Cross Sectional Facts for Macroeconomists: Wage, Income and Consumption Inequality in Turkey

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December 17th, 2018

CEE 2018 Annual Conference

Boğaziçi University

Motivation

- Despite its sizable economic activity and high degree of economic inequality, Turkey lacks *cross-country comparable* inequality estimate series. Income Inequality by Country
  - variable definitions, equivalization and sampling procedures, choice of inequality metrics, ...
- *RED*: *Cross-Sectional Facts for Macroeconomists* special issue explores 8 developed and developing economies with a cross-country comparable methodology following standardized guidelines.
  - US, Canada, UK, Germany, Sweden, Italy, Spain, Russia, and Mexico
- We adhere to the same guidelines so as to explore the evolution of economic inequality in Turkey over the 2002-2016 period via *TurkStat*'s *HBS* and *SILC* data sets.
  - wage, income and consumption inequality

Related Literature

- Economic inequality in Turkey
  - A large body of literature on *regional income differences and convergence*: Altınbaş et al. (2002); Gezici and Hewings (2004); Yıldırım and Öcal (2006); Kırdar and Saraçoğlu (2006) and Sarı and Güven (2007)
  - **Wage inequality**: Ekşi and Kırdar (2015): 2002–2011 via *HBS*; Bakış and Polat (2015): 2000–2010 via *HLFS*; Aktuğ et al. (2017): 2002–2014 via *HBS*
  - **Income inequality**: Filiztekin (2015): 1994 & 2003–2011 via *HBS*; Candaş et al. (2010): 2006 & 2007 via *SILC*; Alvaredo et al. (2018): 1994 & 2002–2016 via *HBS*; Torul and Öztunalı (2018): Modified Aiyagari (1994) model to infer Turkey's recent *wealth* distribution
  - **Consumption inequality**: Duygan and Güner (2006): 1994 & 2002 via *HICES*
- *RED*: *Cross-Sectional Facts for Macroeconomists* (2010):
  - Heathcote et al. (2010): US over 1980–2006; Brzozowski et al. (2010): Canada over 1978–2006; Blundell and Etheridge (2010): UK over 1978–2005; Fuchs-Schündeln et al. (2010): Germany over 1983–2003; Jappelli and Pistaferri (2010): Italy over 1987–2006; Pijoan-Mas and Sánchez-Marcos (2010): Spain over 1985-1996; Gorodnichenko et al. (2010): Russia over 1998–2005; Binelli and Attanasio (2010): Mexico over 1989–2002; Domeij and Flodén (2010): Sweden over 1990–2001

Contributions

First paper...

- to investigate the evolution of Turkey's economic inequality with a cross-country comparable methodology
  - following standardized guidelines to unveil where Turkey stands over time
  - using multiple data sets and robustness exercises to investigate wage, income and consumption inequality jointly to reach rigorous conclusions
- to study the time-series properties of Turkey's inequalities
  - unveiling the cyclicality properties of inequality estimates
  - exploring the role of minimum wage

Main results

- Wage, income and consumption inequality all exhibit *downward* time-trends over the sample period 2002–2016
  - Rapid minimum wage growth is decisive
- Determinants of wage exhibit stark differences
  - Education premium increases first and stabilizes around early 2000-levels
  - Gender and experience premium, and residual wage inequality decreases over time
- Wage inequality is *countercyclical* whereas income and consumption inequality is *acyclical*
  - Moderately *procyclical* entrepreneurial income
- Turkey's economic inequality resembles that of the Russian Federation most

Data

TurkStat's micro-data sets:

- Primary data set: Household Budget Survey (*HBS*)
  - information about labor earnings, income and consumption both at individual and household level
  - covers the 2002–2016 period
  - 8,500–12,000 observations per year
- Secondary data set: Survey of Income and Living Conditions (*SILC*)
  - information about labor earnings, income but *not* consumption
  - covers the 2005–2016 period
  - 11,000–23,000 observations per year

Response Rates by Year

Methodology

For *wage* calculations, following *RED* guidelines:

- Nominal variables $\rightarrow$ real variables via Turkish *CPI*
- Concentrate only on working age individuals (25–60) who report hours worked & whose annual earnings are above ₺113
- Annual earnings defined as follows:

$$ae_{i,t} = nw_{i,t} + rw_{i,t} + p_{i,t} + b_{i,t} + \alpha^{TUR}(nse_{i,t} + rse_{i,t} + ag_{i,t})$$

  - where $ae_{i,t}$: annual earnings; $nw_{i,t}$ and $rw_{i,t}$: annual cash and other real payments, $p_{i,t}$ and $b_{i,t}$: annual premiums and bonuses received from employers, α^{TUR}: the share of labor income in national income, $nse_{i,t}$ and $rse_{i,t}$: cash and other real incomes from self-employment, and $ag_{i,t}$ denotes net agricultural income.

- Wage: $w_{i,t} = \frac{ae_{i,t}}{ah_{i,t}}$
  - where $ah_{i,t}$: annual hours worked

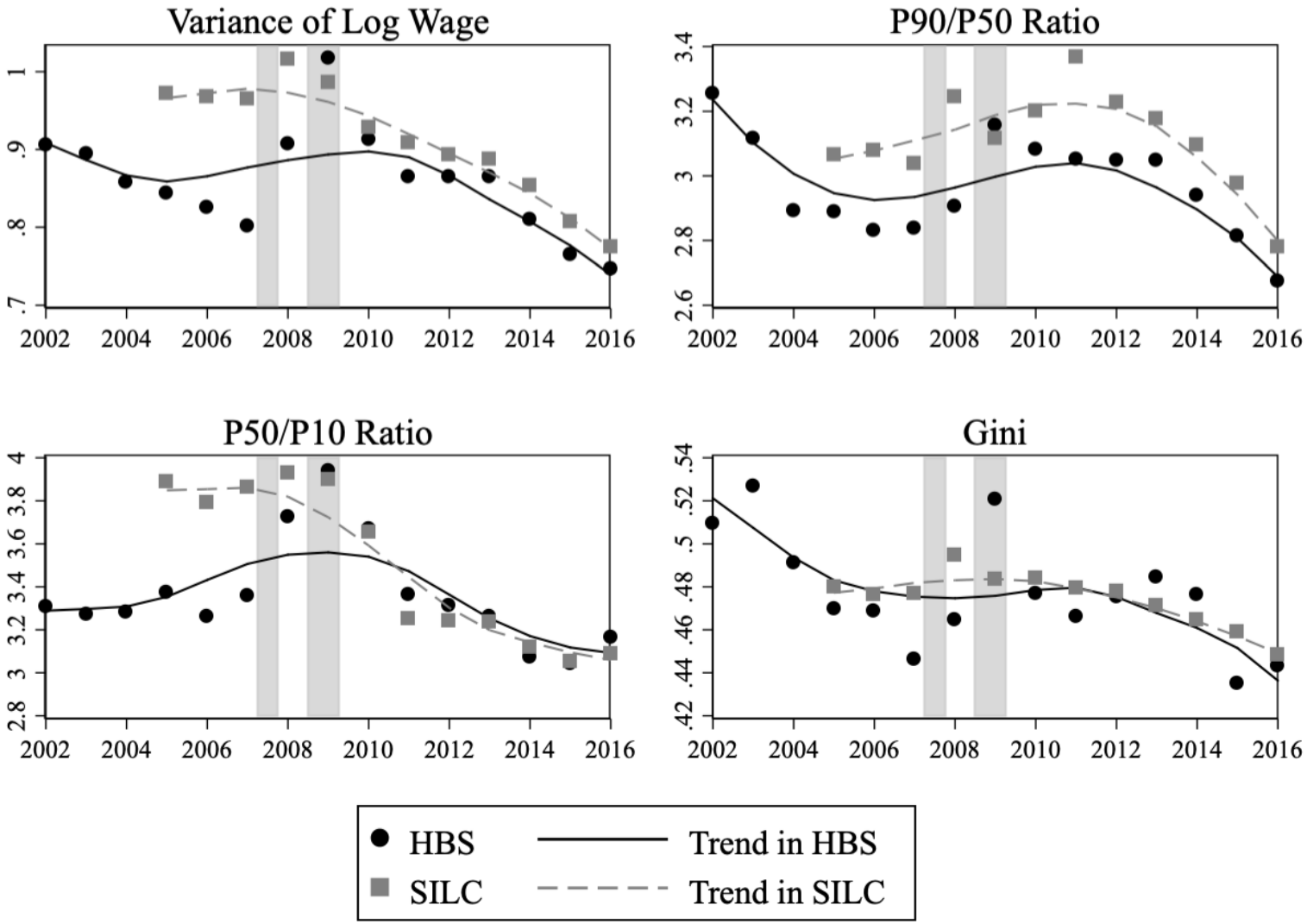
Methodology (cont'd)

- Gender Premium$_t = \frac{\overline{w_t^m}}{\overline{w_t^f}}$; Education Premium$_t = \frac{\overline{w_t^c}}{\overline{w_t^h}}$; Experience Premium$_t = \frac{\overline{w_t^o}}{\overline{w_t^y}}$
  - where $\overline{w_t^m}$ and $\overline{w_t^f}$: average wages of **m**ales and **f**emales; $\overline{w_t^c}$ and $\overline{w_t^h}$: average wages of **c**ollege graduate males and **h**igh school graduate males; $\overline{w_t^o}$ and $\overline{w_t^y}$ average wages of (**o**lder) 45-55-year-old and (**y**ounger) 25-35-year-old males
- For income and consumption, unit of analysis: *household*
  - Equivalized household income via *OECD* equivalence scale
- Report four inequality measures:
  - variance of natural logarithm, percentile ratios (`P90/P50` and `P50/P10`), and the Gini coefficient, along with the variance of *residuals:* $\widehat{\epsilon_{i,t}}$

$$\log(y_{i,t}) = c_t + \beta_1 D^g_{i,t} + \beta_2 D^e_{i,t} + \beta_3 D^f_{i,t} + \beta_4 D^a_{i,t} + \beta_5 D^{ce}_{i,t} + \epsilon_{i,t}$$

  - where D^g: gender dummy; D^e vector of 11 education dummies, D^f vector of dummies for family decompositions, D^a: vector of 7 age category dummies and D^{ce}: vector of 4 dummies for educational attainment of couples.

Wage Inequality

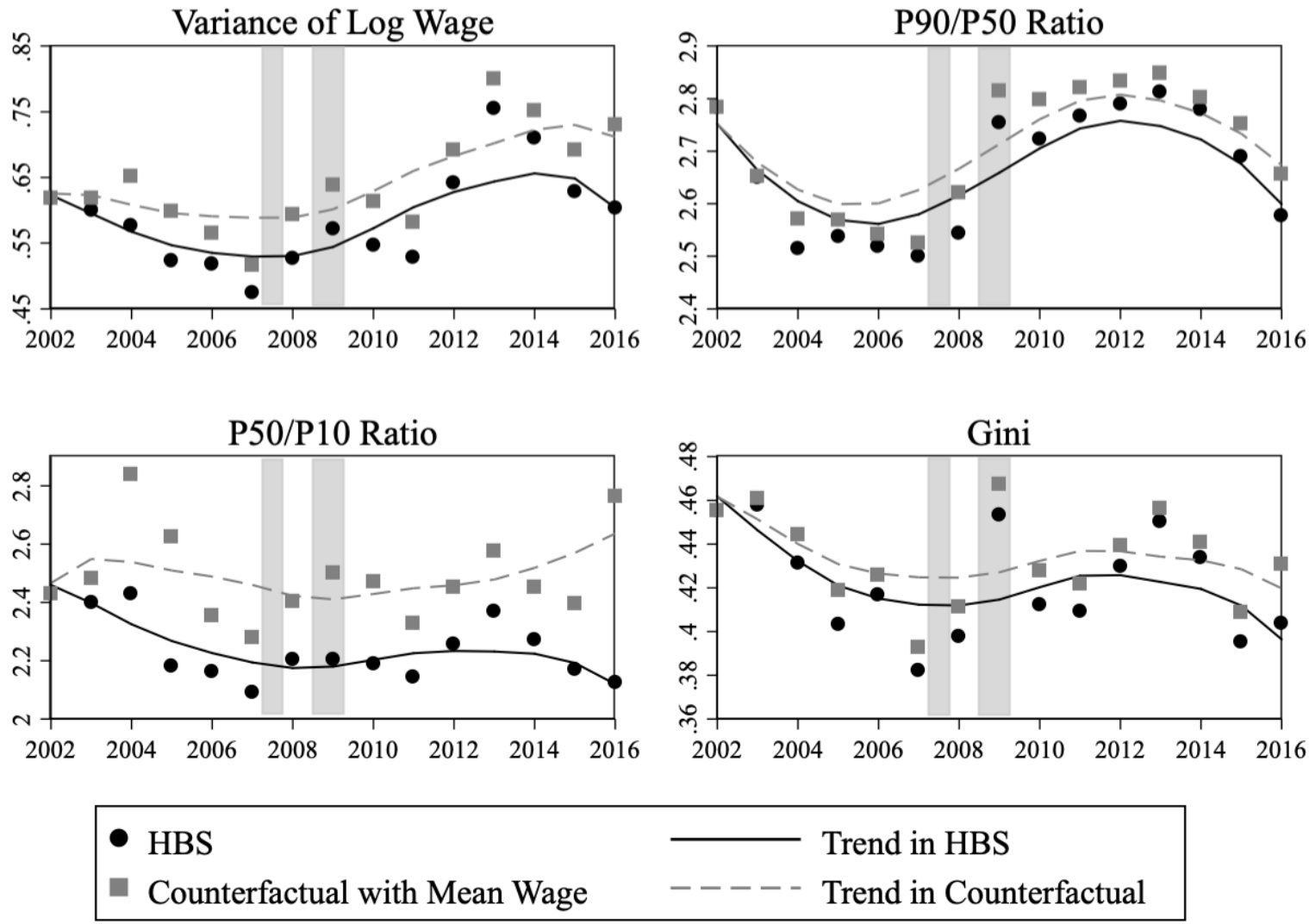


Wage Inequality (cont'd)

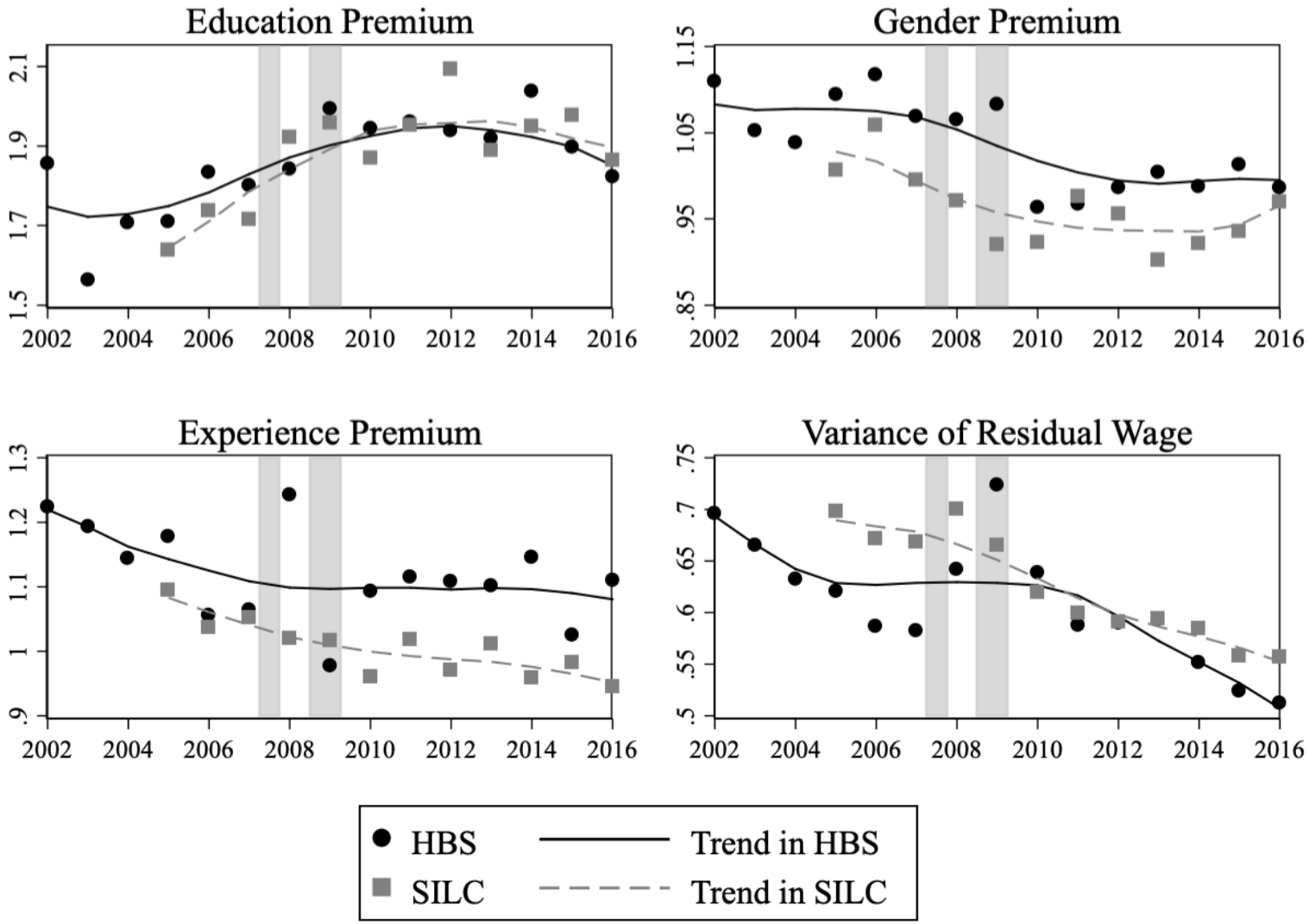
- Wage inequality decreases especially after the Great Recession
  - Both *HBS* and *SILC* generate downward time-trends, robust to outlier trimming, alternative truncation experiments; accords well with Bakış and Polat (2015) & Ekşi and Kırdar (2015).
- Variance of log wage and Gini robustly *countercyclical*
  - The correlation coefficient between the GDP growth & growth of the variance of log wage, `P90/P50` ratio, `P50/P10` ratio and the Gini coefficient is -0.77 (-0.77), -0.65 (-0.45), -0.68 (-0.44) and -0.75 (-0.69) via *HBS* (lagged *SILC*).
- Rapid minimum wage growth contributes to the downward time-trend
  - Net real minimum wage in Turkey grew 119% while the *average* after-tax labor earnings grew only 56% over 2002–2016
  - Renumeration at (or below) minimum wage is prevalent (40%+) in Turkey

  % of Minimum Wage Earners by Country
- How would wage inequality measures have evolved if the minimum wage *counterfactually* had grown at the average labor earnings growth rate?

Counterfactual Wage Inequality (via *HBS*)



Wage Components



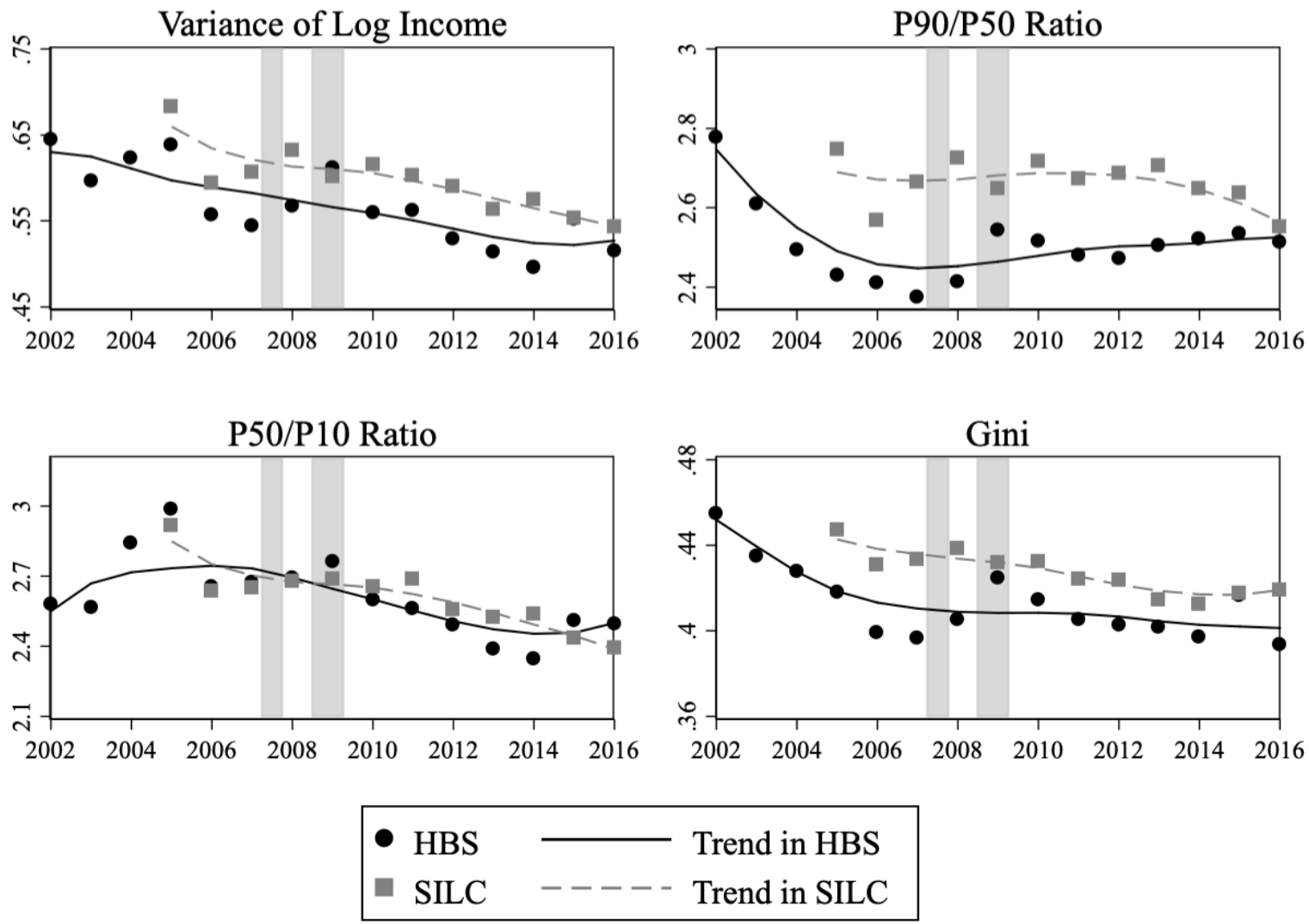
Wage Components (cont'd)

- *Substantial* heterogeneity in the Turkish labor earnings
  - Education, (public vs. private) sector of employment & gender

    Digression: Labor Income Profiles
- According to early 2000 premium estimates, cross-sectionally Turkey $\Uparrow$ in (log) wage dispersion and college premium; $\Downarrow$ gender premium Wage Inequality& Premium by Country
  - Moderation in education premium at least partly to due rapid increase in tertiary education % Tertiary Education by Year
  - Declining gender premium mainly due to *selection bias*
- Hours worked data lacks robustness, correlations between hours worked & wages to be taken with a grain of salt

  Gender-Based Hours& Wage Correlations

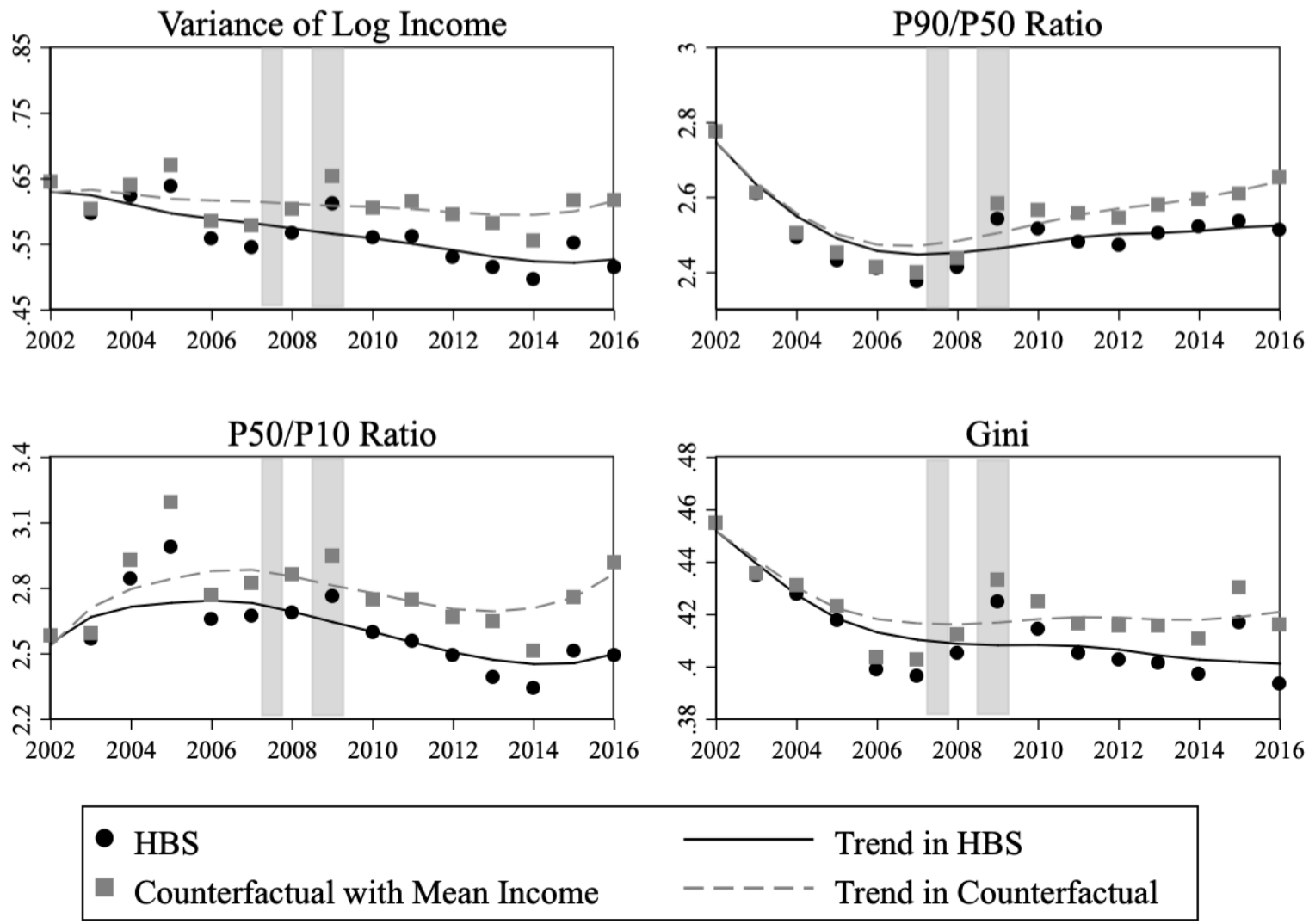
Income Inequality



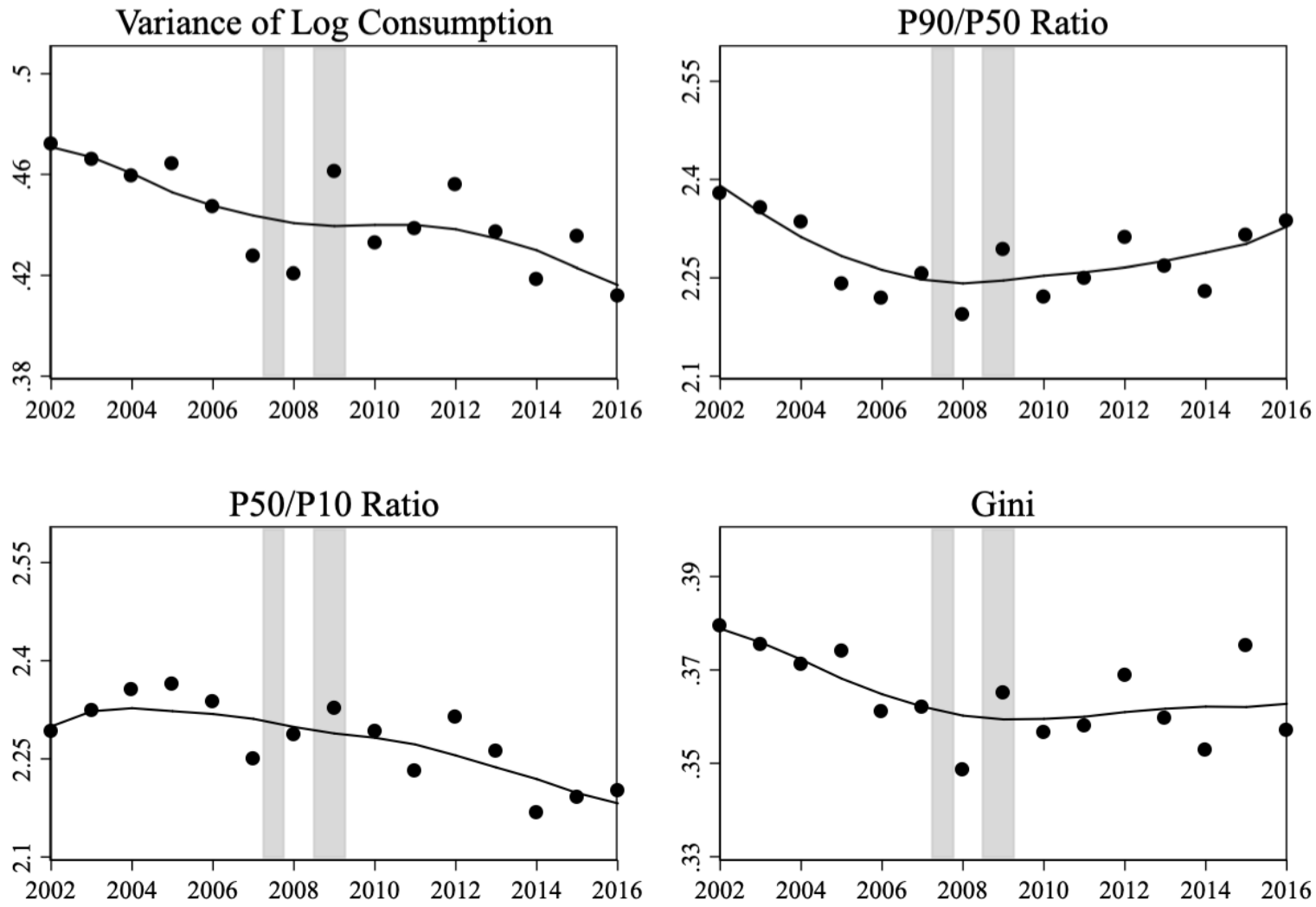
Income Inequality (cont'd)

- Downward time-trend in all four income equality measures
  - Accords well with Filiztekin (2015) but *not* with Alvaredo et al. (2018)
- Acyclical time-series behavior:
  - Correlation coefficient between the GDP growth & growth in variance of log income, `P90/P50` ratio, `P50/P10` ratio and the Gini coefficient is -0.26 (-0.28), -0.65 (-0.26), -0.05 (-0.22), -0.50 (-0.37) via *HBS* (lagged *SILC*), all insignificant at p = 0.10.
  - countercyclical social protection spending (% of GDP) & capital income inequality but *acyclical* entrepreneurial income inequality
- How would income inequality estimates have evolved if household incomes of households whose household-head earns no more than the minimum wage *counterfactually* grew at the average annual disposable income growth rate?

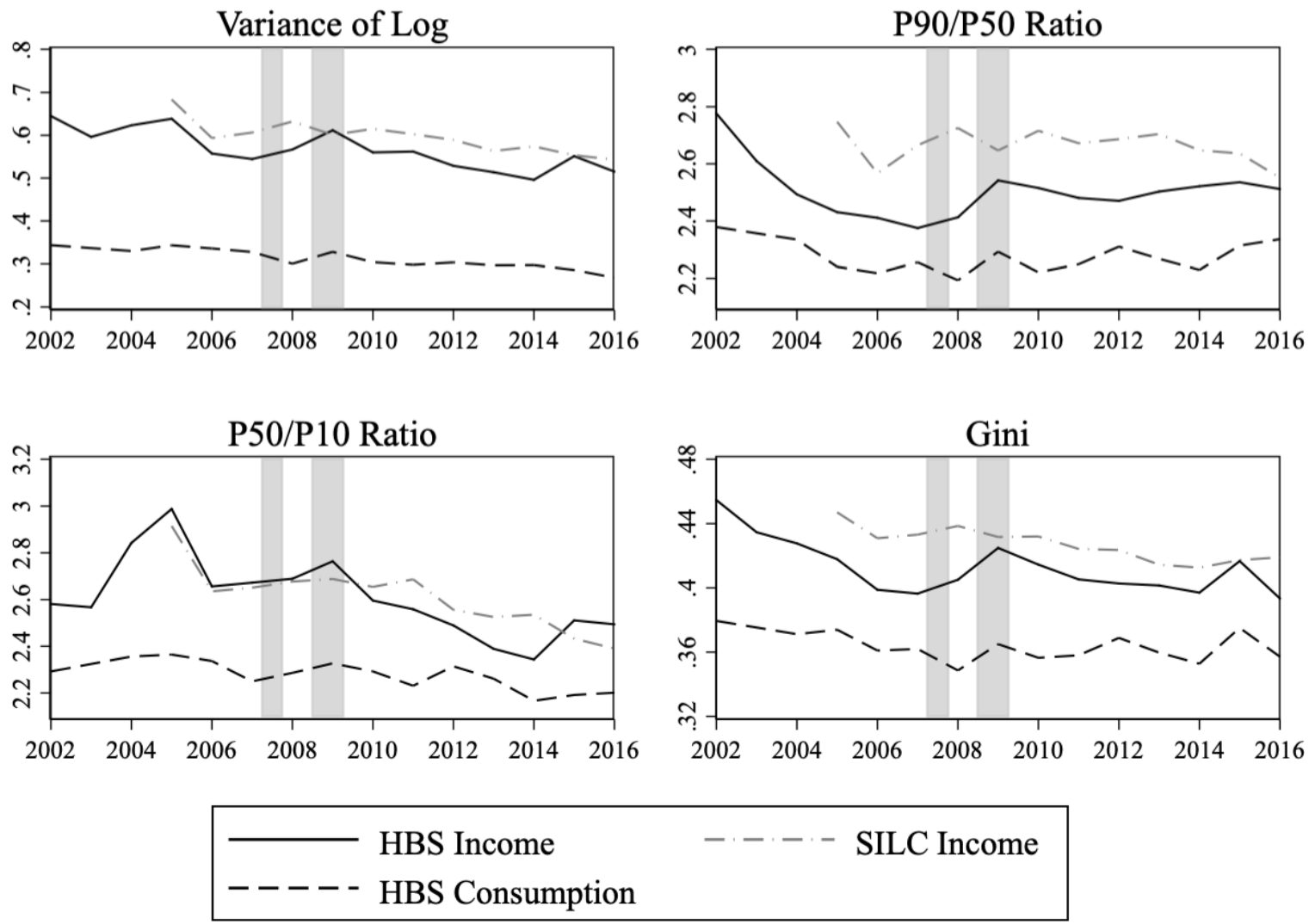
Counterfactual Income Inequality (via *HBS*)



Consumption Inequality



Income & Consumption Inequality



Income & Consumption Inequality (cont'd)

- Downward time-trend and acyclicality in consumption inequality
  - Correlation coefficient between the GDP growth & growth in variance of log consumption, P90/P50 ratio, P50/P10 ratio and the Gini coefficient is -0.44, -0.46, -0.38, -0.21 via *HBS*, all insignificant at p = 0.10.
- Consumption inequality tracks income inequality closely with a moderate level difference
  - in accordance with the predictions by Bewley-Huggett-Aiyagari-type heterogeneous-agent incomplete market models
- Turkey's early 2000 income and consumption P50/P10 ratios around the median; P90/P50 ratios (& income-consumption gap) quite high, second to Mexico
  - Both ratios decrease over time, P90/P50 more rapidly than P50/P10

Income & Consumption Inequality by Country

Conclusions

- Wage, income and consumption inequality decreases over time
  - Rapid minimum wage growth instrumental
- Wage components exhibit contrary time-series patterns
  - Education premium increasing first and stabilizing after; gender and experience premium decreasing over time
- Wage inequality robustly countercyclical, whereas income and consumption inequality acyclical
  - Procyclical entrepreneurial income inequality
- Caveats and Future Research
  - General concerns with survey data
  - Role of informality on economic inequality
  - Increasing *wealth* inequality despite decreasing wage, income and consumption inequality?
  - End of a high-growth episode? Recent Deposit Rates

Income Inequality by Country

Table: Income Inequality by Country

	Gini Coefficient	Theil L GE(0) Index	Theil T GE(1) Index	Atkinson Index ($\epsilon = 0.5$)	Atkinson Index ($\epsilon = 1.0$)
Austria	0.274	0.142	0.140	0.066	0.132
Belgium	0.257	0.115	0.113	0.055	0.109
Bulgaria	0.353	0.232	0.225	0.106	0.207
Croatia	0.300	0.164	0.148	0.074	0.151
Cyprus	0.347	0.204	0.253	0.106	0.184
Czech Republic	0.249	0.105	0.114	0.053	0.100
Denmark	0.266	0.129	0.145	0.065	0.121
Estonia	0.350	0.217	0.204	0.099	0.195
Finland	0.254	0.109	0.114	0.054	0.104
France	0.288	0.141	0.157	0.071	0.132
Germany	0.294	0.156	0.159	0.074	0.145
Greece	0.342	0.218	0.209	0.100	0.196
Hungary	0.285	0.139	0.145	0.068	0.130
Ireland	0.303	0.163	0.162	0.077	0.150
Italy	0.317	0.194	0.178	0.087	0.177
Latvia	0.351	0.222	0.211	0.101	0.199
Lithuania	0.348	0.212	0.209	0.099	0.191
Luxembourg	0.279	0.132	0.134	0.064	0.124
Malta	0.276	0.126	0.130	0.062	0.118
Netherlands	0.255	0.113	0.119	0.056	0.107
Poland	0.306	0.164	0.162	0.078	0.152
Portugal	0.343	0.215	0.203	0.098	0.194
Romania	0.342	0.230	0.201	0.100	0.206
Slovakia	0.259	0.125	0.124	0.059	0.117
Slovenia	0.249	0.107	0.104	0.051	0.101
Spain	0.340	0.220	0.193	0.097	0.198
Sweden	0.249	0.118	0.109	0.054	0.112
United Kingdom	0.308	0.164	0.170	0.079	0.151
Turkey	0.391	0.275	0.305	0.134	0.241

† Source: European Commission Social Situation Monitor for European income inequality estimates in 2014, and authors' calculations for Turkey's inequality indices in 2014 via *TurkStat*'s Household Budget Survey.

Motivation Wealth Inequality

Wealth Inequality by Country

Table: Asset Gini Coefficient by Country

	Gini Coefficient of Assets
Spain	0.542
Australia	0.567
United Kingdom	0.571
Italy	0.599
Luxembourg	0.614
France	0.651
Germany	0.725
United States	0.776
Turkey	0.780

† Source: Cowell et al. (2016) and Torul and Öztunalı (2018).

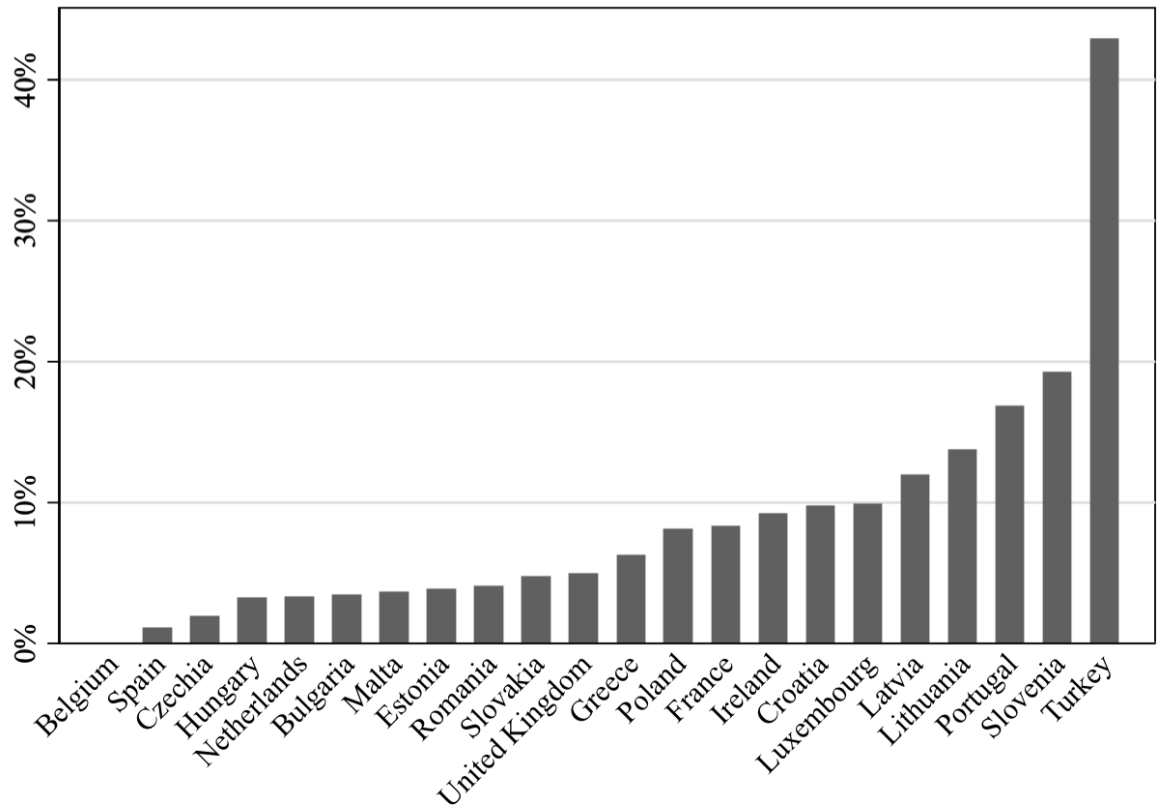
Motivation Income Inequality

Table: Response Rates

								HBS							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Contacted Families	9600	25920	8600	8640	8640	8640	8640	12600	13248	13248	13248	13248	13248	15264	15552
Responses	9555	25764	8544	8559	8558	8548	8549	10046	10082	9918	9987	10060	10122	11491	12096
Refusals	45	156	56	81	82	92	91	2554	3166	3330	3261	3188	3126	3773	3456
Response Rate	99.53%	99.40%	99.35%	99.06%	99.05%	98.94%	98.95%	79.73%	76.10%	74.86%	75.38%	75.94%	76.40%	75.28%	77.77%
								SILC							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Contacted Families	N/A	N/A	N/A	12800	12800	12342	13026	13414	16565	19300	21815	24554	24461	24355	24498
Responses	N/A	N/A	N/A	10920	10796	11228	11870	12107	15026	17563	19899	22740	22763	22441	22869
Refusals	N/A	N/A	N/A	1880	2004	1114	1156	1307	1539	1737	1916	1814	1698	1914	1629
Response Rate	N/A	N/A	N/A	85.31%	84.34%	90.97%	91.11%	90.26%	90.71%	91.00%	91.22%	92.61%	93.06%	92.14%	93.35%

Data

Percentage of Minimum Wage Earners



† Source: *EuroStat*.

Wage Inequality

Wage Inequality and Wage Premium by Country

Table: Wage Inequality and Wage Premium by Country

Country	Levels in 2000				Change				Period
	Var log wage	College premium	Exp. premium	Gender premium	Var log wage	College premium	Exp. premium	Gender premium	
Canada	0.45	1.80	1.32	1.33	0.17	0.22	0.31	-0.11	1978-2006
Germany	0.27	1.38	1.27	1.28	0.05	-0.08	0.22	-0.15	1983-2003
Italy	0.17*	1.51	1.34	1.03	0.03	-0.08	0.11	-0.05	1987-2006
Mexico	0.62	1.88	1.23	1.21	0.04	0.40	0.22	-0.06	1989-2002
Russia	0.77*	1.50	1.05*	1.49	-0.13*	-0.06	0.05	-0.07	1998-2005
Spain[a]	0.23	1.48	1.43	1.16	-0.18	-0.33	0.07	-0.21	1985-1996
Sweden[b]	0.18	1.61	1.20	1.22	-0.09	0.14	-0.02	-0.05	1990-2001
UK	0.33	1.62*	1.25*	1.32	0.10	0.12*	0.20*	-0.21	1978-2005
USA	0.44*	1.80*	1.38*	1.36	0.21*	0.40*	0.28*	-0.25*	1980-2006
Average	0.38	1.62	1.27	1.27	0.04	0.11	0.17	-0.10	
Turkey-HBS[a c]	**0.91**	**1.85**	**1.22**	**1.11**	**-0.16**	**-0.03**	**-0.11**	**-0.17**	**2002-2016**
Turkey-SILC[a d]	**0.97**	**1.64**	**1.10**	**1.00**	**-0.20**	**-0.04**	**-0.15**	**-0.22**	**2005-2016**

Source: Krueger et al. (2010) for countries other than Turkey, and authors calculations for Turkey

* Indicates the statistics is from data on males only.

[a] Data on changes refer to after-tax annual earnings.

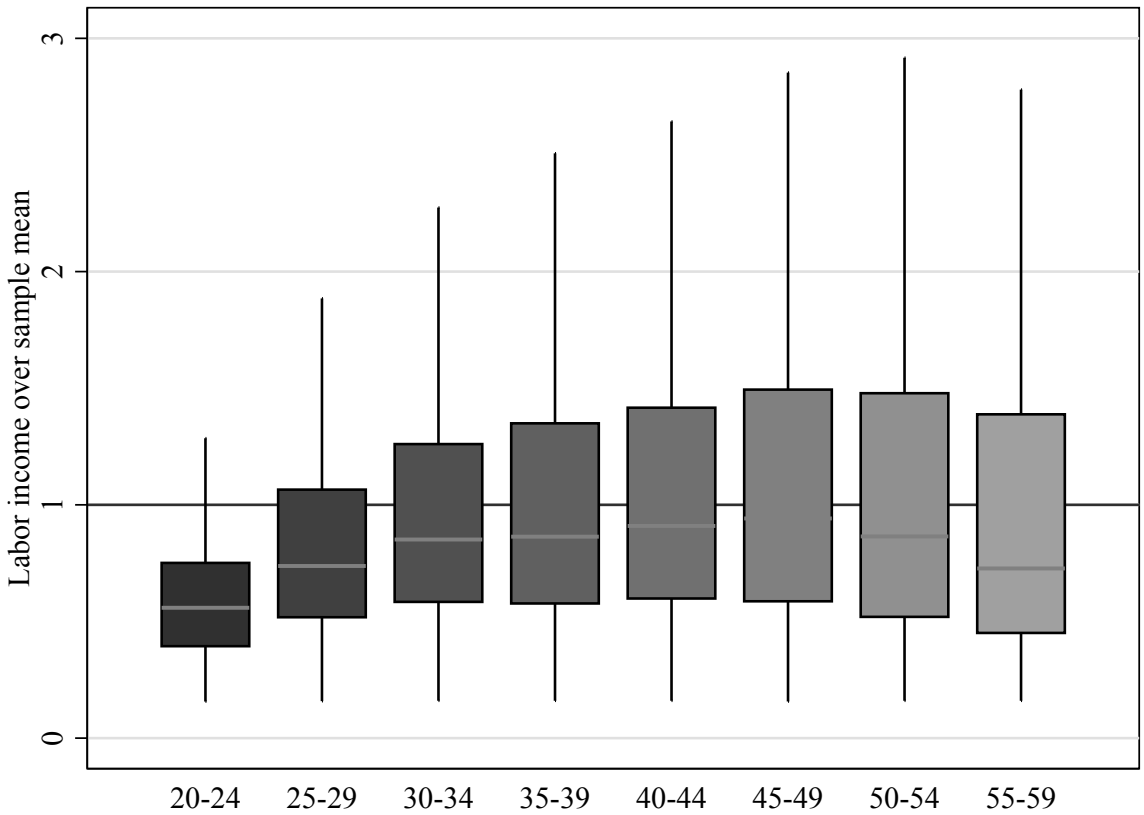
[b] Data on levels is for 1992.

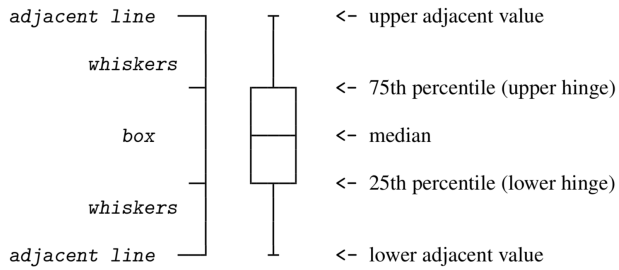
[c] Data on levels is for 2002.

[d] Data on levels is for 2005.

Wage Components

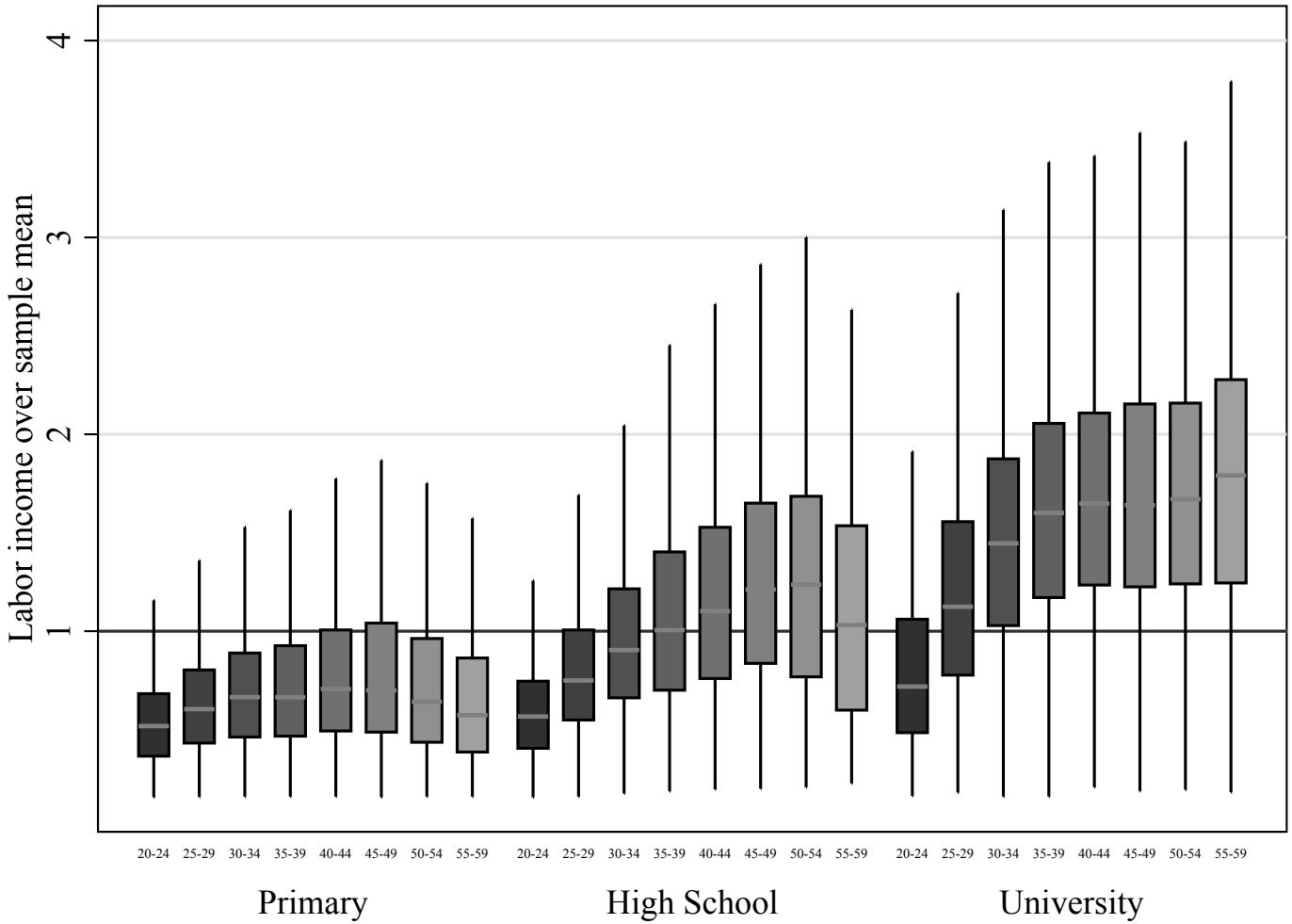
Average Labor Income Profile





Wage Components

Labor Income Profile by Education

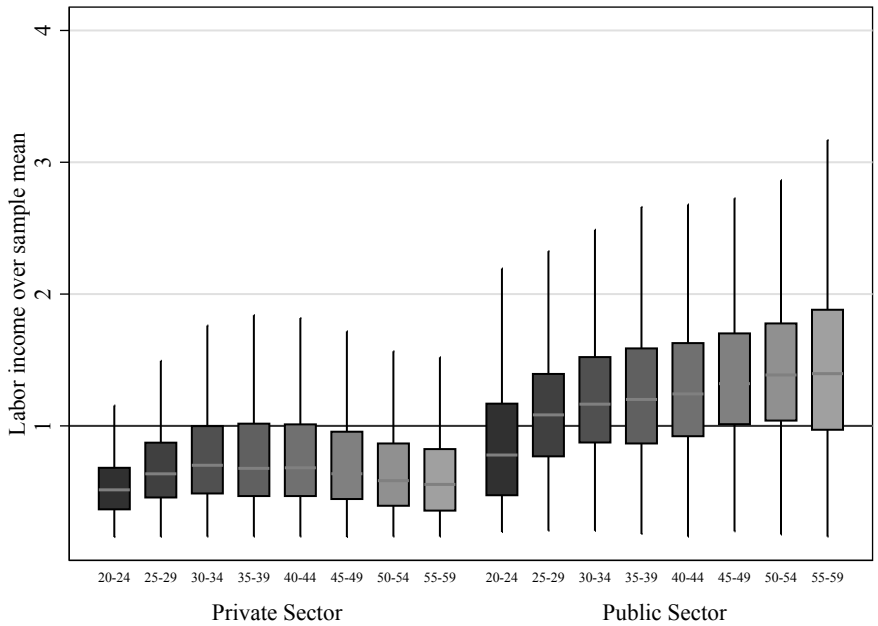


† Source: Aktuğ et al. (2017) via *HBS* 2002–2014.

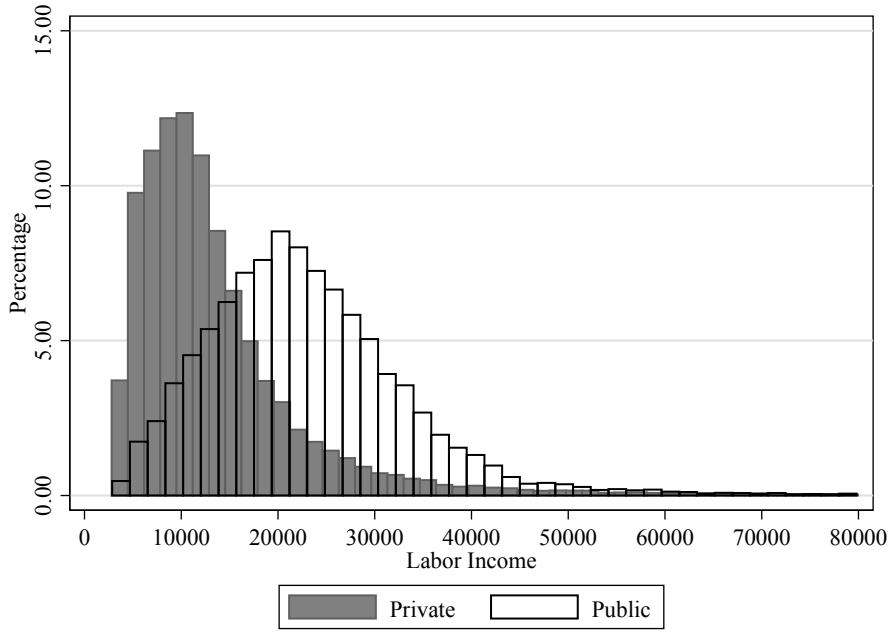
Wage Components

Labor Income Profile by Sector of Employment

Public vs. Private Sector Profiles

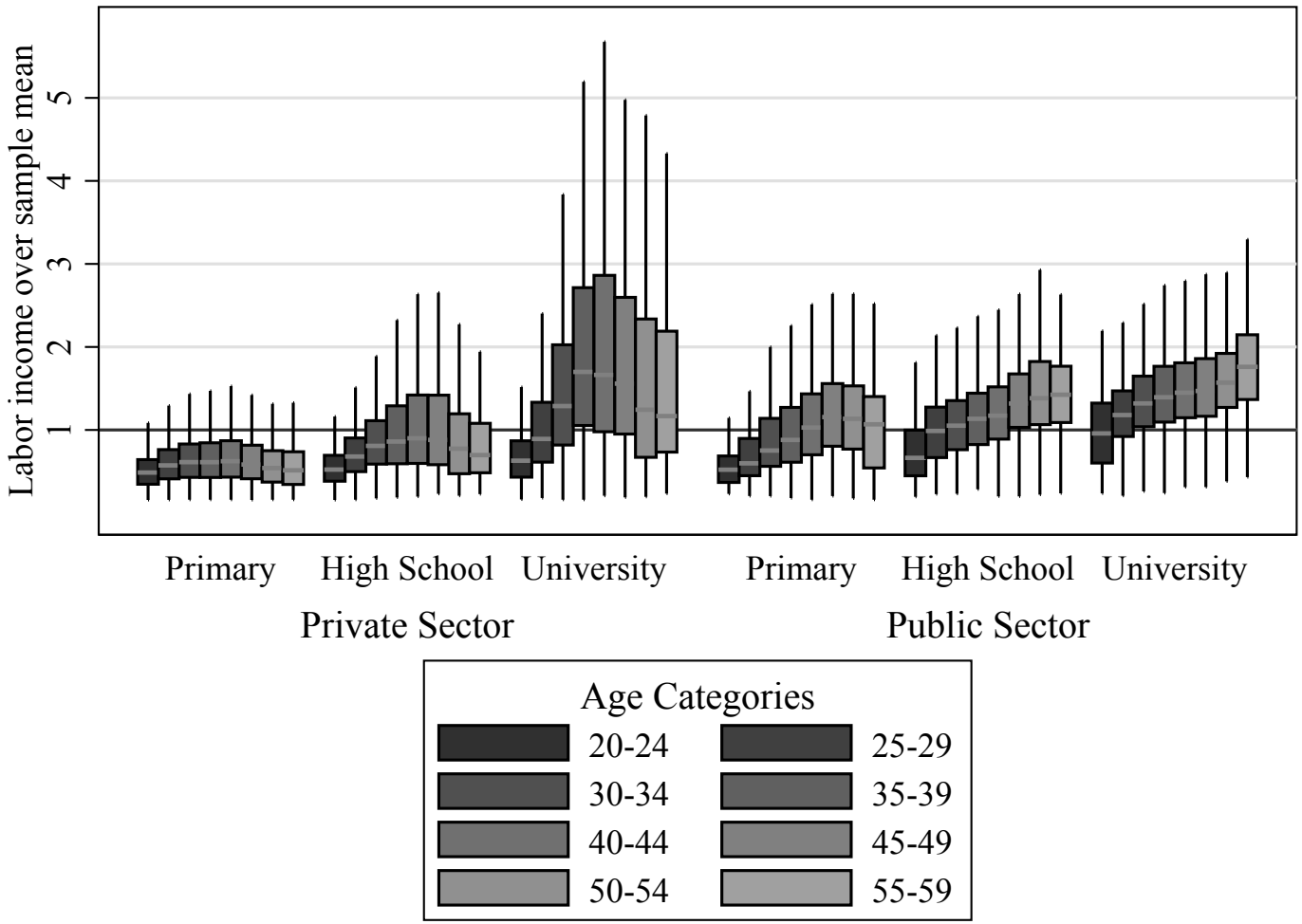


Public vs. Private Sector Histogram



Wage Components

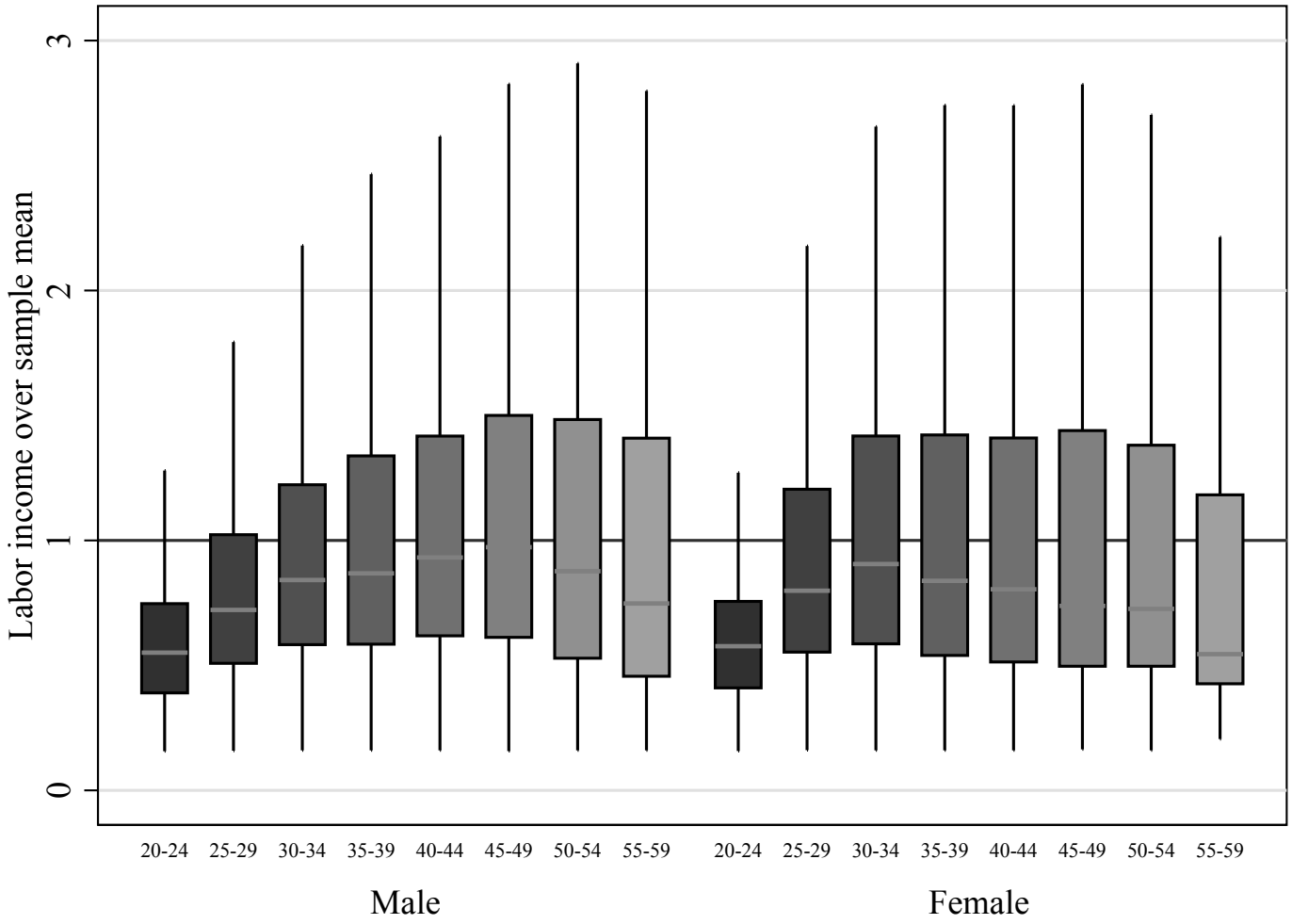
Labor Income Profile by Education and Sector



† Source: Aktuğ et al. (2017) via *HBS* 2002–2014.

Wage Components

Labor Income Profile by Gender

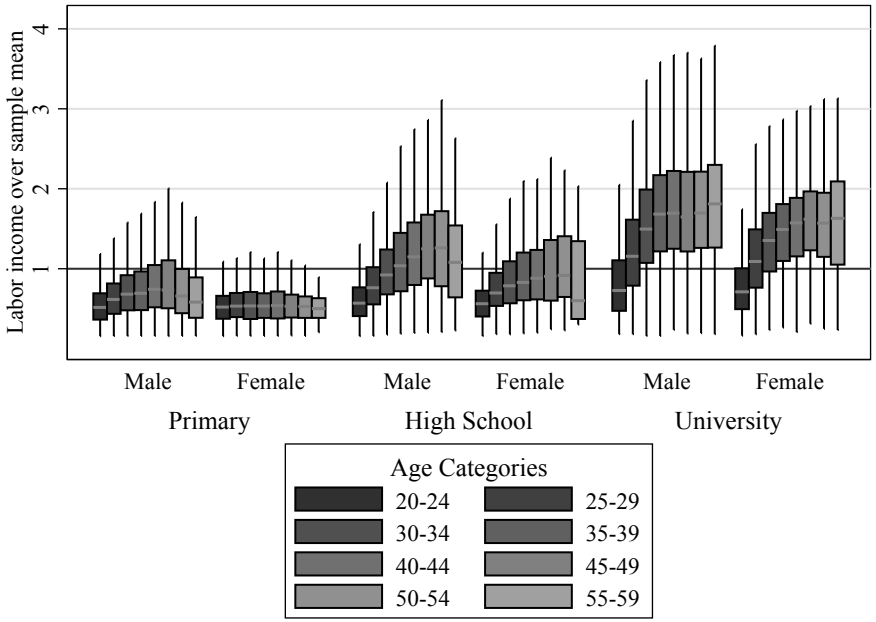


† Source: Aktuğ et al. (2017) via *HBS* 2002–2014.

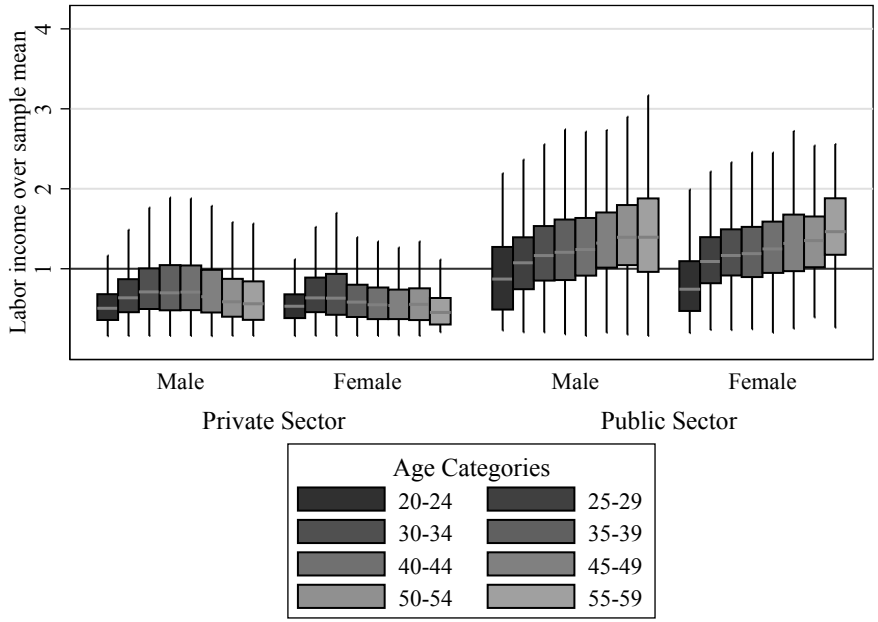
Wage Components

Labor Income Profile by Gender Cluster

Gender-Education Clusters



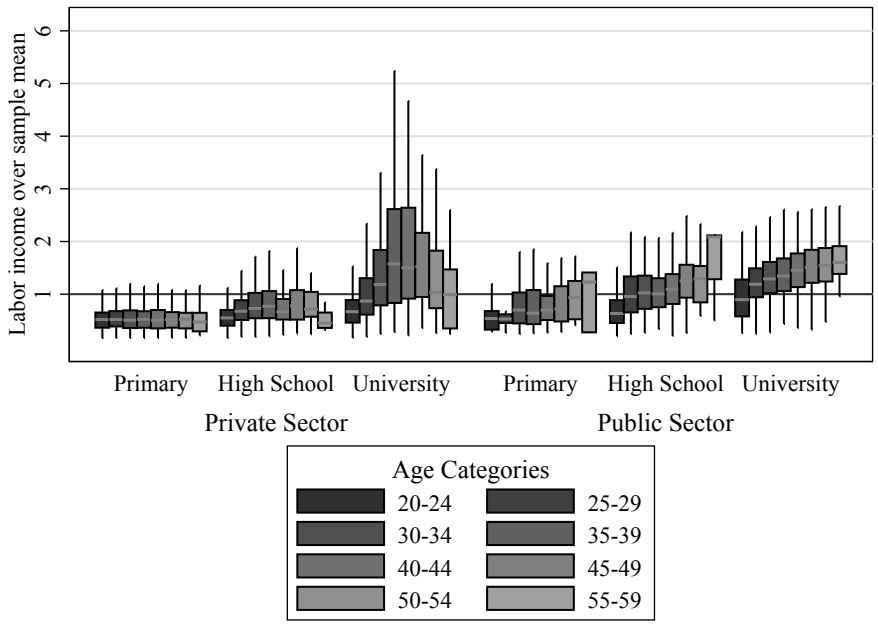
Gender-Sector Clusters



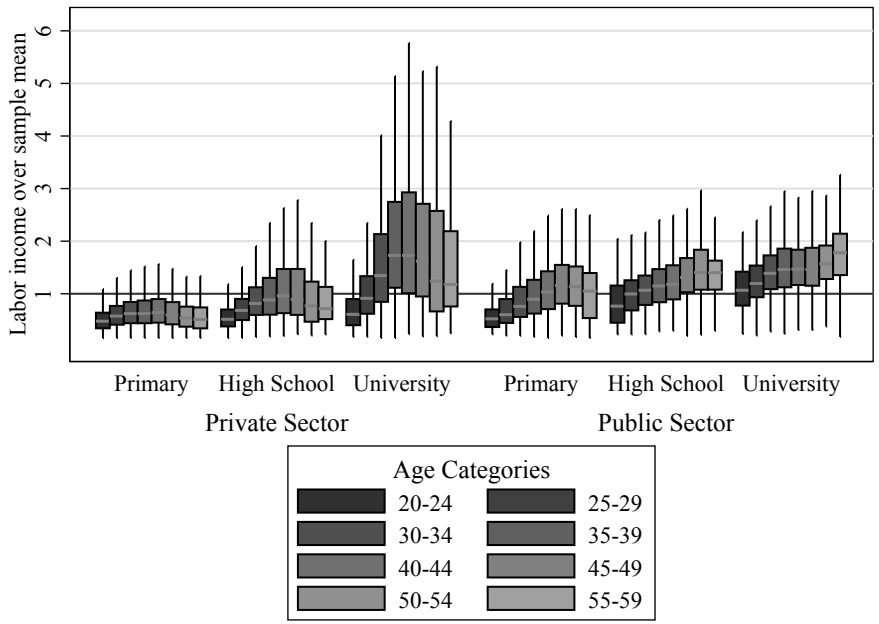
Wage Components

Labor Income Profile by Gender-Edu.-Sector Cluster

Female Distribution

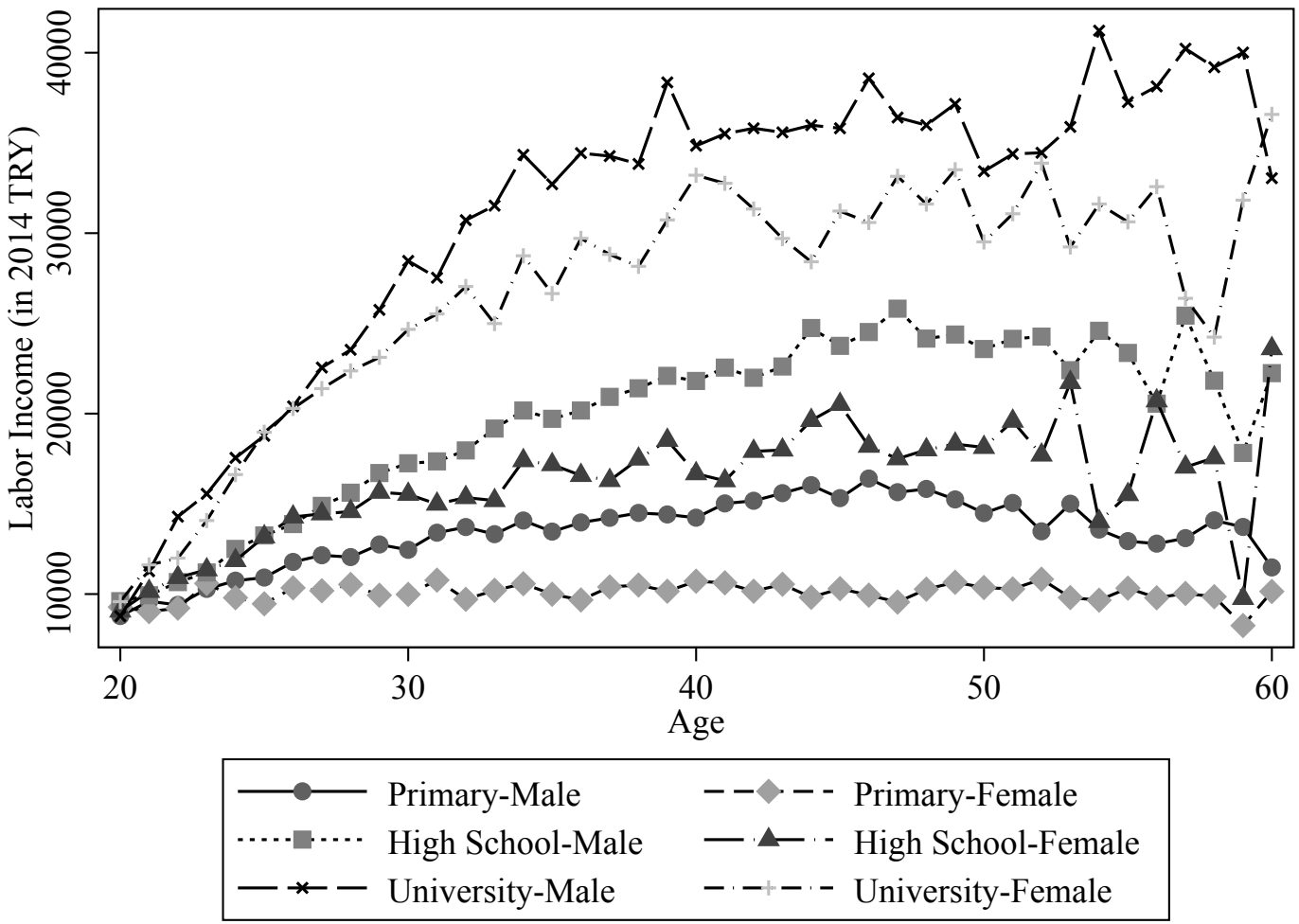


Male Distribution



Wage Components

Labor Income Profile Summary

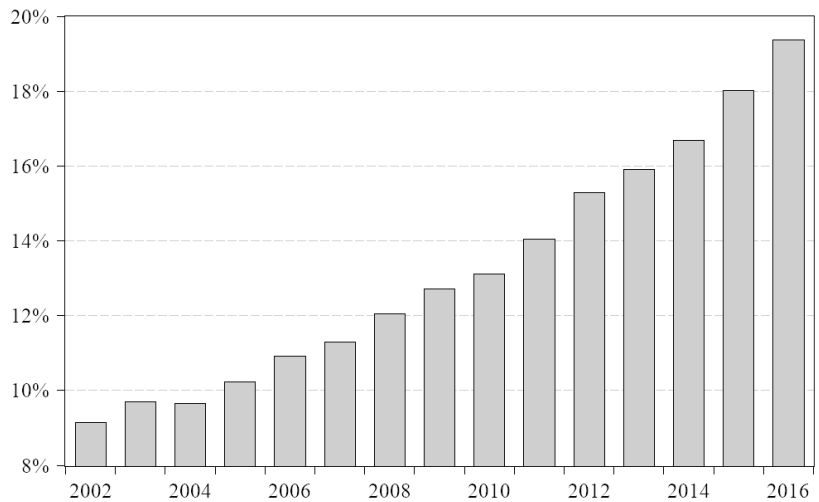


† Source: Aktuğ et al. (2017) via *HBS* 2002–2014.

Wage Components

Rise in Educational Attainment

Tertiary Education (% of 25-64 Year-Olds)



Education Statistics of Labor Force

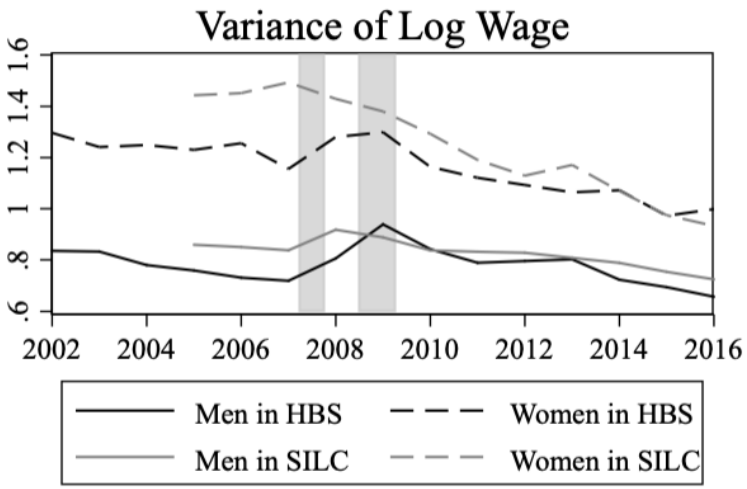
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
HBS															
Male	4.81	4.86	4.94	4.83	5.00	4.96	5.27	5.22	5.29	5.39	5.56	5.52	5.48	5.47	5.61
Female	5.22	5.48	5.42	5.26	5.44	5.47	5.77	5.71	5.83	5.94	6.23	6.22	6.12	6.10	6.25
SILC															
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Male	N/A	N/A	N/A	2.98	3.02	3.08	3.17	3.26	3.29	3.22	3.38	3.41	3.50	4.19	4.18
Female	N/A	N/A	N/A	3.06	3.10	3.23	3.51	3.63	3.68	3.62	3.67	3.76	3.89	4.67	4.68

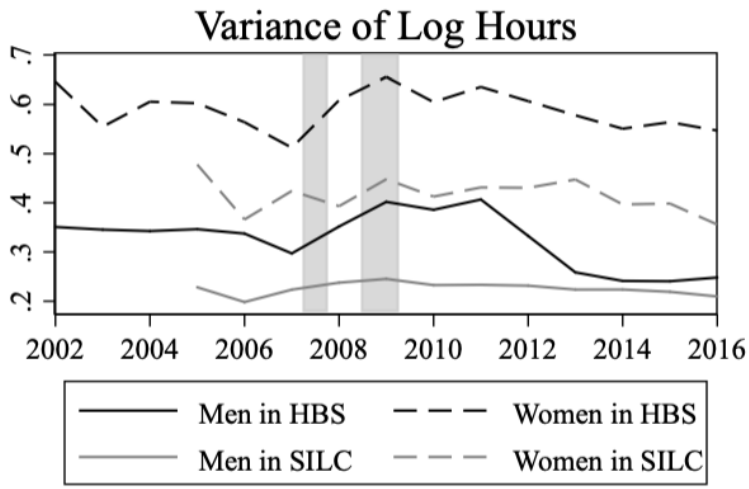
†*Notes-HBS*: Given data limitations, the above education values are calculated via ordinal education clusters by TurkStat with the following values: 1 for illiterate, 2 for literate but no schooling, 3 and 4 for primary school enrolment and completion, 5 for secondary school, 6 for training (secondary) school, 7 for high school, 8 for training (high) school, 9 for community college, 10 for university, and 11 for post-graduate.

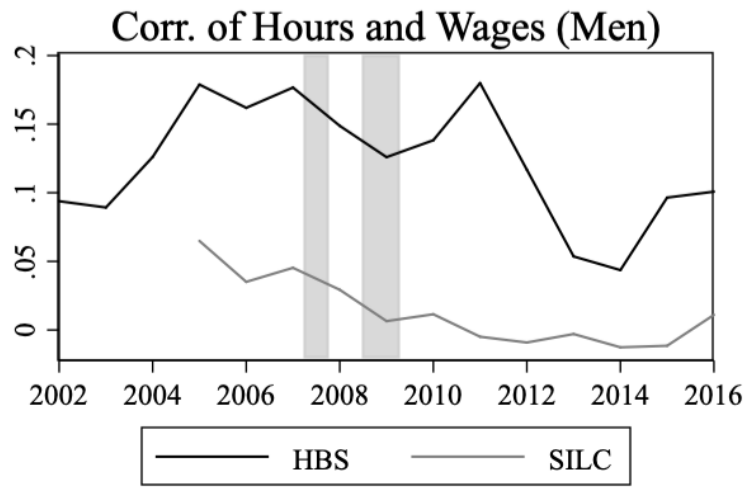
†*Notes-SILC*: Given data limitations, the above education values are calculated via ordinal education clusters by TurkStat with the following values: 0 for illiterate, 1 for literate but no schooling, 2 for primary school, 3 for secondary school and training (secondary) school, 4 for high school, 5 for training (high) school, 6 for community college,university and post-graduate.

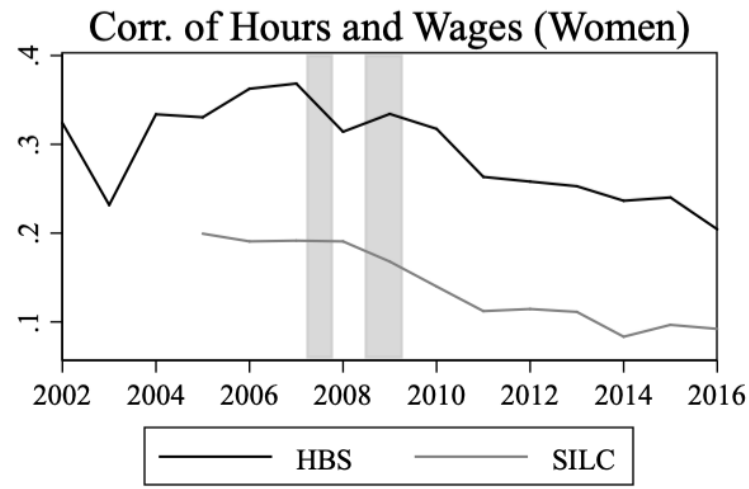
Wage Components

Gender Inequality









Wage Components

Inequality Comparison

Table: Inequality Comparison

Country	Level of Inequality						Long-run Changes in Inequality					
	Bottom(50/10)			Top(90/50)			Bottom(50/10)			Top(90/50)		
	Inc.	Cons.	Gap	Inc.	Cons.	Gap	Inc.	Cons.	Gap	Inc.	Cons.	Gap
Canada	2.21	1.95	0.26	2.00	1.85	0.15	0.38	0.20	0.18	0.10	0.07	0.03
Germany	2.05	1.70	0.35	1.80	1.81	-0.01	0.35	0.00	0.35	0.15	0.10	0.05
Italy	2.45	1.91	0.54	1.93	1.88	0.05	0.22	0.09	0.13	0.05	0.01	0.04
Mexico	8.00	5.10	2.90	4.75	4.00	0.75	5.81	0.80	5.01	1.12	1.08	0.04
Russia	3.02	2.70	0.32	2.60	2.60	0.00	0.10	0.05	0.05	-0.16	-0.10	-0.06
Spain[a]	2.04	1.82	0.22	2.00	1.90	0.10	-0.16	-0.13	-0.03	-0.18	0.01	-0.19
Sweden	1.58	1.62	-0.04	1.64	1.73	-0.09	0.13	0.02	0.11	0.21	0.10	0.11
UK	2.82	N/A	N/A	2.08	N/A	N/A	0.86	0.58	0.28	0.27	0.12	0.15
USA	2.64	2.00	0.64	2.21	2.00	0.21	0.55	0.25	0.30	0.40	0.15	0.25
Average	2.98	2.35	0.65	2.33	2.22	0.15	0.91	0.21	0.71	0.22	0.17	0.05
Turkey-HBS[b]	**2.58**	**2.29**	**0.29**	**2.77**	**2.38**	**0.39**	**-0.09**	**-0.09**	**0.00**	**-0.26**	**-0.04**	**-0.22**
Turkey-SILC[c]	**2.92**	N/A	N/A	**2.75**	N/A	N/A	**-0.53**	N/A	N/A	**-0.20**	N/A	N/A

Source: Krueger et al. (2010) for countries other than Turkey, and authors calculations for Turkey.

[a] Data on levels is for 1996.

[b] Data on levels is for 2002.

[c] Data on levels is for 2005.

Income & Consumption Inequality

Recent Deposit Rates

Large State Bank

Online Banking Deposit Rates	
Maturity	Rates
1-29 days	14.00%
30-31 days	18.00%
32-91 days	18.50%
92 - 120 days	19.00%
121 - 180 days	19.00%
181 - 364 days	19.50%
365 days	20.00%

Branch Office Deposit Rates	
Maturity	Rates
1-29 days	4.50%
30-31 days	4.50%
32-91 days	4.50%
92 - 120 days	4.50%
121 - 180 days	4.50%
181 - 364 days	4.50%
365 days	4.50%

Large Private Bank

Online Banking Deposit Rates						
Maturity/Deposit Amount (in ₺)	1-40k	40k-100k	101-250k	250-500k	501-1000k	1000k+
28-31 days	13.70%	13.75%	14.40%	15.50%	15.55%	16.20%
32-60 days	17.00%	17.90%	19.15%	19.90%	20.65%	21.40%
61-91 days	17.00%	18.30%	19.40%	19.90%	20.65%	21.40%
92-100 days	17.65%	18.40%	19.65%	20.40%	20.90%	21.65%
101-180 days	17.65%	18.50%	19.65%	20.40%	20.90%	21.65%
181-364 days	17.90%	18.90%	20.15%	20.40%	20.90%	21.90%
365 days	18.00%	18.00%	18.00%	18.00%	18.00%	18.00%

Branch Office Deposit Rates						
Maturity/Deposit Amount (in ₺)	1-40k	40k-100k	101-250k	250-500k	501-1000k	1000k+
28-31 days	7.50%	7.50%	7.50%	7.50%	7.50%	7.50%
32-60 days	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
61-91 days	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
92-100 days	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
101-180 days	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
181-364 days	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
365 days	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%

Conclusions

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