TOWARDS A MORE REALISTIC ESTIMATE OF THE INCOME DISTRIBUTION IN MEXICO

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LAYOUT

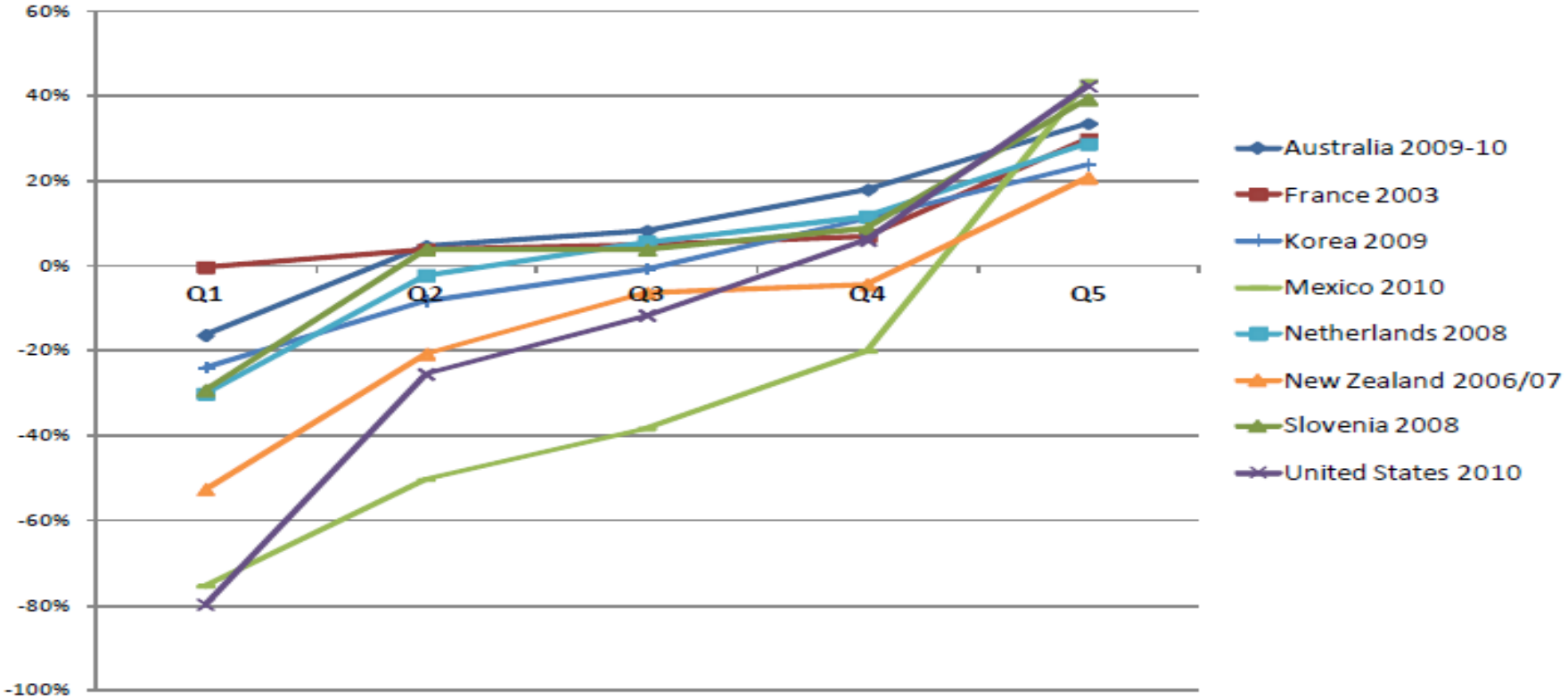
- Preliminaries
  - Problem
  - Adjustment to National Accounts (MSNA)
- Fitting Income Models
  - Purpose
  - Criterion
  - Models
  - Restrictions
- Numerical results.

Problem

- **Income**: important input for measurement of both poverty and inequality.

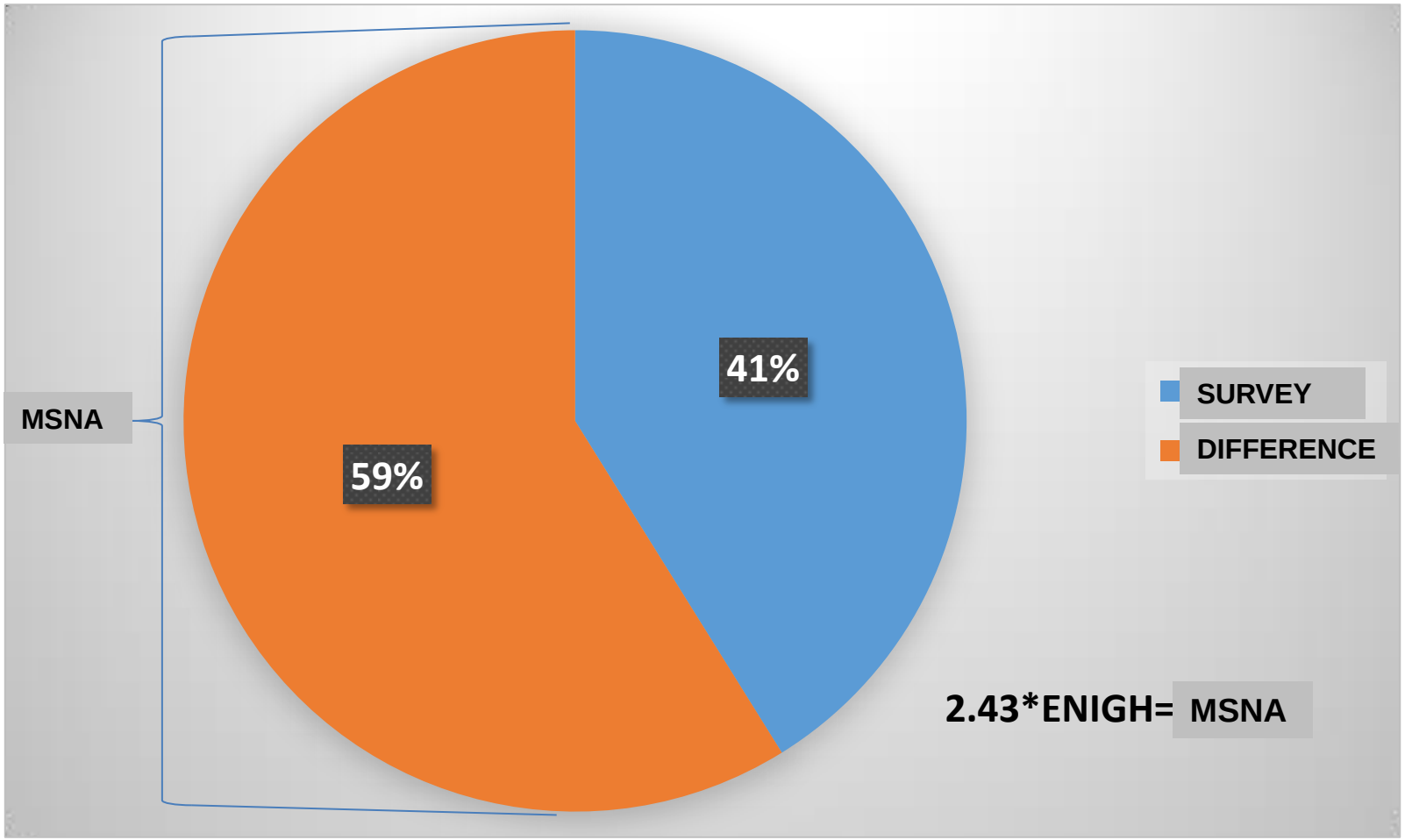
- However, not accurately measured through household income surveys.

Figure 13 - Saving as a percentage of adjusted disposable income by Equivalized Disposable Income quintile



FESSEAU, M., and MATTONETTI, M. L., ***Distributional measures across household groups in a national accounts framework: Results from an experimental cross-country exercise on household income, consumption and saving***, OECD STATISTICS WORKING PAPER NO. 53, Paris, France, 2013.

Total Current Income in Mexico, 2012



WHY?

- Survey income affected mainly by :
  - **Under-reporting,** and
  - **Truncation:** Households with very large income, absent from sample.
- By how much each affect total income? **Not known**
  - 100-0% o 0-100%
- Lacking evidence, consider both.

Attempt to account for the above difference

ADJUSTMENT TO NATIONAL ACCOUNTS

Adjustment to National Accounts

$$Survey: \begin{cases} Y_{(i)} \\ \pi_{(i)} \end{cases}, i = 1, \ldots, n; \qquad SNA: \hat{Y}_{SNA};$$

$$Y_{(i)}^{(a)} = f\left(Y_{(i)}, \hat{Y}_{SNA} - \hat{Y}_{Survey}\right), i = 1, \ldots, n,$$

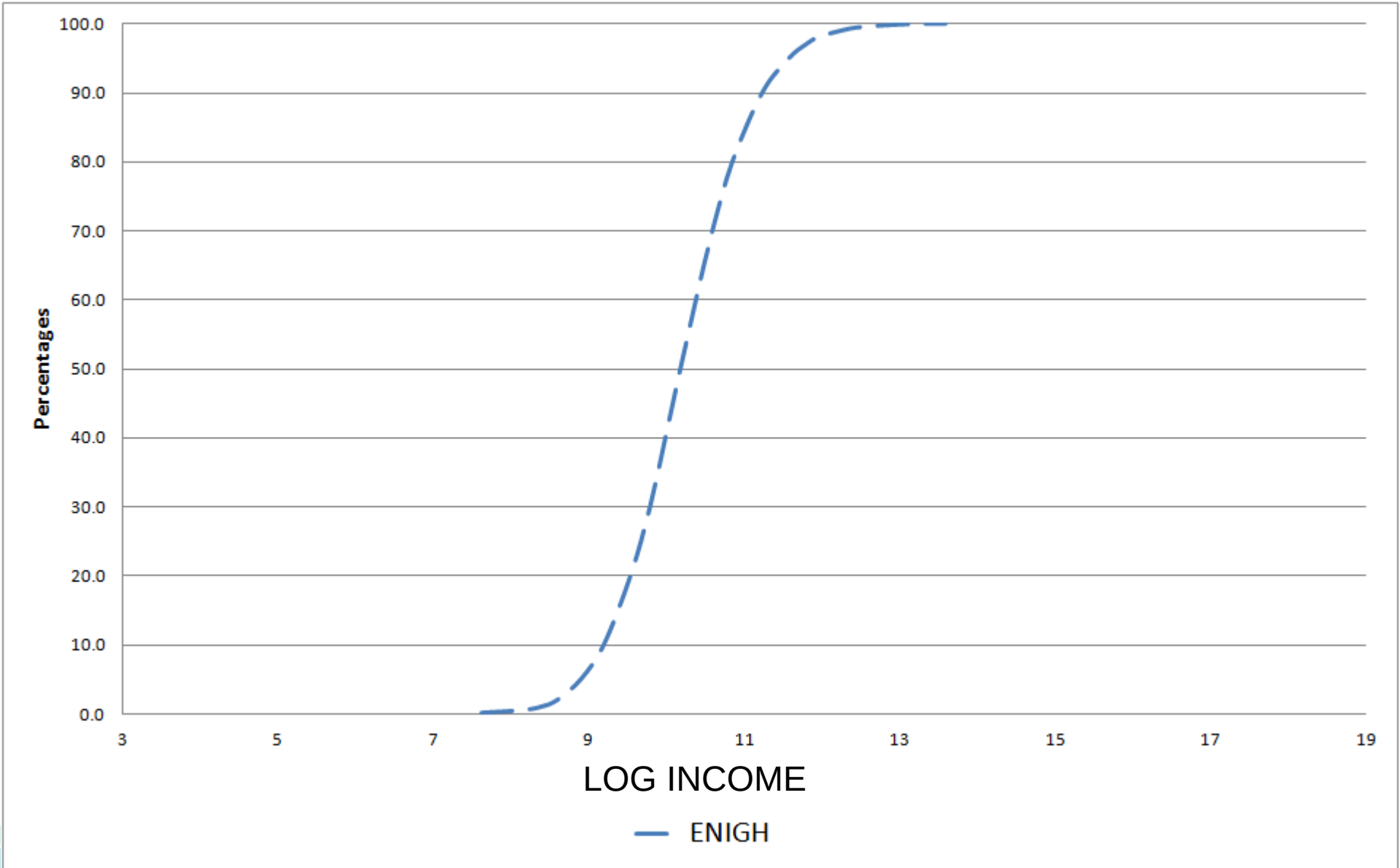
So that:

$$\sum_{i=1}^{n} \frac{Y_{(i)}^{(a)}}{\pi_{(i)}} = \hat{Y}_{SNA}.$$

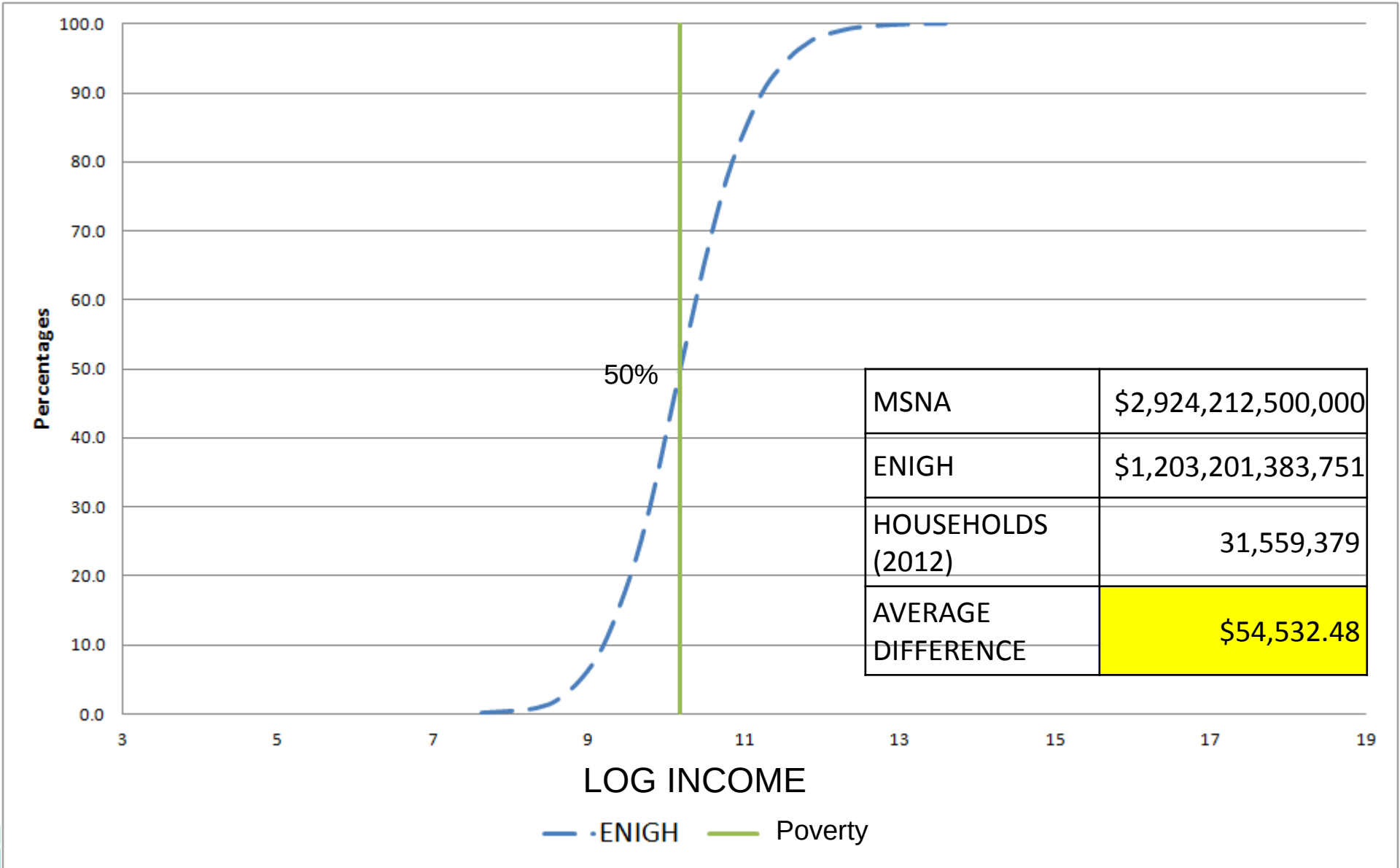
Income Distribution

Poverty, inequality and fiscal studies derived.

IGNORING TRUNCATION

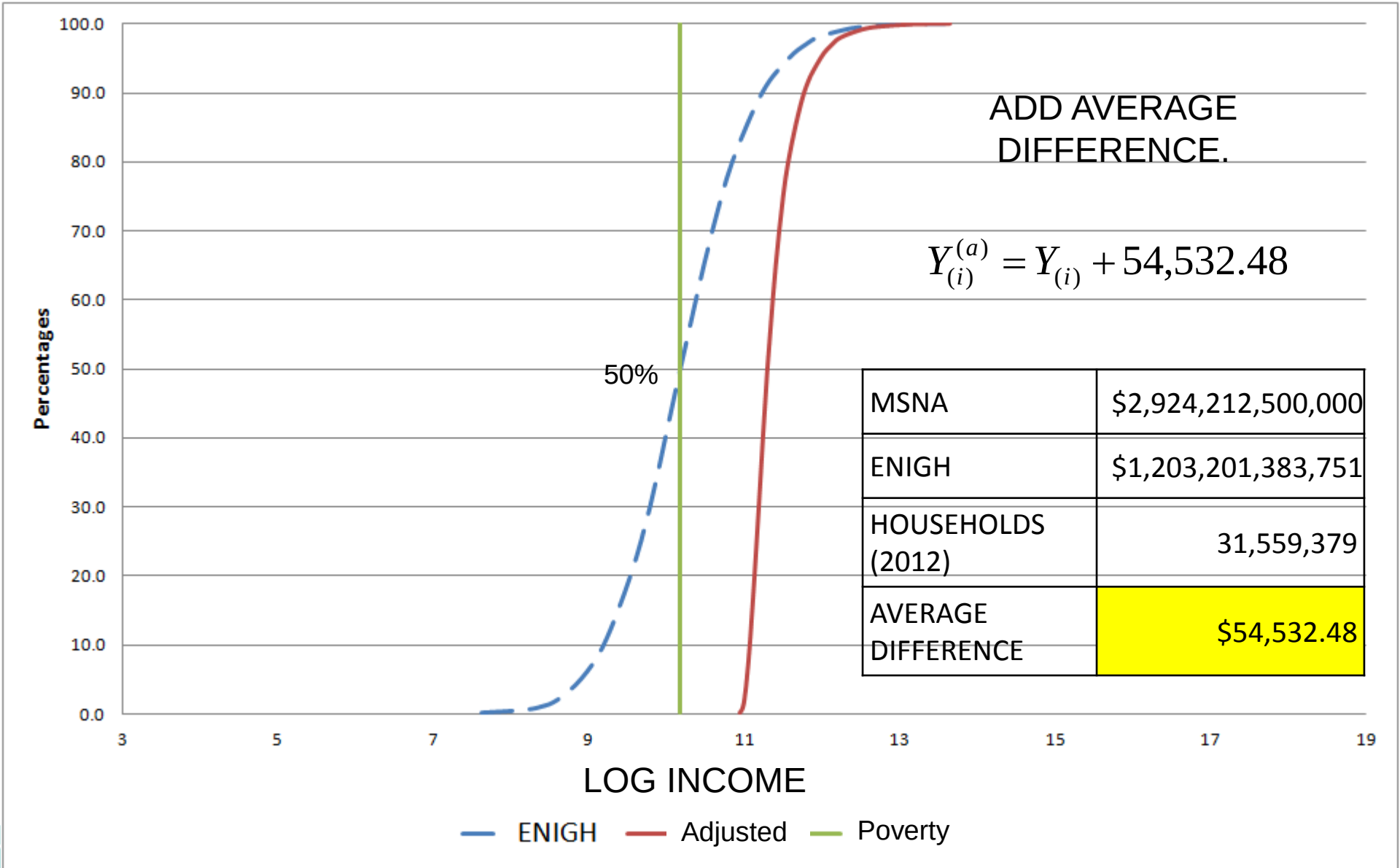


IGNORING TRUNCATION

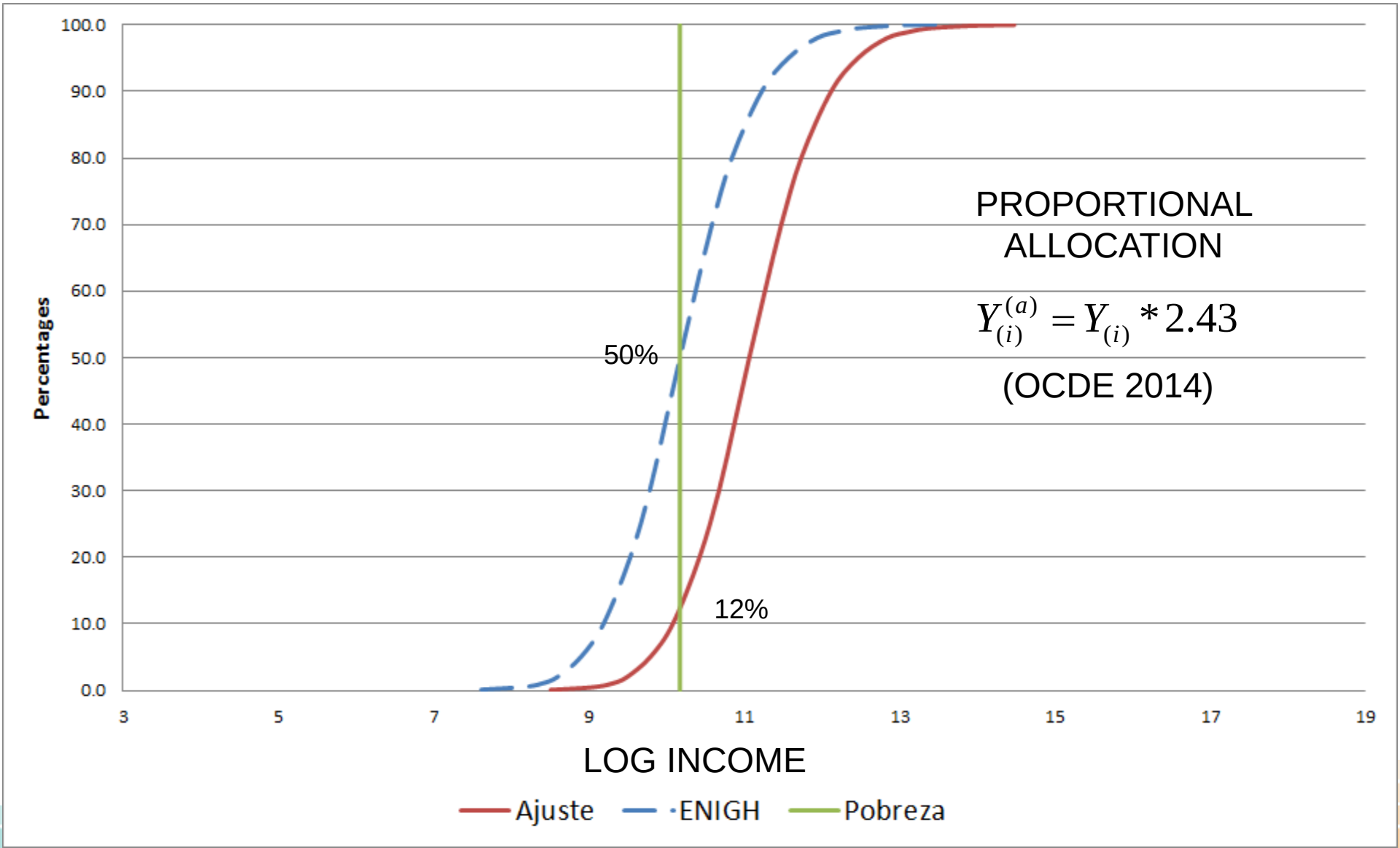


MSNA	$2,924,212,500,000
ENIGH	$1,203,201,383,751
HOUSEHOLDS (2012)	31,559,379
AVERAGE DIFFERENCE	$54,532.48

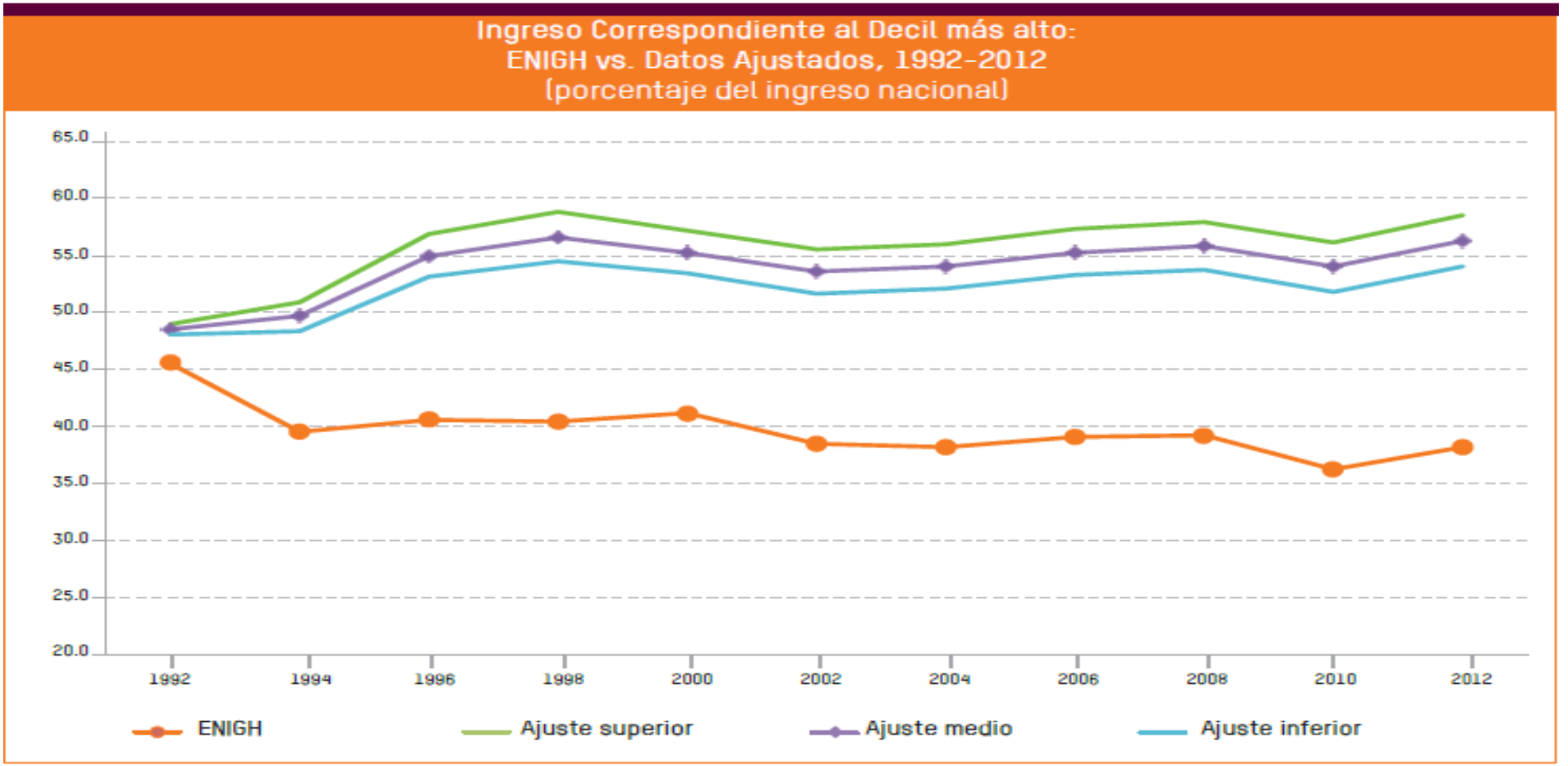
IGNORING TRUNCATION



IGNORING TRUNCATION



ADJUSTMENT NEGLECTING UNDER REPORTING (0-100%)



(78%) 83% (88%) of difference added to the survey X-th income decile; (22%) 17% (12%), to IX-th decile. **Conclusion: inequality is extreme in Mexico.**

Esquivel, *Desigualdad Extrema en México: Concentración del Poder Económico y Político*, Oxfam México, 2015, México

CONSEQUENCES

- In absence of evidence to support either correction of survey-declared incomes, **CONEVAL** (Mexican institution in charge of measuring poverty) decided **NOT TO CARRY OUT ANY INCOME CORRECTION**.
- Equivalent to assuming under-reporting and truncation absent.
- Risks: In presence of significant under-reporting, number of false positives (non-poor counted as poor) grows by unknown amount. On the other hand, inequality is underestimated.

FITTING MODELS TO SURVEY INCOME DATA

PURPOSE

- Skipping the intermediate step of imputing incomes in the sample, to estimate in a less arbitrary manner a household income distribution in Mexico which lies closer to reality by taking other data sources into consideration.

PROPOSED CRITERION

PROPOSAL*

In order to reduce arbitrariness, criterion introduced to determine good and better.
Some parametric distribution families fitted accordingly to quarterly current income. Also reduces arbitrariness.
Use all available information.

$$\text{Model}: f(y;\underline{\theta}) \Rightarrow \begin{cases} \ell(\underline{\theta};\underline{Y}_{(i)}) = \ln\left(f(\underline{Y}_{(i)};\underline{\theta})\right) \\ h(\underline{\theta}) \end{cases};$$

$$\text{Criterion}: \underset{\underline{\theta},\underline{\lambda}}{Max}\left\{\sum_{i=1}^{n}\frac{1}{\pi_{(i)}}\ell(\underline{\theta};\underline{Y}_{(i)}) - \underline{\lambda}'\left(\underline{h}(\underline{\theta}) - \underline{c}\right)\right\}$$

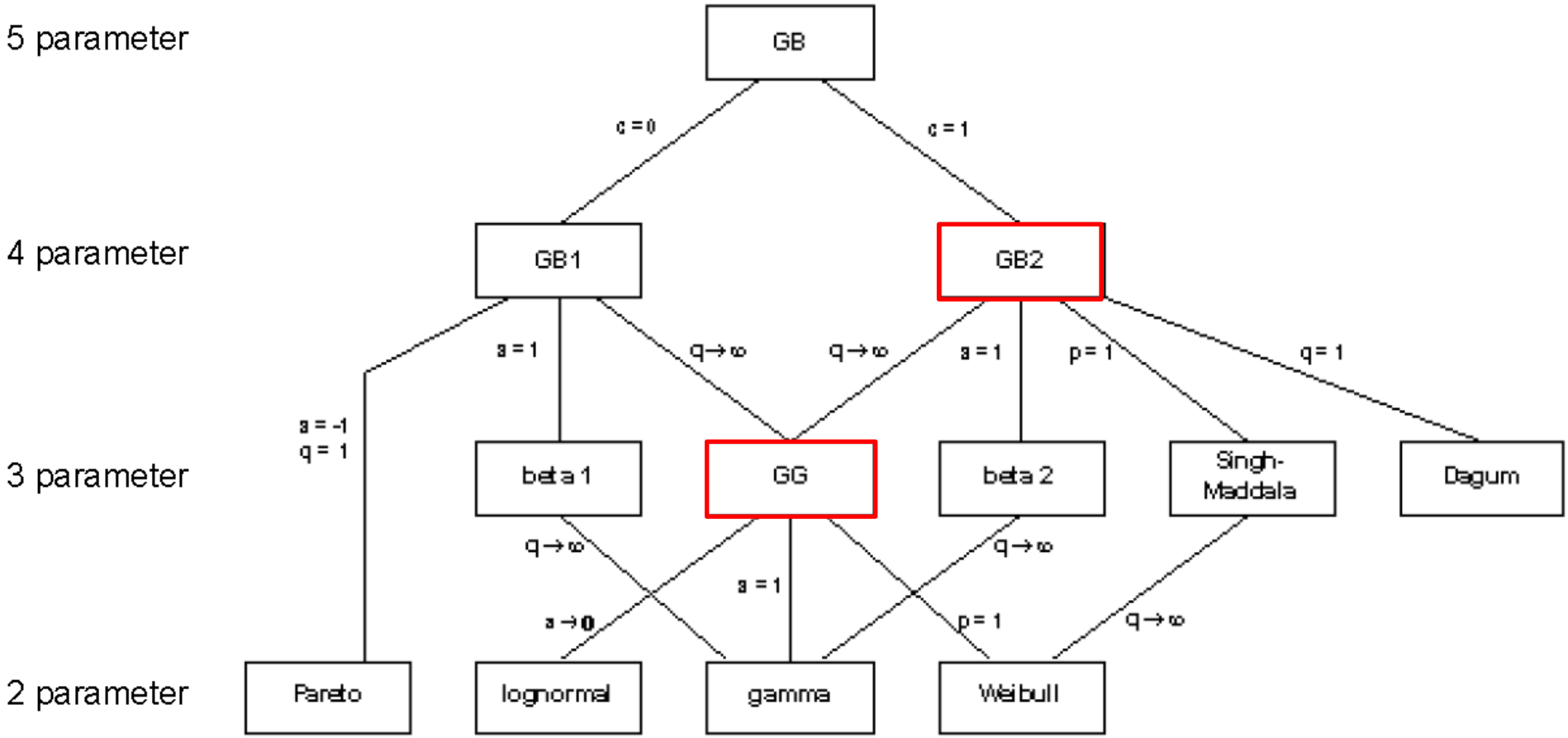
$$\text{ENIGH}: \begin{cases} Y_{(i)} \\ \pi_{(i)} \end{cases}, i = 1,\ldots,n;$$

$$\text{MSNA}: c_1 = \text{Total}(\hat{Y}_{SNC});$$

$$\text{MIRS}: c_2 = Average(Y_{Max-k},\ldots,Y_{Max});$$

* Bustos, Alfredo, "Estimation of the Distribution of Income from Survey Data, Adjusting for Compatibility with Other Sources", Statistical Journal of the IAOS, vol. 31, no. 4, 2015, pp. 565-577.

Models for the Distribution of Income



Bandourian, R., McDonald, J., Turley, R., "*A Comparison of parametric models of income distribution across countries and over time*", Dept. of Economics, Brigham Young University, 2002.

CONSTRAINTS

Concepto	Restricción:	Interpretación
Average household income	$h_1(\underline{\theta}) = E[Y \mid \underline{\theta}] = c_1$	Mean income for fitted model equals average household income, according to MSNA.
Income Integral	$h_3(\underline{\theta}) = \frac{1}{\alpha} \int_{\varphi_\alpha}^{\infty} y f_Y(y \mid \underline{\theta}) dy = M = c_3$	Mean income for households whose income is greater than threshold φ_α is, according to the model, equal to average household income from SAT.

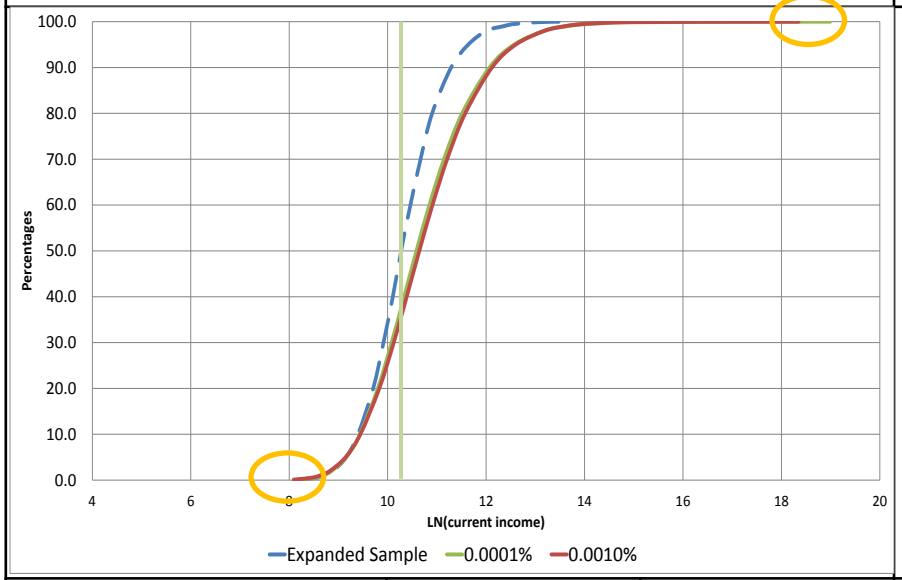
THRESHOLD DETERMINATION

- Requirements:
  - Informative of extreme conditions
  - Reduce weight of conceptual and of unit of observation differences.
- Explored combinations for α = 1%, 0.1%, 0.01%, 0.001% y 0.0001%.
- First three under survey maximum.
- Last two fulfil our requirements.

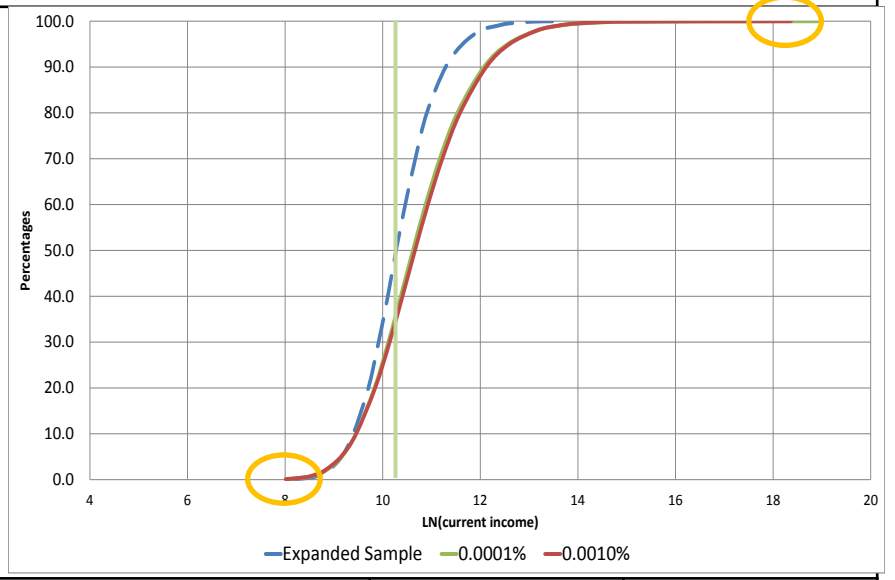
NUMERICAL RESULTS

OPTIMAL FITTED MODELS

Generalized Gamma (GG)



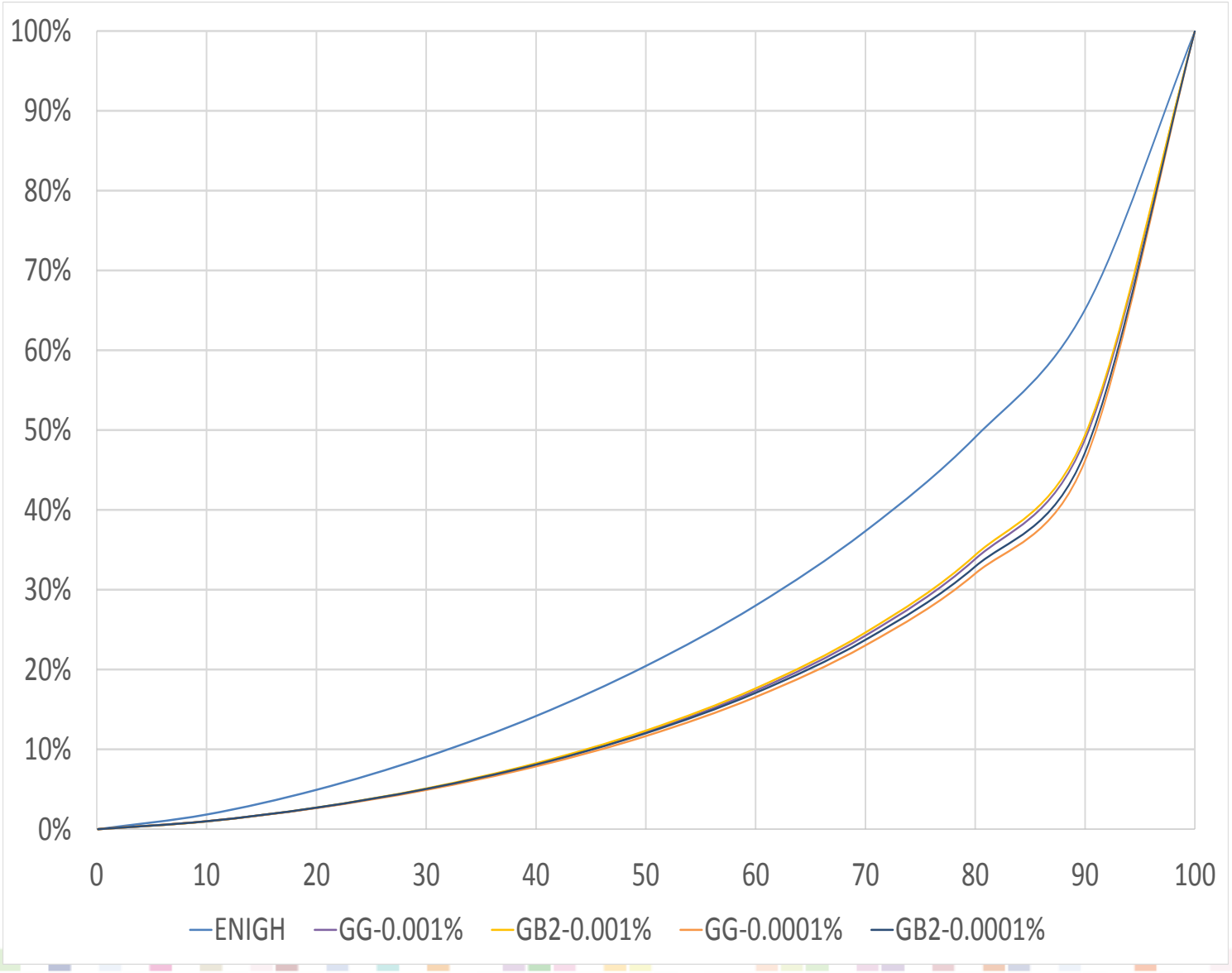
Type II Generalized Beta (GB2)



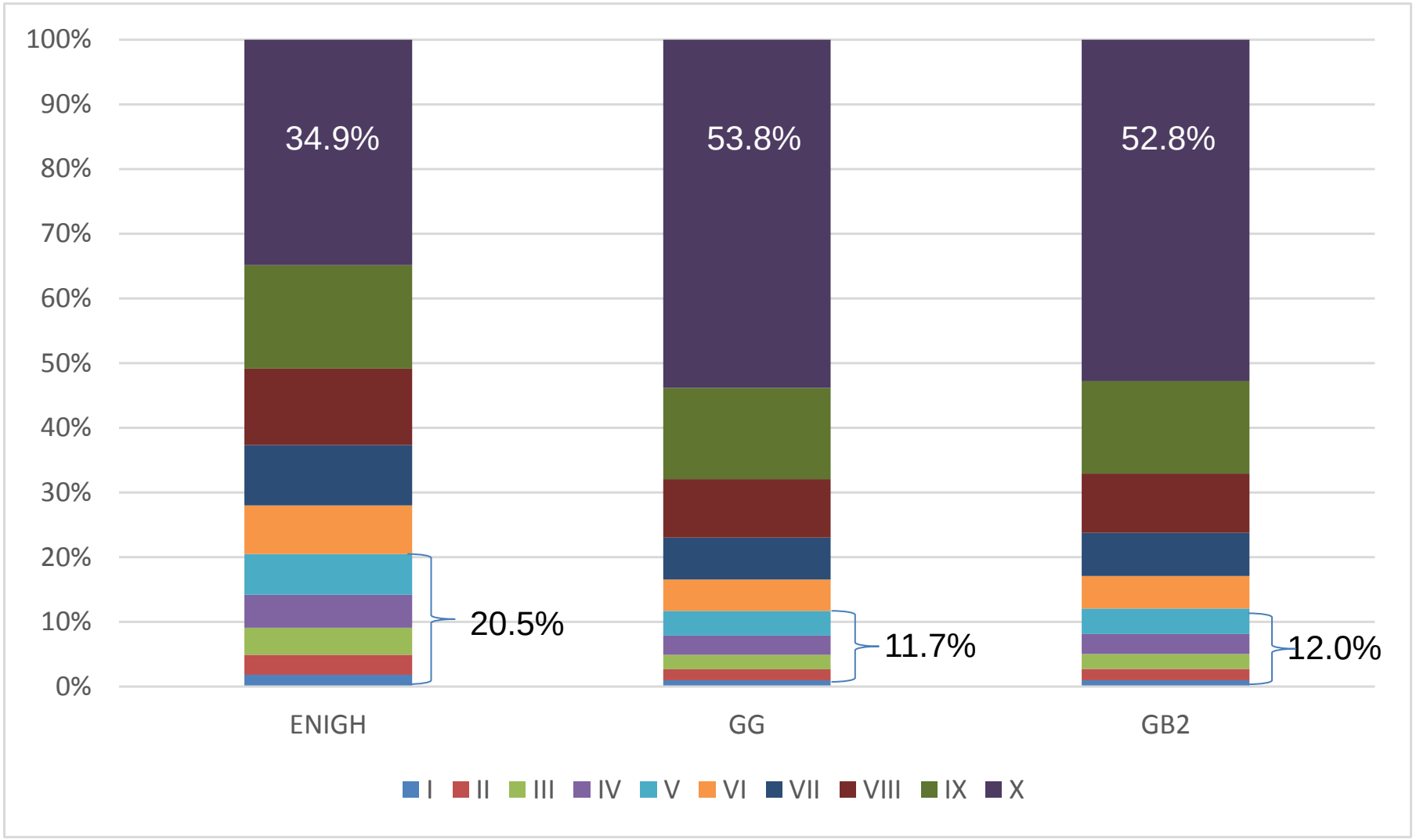
	0.0010%	0.0001%
OPTIMAL CMPL VALUE	-365,349,780	-364,628,437
$E(X\|\theta)$	✓	✓
$E(X\|X > \varphi_\alpha, \theta)$	✓	✓
GINI COEFFICIENT	0.62	0.64
RATIO X/I	52.09	54.16

	0.0010%	0.0001%
OPTIMAL CMPL VALUE	-365,541,743	-364,913,147
$E(X\|\theta)$	✓	✓
$E(X\|X > \varphi_\alpha, \theta)$	✓	✓
GINI COEFFICIENT	0.61	0.63
RATIO X/I	51.66	53.20

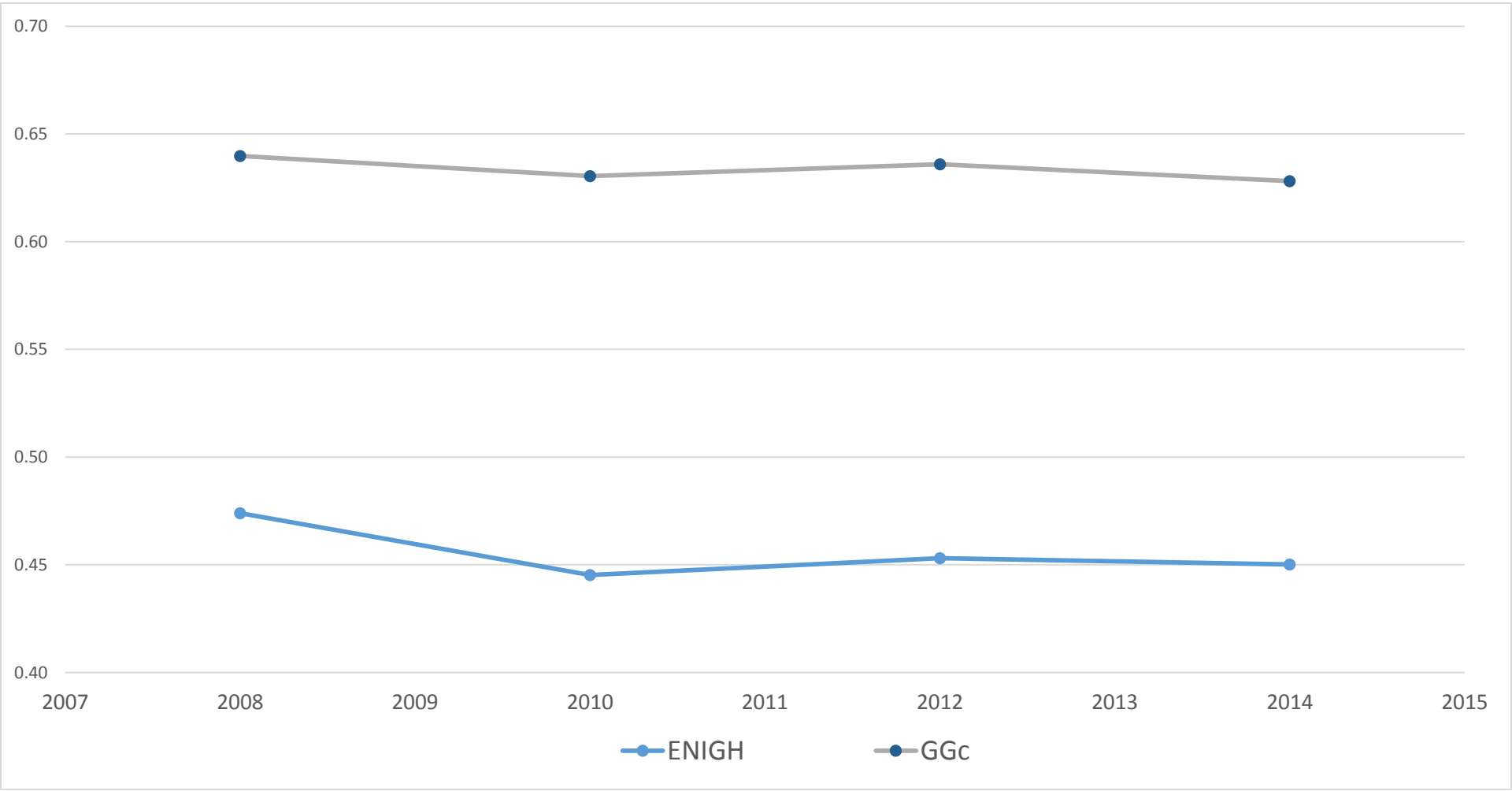
LORENZ CURVES



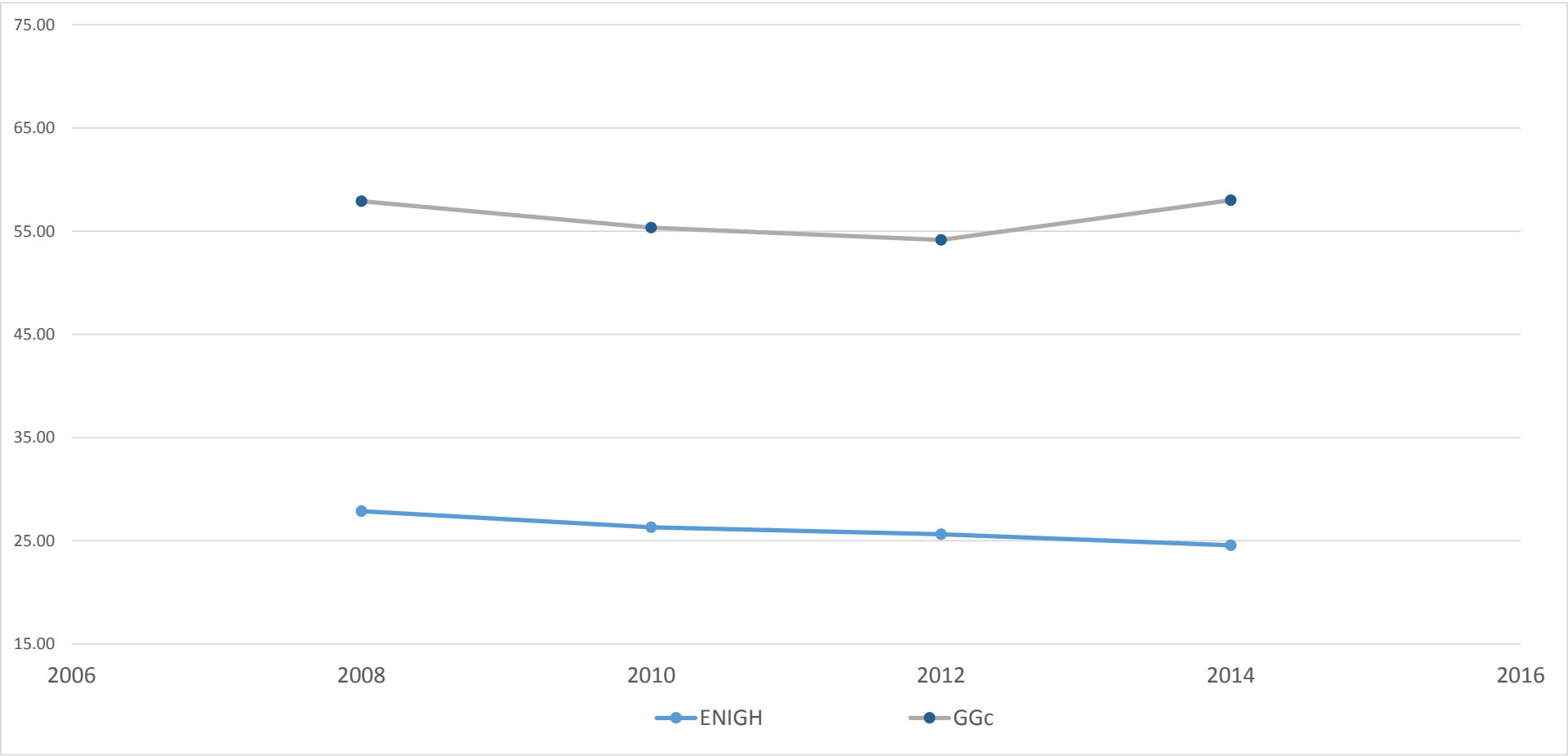
INCOME DISTRIBUTION BY DECILES



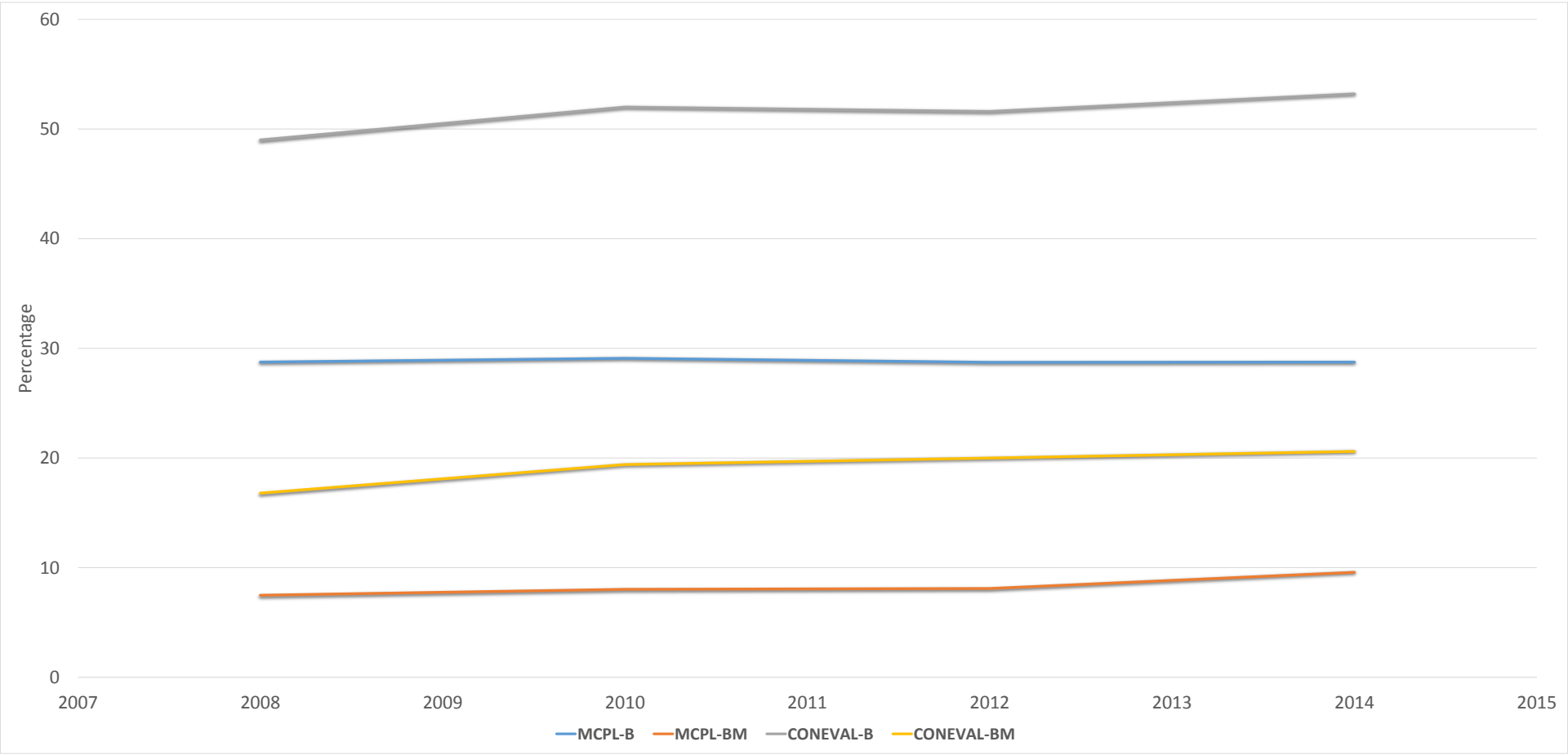
Gini Coefficients, Mexico, 2008-2014



Ratio X-th decile income to I-st decile, 2008-2014



Households with income below CONEVAL welfare lines, México, 2008-2014



Conclusion

- There is evidence of both income under-reporting and truncation in the sample.
- Best fitted model exhibits under-reporting growing with income but less tan proportionally.
- Reality may be very different from survey results.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