Multidimensional inequality and divergence: the euro area crisis in retrospect

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Motivation

- Rising income inequality due to cross-country differences in the euro area (Bönke and Schröder, 2014; Goedemé and Collado, 2016; Vacas-Soriano and Fernández-Macías, 2017).
- Unemployment and social inequality are major challenges for the EU (EC, 2019, QA1).
- Europe as a transnational entity (Beck, 2008; Heidenreich, 2016).
- Lack of multidimensional measures of economic inequality (Decancq, 2017; Sarracino and Mikucka, 2017).

Outlook

Research questions:

- What is the contribution by dimensions and countries to divergence within the EA-13 after the financial and monetary crisis?
- Is the divergence driven by convergence clubs of inequality?

Results

- Divergence is not back to normal.
- Germany as one of the outliers.
- Potential club convergence in southern Europe.

Methods and data

Inequality measure and decomposition methods

Inequality measure (Poppitz, 2019):

- Aggregate income, education, occupational prestige and employment status on the individual level to account for correlation.
- Estimate transnational inequality by Gini or GE-indices.
- Weight dimension by hedonic weights (Schokkaert, 2007).

Decomposition:

- Convergence/divergence is measured by subgroup-decomposition, e.g. share of transnational inequality explained by differences between countries.
- Counterfactual distributions reveal country- and dimension-specific contribution to between-country share of inequality.
- Test for convergence clubs by *log t* test (Phillips and Sul, 2007, 2009).

Measuring multidimensional inequality: framework

1. Aggregate individual achievements W_i for individual i across dimensions j and the respective weight w_j while accounting for correlation at the individual level:

$$W_i = \left(\sum_{j=1}^{m} w_j (x_{ij})^{1-\beta}\right)^{\frac{1}{1-\beta}} \quad \text{if } \beta \neq 0, 1$$

2. Aggregate W_i by a generalized Gini (Decancq and Lugo, 2012) or generalized entropy indices (Maasoumi, 1986).
3. Decompose by subgroups, individual countries or dimensions (Decancq, 2017):

$$GE_\alpha = \left(GE_\alpha(L) - GE_\alpha(\tilde{L})\right) + \left(GE_\alpha(\tilde{L}) - GE_\alpha(\bar{L}_j)\right)$$

$\tilde{L}$: counterfactual distribution after random reshuffle of achievements
$\bar{L}_j$: step-wise equalization of dimension j

Data sources

- EU-SILC: Harmonized household survey (EU-SILC, 2018).
- 4-year rotating panel, 2005 – 2017.
- Hedonic weights estimation based on ISSP (2016). ▸ weights
- Sample restricted to 13 euro area countries in 2007. ▸ more
- Both samples include only working age population (18-65) and individuals not in education.

- $N \sim 250k$ per wave, $\sim 155k$ after list-wise deletion of missing observations and sample restriction.
- Standard errors estimated by bootstrapping (2000 replications).

EU-SILC descriptive statistics

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Figure 1: Descriptive statistics for EA-13 sample

	mean	sd	min	max
income (real, equivalized)	21485	12175	.0612	125027
education in years	15	7.9	0	40
employment status	.92	.27	0	1
occupational prestige (SIOPS)	41	13	5	69

Results

Divergence between countries in the EA-13

- Transnational inequality peaked in 2014, but still lower than in EU-28 or US.
- Between-country inequality started to increase two years later than within-country inequality.
- Income dimension accounts for 78% of between- and 54% of within-country inequality. ▸ figure
- Country-divergence is robust to weights and partially to degree of substitution. ▸ robustness

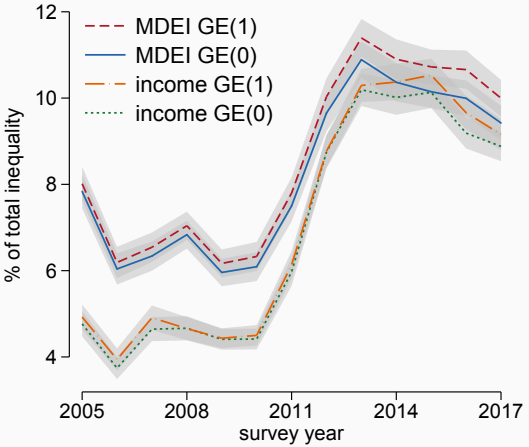

Figure 2: Contribution by between-country differences (%) to transnational inequality (EA-13)

Contribution to divergence by country

- Greece and Portugal contribute most to income divergence.
- Exceptional contribution of Germany according to MDEI.
- *log t* test suggests two clubs: Central and Southern EA.
- Club convergence between GR, IT and PT only found for MDEI GE_0.

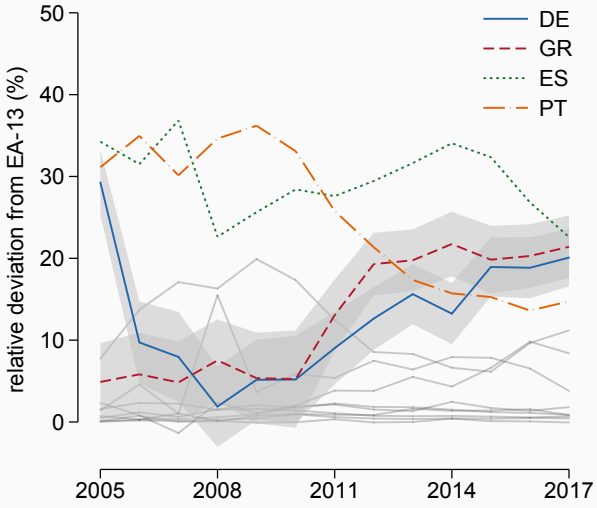

Figure 3: Absolute contribution to subgroup inequality by country (MDEI)

Club convergence for income and MDEI in the EA-13

Figure 4: Convergence clubs of inequality in the euro area (EA-13)

	income		MDEI	
club #	GE_0	GE_1	GE_0	GE_1
1	-0.283	-0.328	-0.037	-0.152
	(-0.836)	(-1.005)	(-0.093)	(-0.425)
	AT BE FI FR DE IE NL SI	AT BE FI FR DE IE NL SI	AT BE FI FR DE IE LU NL SI	AT BE FI FR DE IE LU NL SI
2	-0.586	-0.086	1.882	-0.139
	(-1.164)	(-0.207)	(3.247)	(-0.860)
	GR IT LU PT	GR IT LU PT ES	GR IT PT	GR IT PT ES
none	ES		ES	

Note: Convergence clubs for income inequality and MDEI identified by a clustering algorithm based on *log t*-test for three different inequality indices (Gini, GE_0, and GE_1). Each cell reports $\hat{b}$ and $\hat{t}_b$ of the respective *log t*-test and the countries that belong to the club. The final row lists the group of non-converging countries. Clubs are identified by a four-step algorithm (Phillips and Sul, 2009) starting with the country with the lowest inequality in the final period. *Source:* Author's calculations based on EU-SILC (2018).

Conclusion

Conclusion

- The euro crisis had a substantial effect of economic inequality between countries of the EA-13.
  - ⇒ Income is *the* source of economic inequalities within the EA-13.
  - ⇒ Especially on southern European households, which suffered from deprivation in multiple dimensions.
- Multidimensional inequality highlights Germany's contribution to divergence.
- Club convergence among southern European countries has pushed divergence further.

- Define selection criteria for EU structural funds in line with multidimensional objectives.
  - ⇒ Account for correlation between dimensions.

Thank you!

Appendix

Dimensions of multidimensional economic inequality

- Economic, cultural and social capital are the main determinants of social stratification (Bourdieu, 1979, 1983).
- Distinction of capital types by means of appropriation, reproduction and transferability:

economic capital	income
cultural capital	education (years), occupational prestige (SIOPS)
social capital	employment status

Is the social capital proxy too simplistic?

- Detrimental effect on social status or participation, after controlling for income (Dieckhoff and Gash, 2015; Saar et al., 2017; Sen, 1997).
- Effect increases with duration of unemployment (Pohlan, 2018).
- Unemployment duration can contribute little to overall variation.

Notes on subjective social status

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What does subjective social status (SSS) really measure?

"In our society there are groups which tend to be towards the top […] and towards the bottom. […] Where would you rank yourself?" (ISSP, 2017)

- To locate oneself within society, the perception of a distribution is a necessary condition (Hout, 2008).
- Even a rank-preserving Pigou-Dalton transfer that changes the perceived multidimensional distribution should result in a change of SSS.

Assumptions:

- Decision criteria for distributional estimate and SSS must be the same.
- Control for reference groups effects and normative beliefs about the nature of inequality (Clark and D'Ambrosio, 2015; Evans et al., 1992).

Formal aggregation of MDEI

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1. Aggregate individual achievements W_i for individual i across dimensions j and the respective weight w_j while accounting for correlation at the individual level:

$$W_i = \left(\sum_{j=1}^{m} w_j (x_{ij})^{1-\beta}\right)^{\frac{1}{1-\beta}} \quad \text{if } \beta \neq 0, -1$$

2. Aggregate W_i by a generalized Gini-index (Decancq and Lugo, 2012) or :

$$MDEI = 1 - \frac{\sum_{i=1}^{n} \left[\left(\frac{r^i}{n}\right)^{\epsilon} - \left(\frac{r^i - 1}{n}\right)^{\epsilon}\right] \left(\sum_{j=1}^{m} w_j (x_j^i)^{1-\beta}\right)^{\frac{1}{1-\beta}}}{\left(\sum_{j=1}^{m} w_j \mu(x_j)^{1-\beta}\right)^{\frac{1}{1-\beta}}}$$

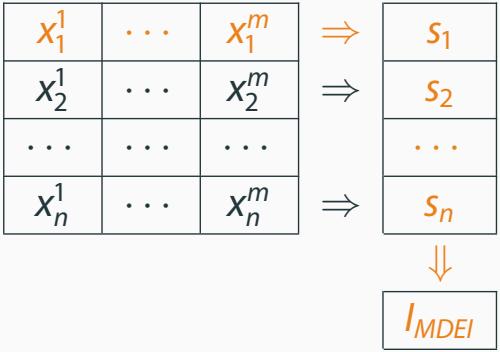
where $\mu(x_j)$ is the dimensionwise mean.

Accounting for correlation

formal aggregation

The social welfare function can be described as 2-step aggregation:

1. Aggregate individual achievements across dimensions by a constant elasticity function.
2. Aggregate synthetic welfare by a generalized Gini (Decancq and Lugo, 2012) or generalized entropy indices (Maasoumi, 1986).



Contribution:

- Account for correlation at the individual level while measuring inequality and divergence (Döpke et al., 2017; Jordá and Sarabia, 2015).
- Estimate hedonic weights (Schokkaert, 2007). results

Estimating hedonic weights

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- Regress dimensions of inequality X and control variables Z on subjective social status (SSS) (Schokkaert, 2007):

$$SSS_{it} = \alpha + \sum_{j=1}^{m} (\beta^j (\Gamma^j x_{it}^j)) + \gamma' Z_{it} + \upsilon_t + \epsilon_{it}$$

- Estimation model replicates aggregation model.
- Recoding of employment dummy (duration) has little impact.

ISSP observations per time spell

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Figure 5: Sample of country/year observations from ISSP

	AT	BE	DE	ES	FR	IT	NL	PT	SI
2005 - 2007		2005	2006	2007	2007		2006	2006	2005
		(920)	(1796)	(1142)	(1290)		(1152)	(690)	(342)
2008 - 2010	2008	2008	2008	2010	2009	2009	2008		2009
	(575)	(810)	(1649)	(1153)	(1752)	(268)	(1262)		(391)
2011 - 2013	2013	2011	2012	2012	2011	2011	2011	2012	2011
	(641)	(749)	(2103)	(2293)	(1900)	(550)	(801)	(563)	(360)
2014 - 2016	2016	2015	2014	2014	2016		2014		2015
	(545)	(629)	(2237)	(1436)	(895)		(987)		(453)

Note: The table shows for each country and three-year time span the selected ISSP wave and the number of non-missing observations in parentheses. *Source:* ISSP (2016).

Hedonic regressions, pooled an per time spell (EA-13)

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dependent variable	subjective social status				
	2005–2007	2008–2010	2011–2013	2014–2016	total
income	0.576	0.479	0.525	0.395	0.480
	(0.029)***	(0.048)***	(0.030)***	(0.037)***	(0.020)***
education (years)	0.134	0.155	0.126	0.196	0.152
	(0.034)***	(0.023)***	(0.021)***	(0.029)***	(0.013)***
occupational prestige	0.236	0.292	0.250	0.266	0.269
	(0.025)***	(0.026)***	(0.023)***	(0.028)***	(0.013)***
employed (dummy)	0.114	0.147	0.063	0.182	0.126
	(0.023)***	(0.025)***	(0.019)***	(0.029)***	(0.012)***
age	0.031	0.007	-0.005	-0.032	-0.002
	(0.024)	(0.024)	(0.022)	(0.027)	(0.012)
age^2	0.030	0.035	0.024	0.065	0.040
	(0.023)	(0.023)	(0.023)	(0.030)*	(0.013)**
female	0.009	-0.010	-0.047	-0.011	-0.019
	(0.021)	(0.021)	(0.021)*	(0.024)	(0.011)$^+$
hh composition	Yes	Yes	Yes	Yes	Yes
adjusted r^2	0.279	0.301	0.328	0.308	0.312
N	7417	7920	9975	7554	32866

Note: $^+$ p¡0.10, * p¡0.05, ** p¡0.01, *** p¡0.001. S.E.'s in parentheses. OLS regression with country (and year) fixed effects. All regressors are z-standardized. *Source:* Author's calculations based on ISSP (2016).

Decomposition by correlation and dimension

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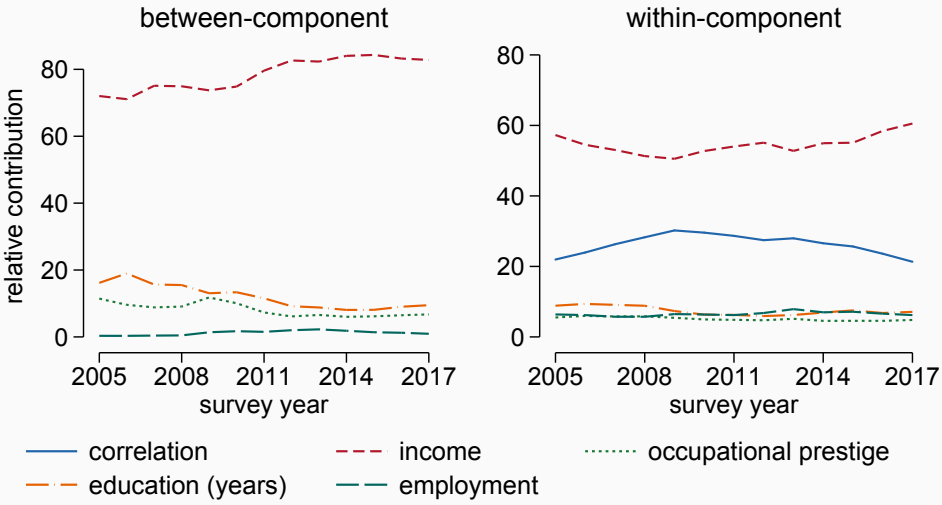

Figure 6: Factor share decomposition of subgroup inequality based on hedonic weights and estimated substitutability .

Robustness of between-country inequality estimates

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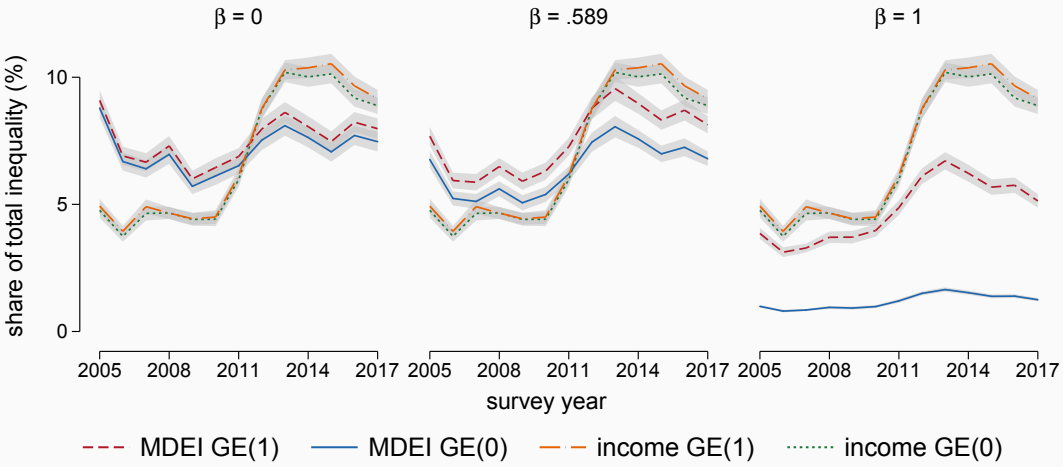

Figure 7: Between-country contribution to total multidimensional inequality based on equal weights for different degrees of substitutability (β) between dimensions

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