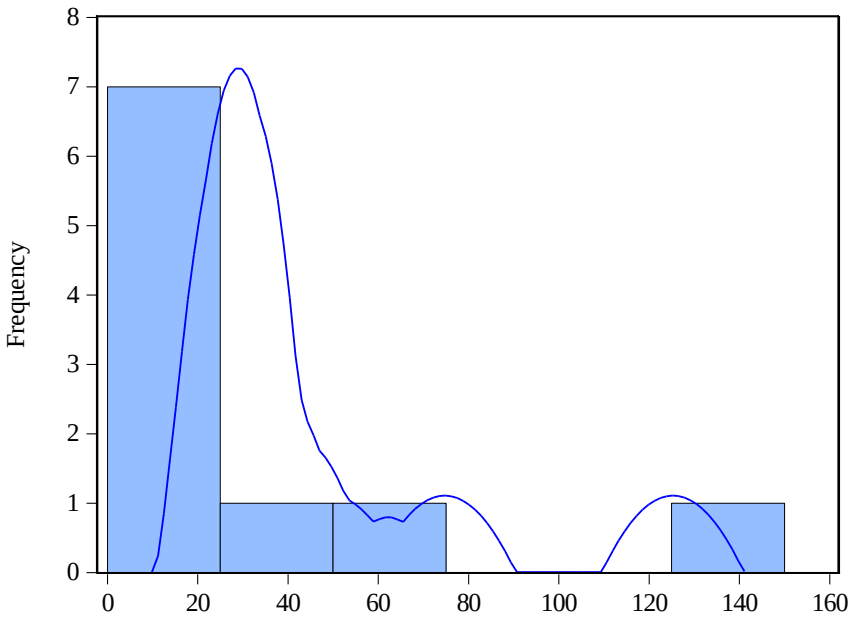
It is worth mentioning the following. In first place, it is a welcomed statistical coincidence that, in 2000, wealth Gini figure estimated by Davies et al. (2006) and the one derived from the

[10] A somewhat similar approach is Burger et al. (2008). They used an index of consumer durables to investigate wealth accumulation by households in Ghana. We prefer to avoid the dilemma regarding the determination of weights because there is no information about the value of the consumer durables. In this sense we made used of the rule number 5 proposed by Kennedy (2003, p. 392) that says “keep it sensibly simple”.

vehicles proposed here are almost equal.[11] In some sense, if we trust Davies´s estimate, then our analysis would allow us to garner information about the trend of the wealth Gini coefficient in Mexico between 1984 and 2010. Taking for granted what was stated above, in second place, it is fair to say that the patterns of wealth and income Ginis are somewhat different. Despite that this analysis is based exclusively on consumer durables, it is worth mentioning that this document offers the first available historic estimate for Mexico's wealth Gini. In third place, it seems that the wealth Ginis derived from the PCs and vacuums were useful to the extent that they served as some sort of confirmatory mechanisms.

Finally, we present an illustration about the meaning of a Gini coefficient equal to 0.662, which is the vehicles Gini obtained for the 2010 year.[12] Our assumptions are the following. The first decil has a wealth equal to one Mexican peso. In order to determine the wealth from the second to the fifth deciles we applied the same observed ratio between the decil in question with respect to the first decil considering its "current monetary income" registered in the ENIGH 2010. It is because it is not until the sixth decil that households are in an economic position to save. In order to determine the wealth from the sixth to the tenth deciles we just applied a constant growth. At the end we obtained the sought distribution. The following figure shows its histogram.

Figure 3. Simulated wealth distribution in Mexico 2010, (Gini=0.662)



Source: own calculations using data from ENIGH 2010.

To put our simulation into perspective it is convenient to quote Kennickell (2007, p. 6), who compared income and wealth distributions using observed data for the US: "The levels of income and wealth are quite different across their distributions... Income is higher than wealth

[11] Another piece of evidence is the following. Using home ownership distribution for the year 2000, Torche and Spilerman (2008) estimated "wealth Gini" coefficients for some Latin American countries. For Mexico the figure obtained was 0.70. On page 160, the authors commented the following: "since direct measures of home value are not available in household surveys, we proxy it by rental value, as estimated by the homeowners… Admittedly, this approach may suffer from bias if some households systematically over or underestimate the rental value of their dwellings, and it assumes that the relation between market value and rental income in a country is constant across regions and neighborhoods".

[12] Considering that we are not taking account the value of the consumer durables, the proposed Gini coefficients are very optimistic.

at the bottom of the distribution and substantially lower at the top… Comparison of the quantiles of each distribution shows that the distributions also differ greatly in relative terms, with wealth being proportionally far higher in the upper tail of the distribution."

Based on ENIGH 2010 it is correct to say that the "current monetary income" observed ratio between the last and the first deciles was 25.1, and the two top deciles owned 51.9 percent of the "current monetary income". The income Gini coefficient reported in the same year was 0.435. In our wealth case the ratio was 146.6, and the two tops deciles owned 74.2 percent of household wealth.[13]

4. Final remarks

Before there was "good" data available, the researchers in the developed world implemented creative solutions in order to approximate wealth data and its distribution between households. By the way, in applied work it is allowed to do it as long as you follow "good practices".

Results obtained by Davies, Sandstrom, Shorrocks and Wolff (2006) and those reported here are complementary, rather than exclusive. Unequal wealth distribution is a salient feature of our societies. In 2000, world wealth Gini was 0.892 and the Gini was 0.734 for Mexico. Additionally, seeing the entire period we found an unexpected result: it seems that the income Gini is rigid and the wealth Gini has a slight tendency to decline. Interestingly, this pattern was broken during the last two observed years, as Ginis moved in opposite directions.

Lastly, the concern about wealth distribution clearly has theoretical implications, but it also has tremendous social and policy repercussions. Three examples. First, it is necessary to investigate the impact of not only income distribution but wealth distribution in the economic performance of countries.[14] Second, we recommend a major review of the Mexican tax structure in terms of the role of wealth taxes. Third, it is time to launch a project to measure wealth and its distribution in our country. Currently the US Federal Reserve Board is the example to follow. According to Jantti, Sierminska and Smeeding (2008, p. 17), its *Survey of Consumer Finances* "is the dataset which captures more assets in the United States and is reputed to be the best wealth survey in the world."

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[13] If we use the Gini wealth coefficient derived from PCs, e.g. 0.782, the ratio would be 764, and the two top deciles would own 86.8 percent of household wealth.
[14] As a counterexample see Durlauf, Johnson and Temple (2005).

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