Accounting for the role of occupational change on earnings in Europe and Central Asia

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Introduction

- Occupations –as opposed simply to skill levels- have increasingly become an important predictor of individuals' wages (Acemoglu and Autor, 2011)

- This takes place in a context of job polarization (Goos & Manning, 2007, Goos et al. 2014). Evidence for Eastern Europe is mixed (Hardy et al, 2016).

- Most of the studies have focused on the impact of job polarization on employment. The broader impact on wages and the whole income distribution remains under-researched, particularly in developing countries.

Our contribution

- We apply a decomposition technique inspired in Bourguignon and Ferreira (2005, 2008) and Inchauste et al. (2014)

- We carry out case study analyses for seven countries: Germany, Poland, Russia, Spain over (roughly) 1993-2013 and Georgia, the Kyrgyz Republic and Turkey over 2003-2013.

- Our main results show two broad regional patterns: in the West, the decrease in routine intensive jobs resulted in regressive changes in the earnings distribution. In the East, occupational change has hit more the high skilled population, resulting in a rather progressive change in the earnings distribution.

The core question

Assuming that routinization and/or import competition (technology and trade) are exogenous and have impacted the occupational structure, the questions are:

➤ How has the change in the occupational structure affected the earnings distribution?

➤ How much of the change in earnings can be attributed to changes in the occupation structure and how much to changes in individuals' characteristics or changes in returns to those characteristics?

Presentation Outline

1. Motivation: Changes in occupations and earnings in ECA.
2. Methodology: brief description and intuition behind simulations
3. Results
4. Summary and Main Messages

Motivation: Changes in occupations and earnings in Europe and Central Asia

Data for Europe and Central Asia

|	Baseline			Final		
	Year	Survey and observations	Harmonization	Year	Survey and observations	Harmonization
Georgia	2002	Household Integrated Survey	ECAPOV	2015	Household Integrated Survey	ECAPOV
		40050 obs.			38130 obs.	
Germany	1994	German Socio-Economic Panel	LIS	2013	German Socio-Economic Panel	LIS
		17812 obs.			41657 obs.	
Kyrgyz Republic	2004	Kyrgyz Household Integrated Survey	ECAPOV	2014	Kyrgyz Household Integrated Survey	ECAPOV
		21176 obs.			20094 obs.	
Poland	1992	Household Budget Survey	LIS	2013	EU-SILC	LIS
		18807 obs.			102780 obs.	
Russia	1994	Russia Longitudinal Monitoring Survey	None	2014	Russia Longitudinal Monitoring Survey	None
		11280 obs.			18365 obs.	
Spain	1990	Household Budget Survey	LIS	2013	EU-SILC	LIS
		72119 obs.			31622 obs.	
Turkey	2003	Household Income and Consumption Expenditure Survey	ECAPOV	2013	Household Income and Consumption Expenditure Survey	ECAPOV
		107614 obs.			36812 obs.	

Occupation categories

		Occupations intensive in routine tasks	Occupations intensive in non-routine, cognitive tasks	Occupations intensive in non-routine, manual tasks
RTI index		**1.930**	0.188	0.079
O*NET task content indices (average)	Routine, manual	**9.308**	6.336	8.191
	Routine, cognitive	**9.929**	8.973	8.495
	Non-routine, cognitive, personal	8.538	**10.635**	8.734
	Non-routine, cognitive, analytical	8.651	**11.105**	8.120
	Non-routine, manual, physical	10.867	7.952	**11.309**
	Non-routine, manual, personal	2.905	3.513	3.037
Examples (ISCO 88 sub-major groups)		Office clerks (41), Metal, machinery and related trades workers (72), Stationary-plan and related operators (81)	Corporate managers (12), Physical, mathematical and engineering science professionals (21), Life science and health associate professionals (32)	Personal and protective services workers (51), Sales and services elementary occupations (91), Drivers and mobile-plant operators (83)

Changes in the occupation structure in ECA
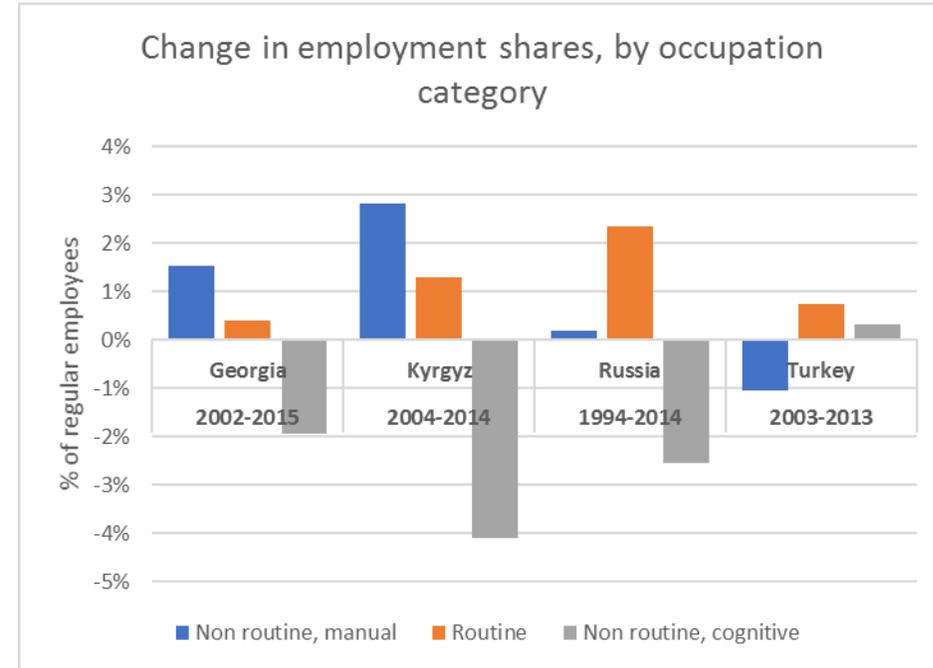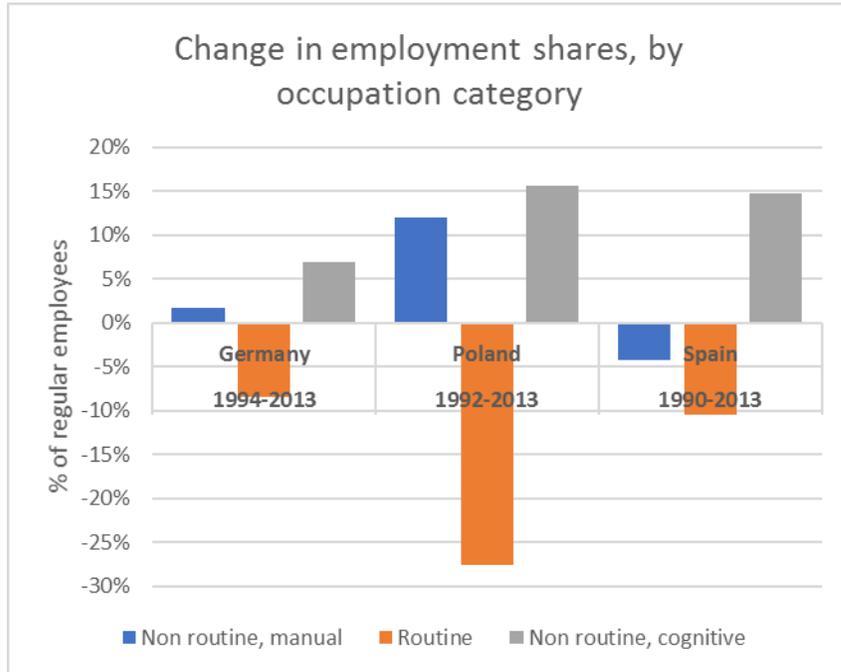
Sources: Poland HBS (LIS), Germany GSOEP (LIS), Russia RLMS, Spain HBS/EU-SILC (LIS), Turkey HICES, Georgia HIS, Kyrgyz Rep. KHIS

Changes in earnings (growth-incidence curves)
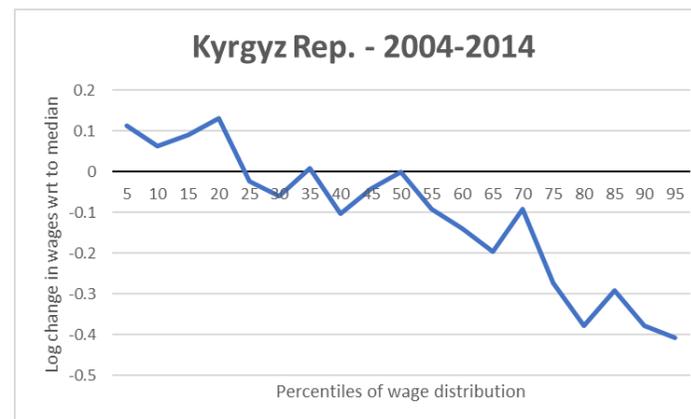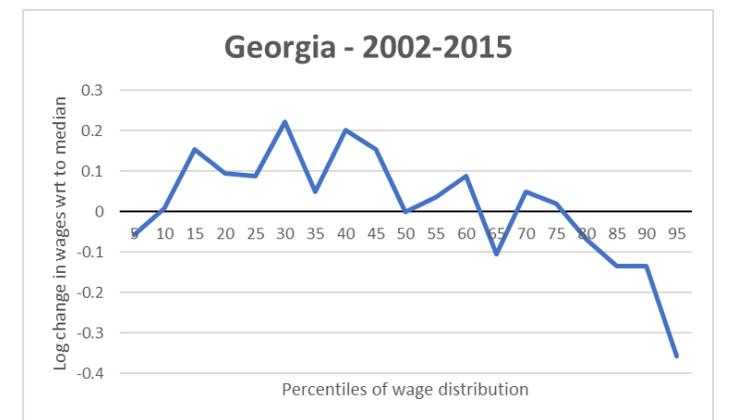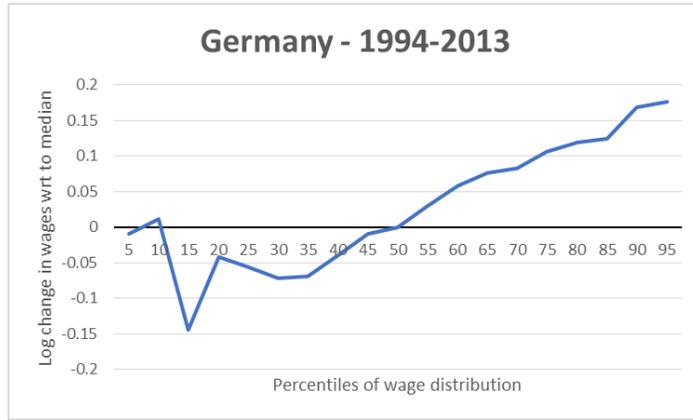
Methodology: Intuition and Main Components

Decomposing changes in the earnings and occupations distributions

$$f^\tau(y) = \iint_{C(X)} g^\tau(y|X) \, \chi^\tau(X) \, dX \quad (1)$$

$$f_g^{\,t \to t'}(y) = \iint_{C(X)} g^{t'}(y|X) \, \chi^t(X) \, dX$$

$$f_\chi^{\,t \to t'}(y) = \iint_{C(X)} g^t(y|X) \, \chi^{t'}(X) \, dX$$

Counterfactual distributions

$$f^t(y) - f^{t'}(y) = [\, f_g^{\,t \to t'}(y) - f^t(y)] + [f^{t'}(y) - f_\chi^{\,t' \to t}(y)]$$

"Rewards" component   "Characteristics" component

Decomposing changes in the earnings and occupations distributions

$$f^\tau(y) = \iint_{C(X)} g^\tau(y|X)\ \chi^\tau(X)\ dX \quad (1)$$

Composed of O (occupations)
and W (exogenous characteristics)

Mincer equation

$$y = G[O, W, \varepsilon;\ \Omega_\tau]$$

Returns to characteristics

Exogenous characteristics

Multinomial Logit

$$O = H[W, \eta;\ \Phi_\tau]$$

Occupation structural parameters

Earnings distribution

$$f^\tau(y) = \int_{G(O,W,\varepsilon;\ \Omega_\tau)=y} \pi^\tau(\varepsilon)\ d\varepsilon\ \times\ \left[\int_{H(W,\eta,\Phi_\tau)=O} \mu^\tau(\eta)\ d\eta\right] \Psi^\tau(W)\ dO\ dW$$

Occupations distribution

$$f^\tau(O) = \iint_{C(W)} h^\tau(O|W)\ \Psi^\tau(W)\ dW$$

Exogenous characteristics (W) also
define the distribution of occupations

Decomposing changes in the earnings and occupations distributions

$$f^{t'}(y) - f^t(y) =$$

$$\{D[\Psi_{t'}, \pi_{t'}, \eta_{t'}; \Omega_{t'}, \Phi_t] - f^{t'}(y)\}$$ Occupation structural parameters

$$+\{D[\Psi_t, \pi_{t'}, \eta_{t'}; \Omega_{t'}, \Phi_t] - D[\Psi_{t'}, \pi_{t'}, \eta_{t'}; \Omega_{t'}, \Phi_t]\}$$ Exogenous characteristics (education, age, gender)

$$+\{D[\Psi_t, \pi_{t'}, \eta_{t'}; \Omega_t, \Phi_t] - D[\Psi_t, \pi_{t'}, \eta_{t'}; \Omega_{t'}, \Phi_t]\}$$ Returns to characteristics

$$+ \{f^t(y) - D[\Psi_t, \pi_{t'}, \eta_{t'}; \Omega_t, \Phi_t]\}$$ Residual component

Decomposing changes in the earnings and occupations distributions

$$f^{t'}(O) - f^t(O) =$$

$$\{D[\Psi_{t'}, \eta_{t'}; \Phi_t] - f^{t'}(O)\}$$

Occupation structural parameters

$$+\{D[\Psi_t, \eta_{t'}; \Phi_t] - D[\Psi_{t'}, \eta_{t'}; \Phi_t]\}$$

Exogenous characteristics (education, age, gender)

$$+ \{f^t(O) - D[\Psi_t, \eta_{t'}; \Phi_t]\}$$
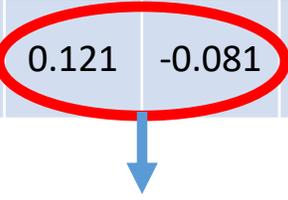
Residual component

Results

Changes in occupation structural parameters

- These parameters link individual characteristics to occupational choices

Marginal change in the probability of being in each occupation category by education level, household heads

	Education	Initial year				Final year				Difference			
		NE	NR,M	R	NR,C	NE	NR,M	R	NR,C	NE	NR,M	R	NR,C
Spain	Tertiary	-0.090	-0.248	0.043	0.296	-0.205	-0.162	-0.024	0.392	-0.115	0.086	-0.067	0.096
	Secondary	-0.071	-0.138	0.180	0.029	-0.121	-0.017	0.099	0.039	-0.050	0.121	-0.081	0.010
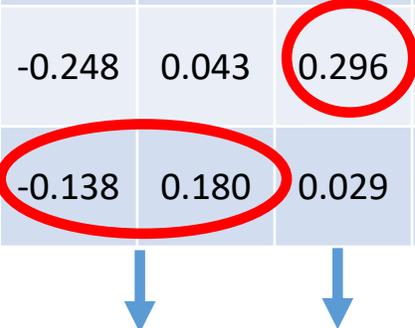
Holders of secondary education diploma 18 p.p. more likely to be in Routine occupations and 14 p.p. less likely to be in Non-routine manual occupations than holders of primary education in 1990.

Holders of tertiary education diploma 29 percentage points more likely to be in a Non-routine, cognitive occupation than those with only secondary education in 1990.

These probabilities changed in opposite directions. Non-routine manual and 2013 occupations more likely, routine less likely.

This probability increased by 9.6 percentage points between 1994 and 2013.

Decomposition of change in occupations: occupation structural parameters

Structural parameters explain a good deal of the entire observed change

Change in employment shares
Actual vs. Simulation (only structural parameter change)

Germany   Poland   Spain
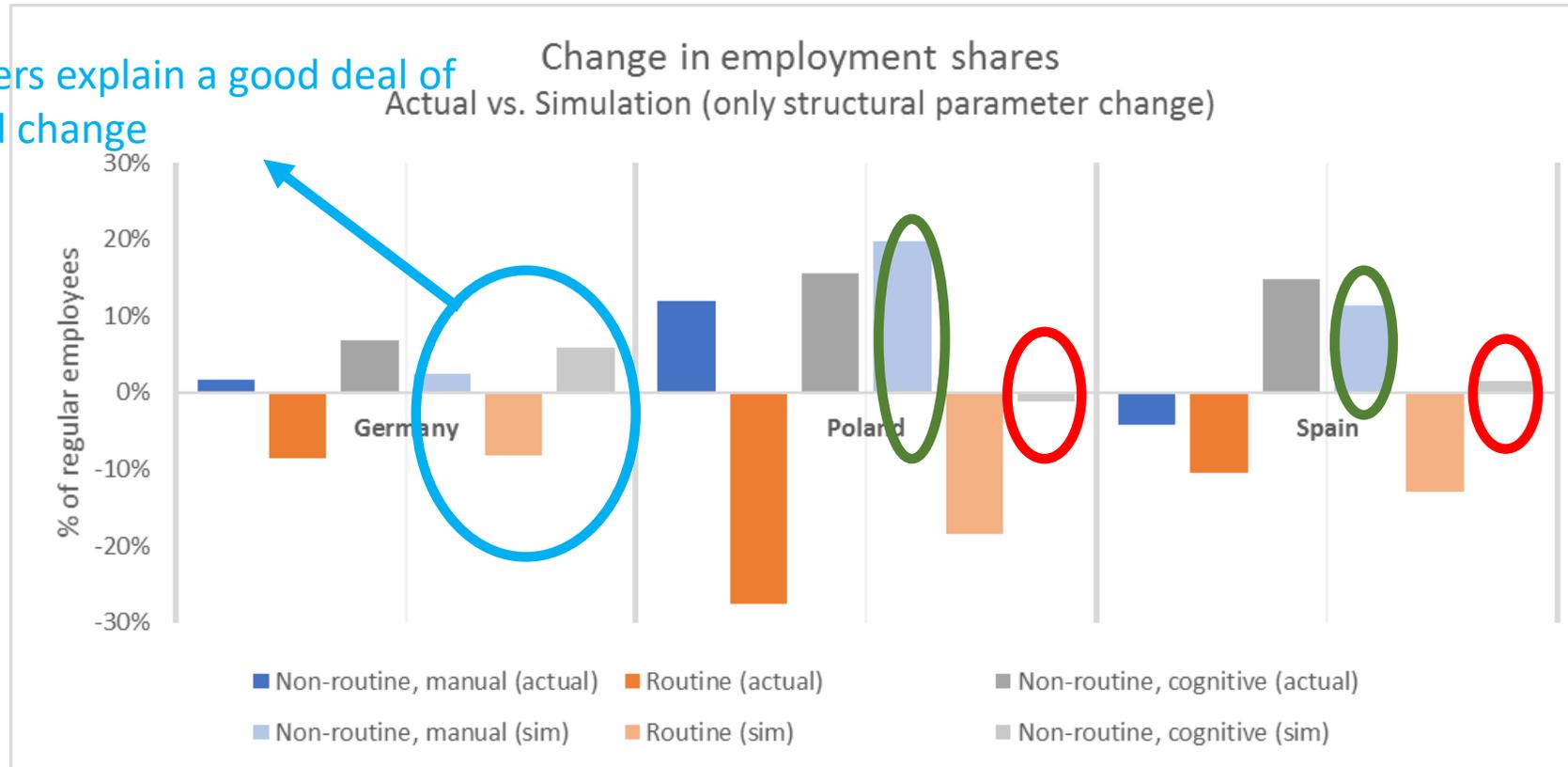
Structural parameters explain
the growth in non-routine, manual jobs

Structural parameters change result in
almost none to negative growth in non-routine,
cognitive jobs

Decomposition of change in occupations: occupation structural parameters

Change in employment shares
Actual vs. Simulation (only structural parameter change)
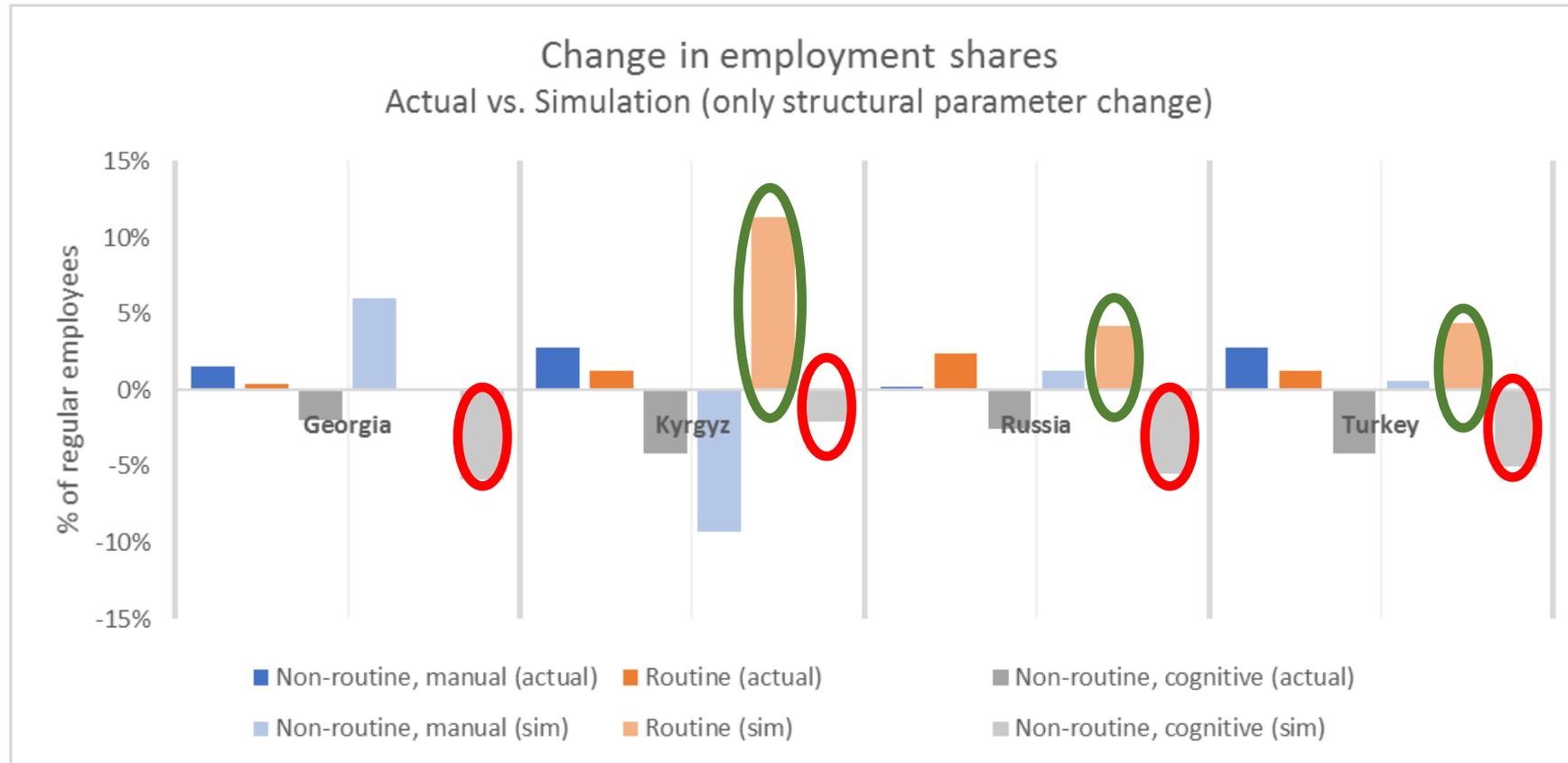
Structural parameters explain the growth in routine occupations

Structural parameters explain the negative growth in non-routine, cognitive occupations

Changes in individuals' characteristics

- We focus on changes in education, age and gender

|	Initial year					Final year					Difference				
	Max education level			Age	Share of women	Max education level			Age	Share of women	Max education level			Age	Share of women
	1ry or less	2ndry	3ry			1ry or less	2ndry	3ry			1ry or less	2ndry	3ry		
Spain	0.709	0.170	0.120	37.67	0.506	0.428	0.226	0.317	40.54	0.498	-0.281	0.056	0.197	2.86	-0.008

Share of individuals with tertiary education increased by 20 percentage points.
Aging also present: average increase in the age of individuals by almost 3 years

- Education upgrading present all across the region (except Germany) as well as aging.

Decomposition of change in occupations: characteristics (education, age, gender)

Change in employment shares
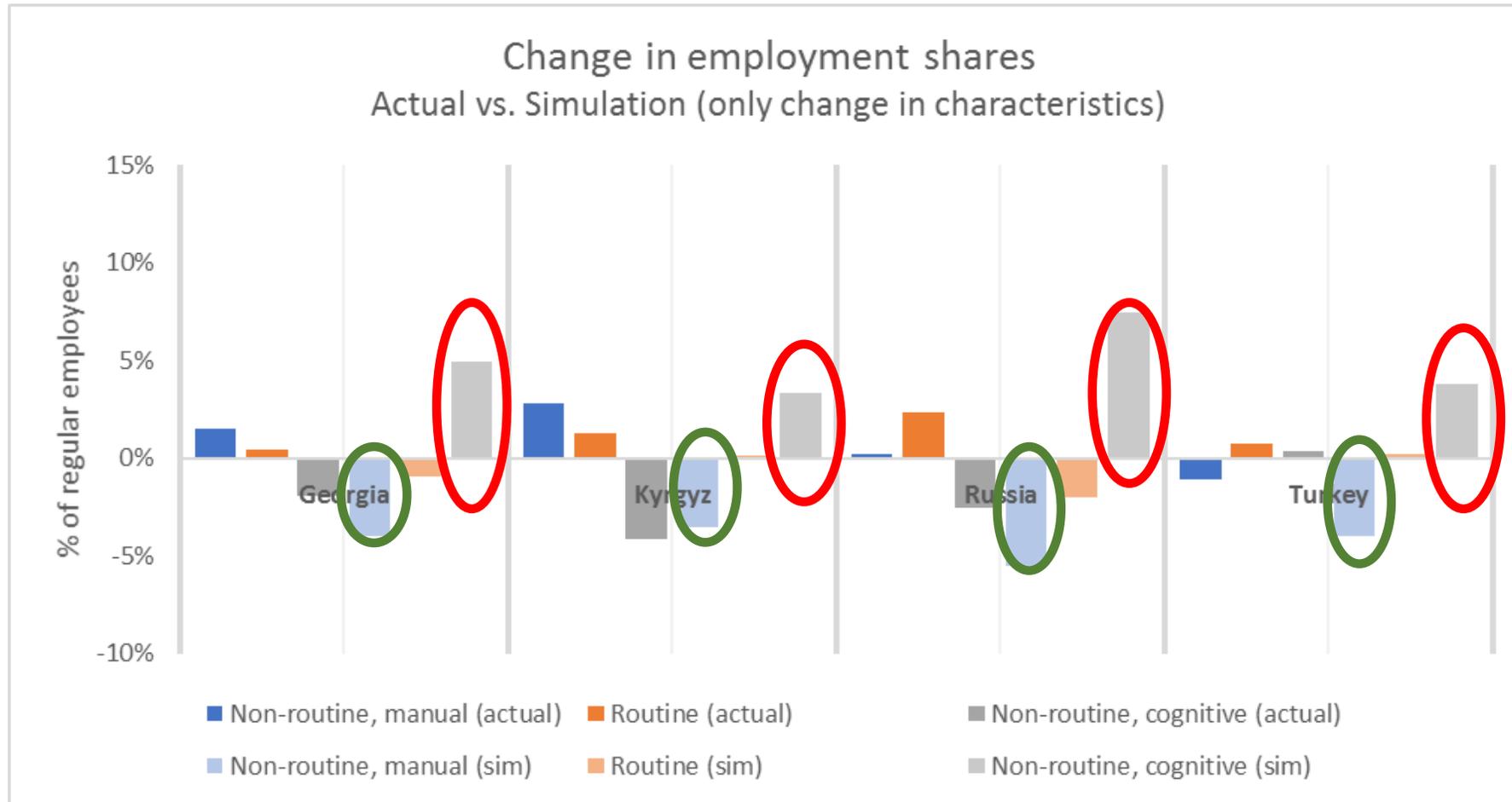Actual vs. Simulation (only change in characteristics)

Characteristics explain a small part of the entire observed change
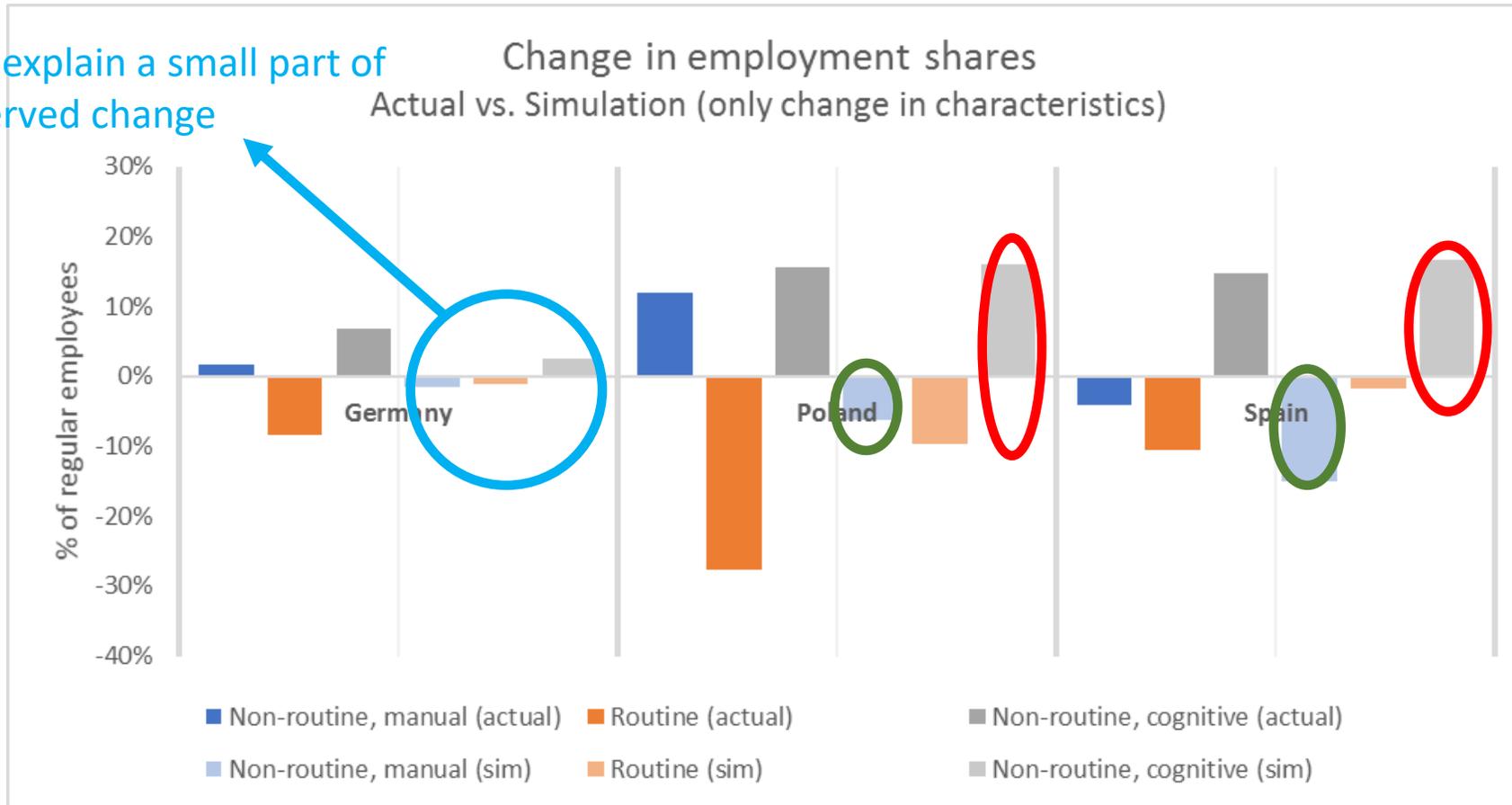
Change in characteristics predict a decrease in non-routine, manual jobs

Change in characteristics predict an increase in non-routine, cognitive jobs
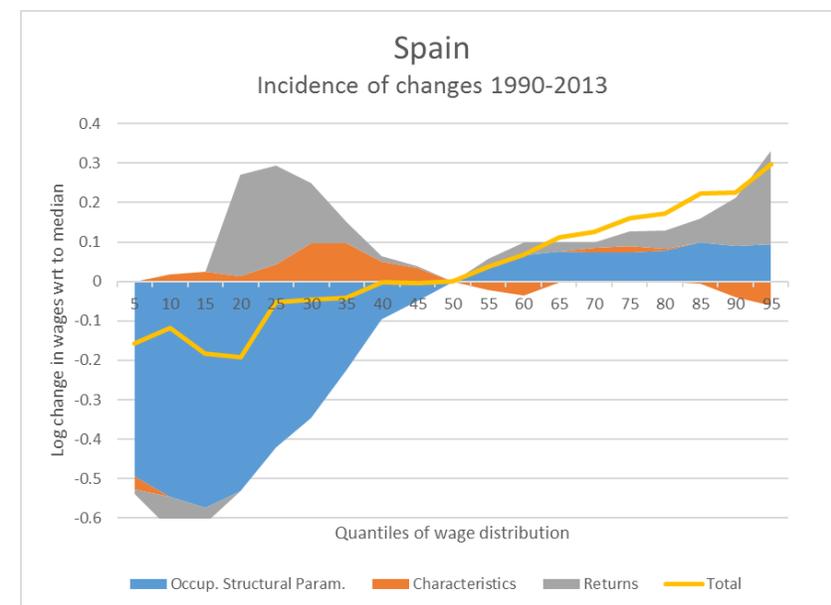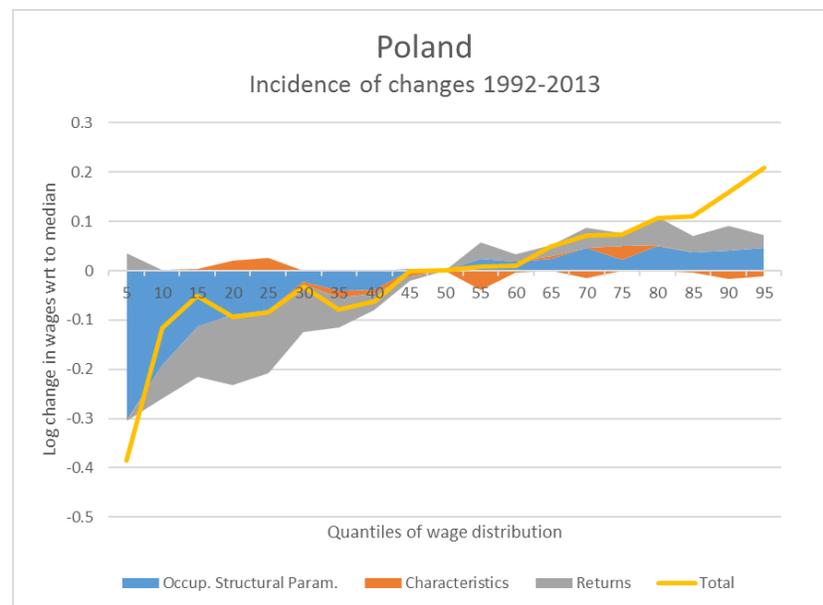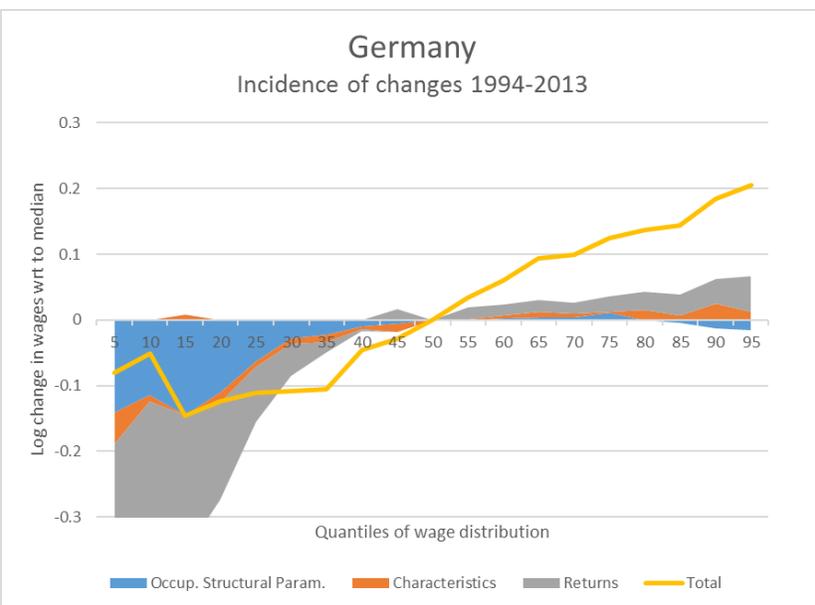
Legend:
- Non-routine, manual (actual)
- Routine (actual)
- Non-routine, cognitive (actual)
- Non-routine, manual (sim)
- Routine (sim)
- Non-routine, cognitive (sim)

Decomposition of change in occupations: characteristics (education, age, gender)

Change in employment shares
Actual vs. Simulation (only change in characteristics)

Change in characteristics predict
a decrease in non-routine, manual jobs

Change in characteristics predict an increase
in non-routine, cognitive jobs

Decomposition of changes in earnings: West of ECA

Germany
Incidence of changes 1994-2013

Poland
Incidence of changes 1992-2013

Spain
Incidence of changes 1990-2013

- Important negative effect of changes in occupation structural parameters on bottom deciles; positive in the top deciles in Poland and Spain.
- Limited role of changes in characteristics
- Regressive effect of changes in returns to characteristics, particularly in Germany and Poland (increasing returns to education in non-routine, cognitive occupations)

Decomposition of changes in earnings:
East of ECA
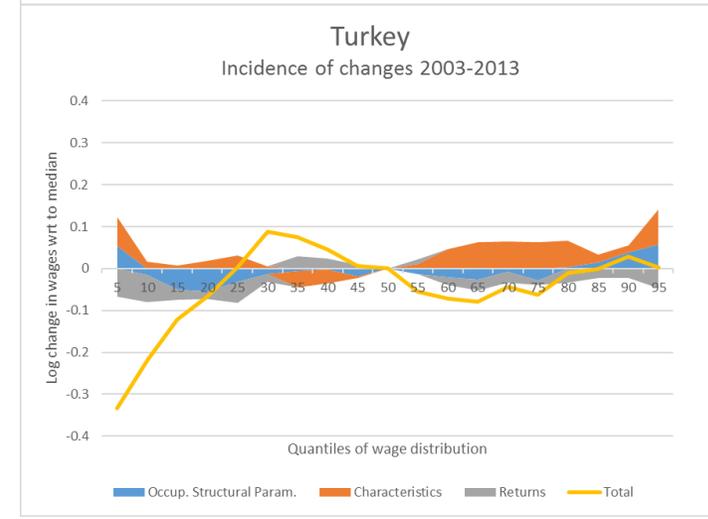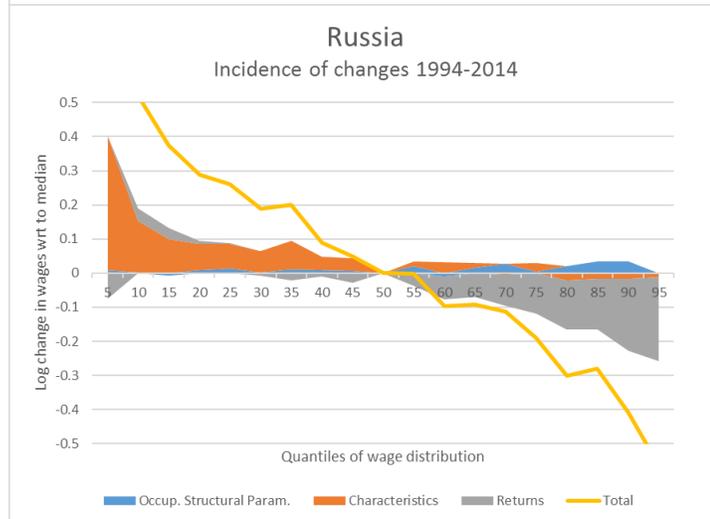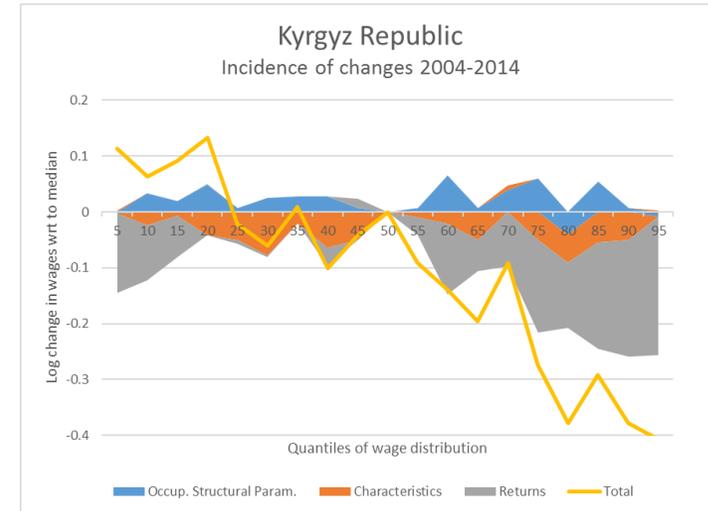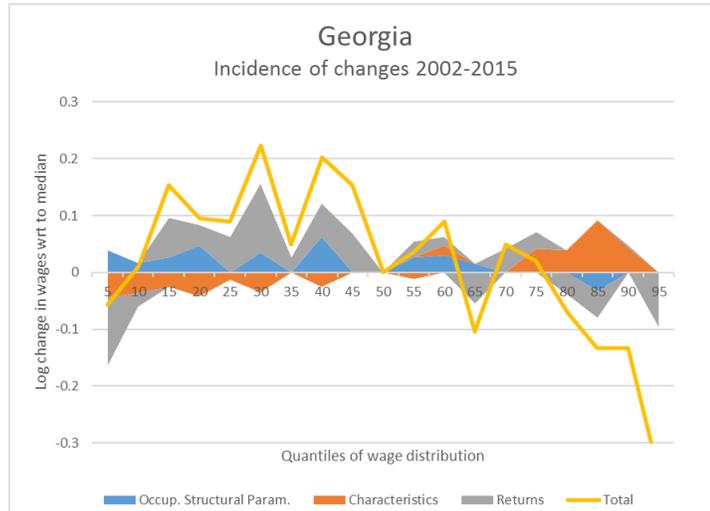
- Changes in occupation structural parameters account for very little of the change in earnings
- Changes in characteristics particularly relevant for the bottom deciles in Russia
- The evolution of returns to characteristics accounts for most of the progressive change in earnings

Additional results: winners and losers

- Our method allows us to identify individuals who "change" occupations from the observed distribution to the counterfactual distribution.

- In the West, individuals who move out of Routine into Non-routine Manual occupations are among the least skilled. Their wages decrease around 30%. Those that "move" into Non-routine, Cognitive are usually more skilled and get an increase in their wages by around 25%.

- In the East, those that move are in general high skilled – and move into occupations where they are overskilled, losing around 20% of their wage.

- In general, women move more across occupations than men.

Summary and Main Messages

Summary: Occupational change

- In the **West**: increase in non-routine, manual occupations is explained by change in occupation structural parameters, whilst increase in non-routine, cognitive occupations is explained by education upgrading.

- In the **East**: growth in routine occupations and decrease in non-routine, cognitive occupations explained by change in occupation structural parameters. Education upgrading alone would have resulted in an increase in non-routine, cognitive occupations, but the fact that this wasn't observed suggests that labor supply and demand were going in opposite directions.

Summary: Earnings

- In the West (Germany, Poland and Spain)
  - The change in occupational structural parameters is very negative for the bottom deciles, slightly positive for the top deciles.
  - Changes in returns to characteristics quite regressive as well.
  - Little contribution of educational upgrading.

- Post Soviet countries (Georgia, Kyrgyz Rep. and Russia):
  - Main explaining factor are changes in returns to characteristics: decline in returns to tertiary education in growing routine occupations.
  - Educational upgrading positive for the bottom deciles in Russia.
  - Little explanatory power of occupation structural parameters

- Turkey appears to be a special case, where sizable increases in the participation rate (particularly among women) are changing the labor force in ways that our model does not correctly account for.

Main messages

- The more to the West, the more the bottom deciles of the distribution are negatively affected by occupational change driven by changes in structural parameters.

- Upskilling appears to be somewhat more progressive, as it allows individuals not only to increase their human capital but also to move to high paid occupations.

- Changes in returns to characteristics have mostly benefited the top of the distribution in the West, and the bottom of the distribution in the East. Overall, this factor explains most of the observed change in earnings.

Thank you