



l'umanesimo che innova

Unraveling the Roots of Income Polarization in Europe: A Divided Continent

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**SCIENZE POLITICHE,
DELLA COMUNICAZIONE,
E DELLE RELAZIONI INTERNAZIONALI**



Introduction

- **Income polarization** as a notion is comparatively understudied, particularly in Europe, compared to inequality and poverty, which have both gotten a lot of attention in the literature.
- High income polarization, on the other hand, suggests a **divided society** and may result in the creation of social conflict, discontent and tension (Esteban and Ray 1994, 1999; Gradín 2000; Zhang and Kanbur 2001).
- Polarization of income also has a **negative impact on economic growth** (Brzezinski 2013; Ezcurra 2009), affecting redistribution with possible negative effects, for example, on consumption.



Introduction

- The notion of polarization is concerned with the **disappearance of the middle class** (Foster and Wolfson, 1992; Wolfson, 1994, 1997); can be define as the concentration of the population around two or more poles along the distribution.
- There are two different approach:
- Foster and Wolfson (1992, 2010) developed the concept of **bi-polarization**: in this case, the two poles are formed on the two sides of the median, in the tails of distribution. This approach is concerned with the decline of the middle class
- A more general notion of income polarization regards the latter as “**clustering**” of a population around two or more poles of the distribution, irrespective of where they are located along the income scale (Esteban and Ray, 1994).



Introduction

- This article contributes to the literature by observing the polarization trends in **12 European countries** for the period from the early 2000s to the end of the second decade of the century.
- To observe these trends, this paper uses the **relative distribution method** (Handcock and Morris 1998, 1999), a non-parametric approach. The relative distribution method is able to provide us with results that are easily usable and of immediate interpretation.
- Subsequently, the paper applies the RIF-regression (Firpo et al. 2009) **to observe the impact of covariates on the distribution** in detail, providing the possibility to assess economic policy interventions that should be taken to counteract the phenomenon of income polarization.



Data

- Data are taken from the **Luxembourg Income Study Database** (LIS). Data used cover 12 European countries available in the dataset and for which it is possible to have comparable surveys for two separate years.
- The countries are: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherland, Spain and United Kingdom.
- The variable used in the first part for the distribution analysis is **household-disposable income**, net of income taxes and contributions.
- To analyze the impact of social conditions on polarization trends in the second part of the paper, **demographic, geographic, employment status and educational level of the head of household variables** are used.



Relative distribution

- The relative distribution method (Morris et al., 1994; Handcock and Morris, 1998, 1999) is a non-parametric approach that **compares the distribution of two populations**, considering differences over the entire range of the distribution.
- Let Y_0 be the income variable for the reference population and Y the income variable for the comparison population. The relative distribution is defined as the ratio of the density of the comparison population to the density of the reference population evaluated at the relative data r :

$$g(r) = \frac{f(F_0^{-1}(r))}{f_0(F_0^{-1}(r))} = \frac{f(y_r)}{f_0(y_r)} \quad 0 \leq r \leq 1; y_r \geq 1,$$

where $f(\cdot)$ and $f_0(\cdot)$ denote the density functions of Y and Y_0 , respectively, and $y_r = F_0^{-1}(r)$ is the quantile function of Y_0 .



Relative distribution

- This method offers the possibility to **decompose** the relative distribution into changes in **location** and changes in **shape**: the *location* component can be attributed to a change in the distribution's mean or median, while the *shape* component includes differences in variance, asymmetry and/or other distributional characteristics.

$$\frac{f(y_r)}{f_0(y_r)} = \frac{f_{0L}(y_r)}{f_0(y_r)} \times \frac{f(y_r)}{f_{0L}(y_r)}$$

y_{0L} is a counter-factual distribution with the same shape as the reference distribution but with the median of the comparison distribution.

- The relative distribution approach includes a **median relative polarization index (MRP)**, which is a measure showing how the comparison distribution is more polarized than the reference one:

$$MRP = \frac{4}{n} \left(\sum_{i=1}^n \left| r_i - \frac{1}{2} \right| \right) - 1$$

- The **MRP index can be decomposed** into the contributions from the lower and upper tails of the distribution (Handcock and Morris, 1999).



RIF-Regression Model

- One novelty of this study is the use of **Recentered Influence Function** (RIF) regressions to analyze the drivers of income polarization. This method can compute the degree of association between a small change in one covariate and a change in a relative polarization index.
- RIF-regression is a statistical tool introduced by Firpo et al. (2009) for analyzing partial effects on unconditional quantiles in the framework of regression analysis.
- The simplest approach to estimate RIF regressions is to assume a **linear relationship between the RIF of a given distributional statistic** - e.g. a specific quantile - **and the explanatory variables**. Under this assumption, standard Ordinary Least Squares (OLS) can be used to fit a linear model to capture how small changes in the distribution of the independent variables affect the distributional statistic of interest.



RIF-Regression Model

- Following the Firpo et al.'s (2009) procedure, one can first compute the RIF of the MRP index for each income i ; subsequently, the coefficients β can be estimated by OLS through the following equation:

$$RIF_i \left(\widehat{MRP} \right) = \alpha + \sum_{k=1}^K \beta_k x_{i,k} + \epsilon_i, \quad \forall i \in \mathcal{D},$$

- The estimated model parameter β_k can be interpreted as the effect of a small change in the distribution of X_k on MRP when the distribution of other covariates remains unchanged.

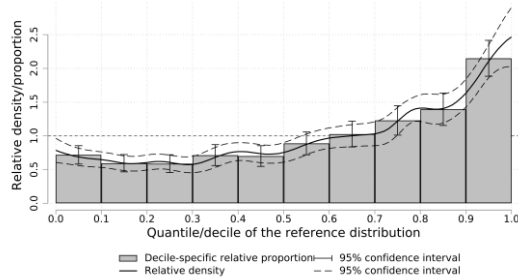


Relative Distribution Results

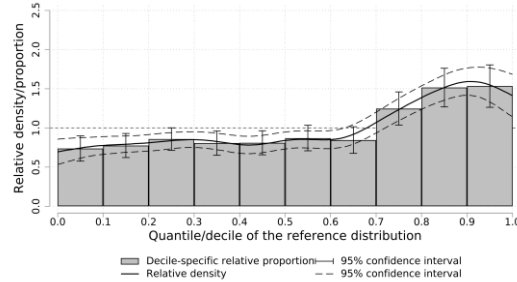
- The results obtained with this method **are contrasted** with the inequality results obtained with traditional measures (e.g., Gini index), where we do not observe a clear and common trend across countries.
- Relative distribution **indexes** show a homogenous pattern throughout the European countries surveyed.
- In 9 countries the **LRP index value is higher than the URP value**, showing a more pronounced concentration in the lower tail than in the upper tail.



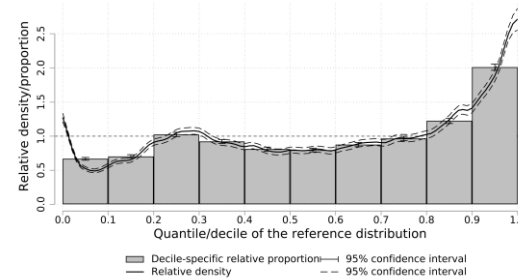
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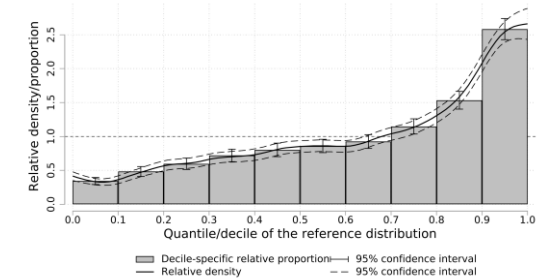
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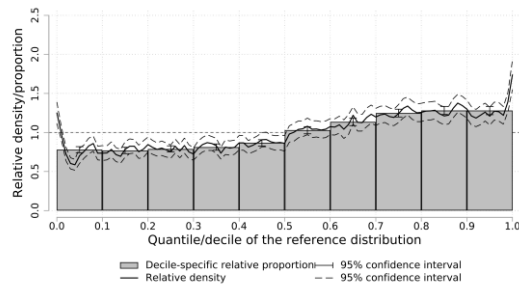
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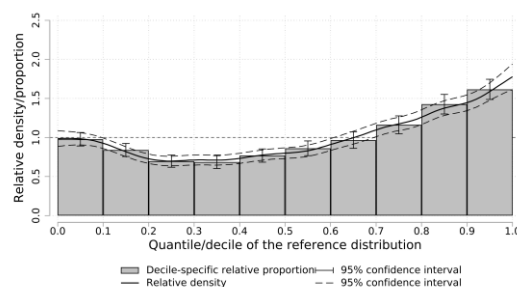
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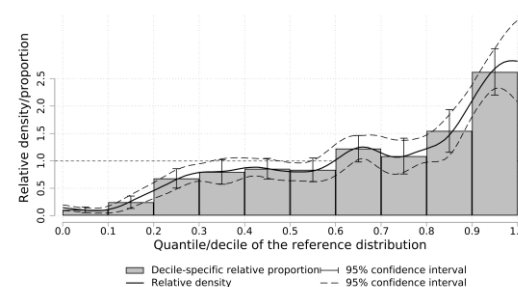
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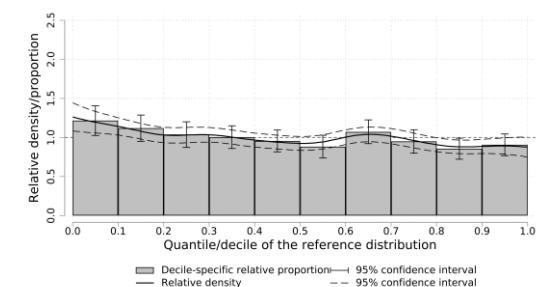
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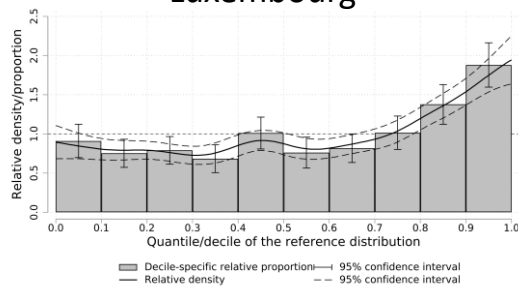
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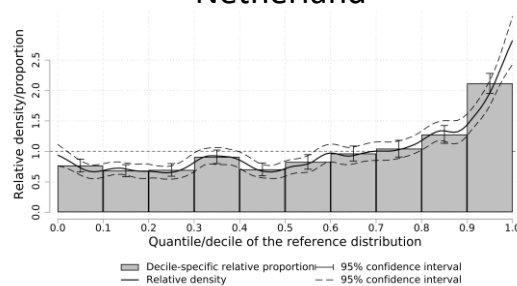
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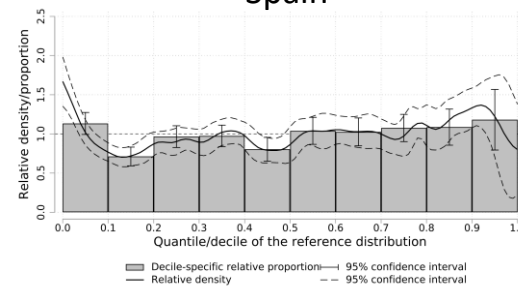
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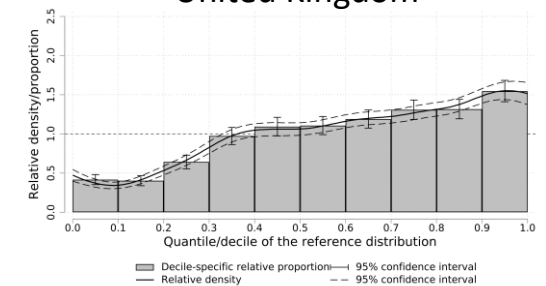
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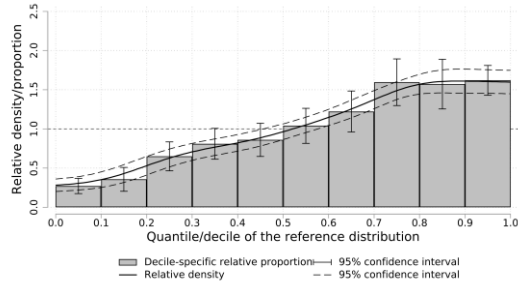


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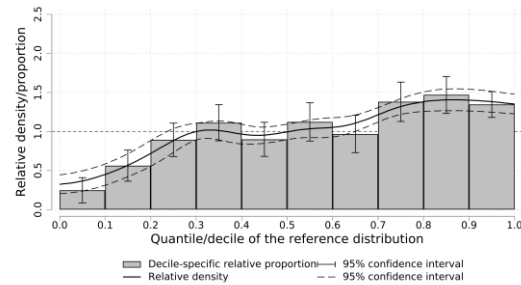




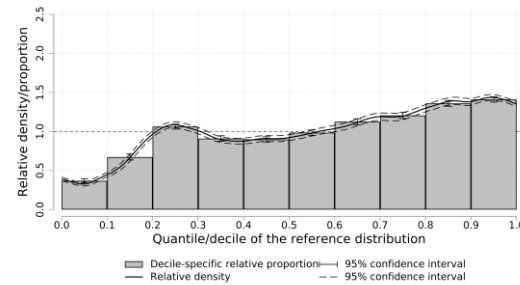
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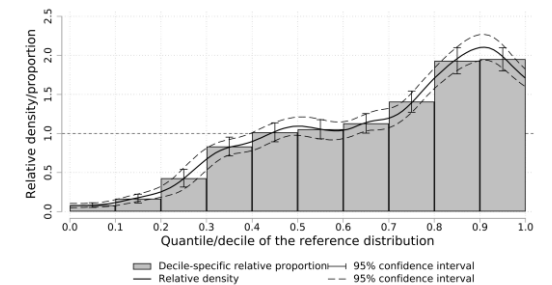
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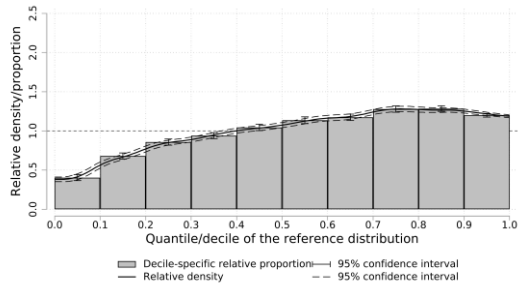
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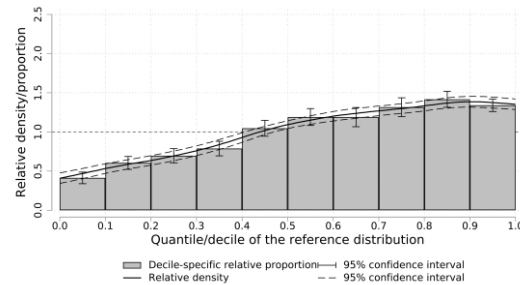
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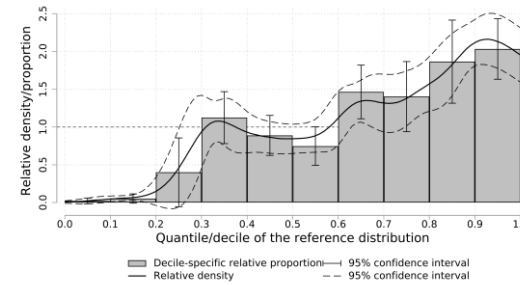
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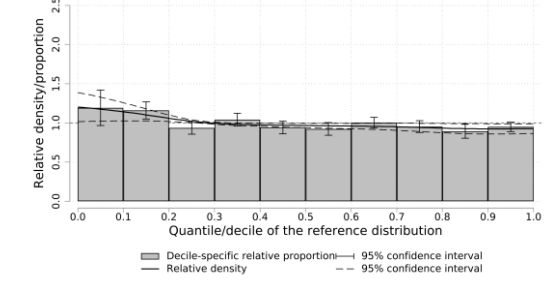
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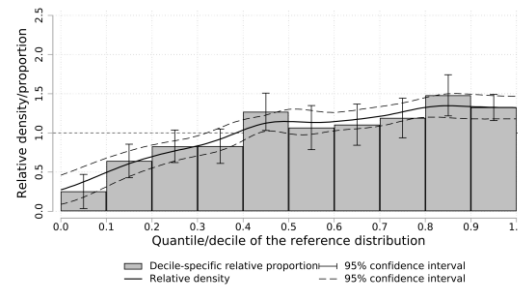
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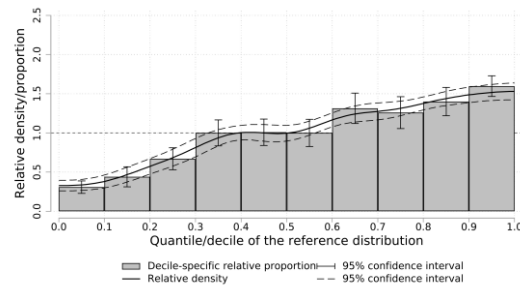
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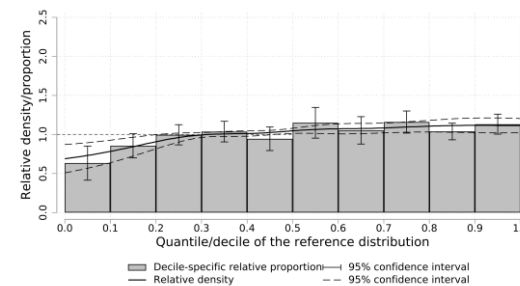
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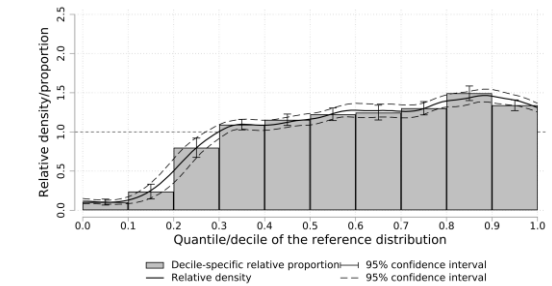
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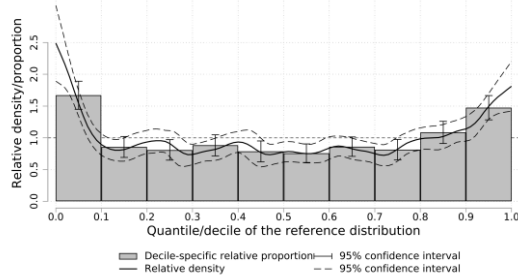


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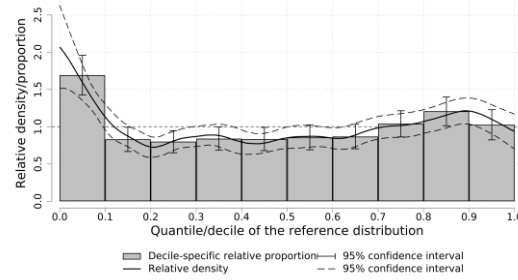




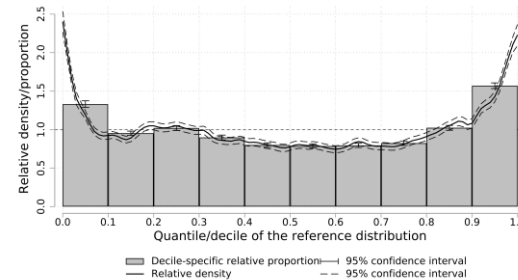
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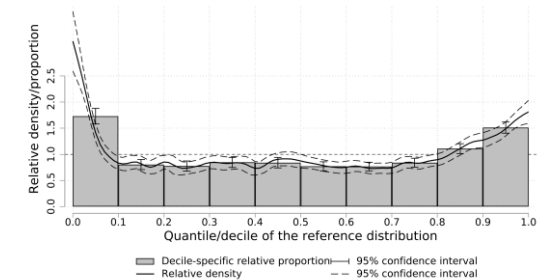
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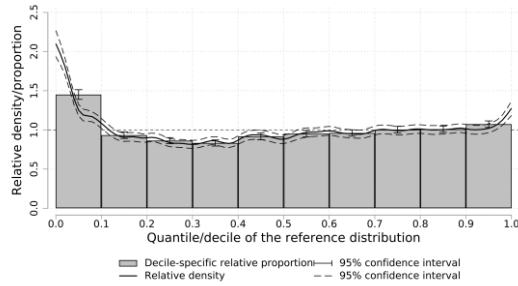
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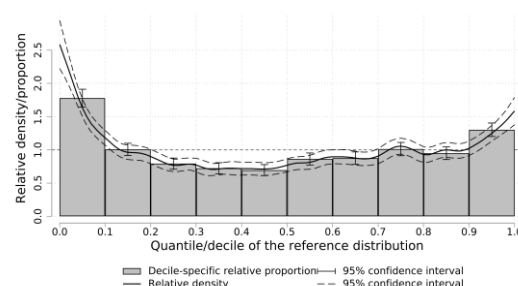
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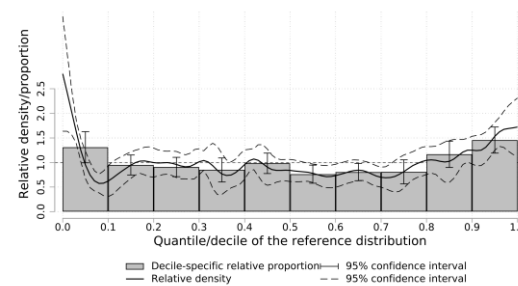
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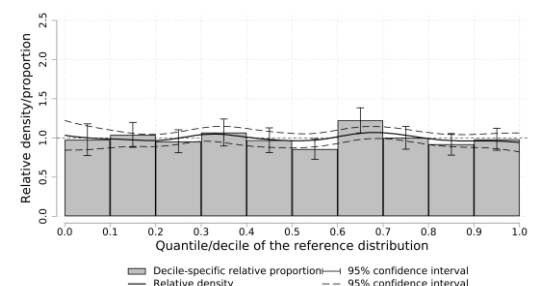
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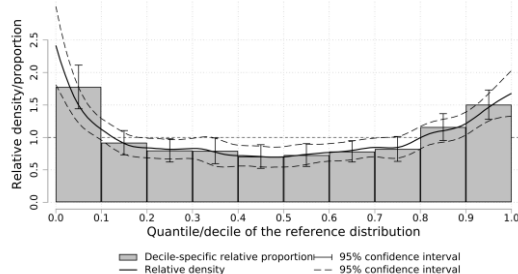
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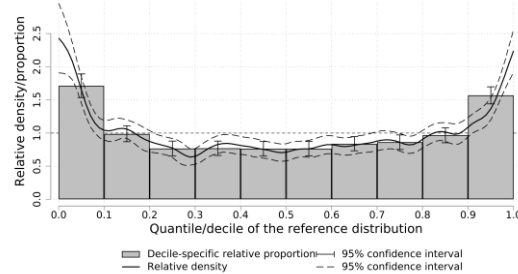
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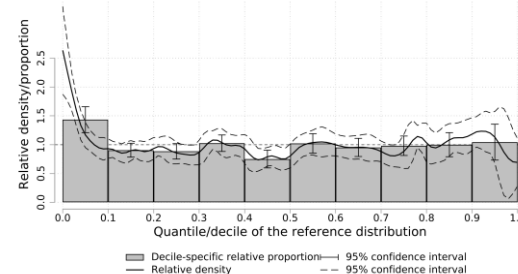
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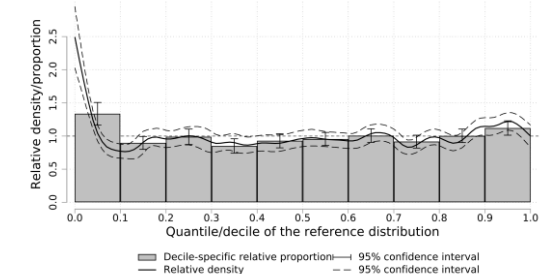
Netherland



Spain



United Kingdom





Relative Distribution Results

- The results obtained with this method **are contrasted** with the inequality results obtained with traditional measures (e.g., Gini index), where we do not observe a clear and common trend across countries.
- Relative distribution **indexes** show a homogenous pattern throughout the European countries surveyed.
- In 9 countries the **LRP index value is higher than the URP value**, showing a more pronounced concentration in the lower tail than in the upper tail.



Relative Distribution Results

<i>Austria</i>			<i>Belgium</i>			<i>Denmark</i>			<i>Finland</i>		
<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>
<i>0.15</i>	<i>0.161</i>	<i>0.139</i>	<i>0.102</i>	<i>0.148</i>	<i>0.056</i>	<i>0.127</i>	<i>0.101</i>	<i>0.153</i>	<i>0.155</i>	<i>0.157</i>	<i>0.153</i>
<i>Ireland</i>			<i>Italy</i>			<i>Luxembourg</i>			<i>Netherland</i>		
<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>
<i>0.12</i>	<i>0.09</i>	<i>0.15</i>	<i>-0.005</i>	<i>0.007</i>	<i>-0.017</i>	<i>0.178</i>	<i>0.234</i>	<i>0.122</i>	<i>0.167</i>	<i>0.188</i>	<i>0.146</i>
<i>France</i>			<i>Germany</i>			<i>Spain</i>			<i>United Kingdom</i>		
<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>	<i>MRP</i>	<i>LRP</i>	<i>URP</i>
<i>0.065</i>	<i>0.105</i>	<i>0.026</i>	<i>0.148</i>	<i>0.213</i>	<i>0.082</i>	<i>0.045</i>	<i>0.081</i>	<i>0.01</i>	<i>0.058</i>	<i>0.083</i>	<i>0.032</i>



RIF-Regression Results

	Austria	Belgium	Denmark	Finland	France	Germany	Ireland	Italy	Luxembourg	Netherland	Spain	U.K.
<u>Sector</u>												
Not employed	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)
Agriculture	0.090** (0.040)	0.095** (0.039)	0.926*** (0.247)	0.171*** (0.050)	0.029 (0.173)	-0.217 (0.214)	0.047* (0.025)	0.131*** (0.043)	0.021 (0.053)	0.195*** (0.061)	0.078* (0.041)	0.088 (0.313)
Industry	0.004 (0.018)	-0.002 (0.014)	0.656*** (0.084)	0.066** (0.029)	-0.327*** (0.072)	-0.062 (0.043)	0.005 (0.013)	0.000 (0.033)	0.008 (0.016)	-0.096*** (0.028)	-0.034* (0.020)	0.360*** (0.059)
Services	0.002 (0.012)	-0.015 (0.010)	0.672*** (0.050)	0.033 (0.022)	-0.306*** (0.057)	-0.021 (0.029)	0.008 (0.009)	-0.010 (0.024)	0.025** (0.012)	-0.049*** (0.016)	-0.021 (0.016)	0.218*** (0.042)
<u>Education</u>												
Low	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)
Medium	-0.001 (0.013)	-0.019* (0.009)	-0.242*** (0.050)	-0.057** (0.024)	0.230*** (0.052)	-0.150*** (0.035)	0.039*** (0.010)	0.098*** (0.019)	0.015 (0.010)	-0.020 (0.016)	0.099*** (0.016)	0.064 (0.047)
High	0.080*** (0.017)	0.053*** (0.009)	1.127*** (0.057)	0.200*** (0.025)	2.229*** (0.062)	0.209*** (0.039)	0.106*** (0.009)	0.358*** (0.034)	0.096*** (0.011)	0.176*** (0.017)	0.309*** (0.015)	0.469*** (0.043)
<u>Country of birth</u>												
Born in the country	(base)	(base)			(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)
Born outside the country	-0.014 (0.013)	0.017*** (0.010)			0.335*** (0.061)	0.039 (0.033)	-0.055*** (0.009)	-0.173*** (0.040)	-0.016* (0.009)	0.074*** (0.023)	-0.020 (0.020)	-0.041 (0.0549)
<u>Area</u>												
Cities	(base)	(base)	(base)	(base)	(base)		(base)		(base)		(base)	
Towns and Suburbs	-0.008 (0.012)	-0.021*** (0.008)	-0.650*** (0.052)	-0.108*** (0.021)	-0.461*** (0.076)		-0.024** (0.010)		-0.022 (0.013)		-0.057*** (0.015)	
Rural areas	-0.031** (0.012)	-0.034*** (0.011)	-0.609*** (0.081)	-0.117*** (0.022)	-0.570*** (0.087)		-0.041*** (0.008)		-0.017 (0.013)		-0.102*** (0.013)	
Age	0.001*** (0.000)	-0.000 (0.000)	0.009*** (0.001)	0.001 (0.001)	0.010*** (0.001)	-0.003*** (0.001)	0.001*** (0.000)	0.000 (0.000)	0.001** (0.000)	0.000 (0.000)	0.001* (0.000)	0.000 (0.001)
Sex												
Male	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)	(base)
Female	0.016 (0.010)	0.002 (0.007)	0.219*** (0.048)	-0.074*** (0.018)	-0.329*** (0.049)	-0.066*** (0.025)	-0.003 (0.007)	-0.053*** (0.016)	-0.003 (0.009)	-0.040*** (0.014)	-0.034*** (0.012)	0.155*** (0.036)
N° Household members	-0.001 (0.004)	-0.000 (0.003)	-0.125*** (0.020)	-0.053*** (0.007)	-0.016 (0.019)	-0.050*** (0.009)	-0.003 (0.002)	0.019** (0.008)	-0.007** (0.003)	-0.014*** (0.005)	0.014*** (0.004)	-0.067*** (0.016)



RIF-Regression Results

- The results show the impact of household characteristics on the increase of polarization.
- The results indicate that the sector of employment, education level, country of birth, area of residence and age have significant effects on the median relative polarization in many of the countries.
- **Education level** has a significant effect, with those having a high level of education showing an increase effect on the median relative polarization in all countries.
- **The area of residence** also has significant effects, with living in rural areas or in a small town having decrease effects on the median relative polarization.
- **Female-headed households reduce polarization**, especially in the lower tail.



Conclusions

- Income polarization is a concept that is gaining increasing importance in the analysis of income distribution in Europe.
- Reduction in the middle class is a significant factor that may contribute to income polarization. High levels of income polarization can lead to social unrest, political instability and economic downturns.
- The results of this paper confirm what has been seen in previous studies regarding polarization in specific European countries: the phenomenon is primarily driven by the different conditions of households in the labor market (Gigliarano and Mosler 2009; Brzezinski 2013).
- Having carried out the same analysis for different European countries, the results open up a policy discussion, leading to an analysis of what might be **common policies** to counteract this growing income distancing observed.