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## **The Impact of Social Security Wealth on the Distribution of Household Wealth in the European Union**

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# The impact of social security wealth on the distribution of wealth in the European Union

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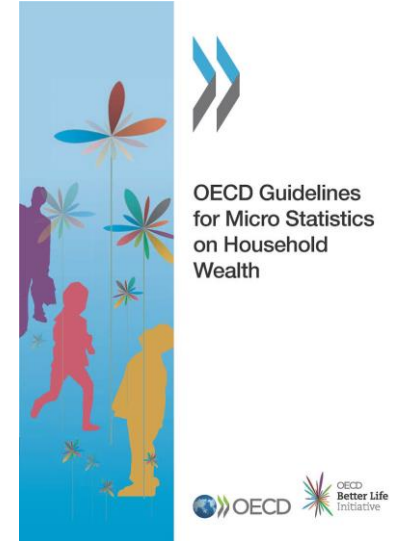
Household finance  
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Household Finance and Consumption Survey  
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### ABSTRACT

The ageing of society means that public pension systems are becoming increasingly important. This study evaluates the influence of public pension entitlements on wealth inequality among pensioners. A novel data source - the Eurosystem Household Finance and Consumption Survey – is used to compare the impact of the public pension system on wealth inequality in 19 European countries. Findings indicate that in all investigated countries, social security wealth reduces wealth inequality. Augmented wealth inequality is ca. 30% lower than private wealth inequality. This estimate refers to the population of pensioners, while in the whole population the equalizing impact of public pension systems may be weaker. Social security wealth mitigates not only wealth inequality measured at the country level, but also wealth inequality in the whole European Union.

# Introduction

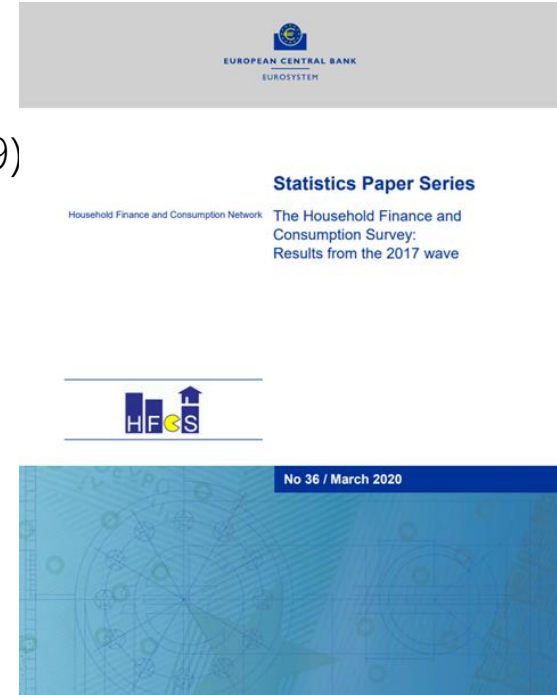
- Usually, researchers, who investigate household wealth distribution study only the distribution of private household wealth.
- Similarly, the concept of household wealth adopted by the OECD (2013) excludes entitlements in the public pension system. The lack of internationally comparable data on entitlements in the public pensions system is the reason for the exclusion.
- Social security wealth may matter for the accumulation of private wealth (Feldstein, 1974; Blanchet et al., 2016; Bönneke et al., 2019), cross-national wealth gaps (Cowell et al., 2018;), and wealth inequality (see eg. Wolff & Marley, 1989; Cowell & Van Kerm, 2015). Therefore researchers estimate the value of social security wealth and augmented wealth distribution.



- Social security wealth has an equalizing impact on wealth distribution. The distribution of augmented wealth is less unequal than the distribution of private wealth.
- The equalizing impact of social security wealth has been empirically confirmed in Australia (Longmuir, 2021), Germany (Frick & Grabka, 2013), Italy (Mazaferro & Tosso, 2019), Switzerland (Kuhn, 2021), UK (Crawford & Hood, 2016), USA (Wolff, 2005), Poland (Wroński, 2021).
- The outcomes of single-country studies are difficult to compare because of varying methods and data sources used by authors. The availability of cross-country studies is low (exception: Cowell et al., 2017).
- In this paper, I use a novel cross-national data source to obtain comparable measures of the equalizing impact of social security wealth across many countries.
- My research covers 19 European countries.

# Conceptual framework

- We analyze distributions of: private wealth, social security wealth and augmented wealth (Wolff, 2006; Böncke et al., 2019)
- Augmented wealth = Private wealth + Social security wealth
- I estimate the distribution of private wealth based on Eurosystem Household Finance and Consumption Survey (HFCS).
- I estimate the distribution of social security wealth based on HFCS data on public pension benefits and Eurostat mortality forecast.
- I investigate the impact of social security wealth on wealth inequality.



# The estimation of social security wealth

- The value of social security wealth equals the discounted actuarial value of future public pension benefits.
- The data on public pension entitlements of the working-age population are not available. Therefore, my research covers only those, who already receive public pensions (similarly as Cowell et al. 2017). The sample includes 1 and 2 person households, in which all members receive public pensions.
- The age of respondents is top-coded at 85. I have to discard pensioners older than 84 years.
- Because data on respondents' age in Ireland and Malta is expressed in brackets, I have to exclude Ireland and Malta from our study.

- To estimate the value of social security wealth, I follow OECD (2019) and use  $r = 2\%$ . In the calculation of social security wealth, I use mortality rates implied by baseline Eurostat EUROPOP 2019 forecast. The maximum age is set at 100.

$$(1) \quad SSW_i = \sum_{t=0}^T \frac{1}{(1+r)^t} * P_{i,t}$$

$$(2) \quad P_{i,t} = \textit{benefit}_i * q_{i,t,g}$$

SSW – social security wealth, P – pension benefits (yearly), q – survival probability, r – interest rate

- I also estimate alternative distributions of social security wealth based on  $r=1\%$ ,  $r=3\%$  as well as different assumptions regarding mortality (current mortality rates, EUROPO 2019 low mortality scenario). Results obtained using alternative values of social security wealth are similar.
- The estimates of social security wealth does not cover survivor's benefits (widower's pensions). In many countries rules determining the value of survivor's benefits are too complex to calculate them using HFCS data.

# Descriptive statistics

- In nearly all countries the mean value of social security wealth is similar or higher than mean value of private wealth (exc. Luxembourg and Cyprus).
- The PW-rich countries tend to be also SSW-rich. The social security wealth does not overturn the hierarchy.
- In some countries small sample size may be a problem.

Table 1. Descriptive statistics.

Country	Sample size	Mean			Ratio
		PW	SSW	AW	AW / PW
Austria	862	191,739	422,738	614,478	320%
		(14,757)	(9,364)	(20,960)	
Belgium	584	406,682	411,582	818,264	201%
		(35,208)	(19,882)	(44,400)	
Cyprus	188	289,009	204,816	493,825	171%
		(50,499)	(17,377)	(56,689)	
Germany	1,351	228,968	302,200	531,261	232%
		(14,793)	(7,445)	(17,575)	
Estonia	694	68,477	80,407	148,884	217%
		(5,448)	(2,445)	(6,774)	
Finland	543	127,120	68,449	195,569	154%
		(10,439)	(3,897)	(10,479)	
France	3,205	290,194	390,804	680,998	235%
		(8,865)	(5,903)	(12,395)	
Greece	502	81,436	219,178	300,613	369%
		(5,358)	(9,452)	(12,602)	
Croatia	281	81,816	68,584	150,400	184%
		(6,344)	(3,554)	(8,306)	
Hungary	2,016	57,021	67,934	124,955	219%
		(4,053)	(1,275)	(4,438)	
Italy	2,050	228,761	300,394	529,155	231%
		(9,129)	(7,232)	(12,688)	
Lithuania	266	73,768	61,821	135,588	184%
		(24,813)	(5,479)	(24,800)	
Luxembourg	233	1 445,700	779,410	2 225,110	154%
		(209,244)	(40,584)	(218,091)	
Latvia	369	30,649	54,425	85,073	278%
		(3,193)	(2,742)	(2,76)	
Netherlands	792	175,627	280,519	456,147	260%
		(12,104)	(8,559)	(15,287)	
Poland	1,635	59,571	92,306	151,877	255%
		(1,753)	(1,883)	(2,787)	
Portugal	1,288	149,663	169,367	319,029	213%
		(15,384)	(5,949)	(17,761)	
Slovenia	437	116,127	122,725	238,853	206%
		(6,328)	(4,235)	(8,771)	
Slovakia	739	71,527	100,519	172,047	241%
		(4,080)	(1,935)	(4,929)	
All	18,035	212,340	285,827	498,190	235%
		(4,910)	(2,881)	(6,183)	



# The link between distributions

- The correlation between PW and AW is stronger than the correlation between SSW and AW. The correlation between PW and SSW is in general weak.
- **Cross-country differences are not always statistically significant. Outliers:**  
PW-SSW: Latvia, France, Italy (high); Hungary, Lithuania, Netherlands (low)  
PW-AW: Cyprus, Luxembourg (high); Austria, Netherlands, Poland (low)  
SSW-AW: Greece, Latvia, Austria (high); Luxembourg, Finland, Belgium (low)
- There is no easy generalization of the outcomes available.

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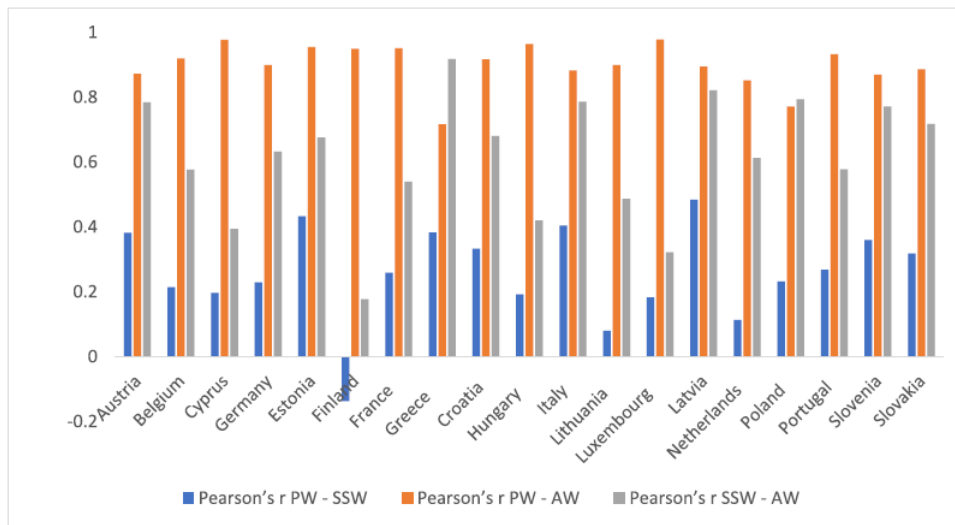


Fig. 1. The correlation between private wealth, social security wealth, and augmented wealth (Pearson's r).

# The impact of SSW on wealth inequality

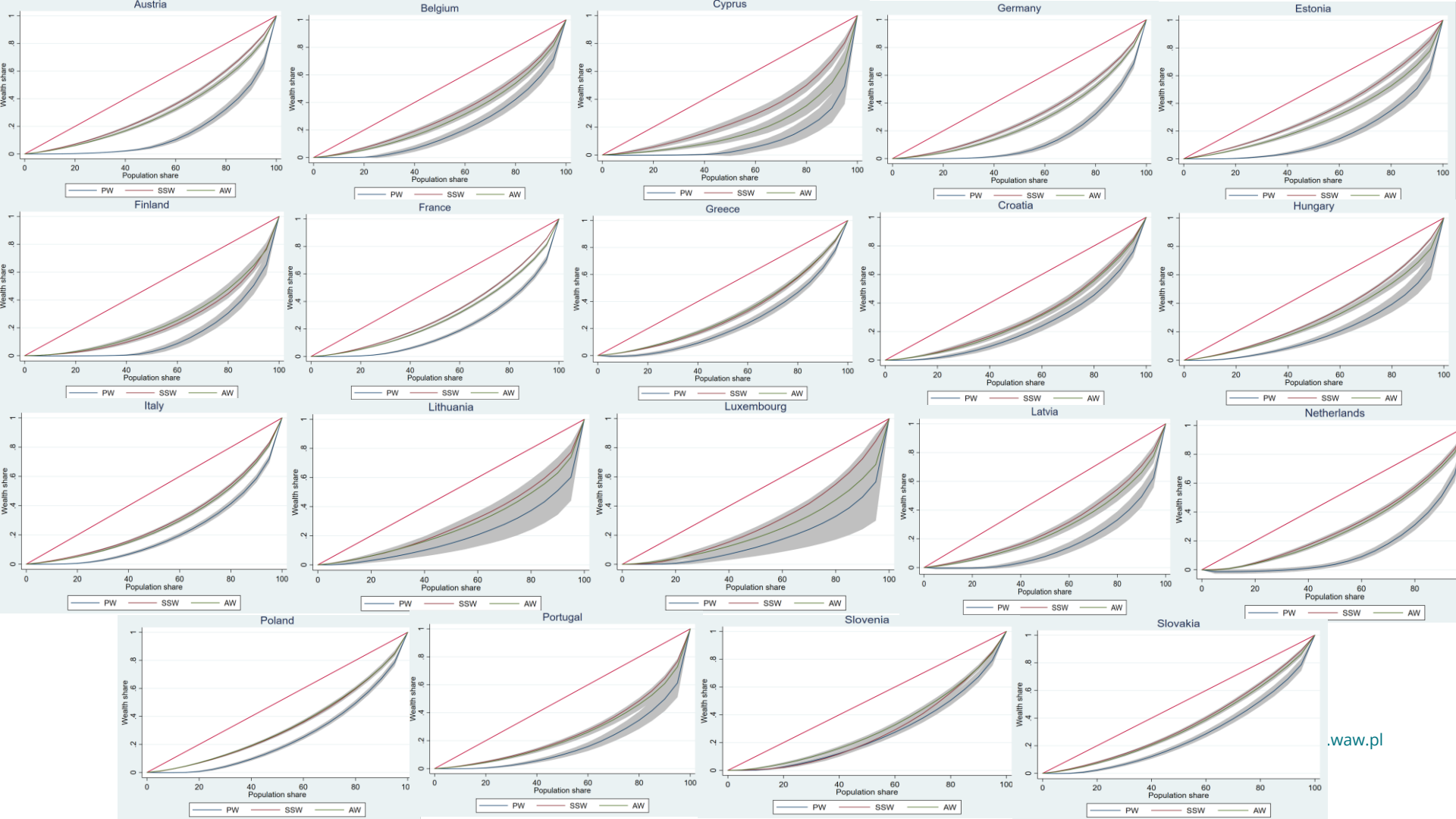
- To measure the impact of SSW on wealth inequality I:
  - compare inequality measures calculated for the distribution of the PW and AW;
  - decompose Gini index by factors (Shorrocks et al., 1982; Stark et al., 1986 Lopez-Feldman, 2006) to identify contributions and marginal effects of private wealth and social security wealth on augmented wealth inequality.

# The impact of SSW on wealth inequality – Gini coefficient

- In all countries, Gini coefficient is lower in the case of SSW and AW than in the case of PW.
- SSW equalizes wealth distribution.
- The AW inequality is typically 30% lower than PW inequality.
- The equalizing impact of SSW is strongest in Austria (-43%), Netherlands (-42%), Estonia (-38%) and Germany (-36%).
- The equalizing impact of SSW is weakest in Slovenia (-18%) and Luxembourg (-20%).

Table 3. The impact of social security wealth on wealth inequality – change in the Gini coefficient

Country	PW	SSW	AW	AW - PW	AW - PW (%)
Austria	0.6744 (0.000)	0.3275 (0.000)	0.3852 (0.000)	-0.2119 (0.000)	-43.28% (0.03%)
Belgium	0.5659 (0.001)	0.3465 (0.000)	0.3984 (0.001)	-0.1675 (0.000)	-29.57% (0.05%)
Cyprus	0.7813 (0.001)	0.4217 (0.001)	0.5973 (0.001)	-0.1840 (0.001)	-23.56% (0.07%)
Germany	0.6793 (0.000)	0.3672 (0.000)	0.4320 (0.000)	-0.2474 (0.000)	-36.41% (0.00%)
Estonia	0.6447 (0.001)	0.2994 (0.000)	0.4011 (0.001)	-0.2437 (0.000)	-37.80% (0.05%)
Finland	0.6962 (0.001)	0.5157 (0.000)	0.4857 (0.000)	-0.2105 (0.000)	-30.24% (0.06%)
France	0.5843 (0.000)	0.3522 (0.000)	0.4004 (0.000)	-0.1840 (0.000)	-31.48% (0.02%)
Greece	0.5101 (0.001)	0.3705 (0.000)	0.3565 (0.000)	-0.1536 (0.001)	-30.06% (0.01%)
Croatia	0.5101 (0.001)	0.3742 (0.000)	0.3909 (0.001)	-0.1192 (0.000)	-23.35% (0.06%)
Hungary	0.5779 (0.001)	0.3326 (0.000)	0.3912 (0.001)	-0.1867 (0.000)	-32.30% (0.03%)
Italy	0.5710 (0.000)	0.3952 (0.000)	0.4194 (0.000)	-0.1516 (0.000)	-26.54% (0.03%)
Lithuania	0.5621 (0.002)	0.3998 (0.001)	0.4288 (0.001)	-0.1333 (0.001)	-23.58% (0.08%)
Luxembourg	0.6240 (0.003)	0.4004 (0.001)	0.5001 (0.002)	-0.1239 (0.001)	-19.96% (0.06%)
Latvia	0.6593 (0.001)	0.3891 (0.001)	0.4347 (0.001)	-0.2246 (0.001)	-34.06% (0.07%)
Netherlands	0.6978 (0.001)	0.3747 (0.000)	0.4030 (0.000)	-0.2948 (0.000)	-42.23% (0.05%)
Poland	0.4944 (0.000)	0.3379 (0.000)	0.3315 (0.000)	-0.1628 (0.000)	-32.93% (0.04%)
Portugal	0.6381 (0.001)	0.4576 (0.000)	0.4860 (0.001)	-0.1521 (0.000)	-23.81% (0.04%)
Slovenia	0.4616 (0.001)	0.4237 (0.000)	0.3790 (0.000)	-0.083 (0.000)	-17.84% (0.07%)
Slovakia	0.4520 (0.001)	0.2755 (0.000)	0.3019 (0.000)	-0.1501 (0.000)	-33.17% (0.05%)



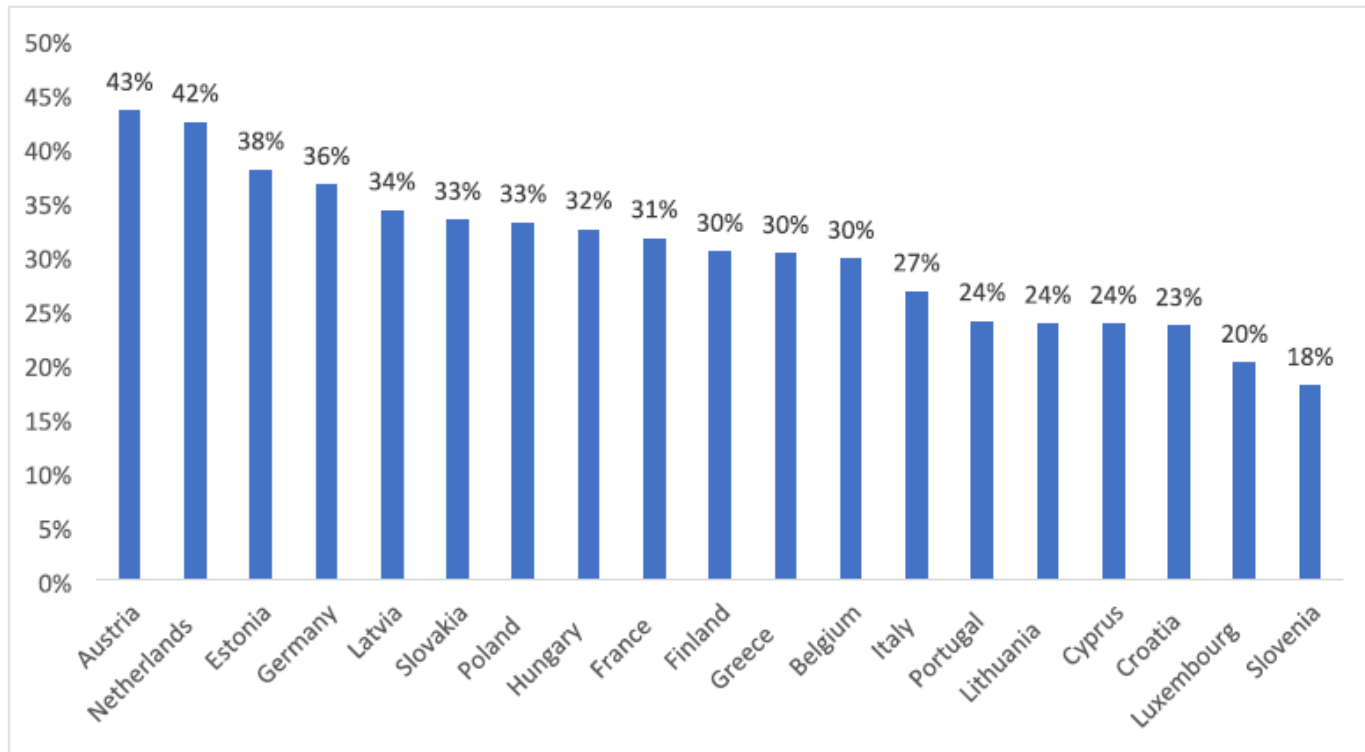


Fig. 2. The impact of social security wealth on wealth inequality. The reduction in private wealth inequality after including social security wealth into household wealth.

# The impact of SSW on wealth inequality – deciles shares

- Deciles shares also confirm equalizing impact of SSW.
- The bottom 50% benefit most from the inclusion of SSW. The change of wealth shares of the middle 40% is small. Wealth share of top 10% diminishes.
- Households up to 75-85th percentile increase their wealth share thanks to SSW.
- The increase in wealth shares of the bottom 50% is biggest in Austria, Germany and Netherlands. It is smallest in Slovenia, Croatia, and Slovakia.
- The drop in wealth shares of top 10% is highest in Austria, Netherlands and Germany. It is smallest in Slovenia, Portugal, and Luxembourg.

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Table A1. The impact of social security wealth on wealth inequality – deciles shares

Country	Bottom 50%			Middle 40%			Top 10%		
	PW	SSW	AW	PW	SSW	AW	PW	SSW	AW
<b>Austria</b>	5.2% (0.5%)	27.0% (0.6%)	23.9% (0.7%)	45.7% (2.1%)	49.7% (0.5%)	47.8% (0.8%)	49.1% (2.4%)	23.4% (0.6%)	28.3% (1.2%)
<b>Belgium</b>	13.6% (1.5%)	26.0% (1.0%)	23.3% (1.2%)	46.3% (2.6%)	47.3% (1.1%)	47.4% (1.4%)	40.1% (3.4%)	26.6% (1.5%)	29.3% (2.0%)
<b>Cyprus</b>	4.2% (1.5%)	22.4% (1.9%)	13.1% (1.7%)	31.7% (4.6%)	46.3% (2.3%)	40.1% (3.5%)	64.1% (5.3%)	31.3% (2.6%)	46.7% (4.3%)
<b>Germany</b>	5.2% (0.7%)	24.7% (0.7%)	20.9% (0.8%)	48.3% (1.9%)	48.7% (0.6%)	48.7% (0.9%)	46.5% (2.2%)	26.6% (0.8%)	32.2% (2.2%)
<b>Estonia</b>	8.9% (1.0%)	29.1% (0.8%)	23.9% (1.0%)	42.5% (2.4%)	47.5% (1.1%)	43.9% (1.4%)	48.6% (3.0%)	23.4 (1.7%)	32.2% (2.2%)
<b>Finland</b>	4.8% (1.0%)	15.9% (1.0%)	18.3% (1.1%)	47.6% (2.7%)	47.5% (1.3%)	46.6% (1.8%)	47.7% (3.1%)	36.6% (1.8%)	35.1% (2.5%)
<b>France</b>	11.9% (0.6%)	25.3% (0.4%)	22.9% (0.4%)	46.5% (1.0%)	50.2% (0.3%)	48.0% (0.5%)	41.6% (1.2%)	24.5% (0.4%)	29.0% (0.7%)
<b>Greece</b>	16.5% (1.0%)	23.8% (0.9%)	24.9% (0.9%)	48.1% (1.3%)	50.7% (1.2%)	49.9% (1.2%)	35.3% (1.8%)	25.5% (1.2%)	25.1% (1.2%)
<b>Croatia</b>	17.3% (1.5%)	23.8% (1.2%)	23.6% (1.2%)	47.0% (1.8%)	50.1% (1.1%)	49.4% (1.3%)	35.7% (2.4%)	26.2% (1.3%)	27.0% (1.8%)
<b>Hungary</b>	15.4% (1.0%)	26.7% (0.5%)	24.8% (0.8%)	39.9% (2.5%)	48.6% (0.5%)	44.1% (1.3%)	44.7% (3.4%)	24.7% (0.6%)	31.0% (2.1%)
<b>Italy</b>	13.5% (0.6%)	22.9% (0.5%)	21.9% (0.5%)	45.8% (1.0%)	48.7% (0.5%)	48.3% (0.5%)	40.7% (1.3%)	28.4% (0.6%)	29.9% (0.7%)
<b>Lithuania</b>	15.2% (4.2%)	24.8% (2.0%)	22.4% (3.6%)	36.4% (8.4%)	44.0% (1.7%)	40.9% (5.3%)	48.4% (12.2%)	31.2% (2.9%)	36.8% (8.5%)
<b>Luxembourg</b>	11.9% (2.4%)	22.3% (1.5%)	18.3% (2.2%)	34.5% (6.1%)	49.7% (1.4%)	40.5% (4.3%)	53.6% (8.2%)	28.0% (1.4%)	41.2% (6.1%)
<b>Latvia</b>	10.7% (1.4%)	23.1% (1.1%)	21.8% (1.3%)	40.7% (2.5%)	47.8% (1.1%)	44.7% (1.4%)	48.6% (3.3%)	29.1% (1.6%)	33.5% (2.2%)
<b>Netherlands</b>	5.7% (0.6%)	24.2% (0.9%)	22.9% (0.9%)	46.2% (2.1%)	48.6% (0.8%)	48.2% (1.0%)	48.1% (2.4%)	27.2% (1.3%)	28.9% (1.5%)
<b>Poland</b>	18.8% (0.7%)	26.7% (0.6%)	27.8% (0.5%)	49.1% (0.9%)	48.7% (0.7%)	47.9% (0.6%)	32.1% (1.3%)	24.6% (1.1%)	24.3% (0.9%)
<b>Portugal</b>	11.0% (1.2%)	19.9% (0.7%)	19.3% (1.0%)	39.5% (3.2%)	44.7% (0.9%)	41.8% (1.7%)	49.5% (4.2%)	35.4% (1.2%)	38.9% (2.5%)
<b>Slovenia</b>	19.7% (1.1%)	19.2% (1.3%)	23.7% (1.0%)	48.0% (1.6%)	54.9% (0.9%)	50.5% (1.8%)	32.3% (2.1%)	25.9% (0.8%)	25.9% (1.3%)
<b>Slovakia</b>	21.3% (1.3%)	30.5% (0.6%)	29.8% (0.8%)	47.2% (1.9%)	49.9% (0.5%)	48.2% (0.8%)	31.5% (2.8%)	19.6% (0.6%)	22.1% (1.3%)

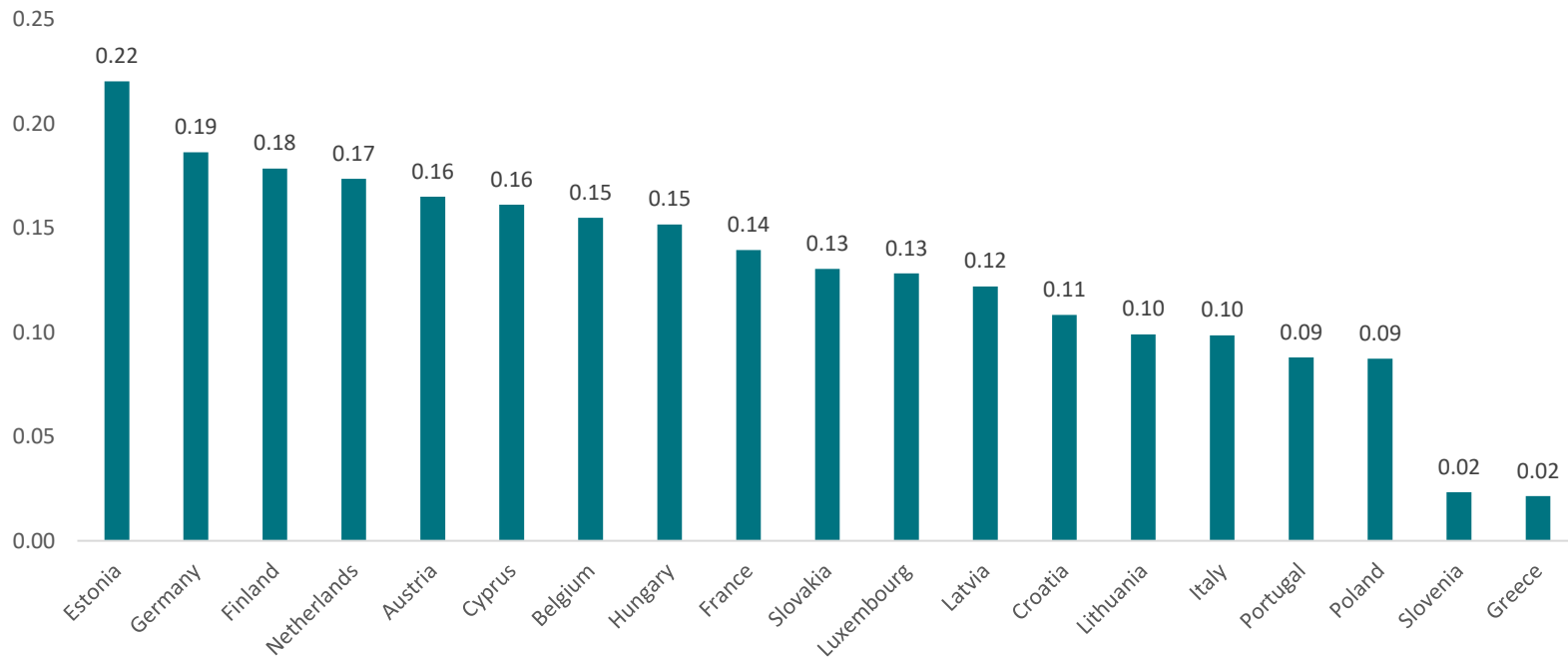
# The impact of SSW on wealth inequality – Gini decomposition by source

- Decomposition confirms equalizing impact of SSW:
  - relative contribution of SSW to Gini coeff. is smaller than it's share in AW;
  - the impact of marginal increase in SSW on AW inequality is negative.

Table 4. Wealth inequality – the decomposition of the Gini coefficient by source

Country	PW	SSW	PW	SSW	PW	SSW
	share in AW	share in AW	share ineq	share ineq	marginal effects	marginal effects
Austria	31.23% (0.04%)	68.77% (0.04%)	47.74% (0.07%)	52.27% (0.07%)	0.1650 (0.000)	-0.1650 (0.000)
Belgium	49.64% (0.06%)	50.36% (0.06%)	65.12% (0.10%)	34.87% (0.10%)	0.1548 (0.001)	-0.1549 (0.001)
Cyprus	58.26% (0.13%)	41.74% (0.13%)	74.36% (0.14%)	25.62% (0.14%)	0.1609 (0.000)	-0.1612 (0.000)
Germany	43.01% (0.04%)	56.98% (0.04%)	61.64% (0.06%)	38.35% (0.06%)	0.1863 (0.000)	-0.1863 (0.000)
Estonia	45.95% (0.05%)	54.05% (0.05%)	67.97% (0.08%)	32.01% (0.08%)	0.2202 (0.000)	-0.2204 (0.000)
Finland	64.83% (0.08%)	35.17% (0.08%)	82.68% (0.09%)	17.32% (0.09%)	0.1785 (0.000)	-0.1785 (0.000)
France	42.64% (0.02%)	57.36% (0.02%)	56.57% (0.03%)	43.42% (0.03)	0.1393 (0.000)	-0.1394 (0.000)
Greece	27.08% (0.03%)	72.92% (0.03%)	29.23% (0.07%)	70.78% (0.07%)	0.0215 (0.000)	-0.0214 (0.000)
Croatia	54.39% (0.06%)	45.61% (0.06%)	65.22% (0.10%)	34.78% (0.10%)	0.1083 (0.001)	-0.1084 (0.001)
Hungary	45.55% (0.06%)	54.45% (0.06%)	60.71% (0.10%)	39.29% (0.10%)	0.1516 (0.000)	-0.1516 (0.000)
Italy	43.18% (0.03%)	56.82% (0.03%)	53.03% (0.05%)	46.97% (0.05%)	0.0985 (0.000)	-0.0986 (0.000)
Lithuania	54.13% (0.16%)	46.16% (0.17%)	63.74% (0.31%)	36.26% (0.31%)	0.0961 (0.002)	-0.0990 (0.002)
Luxembourg	64.22% (0.17%)	35.85% (0.17%)	76.95% (0.21%)	23.03% (0.21%)	0.1273 (0.001)	-0.1282 (0.001)
Latvia	36.02% (0.06%)	63.98% (0.06%)	48.20% (0.10%)	51.78% (0.10%)	0.1218 (0.000)	-0.1220 (0.000)
Netherlands	38.31% (0.05%)	61.47% (0.05%)	55.88% (0.09%)	44.11% (0.09%)	0.1757 (0.001)	-0.1736 (0.001)
Poland	39.22% (0.02%)	60.78% (0.02%)	47.95% (0.06%)	52.05% (0.06%)	0.0873 (0.000)	-0.0874 (0.000)
Portugal	46.83% (0.07%)	53.17% (0.07%)	55.61% (0.12%)	44.38% (0.12%)	0.0878 (0.000)	-0.0879 (0.000)
Slovenia	48.62% (0.04%)	51.38% (0.04%)	50.94% (0.08%)	49.05% (0.08%)	0.0232 (0.001)	-0.0233 (0.001)
Slovakia	41.54% (0.03%)	58.46% (0.03%)	54.58% (0.08%)	45.43% (0.08%)	0.1304 (0.001)	-0.1303 (0.001)

## Marginal effect of increase in SSW on AW inequality (Gini decomposition, -)





## The impact of SSW on wealth inequality – EU as a whole (19 countries)

- Here, we measure wealth inequality in all 19 countries taken together.
- Also in this case, social security wealth equalizes wealth distribution. Augmented wealth inequality in the EU is lower than private wealth inequality.
- However, the decomposition of Theil index shows that augmented wealth inequality is to a larger extent driven by between-country inequality.

**Table 5. The decomposition of the Theil Index**

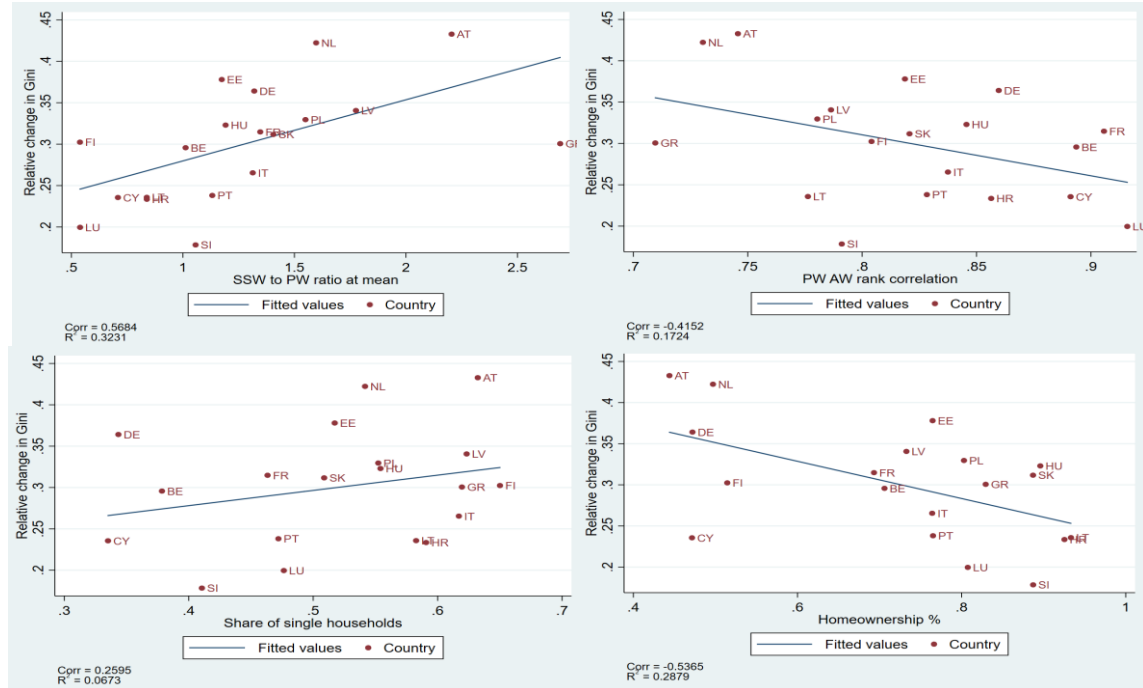
Stat	PW	SSW	AW
<b>Theil</b>	0.8408 (0.001)	0.3101 (0.001)	0.3967 (0.000)
<b>Theil_within</b>	0.7392 (0.001)	0.2243 (0.001)	0.3081 (0.001)
<b>Theil_between</b>	0.1016 (0.001)	0.0858 (0.000)	0.0886 (0.000)
<b>Theil_within: share</b>	87.91% (0.02%)	72.34% (0.02%)	77.66% (0.02%)
<b>Theil_between: share</b>	12.09% (0.02%)	27.66% (0.02%)	22.34% (0.02%)

*Source: own estimation using HFCS data. Standard errors based on 1000*

*bootstrap replications are presented in parentheses.*

# What explains equalizing power of SSW?

- Higher SSW-PW ratio at mean -> stronger equalizing power
- Higher AW-PW correlation -> weaker equalizing power
- Higher share of single HH -> stronger equalizing power
- Higher homeownership -> weaker equalizing power



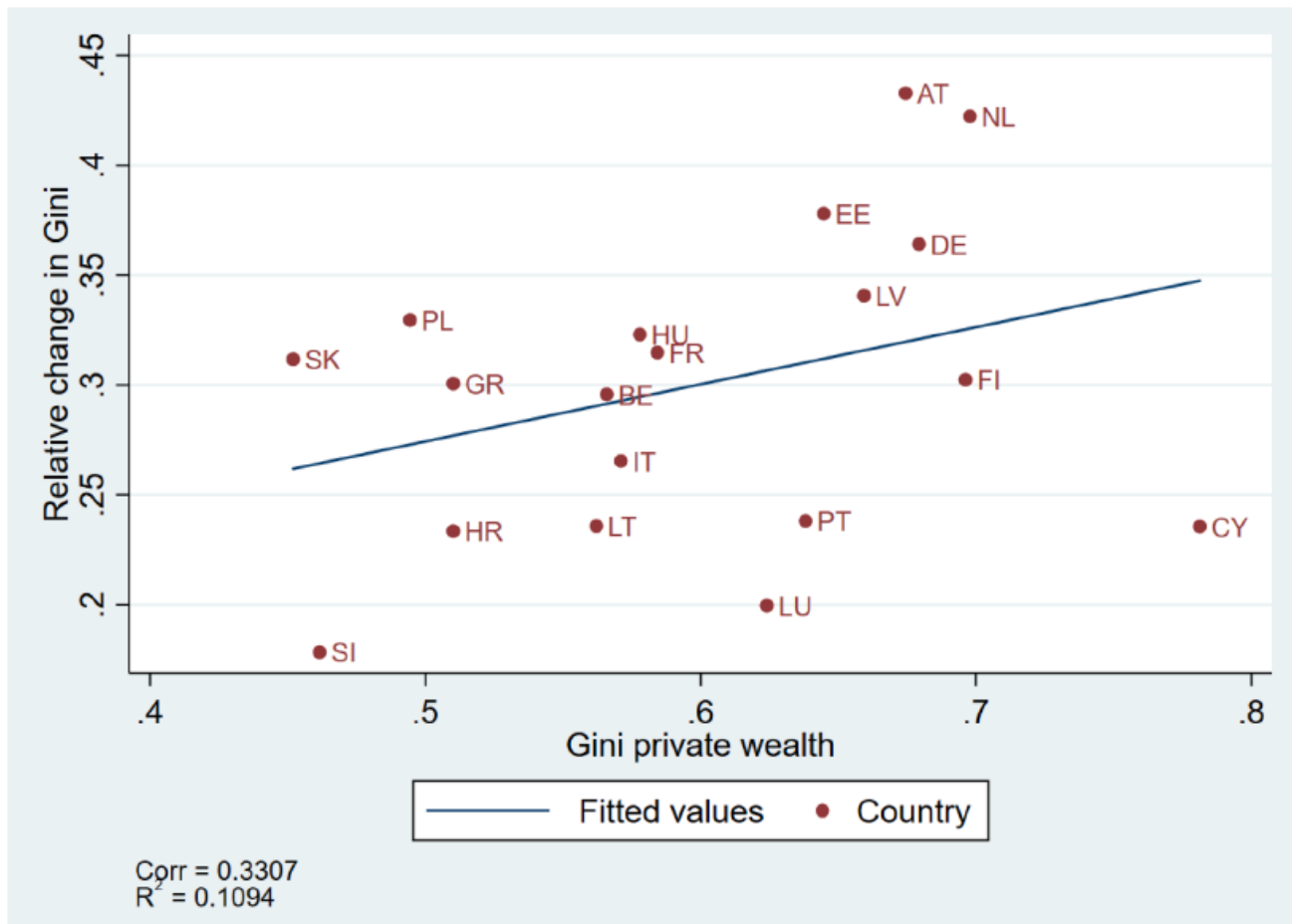


Fig. 3-8. Various correlates of equalizing power of social security system (measured by the relative change in the Gini index).

# Conclusion

- I use the novel data source to compare the impact of social security wealth on wealth inequality across EU member states. My research covers 19 countries.
- In all countries, SSW equalizes wealth distribution. However, the strength of the impact varies across countries.
- The exact ranking of countries in terms of „SSW equalizing power“ depends on chosen measurement methods. Our research shows that the impact of SSW on wealth inequality is strongest in Austria, Germany, Netherlands, while it's weak in Slovenia and Greece.
- Higher SSW/PW ratio increases equalizing power. Higher homeownership decreases equalizing power of SSW
- **Limitations:** the lack of actuarial valuation of private pensions, limited sample (only pensioners households, in some countries sample size, is small), widowers pensions are not taken into account.



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# Factor (source) decomposition of Gini Index

- Gini index can be expressed as (Shorrocks, 1982; Lerman and Yitzhaki, 1985):

$$G_k = \sum_{k=1}^K R_k G_k S_k, \text{ where}$$

- $R_k$  – stands for the Gini correlation\* of the distribution of  $k$  wealth component (e.g. PW) and the distribution of the augmented wealth;  
 $G_k$  – is the Gini coefficient of the distribution of  $k$  wealth component;  
 $S_k$  – represents the share of  $k$  wealth component in augmented wealth

$$*R_k = \text{Cov}\{y_k, F(y)\} / \text{Cov}\{y_k, F(y_k)\}$$

- As Lerman and Yitzhaki (1985) show it is possible to estimate the effect of small changes in income (wealth) source, holding other components constant.

$$\frac{\partial G}{\partial e} = S_k (G_k R_k - G)$$

$$\frac{\partial G / \partial e}{G} = \frac{S_k G_k R_k}{G_k} - S_k$$