

Changes in income inequality in Lithuania: the role of policy, labour market structure, returns and demographics

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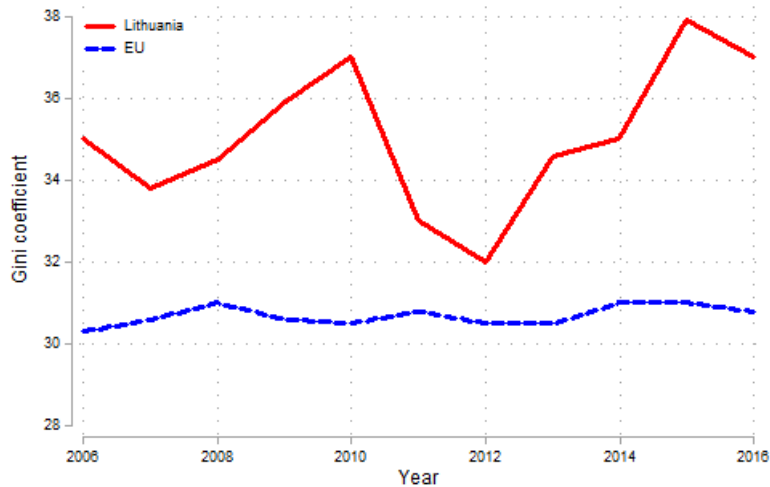
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Motivation: what's the Gini up to?



Motivation: first country from the region

- ▶ First east European country to decompose household disposable income by demographics, labour market structure, returns structure and tax-benefit system.
- ▶ Several possible explanations of the Gini dynamics in 2007-2015 in Lithuania: financial crisis, policy reforms, migration and ageing.
- ▶ We use micro-simulation micro-econometric decomposition approach developed by Sologon et al. (2018, 2019).

Methods#1

In a nutshell...

- ▶ factors:
 - ▶ demographics
 - ▶ labour market structure
 - ▶ returns structure
 - ▶ tax-benefit systems
- ▶ the contribution of each factor is assessed using a sequence of simulated counterfactual distributions of household disposable incomes that would prevail in each period, if these factors were swapped between periods
- ▶ the logic of the Generalized Oaxaca-Blinder decompositions - extended to the entire distribution take care "partially" of path dependency

Household income generation process

- ▶ describe the overall household income distribution & *create counterfactual distributions*

Components:

- ▶ hierarchically structured, multiple equation specifications for detailed sources of income
 - ▶ a set of basic observable characteristics (individual and household level)
 - ▶ vector of 'parameters' describing how the receipt and level of income sources vary with household and individual characteristics
 - ▶ a vector of household-specific 'residuals' linking predictions from model parameters to observed income sources
- ▶ public transfers, taxes and social security contributions

Methods#3

Household income generation process

- ▶ Household disposable income components

$$y_h = y_h^L + y_h^K + y_h^O + y_h^B - t_h.$$

$$y_h^L = \sum_{i=1}^{n_h} I_{hi}^{lab} (I_{hi}^{emp} y_{hi}^{emp} + I_{hi}^{se} y_{hi}^{se})$$

$$y_h^K = \sum_{i=1}^{n_h} (I_{hi}^{inv} y_{hi}^{inv} + I_{hi}^{prop} y_{hi}^{prop})$$

$$y_h^O = \sum_{i=1}^{n_h} (I_{hi}^{pripen} y_{hi}^{pripen} + I_{hi}^{other} y_{hi}^{other})$$

$$y_h^B = y_h^{pens} + y_h^{mtb} + y_h^{nmtb}$$

$$t_h = tax_h + \sum_{i=1}^{n_h} SSC_{hi}.$$

Methods#4

Household income generation process

- ▶ Parametric specifications - parametric relationships between income components and observed household/individual characteristics
 - ▶ Labour incomes: model the probability to be at work, to earn income from salaried employment or self-employment, self-employment income, the occupational, sector and industry choices, wages, hours
 - ▶ Other market incomes: model the probability of receiving each income source and the level
 - ▶ Public transfers (non-simulated/partially simulated): model the probability of receiving the benefit and the level
- ▶ Tax-benefit calculator - EUROMOD
 - ▶ public transfers
 - ▶ taxes and social security contributions

Household income generation process

- ▶ Estimation of parameters
 - ▶ market structure & presence of income sources - logistic & multinomial logistic model
 - ▶ wage rate - Singh-Maddala distribution regression (without and with endogenous selection)(Van Kerm, 2013)
 - ▶ income sources - log-linear model
 - ▶ residual distribution: Juhn et al. (1993) extended to a more complex multivariate model

Methods#6

Household income generation process

The generic representation of the income generation process:

$$Y = m^{\xi}(X, \Upsilon; \xi)$$

Y is income, X a vector of 'exogenous' characteristics, Υ a vector of unobserved characteristics (residual) terms, m^{ξ} the specific parametric structure and ξ the vector of parameters values.

- ▶ Generating counterfactual distribution - transformations of the income generation process 'swapping coefficients':
 - ▶ labour market structure transformation
 - ▶ price and return transformation
 - ▶ tax-benefit transformation
 - ▶ demographic transformation

Methods#7

Household income generation process

- ▶ **Price and returns transformation:** $F^r = m^\xi(X, \Upsilon; \tilde{r}(\xi))$
 - ▶ import the parameters of the equations characterizing the level of earnings and all other pre-tax incomes
 - ▶ impact on θ is $\Delta_\theta^r(F) = \theta(F) - \theta(F^r)$.

Household income generation process

▶ Labour market structure transformation:

$$F^l = m^\xi(X, \Upsilon; \tilde{l}(\xi))$$

- ▶ import the parameters of the equations characterising the labour market structure: employment probabilities, occupational, industrial structure, the presence of non-labour incomes, etc....
- ▶ impact of the labour market structure transformation, $m^\xi(X, \Upsilon; \xi) - m^\xi(X, \Upsilon; \tilde{l}(\xi))$, on distribution functionals of interest θ is
$$\Delta'_\theta(F) = \theta(F) - \theta(F^l).$$

Household income generation process

- ▶ **Tax-benefit transformation:** $m^\xi(X, \Upsilon; \tilde{tb}(\xi))$
 - ▶ import the regression parameters determining the level/eligibility of public transfers
 - ▶ import the parameters if the EUROMOD tax-benefit calculator
 - ▶ impact on θ is $\Delta_\theta^{tb}(F) = \theta(F^{tb}) - \theta(F)$.

Household income generation process

- ▶ **Demographic transformation:** $F^d = m(\tilde{X}(X), \Upsilon; \xi)$
 - ▶ re-weighting techniques in the tradition of DiNardo et al. (1996): age, gender, migrant status, marital status, education, number of children
 - ▶ impact of a demographic transformation, $m^\xi(X, \Upsilon; \xi) - m^\xi(\tilde{X}(X), \Upsilon; \xi)$, on distribution functionals of interest θ is $\Delta_\theta^d(F) = \theta(F) - \theta(F^d)$.

Methods#8

'Direct effects' (Biewen and Juhasz, 2012; Biewen, 2014) - to reduce issues of path-dependence:

- ▶ assess the impact of each factor from the same initial benchmark distribution:

- ▶ $D_{\theta}^k(F^A, F^B) = \theta(F^A) - \theta(F_A^k)$

- ▶ F_A^k = counterfactual distribution obtained by applying one particular transformation k (e.g. tax-benefit systems swap)

- ▶ $\Delta_{\theta}(F^A, F^B) =$

$$D_{\theta}^l(F^A, F^B) + D_{\theta}^r(F^A, F^B) + D_{\theta}^{tb}(F^A, F^B) + D_{\theta}^d(F^A, F^B) + R_{\theta}(F^A, F^B) + \Delta_{\theta}^{\gamma}(F^A, F^B)$$

- ▶ $R_{\theta}(F^A, F^B) = \theta(F^A) - \theta(F_A^{pop^d})$

- ▶ Unexplained effect

$$\theta(F^A) - \theta(F^B) - \left(\sum_{k \in \{l, r, tb, d\}} D_{\theta}^k(F^A, F^B) \right)$$

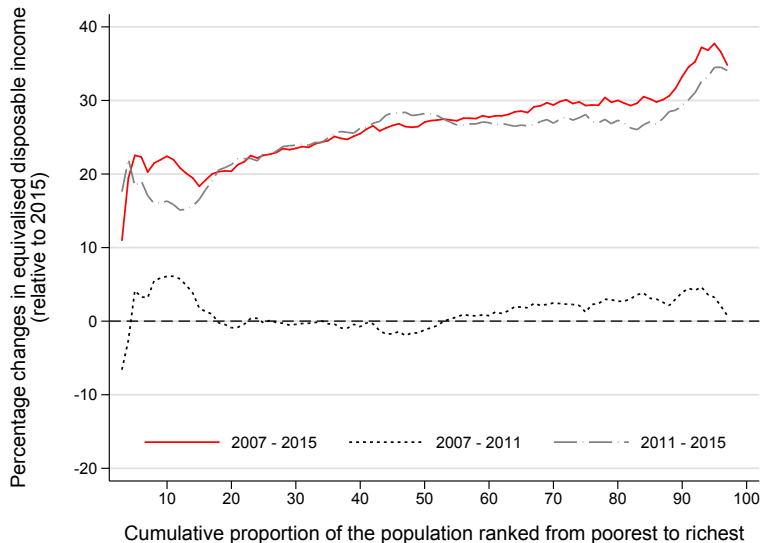
- ▶ $R_{\theta}(F^A, F^B) =$

Data

- ▶ EUROMOD standardized datasets based on European Union Statistics of Income and Living Conditions (EU-SILC) database
- ▶ 2007, 2011, 2015
- ▶ Outcome income measure : equivalized household disposable income (LIS equivalence scale - square root of the household size)

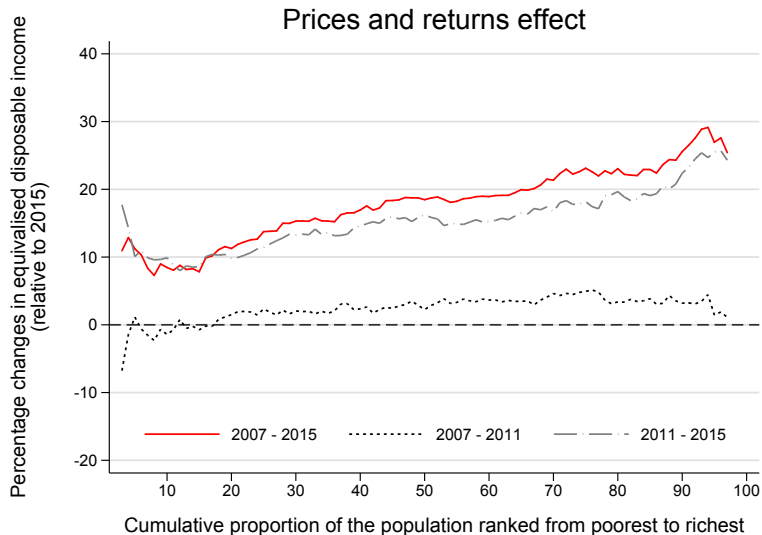
Results#1: Accounting for changes in income inequality

Total change



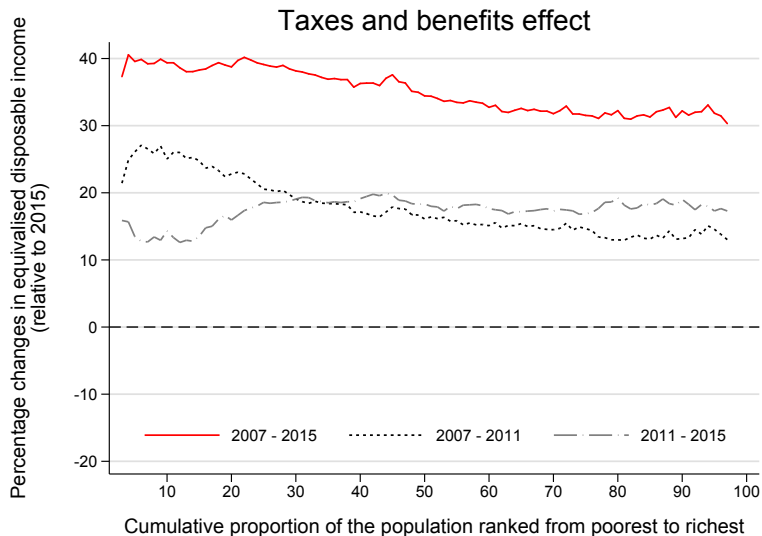
Results#2: Accounting for differences in income inequality

Counterfactual distribution Price and Returns



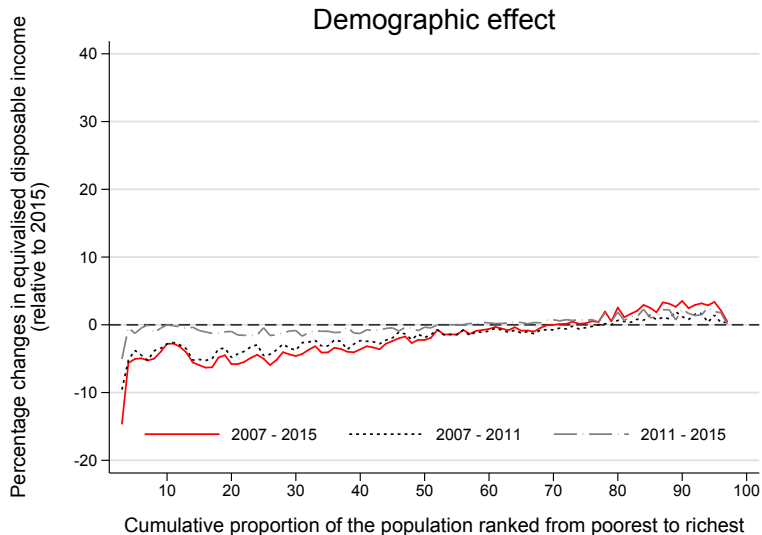
Results#3: Accounting for differences in income inequality

Counterfactual distribution Taxes and Benefits



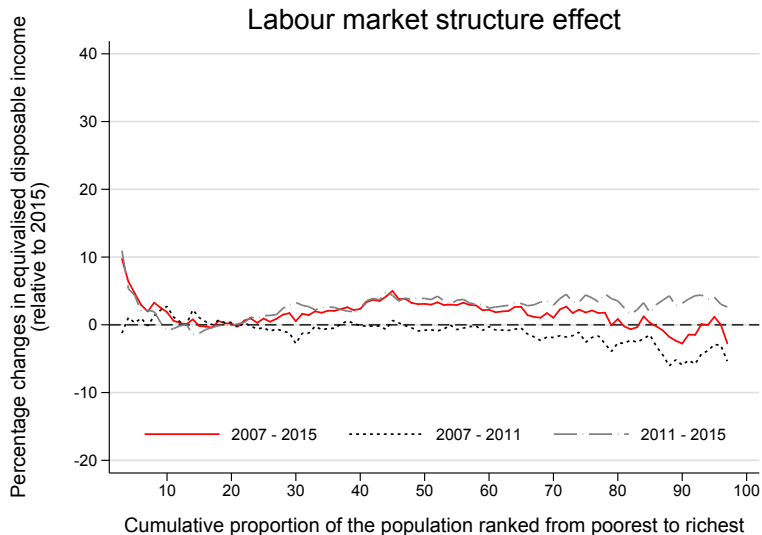
Results#4: Accounting for differences in income inequality

Counterfactual distribution Demographics



Results#5: Accounting for differences in income inequality

Counterfactual distribution Labour Market Structure



Results#6

	2007-2015	2007-2011	2011-2015
Gini Market Income			
Total change	0.042	0.040	0.002
Labour Market Structure	-0.015	-0.015	-0.001
Returns	0.006	-0.007	0.013
Tax-benefit system	0.002	0.004	-0.001
Demographics	0.020	0.017	0.003
Interactions	0.003	0.009	-0.006
Unexplained	0.026	0.033	-0.007
Gini Disposable Income			
Total change	0.021	-0.008	0.029
Labour Market Structure	-0.012	-0.017	0.005
Returns	0.030	-0.002	0.032
Tax-benefit system	-0.020	-0.021	0.000
Demographics	0.013	0.008	0.006
Interactions	0.017	0.002	0.016
Unexplained	-0.008	0.022	-0.030
Net Redistribution			
Total change	0.021	0.048	-0.026
Labour Market Structure	-0.003	0.003	-0.006
Returns	-0.024	-0.005	-0.019
Tax-benefit system	0.023	0.024	-0.001
Demographics	0.006	0.009	-0.003
Interactions	-0.014	0.007	-0.021
Unexplained	0.034	0.010	0.023

Columns indicate the time period over which statistics were calculated (e.g. 2007-2011 refers to the change from 2007 to 2011).

Main conclusions

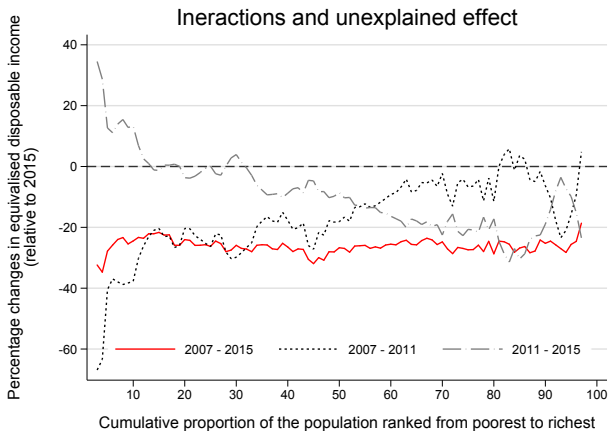
- ▶ Changes in the tax and benefit system successfully accommodated a rapid rise in market income inequality due to the crisis during the 2007-2011...
- ▶ but did less during the subsequent years when the rising returns in the labour market significantly increased the disposable income inequality
- ▶ Demographic effects contribute significantly to the rising inequalities in Lithuania

Thank you

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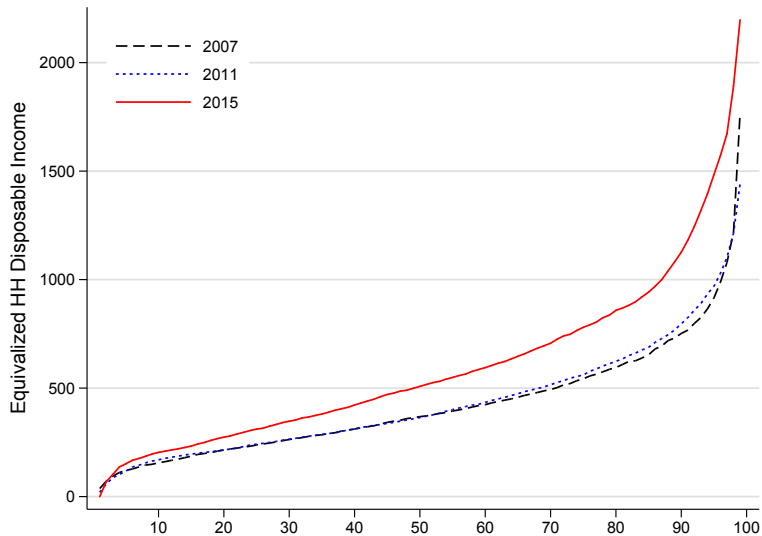
Results: Accounting for differences in income inequality

Counterfactual distribution (f) Unexplained and interactions



Results

Incomes barely changed from 2007-2011, but rose rapidly thereafter.



Methods#8

The decomposition procedure aims to decompose the total difference between the income distributions in two periods, described by some summary index measure $\theta(F)$:

- ▶ $\Delta_{\theta}(F^A, F^B) = \theta(F^B) - \theta(F^A)$

into a number of factors that capture the contribution of different components of the model to the gap:

- ▶ $\Delta_{\theta}(F^A, F^B) = \sum_{k=1}^K D_{\theta}^k(F^A, F^B).$

- ▶ $k =$ TB system, market composition, returns, demographics.