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Inequality of Opportunity in Developing countries: Does the income aggregate matter?*

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The aim of this paper is to shed some light on the behaviour of Inequality of Opportunity (IOp henceforth) in developing countries. The analysis is carried out using microdata collected by national surveys and harmonised by the Luxembourg Income Study (LIS). The LIS database incorporates a wide variety of personal harmonised variables, which allow us to made cross-country comparisons for developing countries. More specifically, we analyse six countries: Brazil, Egypt, Guatemala, India, Peru and South Africa and the periods of time covered vary from 2004 to 2014.

Looking back to Amartya Sen´s famous question "Equality of what?" we compare IOp with economic inequality to obtain relative indicators of inequality of opportunity for each country analysed. Moreover, we use several indicators of income and consumption to assess if different aggregates lead to different conclusions both in the evolution of IOp and overall inequality and in the relative weights of the circumstances that conform IOp.

In particular, we analyse IOp and Inequality for five different income aggregates: Equivalised Disposable Income using the OECD-modified scale, Personal Income, Labour Personal Income, Consumption and Monetary Consumption. We find that the use of an aggregate is not as important as it at first seems, leading in most cases to the same conclusions.

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1. INTRODUCTION

The aim of this paper is to contribute to the analysis of Inequality of Opportunity and income inequality for developing countries. Since the contribution of John Roemer (1998) researchers have devoted special attention to the study of Inequality of Opportunity (IOp henceforth). Roemer introduced a distinction of individual outcomes into two categories: factors over which individuals have no control and cannot be held responsible, which are called *circumstances* and factors over which individuals have control, which are called *efforts* and can be attributed to individuals' responsibility.

The literature of IOp has experienced a rapid development in recent years and nowadays there are a great number of methodologies to measure IOp (see Roemer and Trannoy, 2015; Ramos and Van de Gaer, 2016; Ferreira and Peragine, 2015). Within this framework, we adopt the so-called *parametric ex-ante approach* (Ferreira and Gignoux, 2011; Bourguignon et al., 2007) since it is the most commonly used in the literature and in addition is compatible with the core principles of IOp, *reward* and *compensation* (see Ramos and Van de Gaer, 2016 for a further discussion).

We believe that focusing in developing countries is particularly important when analysing IOp, and special attention must be paid to the comparability of empirical results. Up to now, the papers dealing with developing countries are mostly referred to a specific case (Belhaj Hassine, 2012; Piraino, 2015; Singh, 2012; Bourguignon et al., 2007; Aran et al., 2010; Song and Zhou, 2017) or use non-harmonised datasets for cross-country analyses (Brunori et al., 2013; Ferreira and Gignoux, 2011). Consequently, due to the different nature of datasets, cross-country comparability is not guaranteed.

Our goal is to overcome these comparability issues. For this purpose, we use harmonised datasets of the Luxembourg Income Study (LIS) (2017) which allow us to get comparable estimates for both IOp and income inequality. More specifically, we analyse six countries whose datasets contain enough variables to estimate IOp: Brazil, Egypt, Guatemala, India, Peru, and South Africa. For most of these countries IOp can be estimated for several years, then allowing to study how IOp has changed over time.

Moreover, to compute reliable estimates of IOp, we use several indicators of income and consumption, assessing if different aggregates lead to different conclusions in the level and evolution of both IOp and overall inequality, and also in the relative weights of the circumstances conforming IOp. In particular, we analyse IOp and Inequality for Equivalised Disposable Income using the OECD-modified scale, Personal Income, Labour Personal Income, Consumption and Monetary Consumption. We find that the use of an aggregate is not as important as it at first seems, leading in most cases all of them to the same conclusions.

The remainder of this paper is structured as follows: Section 2 gives an introduction to the Luxembourg Income Study database, while section 3 shows a descriptive analysis of the countries analysed. Then section 4 entails the estimation of IOp and income inequality, and section 5 shows the results for each income and consumption aggregates. Lastly, section 6 concludes.

2. THE LIS DATABASE AND DESCRIPTIVE ANALYSIS

To carry out this analysis we use datasets harmonised by the Luxembourg Income Study (LIS) (2017). LIS provides harmonised microdata which enables cross-country comparisons through two databases: the Luxembourg Income Study Database and the Luxembourg Wealth Study Database. For our analysis we use the first one, the so-called LIS, which is the largest microdata-base of income, comprising 50 countries and providing datasets for several years organised in waves (see Ravallion, 2015 for an overview).

Despite the large number of datasets collected by LIS, we cannot use all of them, since we need a battery of socio-demographic variables to be used as circumstances that are not always available. In fact, only six developing countries[1] incorporate a sufficient number of these sort variables to compute IOp: Brazil, Egypt, Guatemala, India, Peru and South Africa. The corresponding information is summarised in Table 1.

Table I. Datasets available for country

Country	Years & Waves
Brazil	2006 (Wave VII), 2009 and 2011 (Wave VIII) and 2013 (Wave IX)
Egypt	2012 (Wave IX)
Guatemala	2006 (Wave VI), 2011 (Wave VIII) and 2014 (Wave IX)
India	2004 (Wave VI) and 2011 (Wave VIII)
Peru	2004 (Wave VI), 2007 (Wave VII), 2010 (Wave VIII) and 2013 (Wave IX)
South Africa	2008 (Wave VII), 2010 (Wave VIII) and 2012 (Wave IX)

To perform the analysis, we restrict the sample to individuals aged between 25 and 59 years and which are dependent and regular employees. This latter restriction is used to ensure reliability of the declared income, which cannot be guaranteed for self-employed workers. Regarding the variables used, we need two sorts of variables: an "advantage variable", for which we measure inequality and IOp and a set of additional variables to approximate factors beyond individual responsibility, that is to say, circumstances.

[1] In case we do not restrict our study to the developing countries we could also include some European countries (Austria, Estonia, Germany, Greece, Iceland, Italy, Luxembourg, Slovakia, Spain and Switzerland), which are commonly analysed using the also harmonised EU-SILC microdata (see Bourguignon et al., 2007; Ferreira and Gignoux, 2011).

Firstly, as advantage variable we adopt the equivalised disposable income of the households. This variable, equivalised using the OECD-Modified scale, has already been used in other studies about IOp with EU-SILC data (see Marrero and Rodríguez, 2012; Brzezinski, 2015; Suárez Álvarez and López Menéndez, 2017) and it is usually considered as a good indicator of the truly available income each individuals benefits from. Nevertheless, a disadvantage of this variable is that it underestimates gender differences because each person in the household is assumed to have the same income since it is the most approximate quantity of income we can effectively use. Moreover, another potential drawback when using this variable for developing countries is that income aggregates do not always provide a reliable estimation of individuals inequality and welfare. It is argued that consumption provides more reliability since it captures long-run welfare better than income (see Deaton, 1997).

Taking into account these two disadvantages, in Section 5 we compute estimates using different aggregates, which are Personal Income, Personal Labour Income, Equivalised Consumption and Equivalised Monetary Consumption. A detailed description of these variables and their availability for each country can be found in Table A1 of the Appendix.

Regarding circumstances we use the following variables: *Gender*, *Immigrant*, *Rural*, *Ethnicity*, *Parental education* and *Age*. Variables *Gender*, *Immigrant* and *Density* are divided into two categories (male/female, not immigrant/ immigrant and not rural area/rural area respectively). *Ethnicity* also relies in two categories, minorities and non-minorities, but the classification differs from one country to another since the ethnical groups are different. A detailed illustration of how the classification is made for each country can be found in Table A2 of the Appendix. Likewise, this variable is not available for two countries: Egypt (which is not included in the original dataset) and Peru (where the variable has many missing values, suggesting the convenience of not using it in order to keep representability).

As for the remaining variables, *Parental education* is classified in three categories, low, medium and high educated parents. Table A3 in the Appendix details how this variable is constructed for each country since the educational system and consequently the educational grades and levels differ from one country to another. Finally, Age is divided into five age groups with amplitude of 6 years: 25-31, 32-38, 39-45, 46-52 and 53-59. We use age groups instead of age cohorts in order to analyse how age affects individual outcome, that is to say, if IOp decreases or increases with age.

For a further description of the data, Table I shows the average equivalised income and the population share of individuals by country/year and category of each circumstance. When looking at Table I, the first thing that calls our attention is that for the variable *Gender*, the share of males is significantly higher than the share of women in all countries except from Brazil and

South Africa. This is due to the scope limitations of the variable *Parental Education* (see Table A3 in the Appendix) and because we restrict the sample to dependent and regular employees to ensure reliability of the declared income. This latter adjustment leaves out of the sample more women than men since there is a lower share of women working.

Regarding other circumstances, for *Rural* it can be seen that most individuals live in urban areas in all the countries analysed and the share of individuals living in rural areas decreases overtime. It is also remarkable that in the case of Egypt the percentage of individuals living in rural areas is slightly superior to the 45%.

TABLE II. Population share by Circumstances

Country	Brazil				Egypt	Guatemala			India		Peru				South Africa		
Variable\Year	2006	2009	2011	2013	2012	2006	2011	2014	2004	2011	2004	2007	2010	2013	2008	2010	2012
Income																	
OECD Modified Scale	12722.05	15866.80	18828.57	22722.24	12539.13	25441.47	30882.03	26093.80	41633.34	83241.56	10903.07	15090.24	17036.42	18830.13	53455.26	57677.02	65300.04
SHARE OF INDIVIDUALS																	
Gender																	
Female	47.47	46.31	46.31	46.73	23.09	30.47	33.72	33.12	4.33	6.81	12.29	14.03	15.63	16.66	41.80	44.91	46.59
Male	52.53	53.69	53.69	53.27	76.91	69.53	66.28	66.88	95.67	93.19	87.71	85.97	84.37	83.34	58.20	55.09	53.41
Parental Education																	
Low	24.42	21.19	22.96	20.43	62.19	73.04	68.10	67.82	34.47	41.17	67.00	59.26	58.79	59.06	50.75	50.43	52.72
Medium	47.34	46.71	43.41	45.35	25.73	16.74	22.49	22.75	41.45	37.43	21.65	24.84	25.33	26.04	28.53	29.84	27.92
High	28.24	32.10	33.63	34.22	12.07	10.23	9.41	9.44	24.08	21.40	11.34	15.91	15.88	14.89	20.72	19.73	19.37
Rural																	
Yes	8.51	8.47	7.65	7.61	45.57	33.98	24.75	27.28	37.83	36.72	10.53	5.47	4.40	5.36	26.25	25.95	25.04
No	91.49	91.53	92.35	92.39	54.43	66.02	75.25	72.72	62.17	63.28	89.47	94.53	95.60	94.64	73.75	74.05	74.96
Immigrant																	
Yes	0.21	0.12	0.10	0.04	0.51	1.09	1.66	0.51	1.44	1.09	0.35	0.29	0.14	0.21	7.46	1.69	3.04
No	99.79	99.88	99.90	99.96	99.49	98.91	98.34	99.49	98.56	98.91	99.65	99.71	99.86	99.79	92.54	98.31	96.96
Ethnic																	
Minorities	46.61	47.72	48.31	50.41	N.A	27.94	20.92	24.33	66.79	70.67	N.A	N.A	N.A	N.A	27.15	28.58	26.46
No minority	53.39	52.28	51.69	49.59	N.A	72.06	79.08	75.67	33.21	29.33	N.A	N.A	N.A	N.A	72.85	71.42	73.54
Age																	
25-31	57.38	57.47	56.08	52.46	27.98	30.53	36.27	36.75	7.88	8.21	15.26	12.40	11.10	10.10	27.37	26.75	26.72
23-38	22.63	21.72	23.23	24.76	25.70	25.88	26.21	26.14	18.32	18.41	24.03	23.33	19.54	17.73	30.39	25.89	26.32
39-45	12.09	12.37	11.78	12.71	16.18	20.02	18.08	18.30	28.67	25.63	25.06	25.61	25.87	26.56	20.51	23.30	22.83
46-52	5.96	6.12	6.44	7.25	18.21	14.39	12.89	11.80	25.47	27.94	23.23	23.66	25.91	26.98	13.22	15.07	15.47
53-59	1.94	2.32	2.46	2.82	11.92	9.17	6.54	7.01	19.66	19.82	12.43	15.00	17.58	18.63	8.52	8.99	8.66
Sample Size	13748	14805	14507	13191	6622	6526	5006	5134	5114	5768	3166	2819	2555	3484	2771	2738	3640

As for the circumstance *Immigrant*, we observe that the share of immigrants in these countries is really small in all cases. More specifically the share of immigrants observed for European countries (see Suárez-Álvarez and López-Menéndez, 2016) is in average 10 percentage points higher, a result which is not surprising taking into account that developing countries do not usually receive immigration.

In the case of *Parental Education*, we can see that most individuals fall in the category "Low" with the exceptions of Brazil, where the vast majority are in the category "Medium" and India, where the share of individuals in the category "Medium" is as high as in the category "Low". These levels of parental education are quite similar to the ones of Southern and Eastern European countries.

For the circumstance *Age*, it can be observed that most individuals fall into the youngest age groups in Brazil, Egypt, Guatemala and South Africa. Whereas for India and Peru in can be seen that the share of middle age individuals -around 40 years- is the highest one.

Finally, for the circumstance *Ethnicity*, we observe different shares between countries. For Brazil the share of individuals is more or less evenly distributed between the two ethnic categories while in the case of Guatemala and South Africa, the category "minorities" comprises around the 20% of the population and for India, it comprises around the 60-70% of individuals. When interpreting this share, it is important to bear in mind that the classification of the different ethnicities differs across countries (See Table A2 in the Appendix).

For a more complete description of the data, Table II provides the share of individuals within each category of circumstance with an income below the median. These shares show the percentage of individuals in a situation of disadvantage in terms of income.

For the variable *Gender*, we can see that the share of individuals in a disadvantageous situation is more or less the same for each category. Nevertheless, women are underrepresented in the sample as explained above. The rest of the results are quite intuitive, for *Parental Education* we can see that the higher the educational level of the parents, the less the share of disadvantaged individuals. This shows the importance of family background in individuals income.

With regard to the variable *Rural*, the share of individuals in a disadvantaged situation is significantly higher for those living on rural areas, which could be related to the lower dynamism of these low density populated areas.

TABLE III: Share of individuals with an equivalent disposable income below the median

Country	Brazil				Egypt	Guatemala			India		Peru				South Africa		
Variable\Year	2006	2009	2011	2013	2012	2006	2011	2014	2004	2011	2004	2007	2010	2013	2008	2010	2012
Income																	
Median	8893.2	11780.5	14086.5	17097.5	8571.429	18359.09	21820	19725	33000	58379.31	6973.462	10433.08	12369.57	14207.62	27782.12	31235.00	39024
Gender																	
Female	0.50	0.51	0.51	0.50	0.29	0.47	0.46	0.44	0.46	0.62	0.48	0.47	0.47	0.45	0.63	0.69	0.69
Male	0.54	0.54	0.52	0.52	0.57	0.67	0.65	0.59	0.46	0.47	0.55	0.53	0.50	0.50	0.61	0.62	0.61
Parental Education																	
Low	0.77	0.77	0.75	0.74	0.60	0.71	0.68	0.62	0.60	0.61	0.63	0.59	0.57	0.58	0.77	0.76	0.76
Medium	0.57	0.58	0.58	0.58	0.40	0.36	0.36	0.40	0.48	0.44	0.39	0.46	0.42	0.39	0.53	0.57	0.59
High	0.24	0.29	0.29	0.30	0.21	0.11	0.11	0.16	0.24	0.29	0.21	0.28	0.30	0.29	0.18	0.29	0.28
Rural																	
Yes	0.82	0.79	0.80	0.73	0.63	0.79	0.76	0.68	0.59	0.60	0.78	0.77	0.77	0.75	0.83	0.81	0.80
No	0.50	0.50	0.50	0.50	0.41	0.46	0.48	0.46	0.40	0.41	0.50	0.49	0.47	0.47	0.49	0.56	0.57
Immigrant																	
Yes	0.18	0.21	0.20	0.43	0.26	0.40	0.38	0.39	0.40	0.38	0.17	0.40	0.25	0.33	0.42	0.47	0.71
No	0.52	0.53	0.52	0.51	0.50	0.62	0.59	0.54	0.47	0.48	0.55	0.52	0.50	0.49	0.63	0.66	0.65
Ethnic																	
Minorities	0.64	0.64	0.63	0.61	N.A	0.79	0.74	0.65	0.53	0.54	N.A	N.A	N.A	N.A	0.42	0.51	0.54
No minority	0.40	0.40	0.40	0.39	N.A	0.55	0.54	0.51	0.34	0.35	N.A	N.A	N.A	N.A	0.71	0.70	0.69
Age																	
25-31	0.53	0.52	0.52	0.51	0.49	0.60	0.58	0.53	0.61	0.72	0.63	0.59	0.53	0.48	0.68	0.70	0.69
32-38	0.55	0.56	0.53	0.53	0.57	0.64	0.64	0.59	0.51	0.64	0.58	0.55	0.55	0.54	0.59	0.70	0.68
39-45	0.52	0.51	0.56	0.54	0.59	0.62	0.62	0.58	0.49	0.53	0.55	0.52	0.48	0.54	0.61	0.63	0.63
46-52	0.44	0.49	0.47	0.45	0.45	0.60	0.52	0.47	0.41	0.40	0.49	0.51	0.50	0.47	0.59	0.58	0.62
53-59	0.42	0.43	0.38	0.42	0.35	0.61	0.50	0.48	0.37	0.28	0.47	0.41	0.43	0.42	0.60	0.64	0.61

In the case of the circumstance *Immigrant*, we can see that the rate of disadvantaged between individuals born in the country of residence is higher than the rate of disadvantaged for immigrants. Since the analysis refers to developing countries, which provide limited opportunities of employment for foreign people these countries are not expected to receive immigration.

As for the circumstance *Age*, it can be observed that the share of individuals in a disadvantaged economic situation is reduced with age, as it has already been proven by Suárez-Álvarez and López-Menéndez, (2017a) for the Spanish economy.

Finally, when looking at the circumstance *Ethnic*, we can see that the share of individuals in a disadvantaged situation is higher for the minority groups, except in the case of South Africa where the minority corresponds to African individuals which entails around more than half of the population.

The circumstances defined above allow us to consider the main aspects that affect individuals' income for which they cannot be held responsible of. It could be interesting to use more variables regarding family background, like parental occupation or whether or not individuals have experienced economic difficulties during childhood. However, the LIS database does not provide these variables.

Moreover, it can be argued that the variable *Rural* is not exogenous to individuals' responsibility, since they can choose where they want to live. However, despite the place of residence is not an invariant factor the level of effort that individuals have to exert to change the place they live in is not homogenous. The level of effort would be greater for individuals with less resources and ultimately it would depend on other circumstances such as the region of birth or the educational level of their parents. Furthermore, it does not seem fair to blame individuals for their outcome in relation to where they live.

3. ESTIMATING INEQUALITY OF OPPORTUNITY

This Section describes the procedure we use to measure Inequality of Opportunity for the countries analysed as well as the contribution that each circumstance has to IOp. Furthermore, at the end of the Section results for the level and evolution of both IOp and overall income inequality are provided, as well as the contribution of the circumstances to IOp.

Firstly, to estimate IOp we use the *ex ante parametric procedure* (Bourguignon et al., 2007; Ferreira and Gignoux, 2011) which is the most commonly used in the literature and therefore allows comparability between different studies.

Through the *ex ante* approach the compensation between individuals to remove inequalities due to circumstances is performed before determining their levels of effort, whereas from an *ex post* perspective compensation is made after knowing the level of effort exerted by the individuals.

Our estimations rely on the *ex ante* approach, since it is compatible with the core principles of IOp, *compensation* and *reward* (see Ramos and Van de Gaer, 2016 for a further discussion on the topic). Moreover, the use of a parametric technique avoids the problem of inaccuracy which arises for non-parametric techniques when the number of circumstances is large or the number of observations is small (see Suárez Álvarez and López Menéndez, 2017).

The *ex ante parametric procedure* involves classifying individuals into *T* types, comprising each of them individuals which share the same value of each circumstance. Since each circumstance, denoted by *k* can take multiple values which are denoted as z_k, the number of types is determined by the number of circumstances and the different values each one can take: $T = \prod_{k=1}^{K} z_k$.

For the analysis we rely in six circumstances, *Gender*, *Immigrant*, *Rural* and *Ethnic* (with two categories each one), *Parental Education* (three categories) and *Age* (five categories) which produce 240 different types, except for Egypt and Peru for which the variable *Ethnic* is not used, in this case we have 120 types of individuals.

Hence, the procedure to estimate IOP entails estimating the following equation:

$$lny_i = C_i\beta + u_i$$

Which is the reduced form of the equation $lny_i = C_i\alpha + E_i\delta + v_i$, where the coefficient α represents the direct effect circumstances have on individual income and the coefficient δ captures the indirect effect of circumstances to income through their effect in the level of effort. Thus, the coefficient of the reduced form incorporates both the direct and indirect effect of circumstances on income, since E_i is assumed to depend on circumstances $E(C,e)$.

When the regression is estimated we can get the measure of IOp through the predicted values of y_i as follows:

$$\hat{\mu}_i = \exp(C_i\hat{\alpha})$$

Thus, we can obtain IOp in absolute terms (IO_A) and relative terms (IO_R) from these expressions:

$$IO_A = I(\hat{\mu}_i) \qquad IO_R = \frac{I(\hat{\mu}_i)}{I(y)}$$

Then, to estimate IOp we use two indices: the mean logarithmic deviation (MLD) and the Gini coefficient.

The mean logarithmic deviation (MLD) is given by the expression: $GE(0) = \frac{1}{N}\sum_{i=1}^{N} \ln\left(\frac{\bar{y}}{y_i}\right)$.

This index belongs to the family of generalised entropy measures and it is additively decomposable by a path-independent decomposition (Foster and Shneyerov, 2000). In addition, this is the only measure decomposable by a path-independent decomposition using the arithmetic

mean as reference, and because of this latter property it has been widely used in the literature of IOp.

In addition to the MLD, we calculate the Gini index since it is easier to interpret and more commonly used to measure inequality. Despite of that, a major disadvantage of the Gini index is that, unlike the MLD, it is not perfectly decomposable into *between* and *within* inequality. There is always an overlapping term which cannot be attributed neither to *between* nor *within* inequality. Following Brunori, (2016) the Gini index for *ex ante* IOp can be decomposed by this expression:

$$Gini\ (y) = Gini(y_{IOp}) + \sum_{k=1}^{n} \alpha_t \omega_t\ Gini(y_i)_{i \in t} + K$$

Where $Gini(y_{IOp})$ represents inequality between types (IOp). Thus, the residual term *K* is not included in the measure of IOp, which allow us to get a lower bound estimate of IOp measured by the Gini index.

Once calculated the estimates of IOp we have to account for the contribution of the circumstances. For this purpose, we use the Shapley value decomposition, which measures the contribution of the circumstances in terms of the inequality index used, in this case the MLD. The procedure involves computing the marginal effects of each of the circumstances under all the possible sets of variables which only differ in the inclusion or omission of the circumstances. Then, the weighted average of the marginal effects of all possible sets is taken as the contribution of circumstances to IOp.

Table III provides the results of the regressions made to estimate IOp. In general, coefficients have the expected sign. *Female* exhibits a negative sign in almost all datasets and the coefficient is always significant except from Peru in 2007, 2010 and 2013. The only exception is Egypt where the coefficient is positive and the variable is significant at 1%, which indicates that in this case men are worse off than women (this is consistent with results of Table II, where we found that only 29% of the females have an income below the median while for males the percentage is 57%). This latter result could be counterintuitive but as it has been explained above in Section 2, this is due to the underrepresentation of women in the sample.

In the case of *Rural* the coefficient is always negative and significant. Showing that living in a rural area has a harmful effect on income. For *Low* and *Medium Education,* the coefficients are also negative and significant except for the coefficients of *Medium Education* for India, which are not significant. We can see that the value of the coefficient for *Medium* is smaller than the one referred to *Low Education*, which implies that the lowering effect of income decreases when the educational level increases.

TABLE IV. Regressions results

	Brazil				**Egypt**	**Guatemala**			**India**		**Peru**				**South Africa**		
	2006	2009	2011	2013	2012	2006	2011	2014	2004	2011	2004	2007	2010	2013	2008	2010	2012
Female	-0.024*	-0.023*	-0.034**	-0.0013	0.29***	0.19***	0.12***	0.087***	-0.17**	-0.26***	-0.11*	-0.0046	-0.028	0.0006	-0.19***	-0.24***	-0.25***
	(0.012)	(0.011)	(0.012)	(0.011)	(0.026)	(0.030)	(0.032)	(0.026)	(0.060)	(0.048)	(0.056)	(0.045)	(0.044)	(0.038)	(0.052)	(0.058)	(0.050)
Rural	-0.30***	-0.29***	-0.34***	-0.22***	-0.25***	-0.45***	-0.34***	-0.16***	-0.38***	-0.34***	-0.66***	-0.50***	-0.46***	-0.32***	-0.56***	-0.51***	-0.39***
	(0.019)	(0.017)	(0.021)	(0.020)	(0.022)	(0.027)	(0.028)	(0.023)	(0.028)	(0.034)	(0.042)	(0.050)	(0.045)	(0.039)	(0.056)	(0.060)	(0.049)
Low Education	-0.73***	-0.64***	-0.53***	-0.51***	-0.63***	-0.95***	-0.91***	-0.60***	-0.47***	-0.57**	-1.09***	-0.72***	-0.59***	-0.53***	-0.82***	-0.83***	-0.76***
	(0.016)	(0.015)	(0.015)	(0.015)	(0.040)	(0.048)	(0.052)	(0.044)	(0.13)	(0.20)	(0.098)	(0.056)	(0.065)	(0.050)	(0.074)	(0.085)	(0.071)
Medium Education	-0.48***	-0.40***	-0.36***	-0.35***	-0.38***	-0.58***	-0.58***	-0.36***	-0.23	-0.19	-0.69***	-0.49***	-0.30***	-0.31***	-0.62***	-0.40***	-0.46***
	(0.014)	(0.013)	(0.013)	(0.012)	(0.042)	(0.052)	(0.055)	(0.046)	(0.13)	(0.20)	(0.10)	(0.063)	(0.070)	(0.055)	(0.074)	(0.096)	(0.082)
Immigrant	0.18	0.46***	0.44**	0.17	0.0074	0.12	0.33	0.43**	0.021	0.0084	0.58***	2.09***	0.016	0.77	0.11	-0.083	-0.041
	(0.20)	(0.12)	(0.16)	(0.32)	(0.18)	(0.13)	(0.22)	(0.17)	(0.085)	(0.077)	(0.082)	(0.57)	(0.27)	(0.75)	(0.090)	(0.13)	(0.12)
Ethnic minority	-0.33***	-0.29***	-0.27***	-0.27***	N.A	-0.31***	-0.19***	-0.099***	-0.22***	-0.22***	N.A	N.A	N.A	N.A	0.57***	0.58***	0.49***
	(0.012)	(0.011)	(0.012)	(0.011)		(0.028)	(0.031)	(0.024)	(0.024)	(0.033)					(0.063)	(0.080)	(0.073)
Age 25-31	-0.38***	-0.32***	-0.29***	-0.31***	-0.30***	-0.23***	-0.25***	-0.20***	-0.49***	-0.72***	-0.51***	-0.44***	-0.22***	-0.14*	-0.23*	-0.35***	-0.37***
	(0.044)	(0.036)	(0.036)	(0.033)	(0.037)	(0.049)	(0.069)	(0.045)	(0.057)	(0.067)	(0.085)	(0.060)	(0.054)	(0.057)	(0.11)	(0.099)	(0.093)
Age 32-38	-0.31***	-0.27***	-0.24***	-0.28***	-0.40***	-0.20***	-0.22**	-0.21***	-0.35***	-0.54***	-0.40***	-0.21***	-0.28***	-0.25***	-0.016	-0.16	-0.19*
	(0.045)	(0.037)	(0.037)	(0.033)	(0.039)	(0.049)	(0.069)	(0.045)	(0.044)	(0.043)	(0.077)	(0.052)	(0.052)	(0.045)	(0.11)	(0.100)	(0.091)
Age 39-45	-0.23***	-0.19***	-0.21***	-0.20***	-0.44***	-0.13*	-0.15*	-0.16***	-0.26***	-0.44***	-0.23**	-0.20***	-0.089	-0.23***	0.059	-0.062	-0.11
	(0.046)	(0.038)	(0.038)	(0.034)	(0.044)	(0.052)	(0.073)	(0.046)	(0.040)	(0.040)	(0.075)	(0.049)	(0.050)	(0.040)	(0.12)	(0.094)	(0.099)
Age 46-52	-0.12*	-0.068	-0.090*	-0.15***	-0.22***	-0.079	-0.0044	-0.018	-0.12**	-0.21***	-0.15	-0.13*	-0.12**	-0.11**	-0.085	0.12	-0.076
	(0.048)	(0.041)	(0.041)	(0.036)	(0.041)	(0.055)	(0.077)	(0.050)	(0.041)	(0.040)	(0.080)	(0.051)	(0.044)	(0.040)	(0.12)	(0.13)	(0.12)
Constant	10.0***	10.2***	10.3***	10.4***	9.92***	10.9***	11.0***	10.6***	11.2***	11.9***	10.1***	10.1***	10.1***	10.2***	11.0***	11.2***	11.4***
	(0.045)	(0.037)	(0.037)	(0.034)	(0.051)	(0.058)	(0.077)	(0.058)	(0.14)	(0.20)	(0.12)	(0.065)	(0.068)	(0.055)	(0.13)	(0.12)	(0.11)
N	13747	14805	12507	13191	6621	6523	5005	5130	5114	5743	3164	2816	2554	3482	2754	2735	3632

Standard errors in parentheses

- p<0.05, ** p<0.01, *** p<0.001

With regard to *Immigrant*, we observe that the variable is only significant in some datasets of Brazil, Guatemala and Peru, and the coefficient shows a positive sign, which implies immigrants have on average a higher income than the native population.

Lastly, for the different age groups we observe significant coefficients which in general show a negative sign for all age groups. Moreover, coefficients became smaller when age increases, showing that, on average, aged individuals perceive a higher income. Overall, we can see that the regression results are consistent with those summarised in Table II. In general, negative coefficients are estimated for categories of each circumstance with more individuals in a disadvantaged situation with respect to the median.

Table IV provides the point estimates for IOp and Overall Income Inequality measured both by the Gini and the MLD indices. At a first glance, we observe that the Gini index is always higher than the MLD index, despite the residual term *K* which contains part of IOp is not included in the estimation. Surprisingly, over time changes in inequality are always greater when measured with the MLD than with the Gini index.

Considering that Gini index is more sensitive to what happens in the middle of the distribution, whilst MLD is more responsive to what happens in the tails, our results suggest that inequality between individuals in the tails of the distribution is greater than for those in the centre. Moreover, the fact that over time changes are smaller for Gini means that inequality variations are mostly experienced at the tails.

We can see that for all countries except from India and Egypt the levels of income inequality and IOp decrease overtime (we only have one year for Egypt and therefore we cannot assess changes overtime). Likewise, changes over time are greater for IOp than for overall income inequality. Figures 1 and 2 represent the evolution of both IOp and overall inequality over the period of study, and Table IV collects all the empirical results, allowing the identification of different patterns

Figure 1: Overall Income Inequality

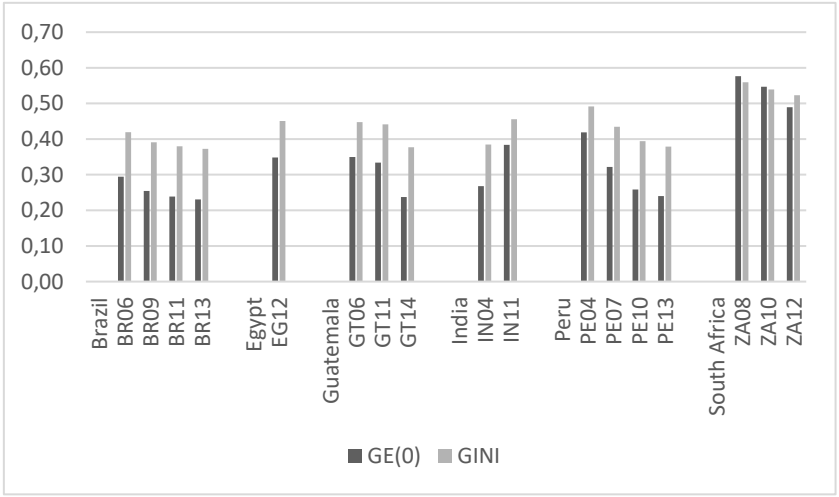
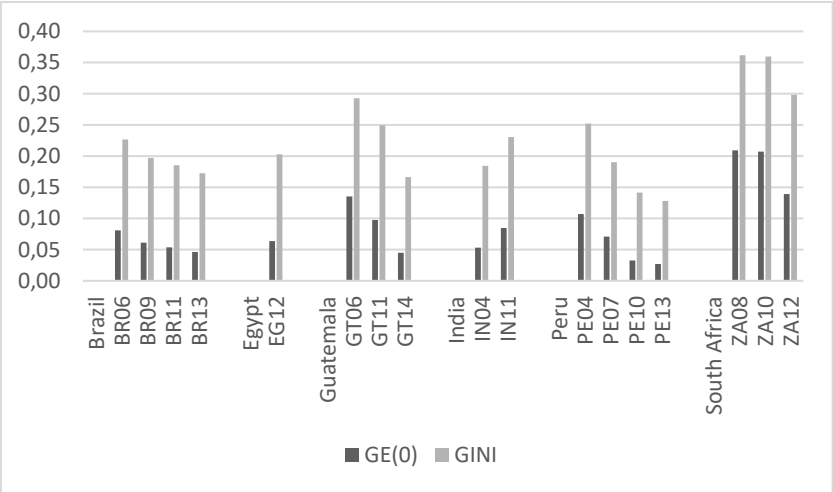


Figure 2: Absolute Inequality of Opportunity



On the one side, Guatemala and Peru are the two countries for which the decrease in the indices is more significant. We can see that overall income inequality for Guatemala decreases around 30 percentage points when measured by the MLD and around 15 for the Gini index. If we look at changes in IOp we can see that they are greater than for income inequality, especially when we consider the MLD, in that case IOp decreases more than 50% both in absolute and relative terms.

For Peru, changes are slightly bigger than for Guatemala, but we observe the same trend for both absolute and relative IOp than for overall income inequality. For this country the decrease in IOp is surprisingly higher (In absolute terms it decreases almost 50 percentage points when measured by the Gini index and around 75% points).

On the other side, Brazil and South Africa also experienced a decrease in both overall income inequality and IOp, but it is not really pronounced. For both countries we observe that changes overtime are also higher for IOp than for income inequality. Overall income inequality remains almost unaltered during the periods analysed and where we observe a greater change in both countries is for absolute IOp measured by the MLD.

For India, the evolution of IOp and overall income inequality is the opposite, the indices experienced an increase between 2004 and 2011. The rise is especially high for absolute IOp measured by the MLD, it rises almost 60 percentage points. Moreover, it also noticeable the increase of overall income inequality also measured by the MLD which is around 40 p.p. Nevertheless, relative IOp remains practically unaltered during the period analysed.

Now if one looks at the levels of inequality and the amount of it that corresponds to IOp. We can see that the most worrisome situation is the one of South Africa. This country is the one with the highest level of Inequality. The level of income inequality in the first year analysed (2008) is of 0.577 point measured by the MLD and 0.559 according to the Gini index. Moreover, with regard

to IOp, the initial level is 0.209 in absolute terms and in relative terms IOp account for more than the 35% of overall inequality. During the period analysed South Africa is not able to significantly reduce these inequality levels and in 2012 it remains the country with higher inequalities.

The situation of India is also concerning, it is the only country for which we observe an increase on inequality and IOp. The initial levels of both IOp and Inequality in 2004 are not particularly high, it we compare it with the rest of the countries, India is the one with the smaller initial level of both IOp and income inequality. Nonetheless, in 2011, income inequality reaches 0.384 and 0.456 by the MLD and Gini indices respectively. This makes India the second country with highest levels of inequality, only surpassed by South Africa.

On the contrary, Guatemala and Peru had also a great initial level of inequality and IOp. However, these two countries achieve a great reduction on the indices analysed, this is especially noteworthy from Peru, with had a level of overall inequality in 2004 of 0.419 points measured by the MLD and 0.492 according to the Gini. Whereas these levels go down in 2013 to 0.40 and 0.379 respectively. The same happens with the estimates of IOp in relative and absolute terms.

Then, an intermediate case is Brazil, which starts with a level of inequality quite low compared with the rest of the countries but is not able to significantly reduce it. Neither for overall income inequality, nor for IOp. Despite of that, is one of the countries with a smaller final level of inequality, only surpassed by Peru and Guatemala.

Finally, for Egypt we cannot say anything about the evolution of inequality and IOp since we only have a dataset for 2012. Regarding to the level of inequality and IOp, it is observed that is quite high in this year. If we compare it with the final levels of inequality of the rest of the countries, only South Africa and India have higher levels of Inequality and IOp than Egypt.

TABLE V. Income inequality and Inequality of Opportunity

	INCOME INEQUALITY		**ABSOLUTE IOP**		**RELATIVE IOP**	
Country(Code-Year)	GE(0)	GINI	GE(0)	GINI	GE(0)	GINI
Brazil						
BR06	0.294	0.419	0.081	0.227	0.275	0.541
BR09	0.254	0.391	0.061	0.197	0.240	0.504
BR11	0.239	0.380	0.054	0.185	0.225	0.488
BR13	0.231	0.373	0.046	0.173	0.201	0.463
Over time change	-21.67%	-11.11%	-42.82%	-23.88%	-27.00%	-14.37%
Egypt						
EG12	0.348	0.451	0.064	0.203	0.183	0.450
Guatemala						
GT06	0.350	0.447	0.135	0.293	0.387	0.654
GT11	0.334	0.441	0.098	0.249	0.292	0.565
GT14	0.237	0.377	0.045	0.166	0.189	0.442
Over time change	-32.18%	-15.77%	-66.89%	-43.16%	-51.18%	-32.51%
India						
IN04	0.268	0.385	0.053	0.184	0.198	0.479
IN11	0.384	0.456	0.085	0.230	0.220	0.506
Over time change	43.32%	18.47%	59.64%	25.14%	11.39%	5.63%
Peru						
PE04	0.419	0.492	0.107	0.252	0.256	0.513
PE07	0.322	0.435	0.071	0.190	0.220	0.437
PE10	0.259	0.394	0.033	0.141	0.126	0.359
PE13	0.240	0.379	0.027	0.128	0.112	0.338
Over time change	-42.63%	-22.95%	-74.84%	-49.20%	-56.14%	-34.07%
South Africa						
ZA08	0.577	0.559	0.209	0.362	0.363	0.647
ZA10	0.547	0.539	0.207	0.360	0.379	0.667
ZA12	0.489	0.523	0.139	0.298	0.284	0.570
Over time change	-15.16%	-6.51%	-33.54%	-17.55%	-21.67%	-11.81%

The last part of this Section is devoted to assessing the contribution of the circumstances to IOp. For this purpose, we include Table V, which shows the contribution of each circumstances for each country-year measured in terms of the overall MLD for IOp.

In general, the contribution of the circumstances remains pretty much constant overtime and the most important circumstance in all datasets is *Parental Education*, which in most cases accounts for more than half of overall IOp.

TABLE VI. Contribution of circumstances to Inequality of Opportunity

Country (Code-Year)	*Gender*	*Rural*	*Parental Education*	*Immigrant*	*Ethnic*	*Age*
Brazil						
BR06	0.13%	7.01%	67.14%	0.22%	22.61%	2.89%
BR09	0.14%	7.54%	65.96%	0.22%	22.89%	3.25%
BR11	0.11%	9.55%	65.34%	0.22%	21.91%	2.88%
BR13	0.26%	5.66%	67.51%	0.05%	23.30%	3.22%
Egypt						
EG12	19.96%	19.54%	45.52%	0.36%	N.A	14.61%
Guatemala						
GT06	6.44%	23.35%	55.55%	0.29%	12.78%	1.59%
GT11	4.50%	18.42%	64.06%	1.66%	7.78%	3.58%
GT14	4.82%	12.27%	70.65%	1.12%	6.62%	4.52%
India						
IN04	0.96%	31.44%	34.27%	0.13%	16.37%	16.83%
IN11	2.67%	19.80%	33.53%	0.11%	12.34%	31.55%
Peru						
PE04	0.46%	18.84%	67.91%	1.95%	N.A	10.84%
PE07	0.35%	8.89%	50.21%	32.88%	N.A	7.66%
PE10	0.18%	13.56%	74.19%	0.04%	N.A	12.03%
PE13	0.33%	11.14%	71.46%	4.28%	N.A	12.78%
South Africa						
ZA08	1.11%	17.53%	41.74%	0.93%	35.84%	2.84%
ZA10	2.91%	16.21%	37.06%	0.01%	37.82%	5.98%
ZA12	4.06%	14.62%	40.63%	0.10%	35.93%	4.67%

If we analyse the contributions country by country, we can see that for Brazil the two most important circumstances are *Parental Education* which accounts for around 65% of total IOp and *Ethnic*, which explains more than 20% of IOp. The remaining circumstances have little importance (*Rural* and *Age* are the next in importance, but they only account from 5.66-9.55% and 2.89-3.25% respectively). Finally, *Gender* and *Immigrant* are of little importance since their contribution is always smaller than 1 percentage point. Regarding changes over time, we observe an increase in importance in *Rural* from 2006 to 2011 (from 7.01% to 9.55%) and a sharply reduction of its contribution from 2011 to 2013 (from 9.55% to 5.66), the rest of the overtime changes observed are of little significance.

Results for Guatemala, are quite similar to the ones for Brazil, *Parental Education* also accounts for more than half of total IOp. However, the variable *Ethnic* is less relevant, and its contribution decreases from 12.78% to 6,62% between the period analysed (2006-2014). The contribution of *Rural* also experienced a significant decrease, from 23.35% to 12,27% as well as the contribution

of *Gender* (from 6.44% to 4.82%). On the contrary, the contribution of *Age* increases at reaches 4.52% in 2004. Finally, *Immigrant* have a small importance overall as happened in the case of Brazil, but increases between 2006 and 2011.

In the case of Egypt, we observe that *Parental Education* continues as the most important circumstance, but it accounts for less than half of IOp (around 45%). For this country, the variables *Gender* and *Rural* are quite relevant, accounting each one for almost 20% of total IOp. With respect the remaining variables, *Age* has also pretty much importance (14,61%), whereas *Immigrant* accounts for less than one percentage point of IOp. Lastly, the case of the circumstance *Gender* is quite different from the other countries, it almost accounts for 20% of overall IOp.

Then, if we look at the results for India, we can see that *Parental Education* continues as the most important circumstance but compared to the other countries its importance is much smaller (around 33%). The next circumstances in order of relevance are *Age* and *Rural*. For *Age* we observe a significant increase on its contribution between 2004 and 2011 from 16.83% to 31.55%. The contrary happens with the circumstance *Rural*, its contribution decreases from 31.44% to 19.80% during the analysed period. The remaining variables *Gender* and *Immigrant* are of little importance, especially the latter, which accounts for less than one percentage points of overall IOp, as occurred in Brazil and Egypt.

For Peru, we see that, again the most important circumstance is *Parental Education*, in this case it accounts for more than half of overall IOp as occurred in the cases of Brazil and Guatemala. Other relevant circumstances are *Rural* and *Age*, each one accounts for more than 10 percentage points of overall IOp and both remain almost unchangeable over time. The circumstance *Gender* is almost irrelevant in the case of Peru, as it accounts for less than one percentage point of IOp. Finally, the results for *Immigrant* are quite striking, this circumstance is of little importance for all years analysed except from 2007, when its contribution reaches more than 30 percentage points of overall IOp, which could be related with the results of Table II, where we observe that the share of immigrants with an income below the median is higher during this year.

Lastly, for South Africa, we observe the two most important circumstances are, as for Brazil, *Parental Education* and *Ethnic* accounting around 40% and 35% of overall IOp respectively. The contribution of these two circumstances remain constant over time. The next variable in order of relevance is *Rural*, it explains around 15% of IOp. Then, we have *Age* and *Gender* which are circumstances of little importance but it contribution growths over period analysed, from 2.84% to 4.67% for *Age* and from 1.11% to 4.06% for *Gender*. The least relevant circumstance is *Immigrant*, its contribution is always lower than 1%.

In conclusion, both Income Inequality and Inequality of Opportunity experienced a reduction for the countries analysed, except for India. The inequality levels and IOp of these countries are quite high if we compare them to EU countries (Suárez-Álvarez and López-Menéndez, 2017b).

We can see two different trends, there are two countries which have been able to significantly reduce both income inequality and IOp over time (Peru and Guatemala). However, South Africa and Brazil experienced a little reduction in IOp and inequality levels, which is especially worrying in the case of South Africa which has the highest levels of inequality, with a Gini index for overall inequality of 0.523 in the last year analysed.

Regarding the contribution of circumstances, it has been proved that *Parental Education* is the most relevant circumstance, a conclusion which is in line with all the studies in the literature of IOp. With respect to overtime variations, we do not observe many significant changes on the contribution of the circumstances analysed. Meaning that the composition of IOp has remained practically unchangeable.

4. ROBUSTNESS CHECK: DOES DIFFERENT AGGREGATES LEAD TO THE SAME CONCLUSION?

This Section is devoted to checking the robustness of the obtained results, analysing if the use of different aggregates as advantage variables to compute Inequality of Opportunity leads to different conclusions.

The empirical analysis described in the previous sections has been carried out using the equivalised disposable income of household, an aggregate that has been used in other studies of IOp for Europe with EU-SILC data (see Palomino et al., 2016; Marrero and Rodríguez, 2012; Brzezinski, 2015; Suárez Álvarez and López Menéndez, 2017).

Nevertheless, we believe that using different aggregates of welfare as advantage variables could provide more consistency to previous results. The use of the equivalised disposable income has two major drawbacks: Firstly, this variable assumes each individual in the household is endowed with the same income, because it is argued that it would be the most approximate quantity of income she can effectively use. Secondly, in this paper we are analysing developing countries, for which income variables are not always reliable to assess welfare or inequality between individuals. This is due to the fact that income could be more irregular and unpredictable in some cases. It is argued that consumption variables could provide more reliability since they are able to capture welfare in a long-run perspective since consumption is smoother than income (Deaton, 1997).

We try to answer to two main concerns:

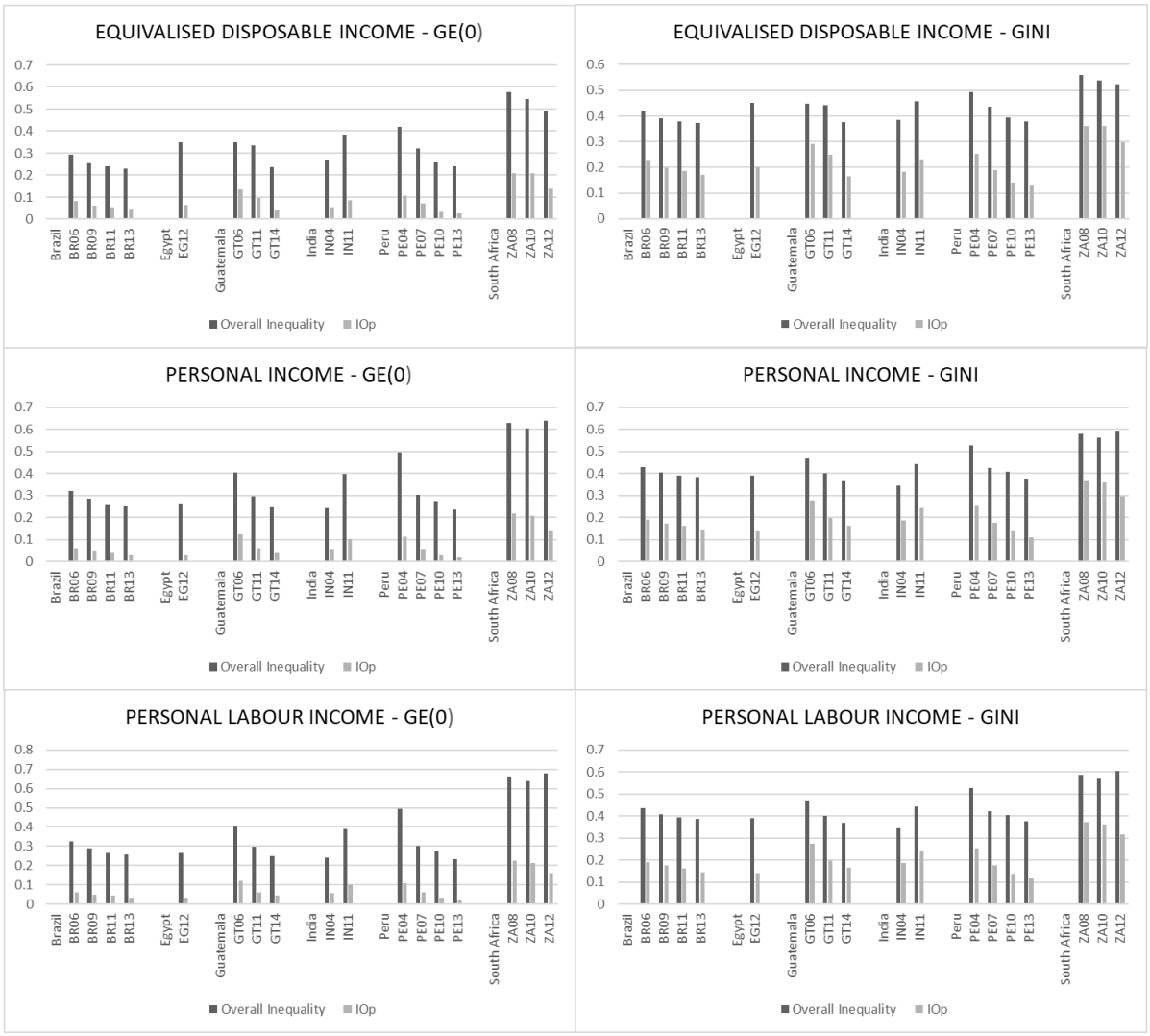
1. Are results affected by the assumption that each person in the household has the same income?
2. Does consumption lead to different conclusions than income?

With the aim of answering the first question we use Personal Income and Personal Labour income as advantage variables to see if results change significantly compared from when we assume each person in the household has the same income.

Regarding the second concern, we adopt Equivalised Consumption and Equivalised Monetary Consumption of household to observe if results vary significantly when using consumption aggregates instead of income. A description of how these variables are constructed for each country is provided in Table A1 of the Appendix Section.

Figures 1-6 show the estimates of overall income inequality and IOp for the different aggregates of income. At first sight, it can be seen that all income aggregates follow practically the same trend than the equivalised disposable income. With regard to the levels, there are also no significant differences. They lead, therefore, to the same conclusion than the equivalised disposable income for both IOp and overall income inequality.

Figures 1-6. Income inequality and IOp for different Income Aggregates

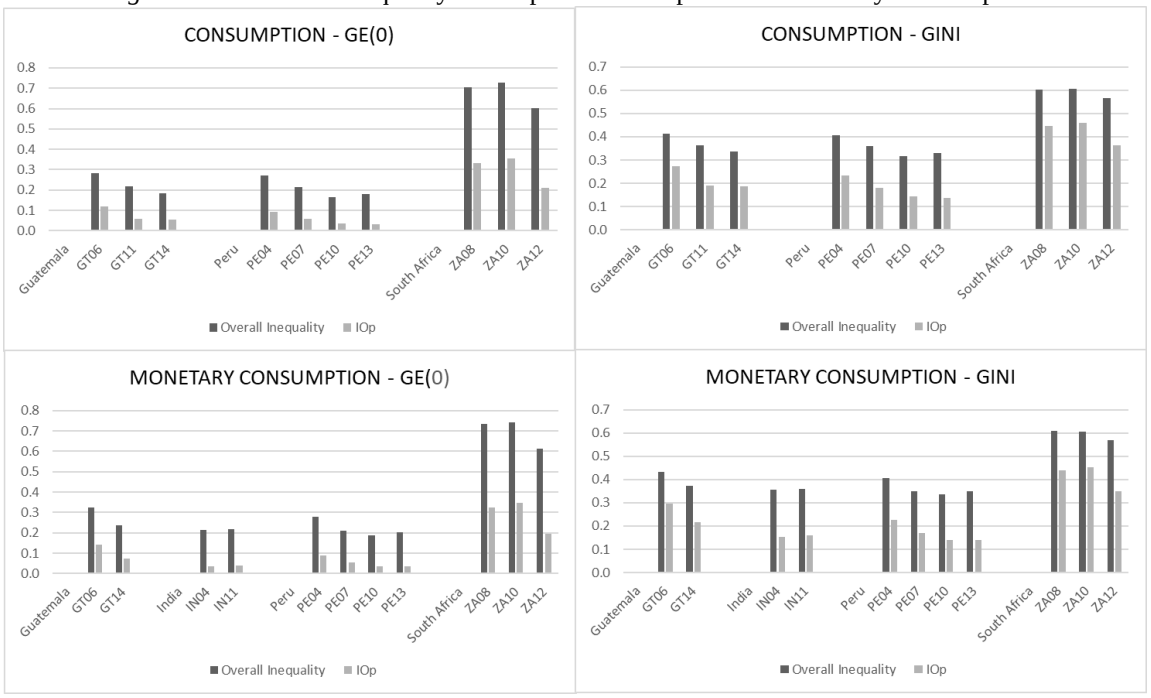


The only exception is overall income inequality for South Africa, since the equivalised disposable income shows a decrease in the level of inequality for the period analysed, whereas for both Personal Income and Personal Labour Income we observe that inequality experienced a reduction between 2008 and 2010 but then, it increases between the last two years, 2010 and 2012, leading to higher levels of inequality than in the first period.

Nevertheless, this is not a very striking difference, since as it has been explained in the previous Section, changes on income inequality for South Africa are not very pronounced (see Table IV). Despite the great levels of inequality observed in South Africa, the decrease on inequality experienced for the disposable income was only around 15 percentage points for the MLD and a 6.5 percentage points for the Gini index. Consequently, is not surprising to observe a slightly increase in these indicators for South Africa when using different variables of advantage.

The following figures (Figures 7-10) represent the levels and evolution of overall inequality and IOp for the Equivalised Consumption and the Equivalised Monetary Consumption. For these variables, we do not have data for all the countries. In the case of the Equivalised Consumption there is only data available for Guatemala, Peru and South Africa, whereas for the Equivalised Monetary Consumption data is also available for India in addition to the mentioned countries, but in the case of Guatemala we only have years 2006 and 2014.

Figures 7-10. Income inequality and IOp for Consumption and Monetary Consumption



In these figures we observe more differences with the equivalised disposable income than in the previous ones. In general, consumption have the same trend that the Equivalised Disposable Income but the levels of overall inequality and IOp differ. In the case of Guatemala, we can observe also a reduction in the levels of inequality for both Consumption and Monetary Consumption, but the levels of both sorts of inequality are lower for the two variables of consumption.

For Peru, we also observe that the levels of overall inequality are lower for the variables of consumption than for income but in the case of IOp levels of inequality are almost the same. Regarding the trend, at first glance, it may seem is the same that for the income aggregates, however, it differs from 2010 and 2013. Between these two years we observe that overall inequality and IOp remains almost unchanged for the variables of consumption. We observe a slightly rise for overall inequality during that period but for IOp changes between these two years are practically unnoticeable.

In India, although we observe the same upward trend for income aggregates than for consumption, consumption variables have a flatter trend. Regarding the level of inequality, we observe again that inequality in consumption is much lower than inequality in income.

On the contrary, in the case of South Africa inequality in consumption is higher than in income and the tendency also differs. Overall inequality and IOp increase between 2008 and 2010 and then decrease between 2010 and 2012, with the exception of overall inequality for Monetary Consumption measured by the Gini index, which also experienced a slightly decrease during the first two years (less than one percentage point).

Regarding the contribution of the different circumstances to Inequality of Opportunity, we do not find significant differences when using different aggregates of income or consumption (See Figures I-V in the Appendix Section). The only remarkable differences is that the circumstance *Gender* have a higher contribution for IOp in Personal Income and Personal Labour Income, that is because we are not assuming each individual in the household to perceive the same income/consumption as we did for the Equivalised Disposable Income or the two consumption variables, which in fact, underestimate the gender effect.

In short, it can be said that the use of different aggregates gives our results more consistency since, overall, all lead to the same conclusion than the Equivalised Disposable Income. In terms of levels of inequality, we found that inequality for Consumption and Monetary Consumption is lower in most cases, and therefore, there are more evenly distributed among individuals. The exception is South Africa, where the contrary happens.

Finally, concerning to the evolution of overall inequality and IOp, we observe that they share in general the same tendency. However, there are few cases in which the trends of the different aggregates differ, that happens when changes previously observed in Equivalised Disposable Income are not very pronounced.

5. CONCLUDING REMARKS

In this paper we make an attempt to analyse overall inequality and IOp in developing countries. Thanks to the efforts made by the Luxembourg Income Study, we had at our disposal high quality harmonised microdata, previously collected by national surveys. Which allow us to get comparable estimates of income inequality and IOp for several developing countries.

In particular, we have analysed six countries: Brazil, Egypt, Guatemala, India, Peru and South Africa using several datasets for each one (except for Egypt for which we only have one dataset corresponding to the year 2012) which cover a time period from 2004 to 2014.

The national surveys harmonised by LIS has been previously used to estimate IOp, however results cannot be compared with our estimates, nor between other studies due to the lack of harmonisation of the data. IOp in Brazil has been previously analyse by Bourguignon et al., (2007) using a survey of 1996, they found similar levels of IOp as we get and in their analysis is also remarkable the importance of Parental Education of IOp.

Belhaj Hassine, (2012) estimates IOp for Egypt, if we compare our estimates to the ones on his paper we can see that the level of IOp we get for 2012 is similar to the value from 2006 and smaller to inequality in 1988 and 1998.

Ferreira and Gignoux, (2011) analyse IOp for Brazil, Guatemala and Peru among other countries, they found IOp is larger for consumption than for income and they get greater levels of overall inequality than us. However, they are using a different equivalence scale and therefore, results are not comparable.

India has been also analysed by Singh, (2012) and he also found that overall inequality is higher for earnings than for consumption, though his analysis is restricted to inequality among men. Finally, Piraino, (2015) estimates IOp in South Africa, but he uses few circumstances for the analysis and consequently, our estimates are much more greater than the ones he gets.

Two different trends on the evolution of both income inequality and IOp are found for the countries analysed. There are some countries which have been able to significantly reduce their levels of inequality and IOp (Peru and Guatemala). Nevertheless, for India we observe an increase in the levels of inequality. Then, South Africa and Brazil, despite we observe a little reduction in levels of IOp and income inequality, these changes are insignificant, especially in the case of South Africa.

The case of South Africa is especially worrying because is the country with the highest levels of inequality and IOp. Moreover, despite we found a little reduction in these levels using the equivalised disposable income, when taking into account different aggregates of income and consumption they didn't lead to the same conclusion. For Personal Income and Personal Labour Income we found a higher level of inequality in 2012 than in 2008, and with regard to consumption aggregates, we found that consumption is more unevenly distributed among individuals, leading to even more higher levels of inequality and IOp than the Equivalised Disposable Income.

With regard the contribution of the different circumstances to IOp. we found that *Parental Education* is the most relevant in all the countries analysed. This finding is in line with all the literature of IOp. Then, we respect to overtime changes, we do not observe any significant changes on the composition of IOp. Furthermore, if we compare the contribution of circumstances using different income and consumption aggregates, there are neither significant differences.

To sum up, there is not a homogenous behaviour in the evolution of IOp for the countries analysed, some of them show a positive evolution in terms of inequality, reducing their levels and the share of inequality due to circumstances, whereas others are not able to change their situation. Results show robustness, since there are not great differences between them when we use different variables as advantage variable.

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APPENDIX

Table A1. Availability and description of the dependent variables by country and year

	Eq. Disposable HH income	**Personal Income**	**Personal Labour Income**	**Eq. Consumption**	**Eq. Mon. Consumption**
	Total monetary and non-monetary current income net of income taxes and social security contributions.	Total monetary payments from labour, property, and social or private transfers. -Total value of non-monetary goods and services received from labour and social or private transfers, excluding social transfers in kind such as universal health insurance, universal education benefits, and near cash benefits from public housing.	-Monetary payments and value of non-Monetary goods and services received from dependent employment. -Profits/losses and value of goods for own consumption from self-employment.	Total consumption, including that stemming from expenditures (monetary consumption) and that stemming from own-production or gifts (non-monetary). A consumption is considered as non-monetary if it has not been purchased, but either given to the household from somebody else, or self-produced.	Total consumption from expenditures (monetary consumption), i.e. consumption of goods and services that have been purchased by the household.
Country					
Brazil					
2006	Available	Available	Available	N.A	N.A
2009	Available	Available	Available	N.A	N.A
2011	Available	Available	Available	N.A	N.A
2013	Available	Available	Available	N.A	N.A
Egypt					
2012	Available	Available	Available	N.A	N.A
Guatemala					
2006	Available	Available	Available	Available	Available
2011	Available	Available	Available	Available	N.A
2014	Available	Available	Available	Available	Available
India					
2004	Available	Available	Available	N.A	Available
2011	Available	Available	Available	N.A	Available
Peru					
2004	Available	Available	Available	Available	Available
2007	Available	Available	Available	Available	Available
2010	Available	Available	Available	Available	Available
2013	Available	Available	Available	Available	Available
South Africa					
2008	Available	Available	Available	Available	Available
2010	Available	Available	Available	Available	Available
2012	Available	Available	Available	Available	Available

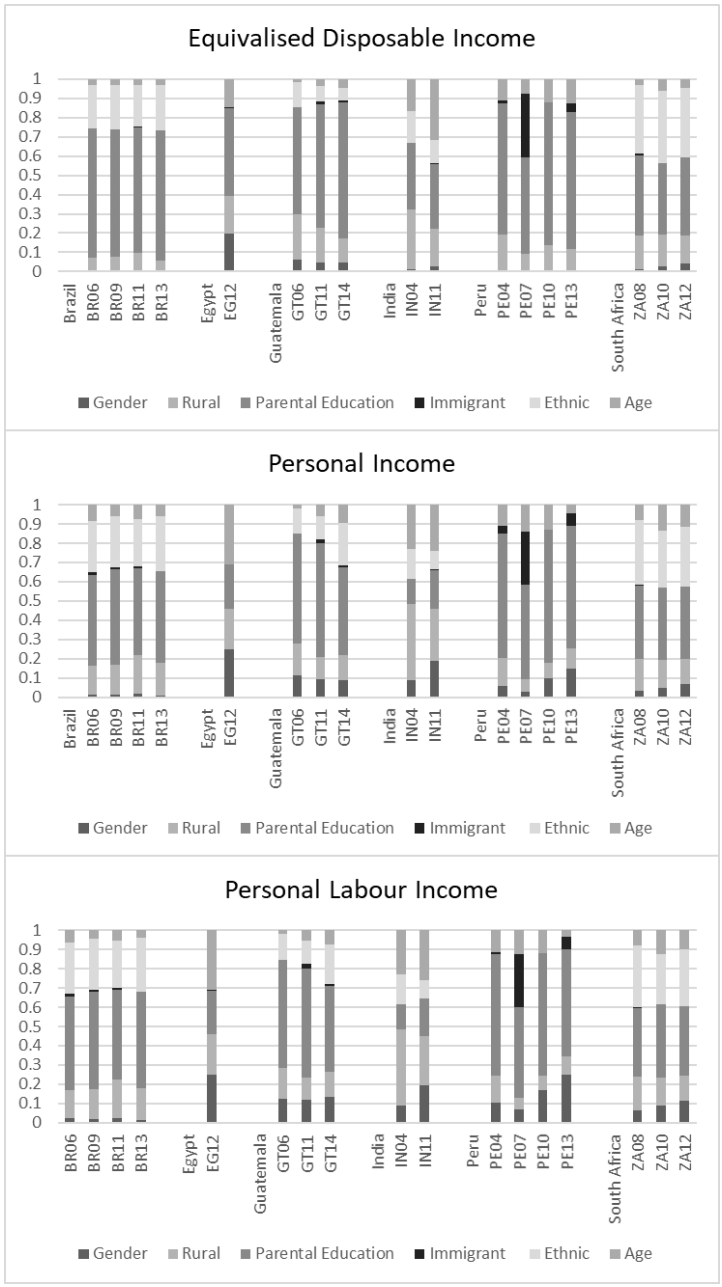
Table A2. Construction of the variable Ethnicity

	Ethnicity	
	LIS Variable	**Variable used**
Country	Ethnic_c	Ethnic (Two categories)
Brazil		
2006	1 indigenous/2 white/3 black/4 yellow/5 mixed race(pardo)	White & Others
2009	1 indigenous/2 white/3 black/4 yellow/5 mixed race(pardo)	White & Others
2011	1 indigenous/2 white/3 black/4 yellow/5 mixed race(pardo)	White & Others
2013	1 indigenous/2 white/3 black/4 yellow/5 mixed race(pardo)	White & Others
Egypt		
2012	N.A	N.A
Guatemala		
2006	29 Non indigenous (Ladino), 30 Foreigner. From 1 to 24 minority ethnics	Non indigenous & Others
2011	29 Non indigenous (Ladino), 30 Foreigner. From 1 to 24 minority ethnics	Non indigenous & Others
2014	29 Non indigenous (Ladino), 30 Foreigner. From 1 to 24 minority ethnics	Non indigenous & Others
India		
2004	1Brahmin,2High caste,3Other Backward Classes,4Dalit,5Adivasi,6Muslim,7Sikh Jain,8Christian	Groups 1-2 High Caste & Groups 3-8 Others
2011	1Brahmin,2Forward cates, 3 Other Backward Classes, 4 Dalit, 5 Adivasi, 6 Muslin, 7 Christian, Sikh,Jain.	Groups 1-2 High Caste & Groups 3-7 Others
Peru		
2004	N.A (Many missings)	N.A
2007	N.A (Many missings)	N.A
2010	N.A (Many missings)	N.A
2013	N.A (Many missings)	
South Africa		
2008	1 African, 2 Coloured, 3 Asian/Indian, 4 White	African & Others
2010	1 African, 2 Coloured, 3 Asian/Indian, 4 White	African & Others
2012	1 African, 2 Coloured, 3 Asian/Indian, 4 White	African & Others

Table A3. Construction of the variable Parental Education

	Parental Education			
	LIS Variables		**Variable used**	**Scope limitations**
Country	Edmom_c	Eddad_c	Max(Edmom_c,Eddad_c) 3 Categories	
Brazil				
2006	0 Still in education, 1-18 less than primary education, 20-29 primary completed and at leas 1 grade of secondary / 30-36 at least first grade of tertiarty education completed	N.A	Low: 0,1,2 Less than primary. Medium: 11-21 (at least one year of primary education completed). High: 22-36 At least one year of secondary completed	Only available for those with mother in HH
2009		N.A		
2011		N.A		
2013		N.A		
Egypt				
2012	1 illiterate, 2, reads & writes, 3 less than intermediate, 4 intermediate, 5 above intermediate, 6 university, 7 postgraduate		1-2 Low, 3-4 Middle, 5-7 High	No scope limitations
Guatemala				
2006	1 none, 2 literate, 3 pre-primary, 4 primary incomplete, 5 primary complete, 6 secondary incomplete, 7 secondary complete, 8 tertiary incomplete, 9 tertiary complete		Low: 1-4. Middle: 5-6. High: 7-9	Available only for children of whom the parents do not live in the household and for the children of the head of the household.
2011			Low: 0+1 + 2, Middle: 10+20. High: 30+39+40+50	
2014	0 none, 1 only knows how to read, 2 incomplete primary, 10 primary level, 20 incomplete secondary, 30 secondary level, 39 incomplete tertiary, 40 university, 50 master or doctorate			
India				
2004	N.A	0 none, 1 1st class, 2 2nd class, 3 3rd class, 4 4th class, 5 5th class, 6 6h class, 7 7th class, 8 8th class, 9 9th class, 10 10th class(secondary), 11 11th class, 12 12th class(high secondary), 13 13th class, 14 14th class, 15 15th class(Bacherlor or above)	Low: 0 None. Middle: 1-9 (less than secondary). High: 10-16 (secondary or above)	Only captured for father of head of household.
2011	N.A			
Peru				
2004	1 no education, 2 some primary not completed, 3 primary completed, 4 some secondary not completed, 5 secondary completed, 6 some tertiary non university no completed, 7 tertiary non-university completed, 8 some tertiary university not completed, 9 tertiary university completed		Low: 1-3. Middle, 4-5. High: 6-9	Only available for household head
2007				
2010				
2013				
South Africa				
2008	1 no schooling, 2 grade R/0, 3 Grade1/Sub A/Class1, 4 Grade2, 5 Grade 3, 6 Grade 4, 7 Grade 5, 8 Grade 6, 9 Grade 7, 10 Grade 8, 11 Grade 9, 12 Grade 10, 13 Grade 11, 14 Grade 12/Matric/Senior Certificate, 15 NTC1, 16 NTC2, 17 NTC 3, 18 certificate with less than Grade 12, 19, Diploma with less than grade 12, 20 Certificate with grade 12, 21, Diploma with Grade 12, 22 Bachelors degre level 4, 23 Bachelors degree and Diploma, 24 Honours degre, 25 Higher degree (Masters Docorate), 26 Other		Low: 1-9 Less than primary. Middle: 10-13+18+19 + 15 + 16. High: 14+17+20-25.	No scope limitations
2010				
2012				

Figures I - III. Contribution of circumstances to IOp for Income Aggregates



Figures IV-V. Contribution of circumstances to IOp for Consumption and Monetary Consumption