The changing nature of work and inequality in Brazil (2003–19)

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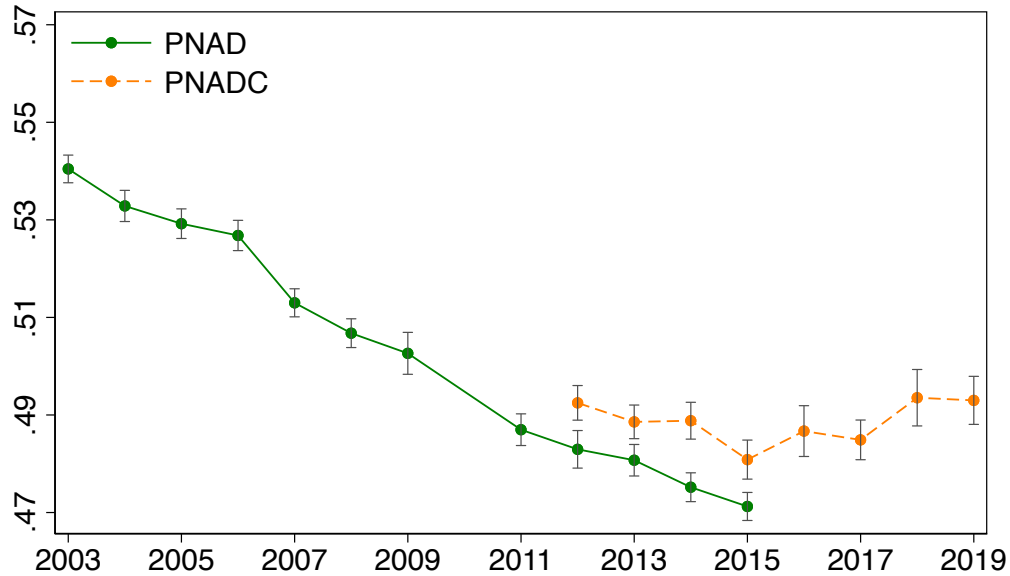
Earnings Inequality in Brazil in the 21st Century



Changes in earnings inequality in Brazil:

- Increased schooling and change in returns (Barros et al, 2010)
- Minimum wage (Engbom and Moser, 2022; Haanwinckel, 2020)
- Experience premium (Ferreira et al, 2021)
- Reduction in "gaps": Across firms; formality, regional, gender, racial (Alvarez, et al, 2018; Ulyssea, 2018; Dix-Carneiro and Kovak, 2017; Morchio and Moser, 2020; Gerard et al 2021)

What was the **role of occupations**?

Objectives:

- Document shifts in the employment structure in Brazil
- Evaluate how occupations and task content affect earnings polarization and inequality changes
- Contrast the importance of task content with other factors

Main findings

- Strong association between occupations average earnings and their task content
  - Between-jobs inequality account for half of overall inequality
- Some evidence of earnings polarization, but not employment polarization
  - More related to pro-poor and pro-rich growth rather than polarization itself
- RTI and inequality:
  - Composition effect: inequality reducing in the first period, enhancing in the second
  - Structure effect: Null or reduction in inequality
  - Overall RTI effect small compared to education and other factors

Outline

Data

Methodology

The Brazilian Context

Polarization in Brazil? Not really

Gini: Aggregate RIF Decomposition

Data

Brazilian National Household Survey (PNAD and PNADC)

- Nationally representative
- 2003-2019, with focus on 2003/04, 2012/13 and 2018/19
- Workers in the formal and informal sectors
- 15-64 years old, male and female, rural and urban employment

Brazilian Occupation Classification

- Use ISCO-88 classification
- Taks content based on O*NET (2003) and Lewandowski et. al. (2019, 2020)
- Task content from Brazil relies on extrapolation from other countries

Methodology

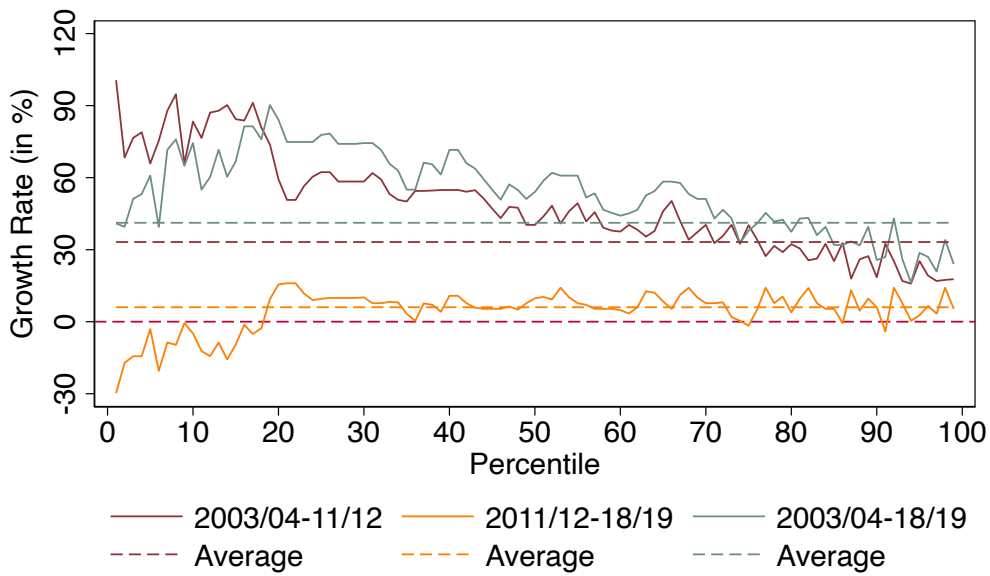
Three different exercises:

- Employment and earnings polarization
  - Goos and Manning (2007); Sebastian (2018) Details
- Importance of occupations in overall inequality
  - Shappley Decomposition (Shorrocks, 2013; Gradin and Schotte, 2020) Details
- Decomposition of changes in inequality on structure and composition effects
  - RIF Decomposition (Firpo et al, 2018) Details

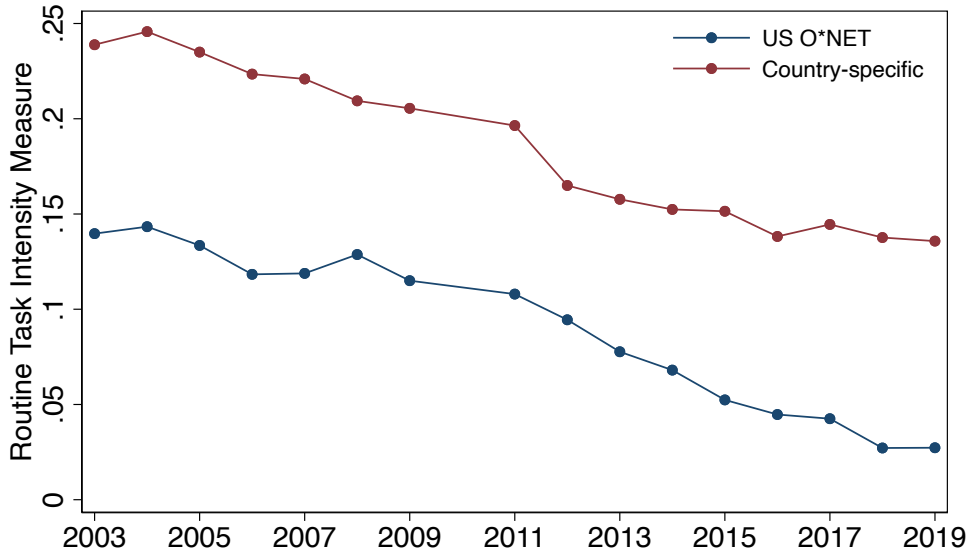
The Brazilian Context: Changes in inequality

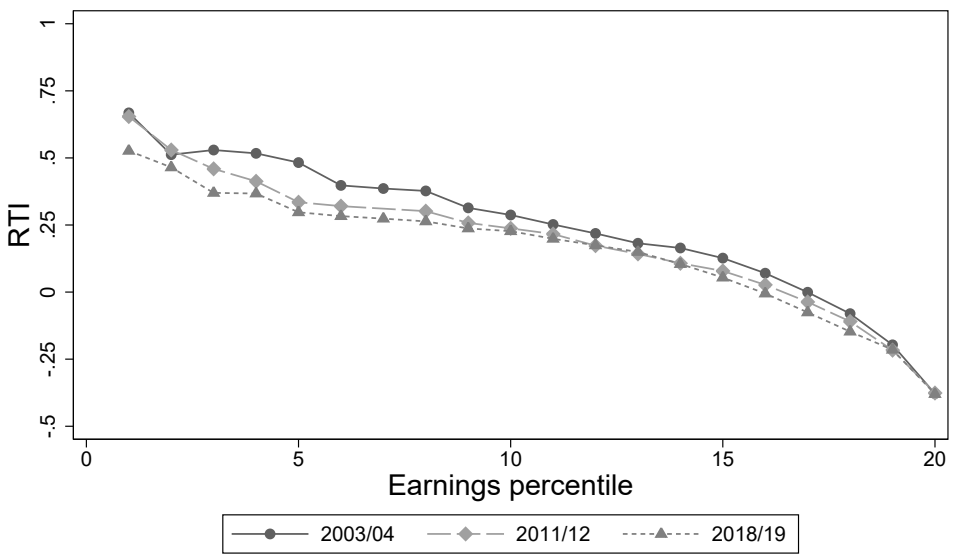
Table: Inter-quantile ratios and summary inequality indices

	Inter-quantile ratios				Summary indices		
	2003/04	2011/12	2018/19		2003/04	2011/12	2018/19
ln(q90)-ln(q10)	2.46	2.04	2.31	Var (log earn)	0.966	0.769	0.892
ln(q90)-ln(q50)	1.36	1.16	1.18	Gini (log earn)	0.106	0.085	0.089
ln(q50)-ln(q10)	1.10	0.88	1.12	Gini (earn)	0.536	0.485	0.493



The Brazilian Context: Changes in RTI





Polarization: Earnings as independent variable

	Log change in employment share			Change in log mean earnings		
	(1) 2003/04–2011/12	(2) 2011/12–2018/19	(3) 2003/04–2018/19	(4) 2003/04-2011/12	(5) 2011/12–2018/19	(6) 2003/04–2018/19
Panel A: Lagged earnings						
(Log) mean earnings (t–1)	1.069**	–2.722**	–0.909	–0.631***	–2.625***	–2.384***
	(0.407)	(1.344)	(1.054)	(0.117)	(0.735)	(0.512)
Sq. (log) mean earnings (t–1)	–0.084**	0.224*	0.086	0.044***	0.207***	0.189***
	(0.039)	(0.117)	(0.099)	(0.011)	(0.062)	(0.046)
Constant	–3.294***	8.074**	2.237	2.409***	8.270***	7.706***
	(1.026)	(3.815)	(2.741)	(0.300)	(2.178)	(1.417)
Observations	78	78	78	78	78	78
Adjusted R^2	0.179	0.059	–0.015	0.647	0.422	0.669

Occupation Percentile

Polarization: RTI as independent variable

	Log change in employment share			Change in log mean earnings		
	(1) 2003/04–2011/12	(2) 2011/12–2018/19	(3) 2003/04–2018/19	(4) 2003/04-2011/12	(5) 2011/12–2018/19	(6) 2003/04–2018/19
*Panel B: RTI - O*NET measures*						
O*NET RTI	–0.149*	0.034	–0.050	0.153***	0.027	0.180***
	(0.075)	(0.104)	(0.122)	(0.024)	(0.049)	(0.061)
Sq. O*NET RTI	–0.161	0.366	0.067	0.128**	0.277	0.405
	(0.257)	(0.256)	(0.306)	(0.056)	(0.228)	(0.265)
Constant	0.141	–0.229*	–0.122	0.227***	0.038	0.264***
	(0.122)	(0.121)	(0.166)	(0.022)	(0.086)	(0.092)
Observations	78	78	78	78	78	78
Adjusted R^2	0.019	0.045	–0.025	0.540	0.118	0.317
Panel C: RTI country-specific measures						
RTI	–0.161**	–0.028	–0.189	0.168***	0.127	0.296***
	(0.075)	(0.141)	(0.166)	(0.030)	(0.079)	(0.090)
Sq. RTI	–0.310**	0.110	–0.199	0.080	0.431**	0.510*
	(0.139)	(0.285)	(0.285)	(0.084)	(0.195)	(0.258)
Constant	0.083	–0.096	–0.014	0.273***	0.006	0.278***
	(0.063)	(0.065)	(0.086)	(0.027)	(0.033)	(0.049)
Observations	78	78	78	78	78	78
Adjusted R^2	0.182	–0.024	0.017	0.387	0.282	0.430

Between- and Within-Occupation Inequality

Table: Gini index decomposed into inequality between and within occupations

	Actual			Shares constant			Means constant		
	2003/04	2011/12	2018/19	2003/04	2011/12	2018/19	2003/04	2011/12	2018/19
Panel A: Gini index decomposition									
Gini (G)	.537	.485	.493	.537	.49	.497	.537	.508	.507
Between-occupation (B)	.251	.215	.216	.251	.192	.201	.251	.222	.225
% (B/G)	46.8	44.2	43.7	46.8	39.2	40.4	46.8	43.67	44.45
Within-occupation (W)	.286	.271	.278	.286	.298	.296	.286	.286	.282
% (W/G)	53.2	55.8	56.3	53.2	60.8	59.6	53.2	56.3	55.6
Panel B: Concentration index based on RTI and Gini index between occupations									
Gini Between-occupations (B)	.391	.322	.313	.391	.337	.316	.391	.384	.372
Concentration index									
RTI (country-specific) (C)	.362	.294	.278	.362	.313	.277	.362	.334	.321
% (C/B)	92.4	91.4	88.7	92.4	92.8	87.5	92.4	87	86.3
RTI (O*NET) (O)	.357	.287	.288	.357	.305	.298	.357	.33	.317
% (O/B)	91.1	89.4	92.1	91.1	90.5	94.3	91.1	85.9	85.3

RIF Decomposition

Table: RIF Decomposition of Gini ($\times 100$)

	Country-specific RTI						O*NET RTI					
	(1) 2003/04-2011/12		(2) 2011/12-2018/19		(3) 2011/12-2018/19		(4) 2003/04-2011/12		(5) 2011/12-2018/19		(6) 2011/12-2018/19	
Overall												
Gini, period 1	44.72***	(0.14)	46.94***	(0.17)	46.94***	(0.17)	44.72***	(0.14)	46.94***	(0.17)	46.94***	(0.17)
Counterfactual	49.78***	(0.12)	47.18***	(0.19)	51.63***	(0.14)	49.67***	(0.12)	47.17***	(0.18)	51.65***	(0.14)
Gini, period 2	49.76***	(0.10)	44.72***	(0.14)	49.76***	(0.10)	49.76***	(0.10)	44.72***	(0.14)	49.76***	(0.10)
Difference	-5.04***	(0.16)	2.22***	(0.23)	-2.82***	(0.21)	-5.04***	(0.16)	2.22***	(0.23)	-2.82***	(0.21)
Total composition	0.02	(0.07)	2.46***	(0.09)	1.87***	(0.10)	-0.08	(0.07)	2.45***	(0.08)	1.89***	(0.10)
Pure composition	1.16***	(0.08)	4.05***	(0.10)	6.74***	(0.15)	1.03***	(0.08)	4.05***	(0.10)	6.70***	(0.15)
Specif. error	-1.14***	(0.05)	-1.59***	(0.05)	-4.86***	(0.10)	-1.11***	(0.05)	-1.60***	(0.05)	-4.80***	(0.10)
Total structure	-5.06***	(0.17)	-0.24	(0.25)	-4.69***	(0.23)	-4.96***	(0.17)	-0.23	(0.24)	-4.71***	(0.23)
Pure structure	-5.08***	(0.17)	-0.18	(0.25)	-4.60***	(0.23)	-4.95***	(0.16)	-0.22	(0.24)	-4.64***	(0.23)
Rwg. error	0.02**	(0.01)	-0.06***	(0.01)	-0.09***	(0.02)	-0.00	(0.01)	-0.01	(0.01)	-0.07***	(0.02)

Gini: Detailed RIF Decomposition

	Country-specific RTI						O*NET RTI					
	(1) 2003/04-2011/12		(2) 2011/12-2018/19		(3) 2011/12-2018/19		(4) 2003/04-2011/12		(5) 2011/12-2018/19		(6) 2011/12-2018/19	
Pure composition												
Education	1.87***	(0.06)	2.88***	(0.08)	6.05***	(0.14)	1.73***	(0.06)	2.64***	(0.08)	5.77***	(0.13)
Age	0.18***	(0.02)	0.28***	(0.02)	0.37***	(0.03)	0.17***	(0.02)	0.27***	(0.02)	0.34***	(0.03)
Gender	-0.05***	(0.01)	-0.09***	(0.01)	-0.12***	(0.01)	-0.04***	(0.01)	-0.09***	(0.01)	-0.12***	(0.01)
Race	0.07***	(0.01)	-0.02**	(0.01)	0.15***	(0.03)	0.08***	(0.01)	-0.01	(0.01)	0.17***	(0.03)
Formality	-0.73***	(0.03)	0.60***	(0.05)	0.01	(0.06)	-0.80***	(0.03)	0.58***	(0.04)	-0.05	(0.06)
RTI	-0.19***	(0.03)	0.41***	(0.03)	0.27***	(0.04)	-0.11***	(0.03)	0.67***	(0.03)	0.59***	(0.04)
Specif. error												
Education	-2.86***	(0.10)	-3.38***	(0.17)	-8.00***	(0.19)	-2.89***	(0.10)	-3.47***	(0.16)	-8.11***	(0.21)
Age	-0.18***	(0.04)	0.02	(0.06)	-0.39***	(0.10)	-0.19***	(0.04)	-0.02	(0.06)	-0.42***	(0.10)
Gender	-0.01	(0.04)	0.41***	(0.07)	0.45***	(0.08)	0.02	(0.04)	0.40***	(0.06)	0.50***	(0.08)
Race	-0.13***	(0.05)	-0.26***	(0.07)	0.15	(0.12)	-0.15***	(0.04)	-0.27***	(0.07)	0.08	(0.12)
Formality	-0.43***	(0.04)	-1.32***	(0.06)	-1.69***	(0.09)	-0.42***	(0.03)	-1.28***	(0.06)	-1.67***	(0.09)
RTI	-0.05	(0.03)	-0.23***	(0.06)	-0.65***	(0.08)	0.33***	(0.04)	0.28***	(0.06)	0.53***	(0.09)
Constant	2.52***	(0.12)	3.18***	(0.19)	5.28***	(0.24)	2.19***	(0.13)	2.77***	(0.19)	4.28***	(0.29)
Pure structure												
Education	0.06	(0.30)	1.05***	(0.37)	1.63***	(0.31)	-0.04	(0.29)	1.09***	(0.36)	1.43***	(0.32)
Age	0.59***	(0.17)	0.08	(0.25)	0.98***	(0.23)	0.57***	(0.17)	0.16	(0.24)	1.03***	(0.23)
Gender	-0.21	(0.16)	-0.48*	(0.26)	-0.75***	(0.23)	-0.12	(0.16)	-0.50**	(0.25)	-0.71***	(0.23)
Race	-1.10***	(0.17)	-0.13	(0.21)	-1.85***	(0.24)	-1.03***	(0.17)	-0.13	(0.21)	-1.75***	(0.23)
Formality	0.67***	(0.16)	0.20	(0.26)	0.70***	(0.25)	0.68***	(0.16)	-0.11	(0.26)	0.40	(0.25)
RTI	-0.17	(0.15)	0.17	(0.20)	0.28	(0.18)	-1.44***	(0.12)	0.98***	(0.16)	-0.43***	(0.16)
Constant	-4.93***	(0.49)	-1.07**	(0.53)	-5.59***	(0.54)	-3.58***	(0.51)	-1.71***	(0.53)	-4.61***	(0.58)

Aggregate decomposition by quantile: 2003/04 - 2011/12

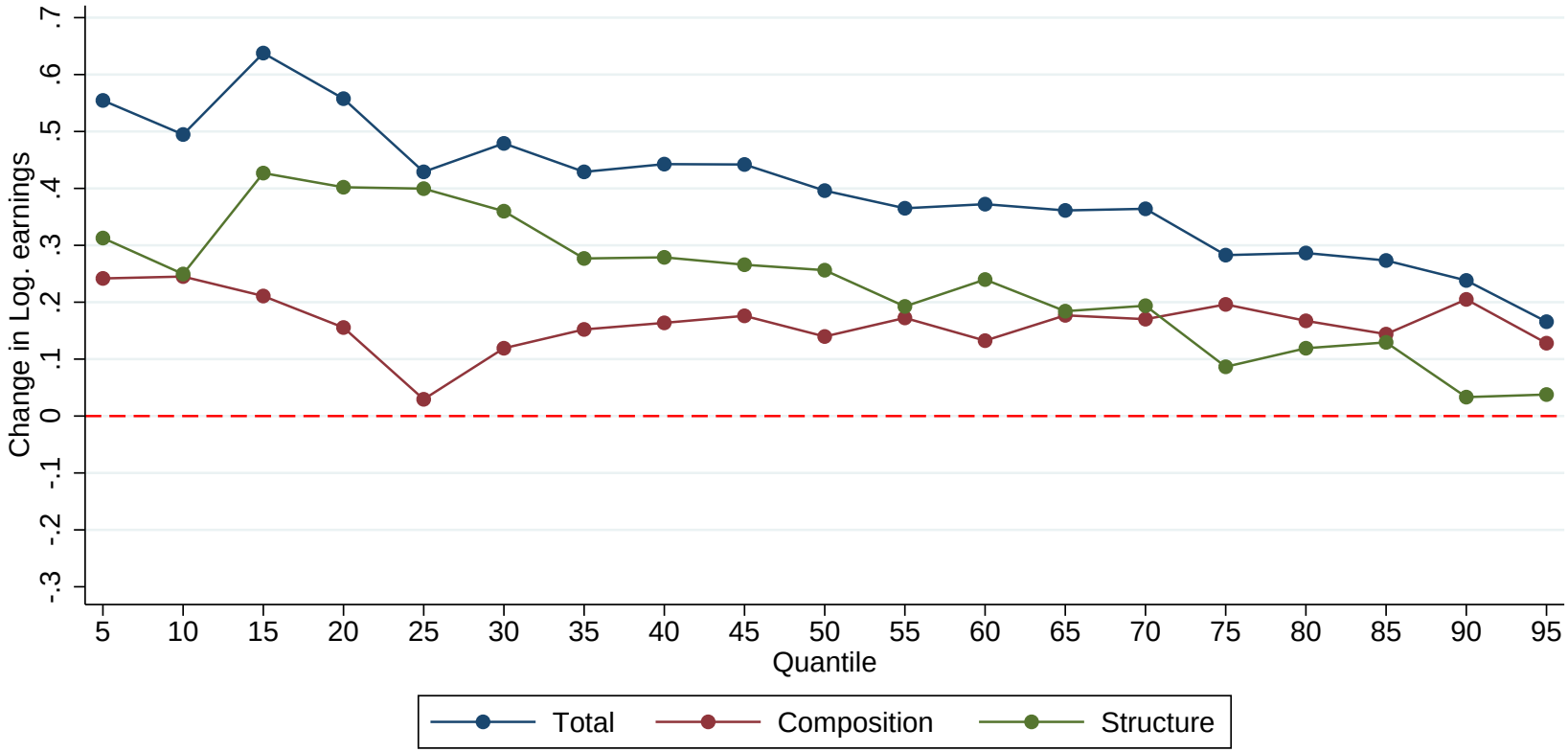


Figure: 2003/04 and 2012/13

Aggregate decomposition by quantile: 2011/12 - 2018/19

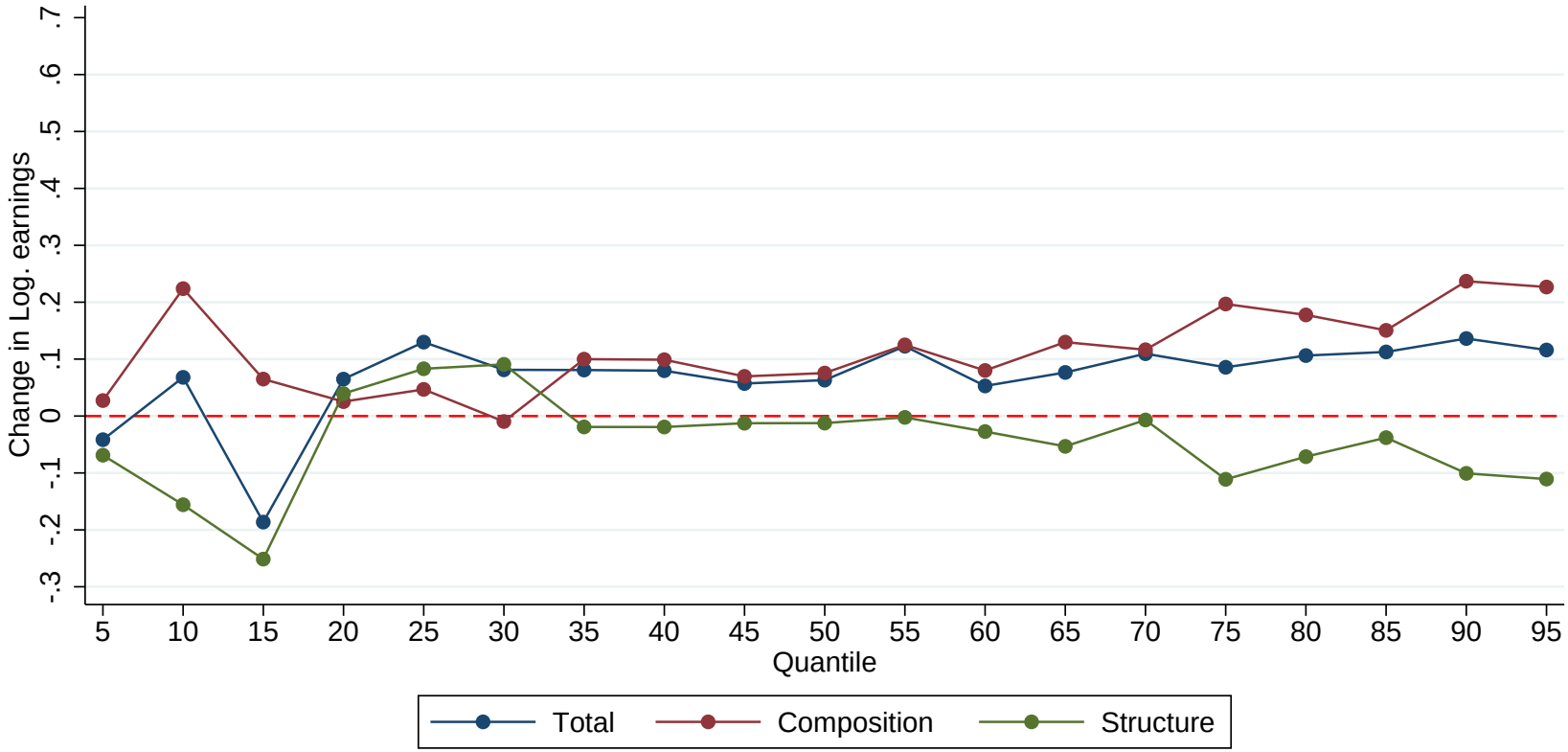


Figure: 2011/12 and 2018/19

Detailed Decomposition: Pure Structure Effects, 2003/04 and 2011/12

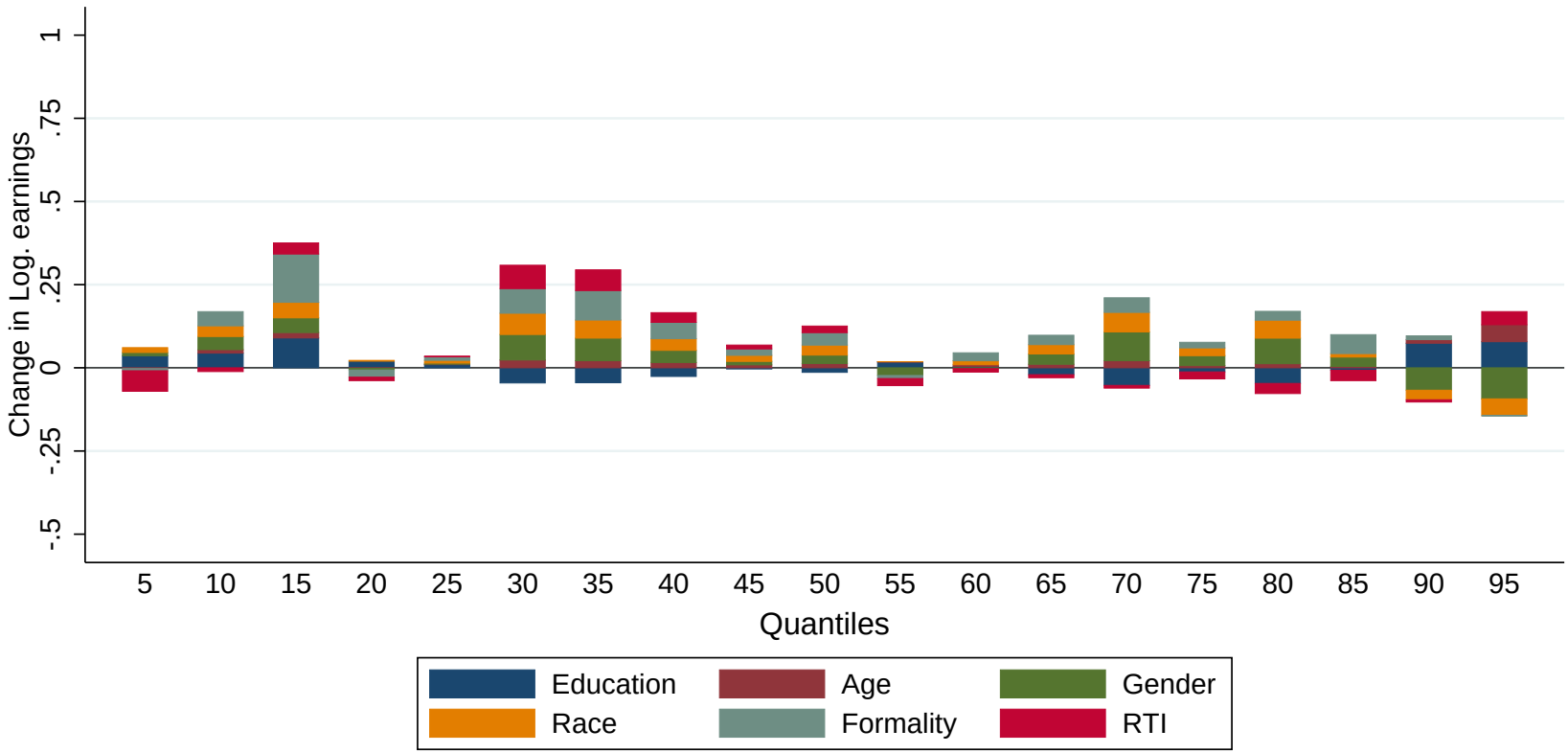


Figure: 2003/04 and 2011/12

Detailed Decomposition: Pure Structure Effects, 2011/12 and 2018/19

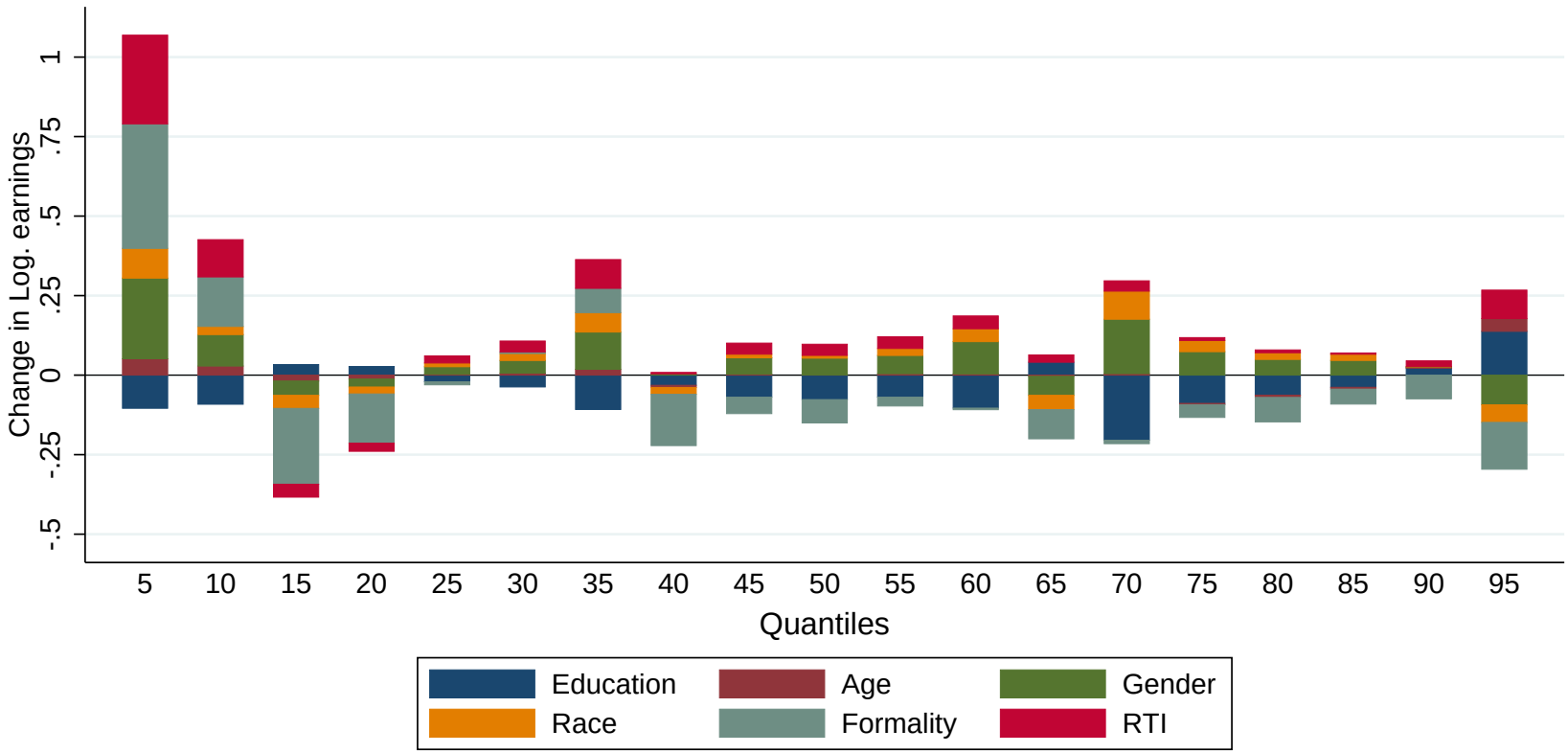


Figure: 2011/12 and 2018/19

Conclusion

- No evidence of earnings or employment polarization
  - More like pro-poor and pro-rich growth
- Reduction in inequality driven by structure effects
- Increase in inequality driven by composition effects
- Small overall role of RTI:
  - Reduction in RTI increased inequality between 2003 and 2019 (composition)
  - Structure effects: inequality-reducing in the first period and inequality-enhancing in the second

Earnings Growth by Occupation Percentile

Back

Polarization: Methodology

- Individuals aggregated at the three-digit level of ISCO-88
- Regress changes in log employment shares and log mean weekly earning on initial log mean weekly earnings and its square:

$$\Delta \log (y_{j,t}) = \varphi_0 + \varphi_1 \log (x_{j,t-1}) + \varphi_2 \log (x_{j,t-1})^2 + \varepsilon_{j,t}$$

- Similarly, replace log of mean earnings and its square with initial RTI and its square (Sebastian, 2018).
- Polarization implies hollowing middle: **squared term should be positive!**

Back

Shorrocks Decomposition: Methodology

Shorrocks decomposition: overall Gini index into a between and within occupation

$$G = G_B + G_W$$

$$G_B = \frac{1}{2}\left[G\left(y_b\right) + G - G\left(y_w\right)\right]$$
$$G_W = \frac{1}{2}\left[G\left(y_w\right) + G - G\left(y_b\right)\right]$$

- y_b: earnings of all workers replaced by the average of the occupation
- y_w: earnings vector is re-scaled so occupations all have the same average earnings.
- $G = G(y)$

Back

RIF Decomposition: Methodology

Reweighting approach

$$\begin{aligned}\Delta_o^v &= \Delta_S^v \quad + \quad \Delta_X^v \\ &= (\gamma_1 - \gamma_c) X_{i1} + \gamma_c (X_{i1} - X_{ic}) + \gamma_0 (X_{ic} - X_{i0}) + (\gamma_c - \gamma_0) X_{ic} \\ &= \Delta_{S,p}^v \quad + \quad \Delta_{S,e}^v \quad + \quad \Delta_{X,p}^v \quad + \quad \Delta_{X,e}^v\end{aligned}$$

Back