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Universidad
del País Vasco

Euskal Herriko
Unibertsitatea

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FACULTY OF ECONOMICS

Pedro Iraburu Muñoz

INEQUALITY AND POVERTY:

financial crisis effects on the households

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How were the different types of households in Spain affected during the financial crisis?

Pedro Iraburu Muñoz

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Abstract

This assignment consists of a short analysis of the evolution of the financial crisis, that came shortly after of the collapse of Lehman Brothers. The study will be split into two main parts, the inequality and the poverty research. For this purpose, stata powerful graphs display, along with the DASP package are used to represent and interpret the data.

Keywords: Poverty, crisis, inequality.

Introduction

After the first years of economic expansion (2000-2007) the Spanish economy built up imbalances and risks that, subject to the global financial crisis, worsened the situation (Banco de España, 2017). We can distinguish two periods within this financial crash, from 2008 to 2012, and the 2013 year, as stated by the Banco de España. In this assignment¹ I will analyze this first temporal interval, and study how were the different types of households affected by the consequences of the financial crisis (I selected the ones I thought would be more interesting to analyze²).

The database used come from the Spanish National Institute of Statistics (INE, 2020), more specifically from the Life Conditions Survey, using as base the year of 2013, for the first and last year of the analyzed temporal period. Inside the LCS are many files, I have only used two:

1. *H* file: contains macroeconomic variable such as income and consumption.
2. *D* file: contains more specific information about the households (it also includes the weights used).

Inequality analysis

For the inequality study, I will use two different measures, Gini and the Generalized Entropy Family:

The Gini index can be expressed by many different definitions, but perhaps the easiest one is that it computes "the average difference between all possible pairs of incomes in the population, expressed as a proportion of total income" (Cowell, 2009). This is the formula behind:

$$G(x) = \frac{1}{2n^2\mu} \sum_{i=1}^n \sum_{j=1}^n \|x_i - x_j\| \quad (1)$$

¹All the graphs and tables are included in the appendix, including the raw stata output of the tables.

²These are households of two adults with one being at least 75 years old, households with two adults and at least three children, households with two adults and just one child, and finally monoparental households.

The Gini coefficient shows clearly the difference between the more affected households and the less one's. The better off groups are the households with no dependent children, and those with just one children, as they retired couples, have less expenditure, and/or from higher social stratum. The more vulnerable groups seem to be the households with monoparental families, and the families with 3 or more children, as they have the harshest level of inequality. This seems logic, as those are probably families with a lot of expenditure, and the monoparental families are usually in a worse situation than others may be in, as they have only one provider. After a few years, the inequality happens to stay at the same level, although the individuals coefficients have not. Not surprisingly, inequality has increased for the households with children (even more for the monoparental and bigger ones), and has diminished for those with none, as we can see in table 1³. We find that the two most vulnerable groups are above the population average, and the others are below, regarding inequality. We can state the fact that the financial crisis exacerbated more the differences between social groups.

The Generalized entropy family follows this formula:

$$GE(\alpha) = \frac{1}{\alpha(\alpha - 1)} \left[\frac{1}{N} \sum_{i=1}^N \left(\frac{y_i}{\hat{y}} \right)^{\alpha} - 1 \right], \quad (2)$$

where \hat{y} is the mean income, and α is the main parameter that represents the weight given to distances between incomes at different parts of the income distribution. The coefficient can take any positive values, with 0 being representing an equal distribution (World Bank, 2005).

Table 1: Inequality measures 2008-2012

| Group | GINI | | GE(0) | | GE(1) | | GE(2) | |
|---------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 |
| 2 Adults (1,75) | 0.3318 | 0.2924 | 0.1887 | 0.1448 | 0.2074 | 0.1498 | 0.3251 | 0.1939 |
| 2 Adults with ≥ 3 children | 0.4063 | 0.4242 | 0.2884 | 0.3124 | 0.2732 | 0.2853 | 0.3293 | 0.3534 |
| 2 Adults with one children | 0.2983 | 0.3152 | 0.1640 | 0.1758 | 0.1476 | 0.1626 | 0.1654 | 0.1805 |
| Adult with ≥ 1 child | 0.3568 | 0.3908 | 0.2622 | 0.2956 | 0.2034 | 0.2523 | 0.2163 | 0.3987 |
| Population | 0.3360 | 0.3337 | 0.2044 | 0.1997 | 0.1926 | 0.1836 | 0.2434 | 0.2216 |

³The data was extracted from the stata output, present in the annex

For the Generalized entropy family, I will take three values for α , with the first one characterizing the so called second Theil's measure, which represents the "average deviation between the log income shares and the log shares that would represent perfect equality" (Cowell, 2009). The coefficients of the Theils, just reassures what we have analyzed with the Gini Index, but this time, the difference is harsher. As the parameter α (inequality aversion: more averse as α falls) grows, so does the sensitivity of the index to larger incomes, whereas for smaller values, it is more sensitive to the existence of small incomes. This can be perfectly appreciated in table 1., as for greater values of inequality aversion in 2008, GE measures greater differences at the top of the distribution. For all groups, inequality increases from 2008, except the households with just two adults (with one of them being older than 75). It is important to note, that even with the inequality aversion diminished, in the year 2012, the monoparental families show the biggest measure of inequality.

Figures 1 to 9, show the Lorenz Curves for the same groups first in 2008, 2012, and both combined. I included the perfect equality line, to have a better view of the position of each group. The Lorenz curves display the deviation of each individual income share from the one that displays perfect equality (Aaberge, 2008).⁴

As we can observe, some of the curves intersect. This is a problem, as we cannot rank them without introducing weaker ranking criteria than first-degree Lorenz dominance (Aaberge, 2008). In 2008, regarding households with just one child, the curve is above other two households, the more vulnerable ones (red and yellow in the graph), so it is more equal than those two contrasts, just the outcome we would expect from the others inequality measures. In spite of this, in 2012, there are two clear distinct groups, the inequalities seems to have worsened. If we compare each group within years, only households with at least one adult older than 75 are better off.

Generalized Lorenz curves are just the same curves but its values are weighted by the mean of their respective distribution (Van Kern & Jenkins, 2001). They keep the same positions as before, with the differences being even more clear between the groups, as seen in figure TA,

⁴In order to appreciate better the difference, I have separated the Lorenz Curves of 2008-2012 in groups.

2008. In the 2012 graph, the distance is more defined, although each within their scope, cross with the other.

Poverty Analysis

For the poverty study, I will take the FGT Index⁵ with different values for the parameter α , with 0 being the equivalent Head-count ratio.

$$FGT_{\alpha}(x; z) = \frac{1}{n} \sum_{i=1}^n g_i^{\alpha}, \alpha \geq 0, \quad (3)$$

This coefficient measures the percentage of people considered poor, in this case, I set an income consisting of 60% of the median for the poverty threshold. As we can observe in table 2, there is again a clear distinction between the groups, as there are two trends, each one with two members. The poorest are the households with three or more children, statement consistent with the logic that those households have more expenditure than others and thus, more difficulties than the average national household. In 2012, all members get more poor but those with at least one adult being 75 years old. In 2012, the overall level stays the same, but all groups suffer a decrease in income except the first one.

When the FGT's parameter takes value of 1, the index is the poverty gap ratio. This time, it does not just consider if the individual is below the poverty line, but also how extreme is the difference. The coefficients descend quite a bit when compared with the heads count ratio, but for the richest group the effect is stronger. It does not barely change from 2008 to 2012.

Finally, for the last value of the parameter, the FGT index equals the Squared Poverty Gap Index, which has the same meaning as the poverty gap ratio, but with the added value of measuring the inequality among those poor people. The values descend even more. Again, the more affected by the consequences of the financial crisis are, yet once more, the households with three or more children, as we have checked through the three instances of the FGT index.

⁵Foster, Greer and Thorbecke are the authors of this index.

Table 2: Poverty measures 2008-2012

| Group | H | | FGT(1) | | FGT(2) | |
|---------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 2008 | 2012 | 2008 | 2012 | 2008 | 2012 |
| 2 Adults (1,75) | 0.1860 | 0.1411 | 0.0461 | 0.0259 | 0.0190 | 0.0095 |
| 2 Adults with ≥ 3 children | 0.3877 | 0.4010 | 0.1435 | 0.1653 | 0.0697 | 0.0964 |
| 2 Adults with ≥ 1 children | 0.1299 | 0.1605 | 0.0396 | 0.0493 | 0.0188 | 0.0217 |
| Adult with one child | 0.3156 | 0.3377 | 0.1394 | 0.1505 | 0.0851 | 0.1005 |
| Population | 0.2031 | 0.2041 | 0.0655 | 0.0670 | 0.0316 | 0.0352 |

The TIP curves (figures 10 to 12), or Cumulative poverty gap Curves, as called by the DASP stata package, are a very powerful tool to visualize poverty, as they provide the "three I's of poverty", incidence, intensity and inequality measures of aggregate poverty (Lambert & Jenkins, 1997). They are concave functions where the slope is the poverty gap for each percentile (horizontal axis). Where the slope is flat, the incomes are at or above the poverty line. Once cleared the meaning, I can continue with the analysis of the households.

The results confirm what we have concluded from the FGT index analysis. In 2008 the households with three or more children, and those consisting of monoparental families take longer to reach the flat slope, that is, the percentile at or above the poverty threshold, and has a much more steeper slope. In 2012, that difference is even more pronounced, as those groups have a steeper slope, and the percentile where they reach the poverty threshold is a bigger one. Regarding the households with at least one person of 75 years, the slope is almost halved, being the only group that has their TIP curve moved downwards.

Concluding remarks

The data analysis has cast out irrefutable conclusions regarding inequality within households, as there is a clear distinction between them. We have the most vulnerable groups: the mono-parental families and the ones with three or more children, showcasing a much higher grade of poverty and inequality than the others.

In conclusion, the crisis did not seem to affect greatly the overall level of inequality, as it stays practically the same, with the better off groups even having their situation in a better position. It looks like, for some groups, they have more difficulties adapting to unforeseen changes. This is pretty logical, as living paycheck to paycheck is not the same as having some money saved or a more stable job.

References

- [1] Banco de España (2017): *REPORT ON THE FINANCIAL AND BANKING CRISIS IN SPAIN, 2008-2014*.
- [2] INE (2020): *Encuesta de condiciones de Vida*
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- [5] World Bank (2017): *INTRODUCTION TO POVERTY ANALYSIS* , pages 95-105.
- [6] Van Kern, P. & Jenkins, S.P. (2001): *Generalized Lorenz curves and related graphs: an update for Stata 7*, pages 107-112.
- [7] Jenkins, S.P. & Lambert P.J. (1997): *THREE 'I'S OF POVERTY CURVES, WITH AN ANALYSIS OF UK POVERTY TRENDS*, pages 317–327

Appendix

Table 3: Stata ouput: Gini Index for 2008

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.331842 | 0.011484 | 0.309327 | 0.354356 |
| 2 Adults with ≥ 3 children | 0.406392 | 0.017244 | 0.372585 | 0.440200 |
| 2 Adults with one child | 0.298331 | 0.007761 | 0.283116 | 0.313546 |
| Adult with one child | 0.356875 | 0.019124 | 0.319382 | 0.394368 |
| Population | 0.336051 | 0.006196 | 0.323903 | 0.348198 |

Table 4: Stata ouput: Entropy Index of 2008, $\alpha = 0$

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.188793 | 0.014344 | 0.160671 | 0.216915 |
| 2 Adults with ≥ 3 children | 0.288462 | 0.024554 | 0.240323 | 0.336601 |
| 2 Adults with one child | 0.164036 | 0.011317 | 0.141849 | 0.186223 |
| Adult with one child | 0.262257 | 0.035098 | 0.193446 | 0.331069 |
| Population | 0.204422 | 0.008512 | 0.187734 | 0.221110 |

Table 5: Stata ouput: Entropy Index of 2008, $\alpha = 1$

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.207494 | 0.022365 | 0.163647 | 0.251341 |
| 2 Adults with ≥ 3 children | 0.273202 | 0.025036 | 0.224118 | 0.322286 |
| 2 Adults with one child | 0.147675 | 0.008196 | 0.131606 | 0.163744 |
| Adult with one child | 0.203454 | 0.021722 | 0.160868 | 0.246041 |
| Population | 0.192632 | 0.009060 | 0.174870 | 0.210395 |

Table 6: Stata ouput: Entropy Index of 2008, $\alpha = 2$

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.325113 | 0.064205 | 0.199235 | 0.450991 |
| 2 Adults with ≥ 3 children | 0.329357 | 0.039863 | 0.251204 | 0.407510 |
| 2 Adults with one child | 0.165404 | 0.012716 | 0.140473 | 0.190334 |
| Adult with one child | 0.216370 | 0.024682 | 0.167979 | 0.264760 |
| Population | 0.243427 | 0.021916 | 0.200459 | 0.286395 |

Table 7: Stata ouput: Gini Index for 2012

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.292467 | 0.006345 | 0.280026 | 0.304907 |
| 2 Adults with ≥ 3 children | 0.424248 | 0.016378 | 0.392138 | 0.456358 |
| 2 Adults with one child | 0.315200 | 0.007145 | 0.301192 | 0.329209 |
| Adult with one child | 0.390858 | 0.028651 | 0.334686 | 0.447030 |
| Population | 0.333796 | 0.005246 | 0.323511 | 0.344080 |

Table 8: Stata ouput: Entropy Index of 2008, $\alpha = 0$

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.144809 | 0.007007 | 0.131071 | 0.158548 |
| 2 Adults with ≥ 3 children | 0.312474 | 0.025694 | 0.262099 | 0.362849 |
| 2 Adults with one child | 0.175853 | 0.008419 | 0.159347 | 0.192359 |
| Adult with one child | 0.295659 | 0.045786 | 0.205893 | 0.385425 |
| Population | 0.199707 | 0.007048 | 0.185890 | 0.213524 |

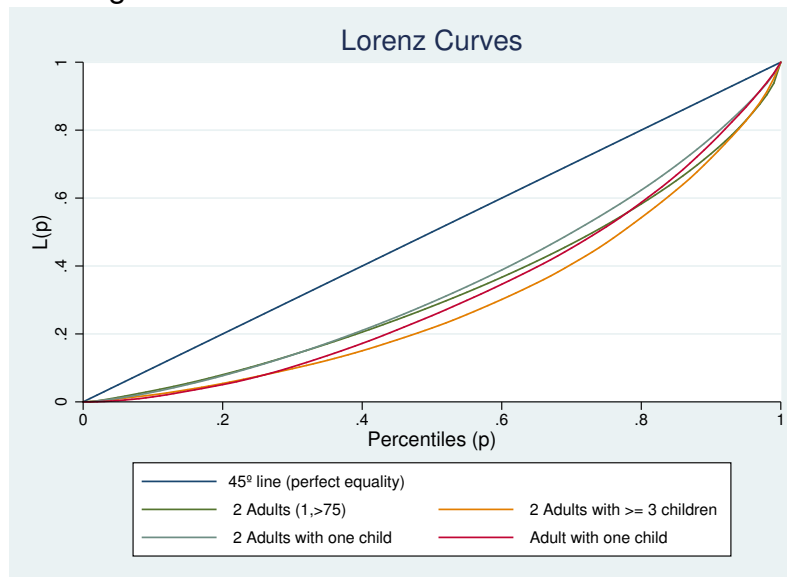
Table 9: Stata output: Entropy Index of 2008, $\alpha = 1$

| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.149803 | 0.008215 | 0.133697 | 0.165910 |
| 2 Adults with ≥ 3 children | 0.285340 | 0.021214 | 0.243749 | 0.326931 |
| 2 Adults with one child | 0.162669 | 0.007529 | 0.147908 | 0.177429 |
| Adult with one child | 0.252308 | 0.049809 | 0.154656 | 0.349961 |
| Population | 0.183623 | 0.006247 | 0.171376 | 0.195869 |

Table 10: Stata output: Entropy Index of 2008, $\alpha = 2$

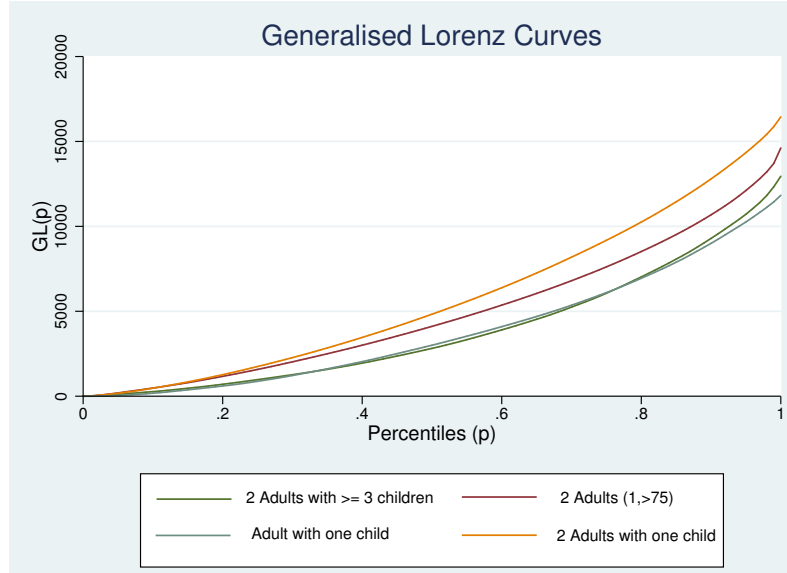
| Group | Estimate | STE | LB | UB |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| 2 Adults (1,>75) | 0.193948 | 0.017210 | 0.160207 | 0.227689 |
| 2 Adults with ≥ 3 children | 0.353441 | 0.032050 | 0.290605 | 0.416276 |
| 2 Adults with one child | 0.180581 | 0.010073 | 0.160832 | 0.200330 |
| Adult with one child | 0.398732 | 0.145643 | 0.113192 | 0.684271 |
| Population | 0.221670 | 0.011893 | 0.198353 | 0.244987 |

Figure 1: Lorenz Curves. Households in 2008



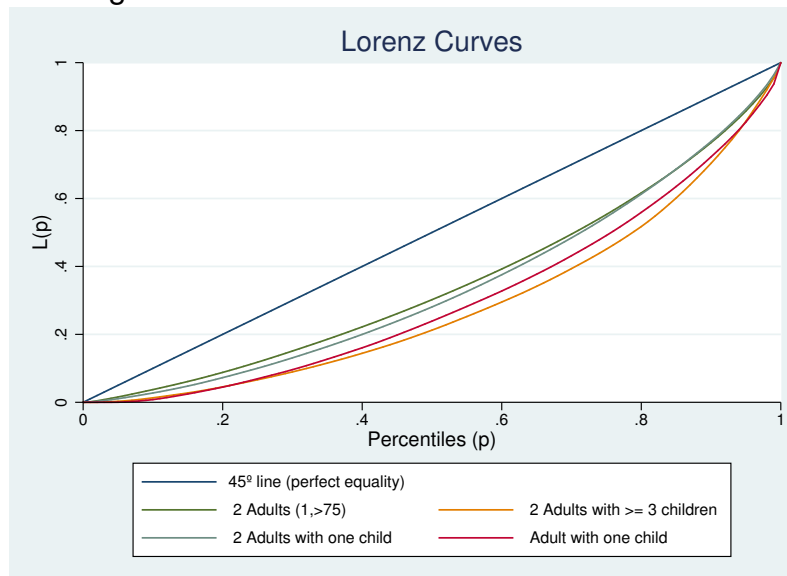
Source: Stata DASP package

Figure 2: Generalized Lorenz Curves. Households in 2008



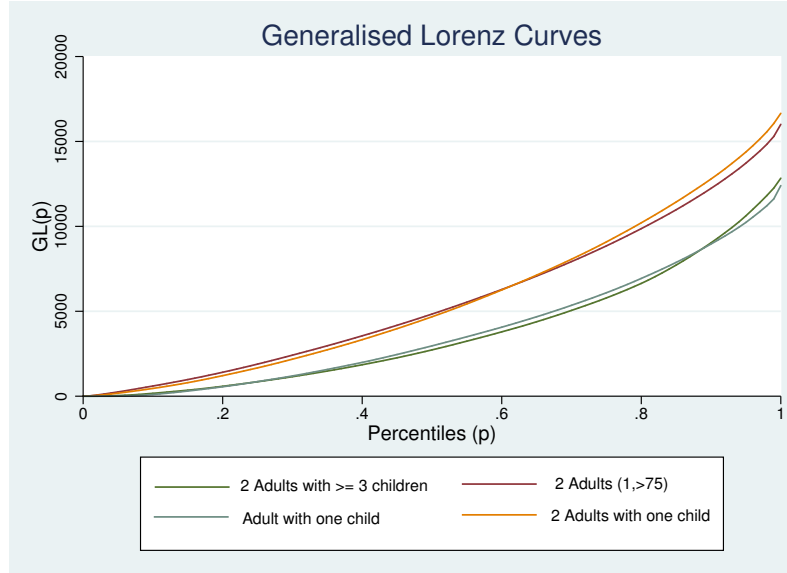
Source: Stata DASP package

Figure 3: Lorenz Curves. Households in 2012



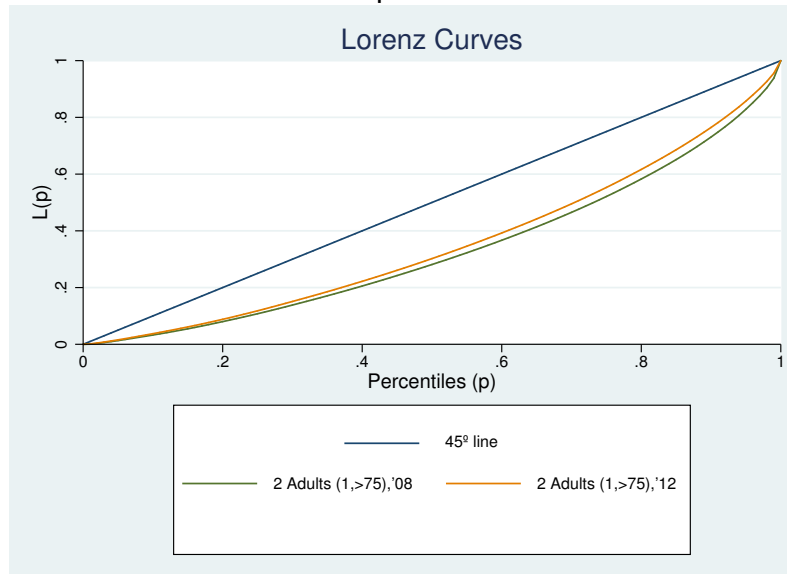
Source: Stata DASP package

Figure 4: Generalized Lorenz Curves. Households in 2012



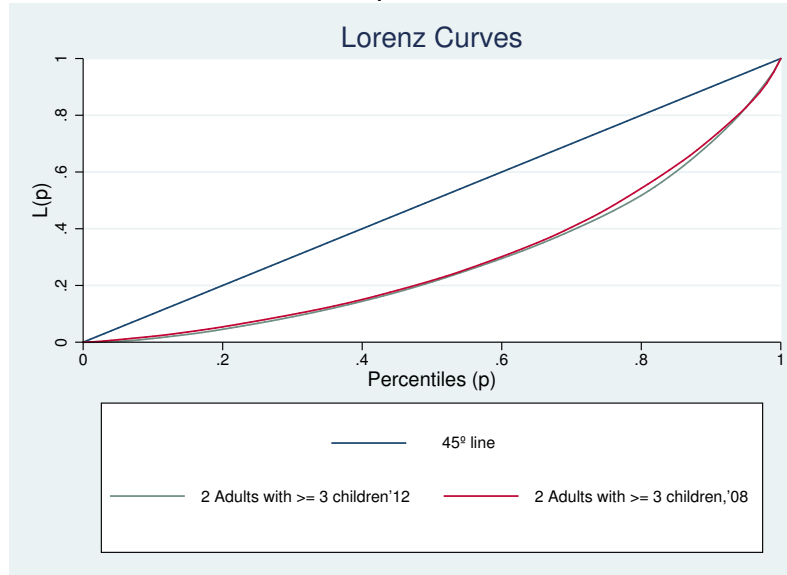
Source: Stata DASP package

Figure 5: Lorenz Curves. Comparison of 2008-2012 of HH type 1



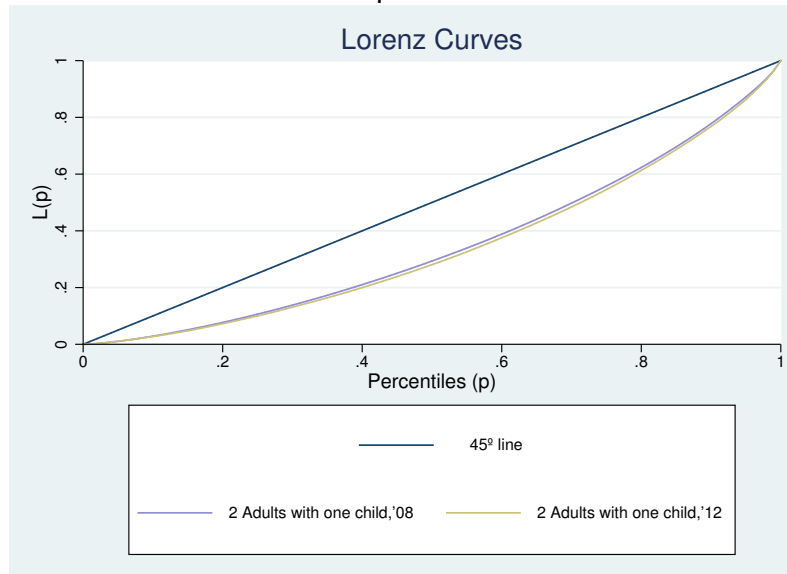
Source: Stata DASP package

Figure 6: Lorenz Curves. Comparison of 2008-2012 of HH type 2



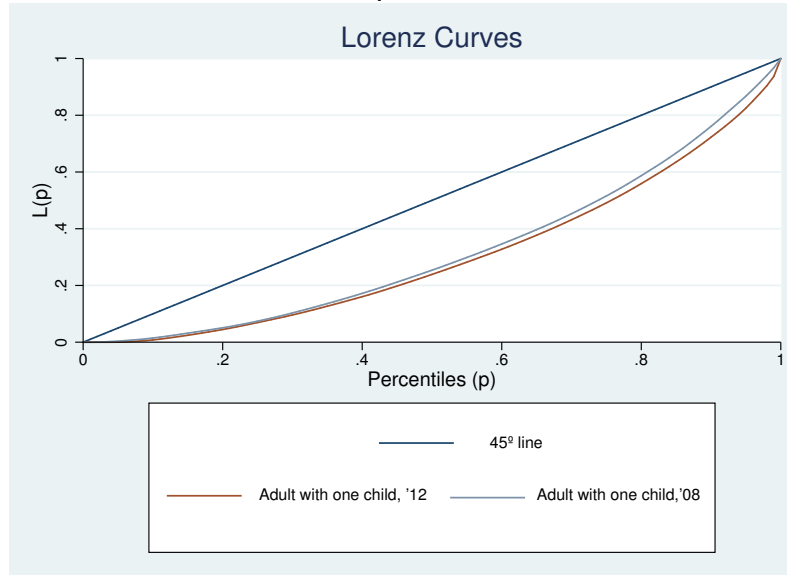
Source: Stata DASP package

Figure 7: Lorenz Curves. Comparison of 2008-2012 of HH type 3



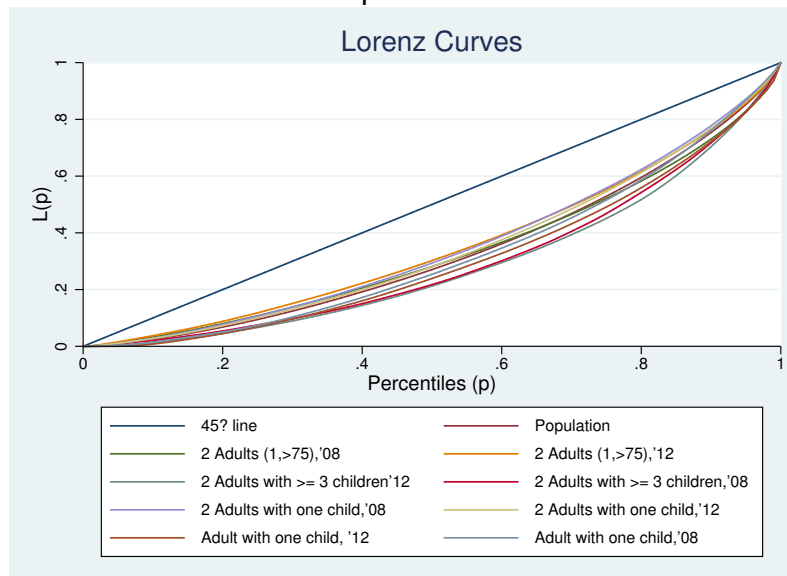
Source: Stata DASP package

Figure 8: Lorenz Curves. Comparison of 2008-2012 of HH type 4



Source: Stata DASP package

Figure 9: Lorenz Curves. Comparison of 2008-2012 of all HH types



Source: Stata DASP package

Table 11: Stata Output: FGT index of 2008, $\alpha = 0$

| Group | Estimate | STE | LB | UB | Pov. line |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 2 Adults (1, >75) | 0.186095 | 0.011358 | 0.163827 | 0.208363 | 7593.06 |
| 2 Adults with ≥ 3 children | 0.387718 | 0.036529 | 0.316100 | 0.459335 | 7593.06 |
| 2 Adults with one child | 0.129928 | 0.013021 | 0.104399 | 0.155456 | 7593.06 |
| Adult with one child | 0.315699 | 0.038847 | 0.239537 | 0.391861 | 7593.06 |
| Population | 0.203179 | 0.008581 | 0.186356 | 0.220002 | 7593.06 |

Table 12: Stata Output: FGT index of 2008, $\alpha = 1$

| Group | Estimate | STE | LB | UB | Pov. line |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 2 Adults (1, >75) | 0.046181 | 0.004214 | 0.037920 | 0.054443 | 7593.06 |
| 2 Adults with ≥ 3 children | 0.143569 | 0.018159 | 0.107968 | 0.179170 | 7593.06 |
| 2 Adults with one child | 0.039683 | 0.005786 | 0.028339 | 0.051027 | 7593.06 |
| Adult with one child | 0.139470 | 0.023514 | 0.093370 | 0.185571 | 7593.06 |
| Population | 0.065562 | 0.004202 | 0.057324 | 0.073801 | 7593.06 |

Table 13: Stata Output: FGT index of 2008, $\alpha = 2$

| Group | Estimate | STE | LB | UB | Pov. line |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 2 Adults (1, >75) | 0.019017 | 0.002862 | 0.013406 | 0.024628 | 7593.06 |
| 2 Adults with ≥ 3 children | 0.069723 | 0.011041 | 0.048077 | 0.091368 | 7593.06 |
| 2 Adults with one child | 0.018880 | 0.003800 | 0.011430 | 0.026329 | 7593.06 |
| Adult with one child | 0.085102 | 0.017531 | 0.050731 | 0.119473 | 7593.06 |
| Population | 0.031615 | 0.002755 | 0.026213 | 0.037016 | 7593.06 |

Table 14: Stata Output: FGT index of 2012, $\alpha = 0$

| Group | Estimate | STE | LB | UB | Pov. line |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 2 Adults (1, >75) | 0.141168 | 0.010020 | 0.121522 | 0.160814 | 7890.72 |
| 2 Adults with ≥ 3 children | 0.401020 | 0.034875 | 0.332647 | 0.469394 | 7890.72 |
| 2 Adults with one child | 0.160536 | 0.012836 | 0.135370 | 0.185702 | 7890.72 |
| Adult with one child | 0.337763 | 0.034476 | 0.270171 | 0.405356 | 7890.72 |
| Population | 0.204185 | 0.008161 | 0.188186 | 0.220184 | 7890.72 |

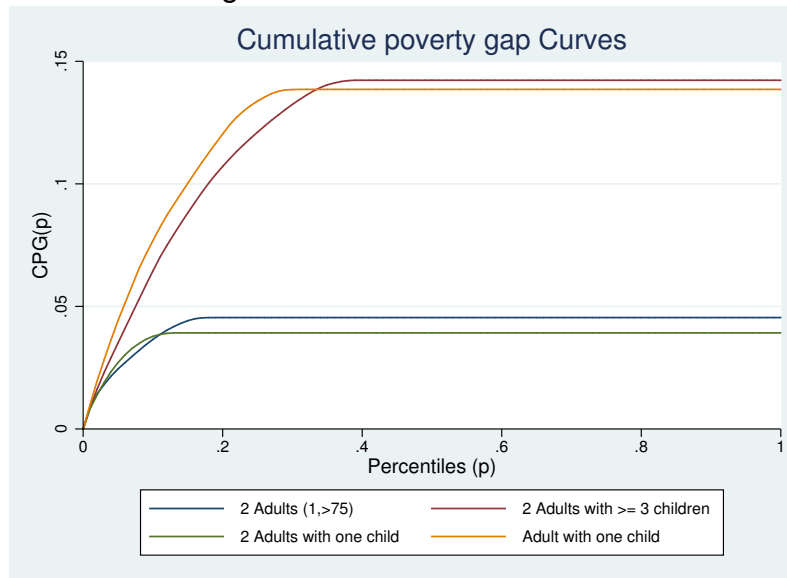
Table 15: Stata Output: FGT index of 2012, $\alpha = 1$

| Group | Estimate | STE | LB | UB | Pov. line |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 2 Adults (1, >75) | 0.025928 | 0.003503 | 0.019061 | 0.032795 | 7890.72 |
| 2 Adults with ≥ 3 children | 0.165316 | 0.019000 | 0.128066 | 0.202566 | 7890.72 |
| 2 Adults with one child | 0.049313 | 0.004724 | 0.040051 | 0.058575 | 7890.72 |
| Adult with one child | 0.150540 | 0.026795 | 0.098008 | 0.203073 | 7890.72 |
| Population | 0.067003 | 0.004168 | 0.058832 | 0.075173 | 7890.72 |

Table 16: Stata Output: FGT index of 2012, $\alpha = 2$

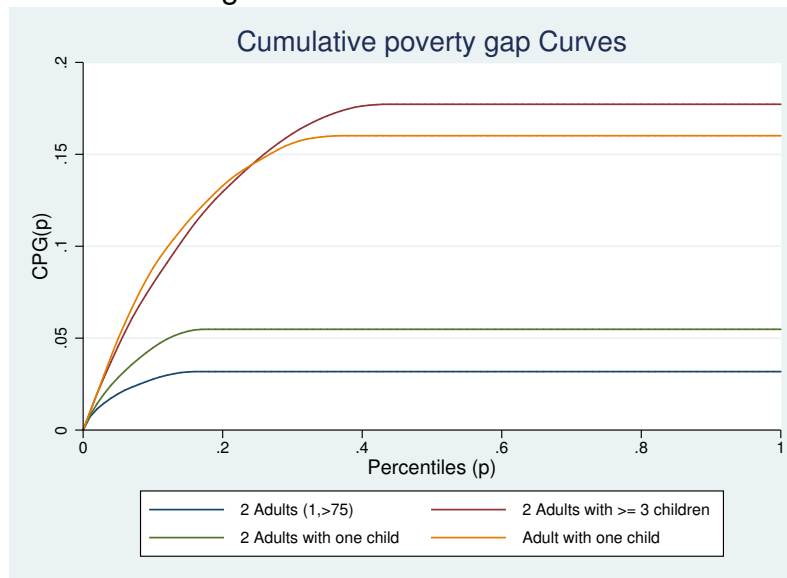
| Group | Estimate | STE | LB | UB | Pov. line |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|----------------|
| 2 Adults (1, >75) | 0.009561 | 0.002281 | 0.005090 | 0.014033 | 7890.72 |
| 2 Adults with ≥ 3 children | 0.096453 | 0.015124 | 0.066802 | 0.126105 | 7890.72 |
| 2 Adults with one child | 0.021704 | 0.002738 | 0.016335 | 0.027072 | 7890.72 |
| Adult with one child | 0.100590 | 0.026427 | 0.048778 | 0.152402 | 7890.72 |
| Population | 0.035265 | 0.003413 | 0.028573 | 0.041957 | 7890.72 |

Figure 10: TIP curves in 2008



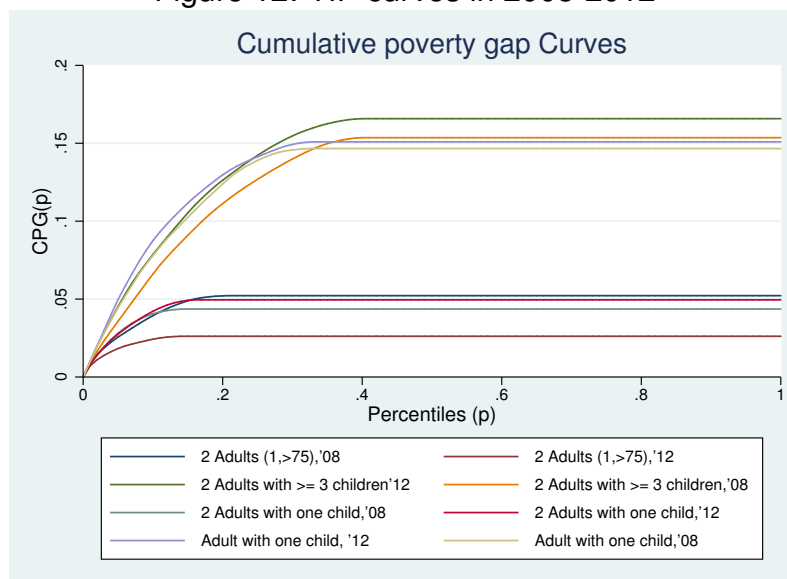
Source: Stata DASP package

Figure 11: TIP curves in 2012



Source: Stata DASP package

Figure 12: TIP curves in 2008-2012



Source: Stata DASP package