ONLINE APPENDIX
Job Polarization and Structural Change

Zsófia L. Bárány and Christian Siegel*

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A Data appendix

We use data from the US Census of 1950, 1960, 1970, 1980, 1990, 2000 and the American Community Survey (ACS) of 2007, which we access from IPUMS-USA, provided by Ruggles et al. (2010). Following Acemoglu and Autor (2011) and Autor and Dorn (2013) we restrict the sample to individuals who were in the labor force and of age 16 to 64 in the year preceding the survey. We drop residents of institutional group quarters and unpaid family workers. We also drop respondents with missing earnings or hours worked data and those who work in agricultural occupations/industries or in the military. Our employment measure is the product of weeks worked times usual number of hours per week.[1] We compute hourly wages as earnings divided by the product of usual hours and weeks worked.

To construct the 30-year change graphs of Figure 1 and A-1, and the 10-year change graphs of Figure A-2 we follow the methodology used in Autor, Katz and Kearney (2006)), Acemoglu and Autor (2011), and Autor and Dorn (2013), which requires a balanced panel of occupations. Dorn (2009) and Autor and Dorn (2013) provide a

*Bárány: Sciences Po, Department of Economics, 28 rue des Saints-Pres, 75007 Paris, France, zsofia.barany@sciencespo.fr. Siegel: University of Kent, School of Economics, Canterbury, Kent, CT2 7NP, UK, c.siegel@kent.ac.uk.

[1]Since in 1950 the Census did not include usual hours worked, we use hours worked last week instead. In 1960 and 1970 the Census asked only for an interval of hours and weeks worked last year; we use the midpoint of the interval given.

balanced panel of occupational classifications (*'occ1990dd'*) over 1980-2008, which we use to construct a balanced panel over 1950-2007 by aggregating occupational codes as needed. This leaves us with 183 balanced occupational codes. Figures 1, A-1, and A-2 plot the smoothed changes in average log hourly wages and total hours worked at each percentile of the occupational skill distribution. These skill percentiles are constructed by ranking the balanced occupations according to their 1950 (Figure A-1 and top row of Figure A-2) or 1980 mean hourly wages (Figure 1 and bottom row of Figure A-2), and then splitting them into 100 groups, each making up 1 percentile of 1950 or 1980 employment.

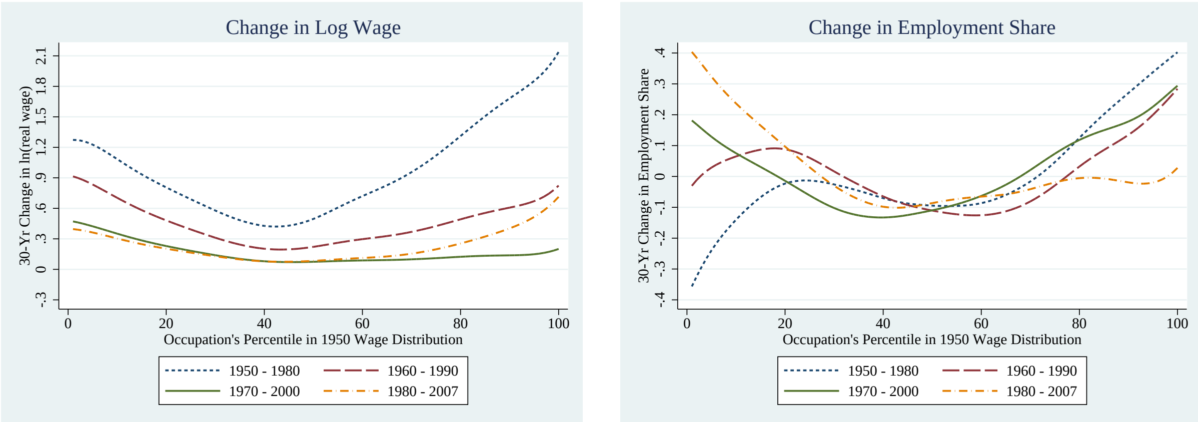

Figure A-1: Smoothed wage and employment polarization 1950 ranking

Notes: Data and left and right panel same as in Figure 1, except occupations are ranked based on their 1950 mean wages.

Figure A-1 shows the change in log real hourly wages and employment, similarly as Figure 1, with the difference that the ranking of occupations is based on their 1950 log real hourly wage. The graph reinforces the message of Figure 1. The left panel shows that wages have been polarizing from 1950 onwards, with the polarization most pronounced in the earlier periods. The right panel shows that the polarization of employment is present in all 30-year periods starting from 1960, with the most pronounced polarization between 1970-2000.

Figure A-2 shows the wage and employment change of occupations for 10-year periods, with occupations ranked based on the 1950 wages (top row) and the 1980 wages (bottom row). These graphs show that polarization does not happen on a decade-by-decade basis. In some decades the top gains, while in others the bottom, but it is never

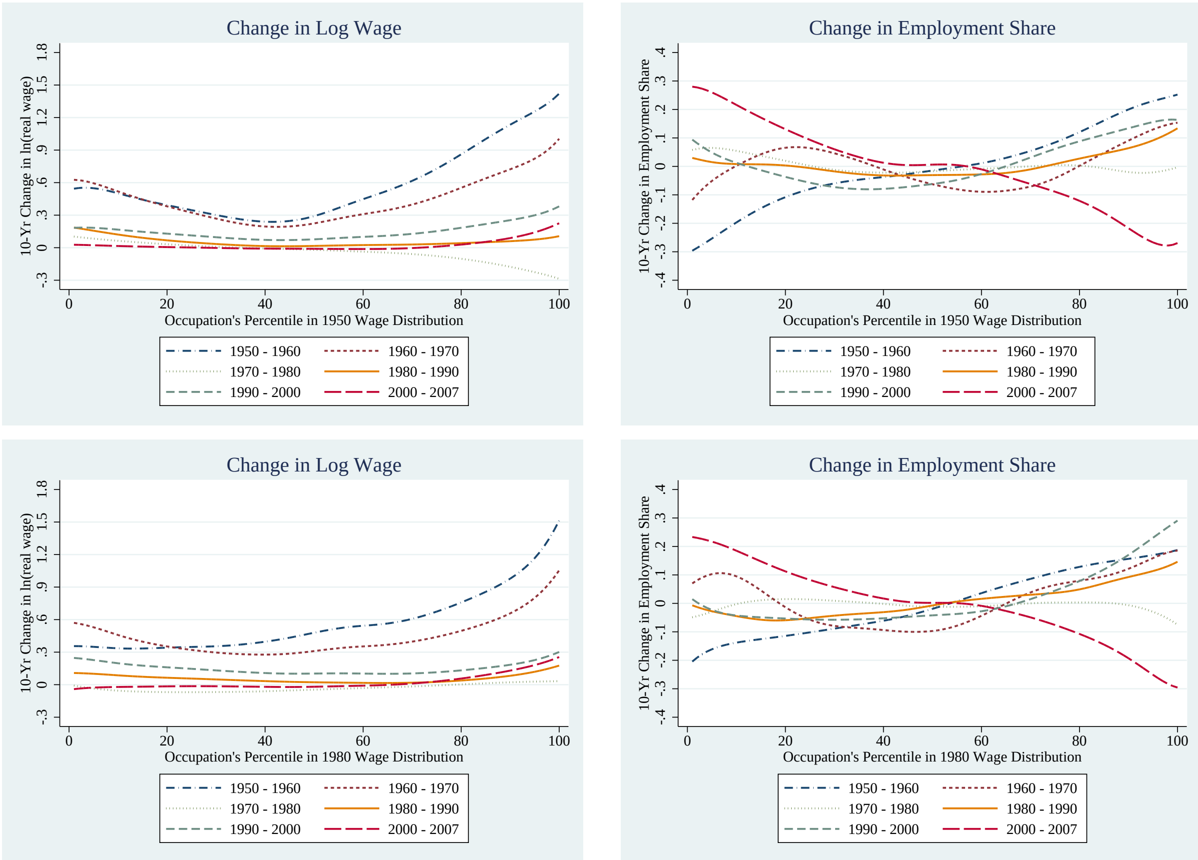

Figure A-2: Smoothed wage and employment polarization, 10-year change

Notes: Data and left and right panel as in Figure 1. All panels show 10-year changes rather than 30-year changes. Occupations are ranked based on their 1950 mean wages in the top two panels, and based on their 1980 mean wages in the bottom two panels.

the middle-wage occupations that gain the most in terms of wages or employment.

In the text we document polarization in terms of occupations for 183 and 10 occupation categories (in Figure 1 and Figure 2 respectively), here we show it for an even coarser classification. As in Acemoglu and Autor (2011) we classify occupation groups into the following categories: manual, routine, and abstract.[2] Figure A-3 shows the patterns of polarization both in terms of wages and employment shares between 1950 and 2007 for these three broad categories. The right panel shows that the employment share of routine occupations has been falling, of abstract occupations has been increasing since the 1950s, while of manual occupations, following a slight compression until 1960, has been steadily increasing. The left panel shows the path of the relative av-

[2]Acemoglu and Autor (2011) have a similar graph of the path of employment shares of four occupation categories (abstract, routine cognitive, routine non-cognitive, manual) between 1960 and 2007. Here we show for 3 categories, starting from 1950, and more importantly, we also show the path of relative occupational wages.

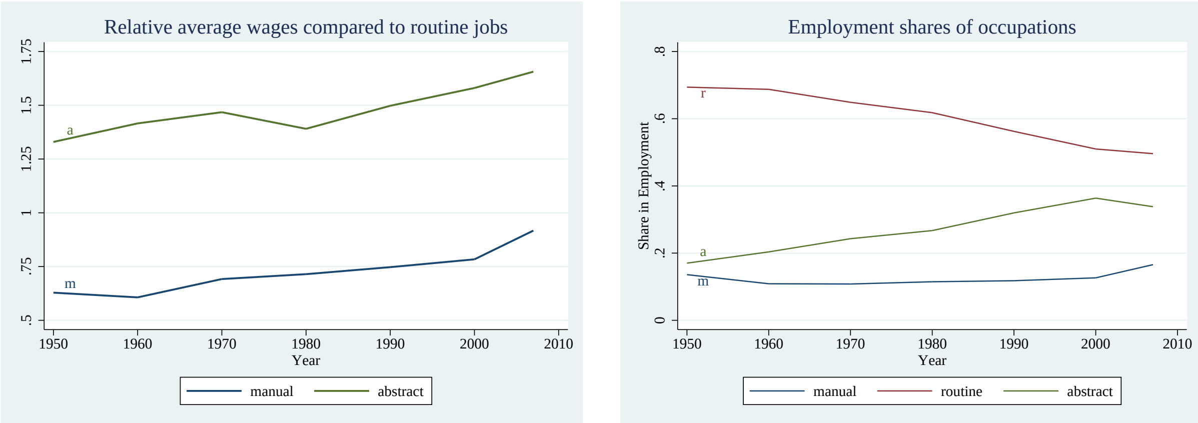

Figure A-3: Polarization for broad occupations

Notes: Relative average wages and employment shares (in terms of hours) are calculated from the same data as in Figure 1. For details of the occupation classification see below.

erage manual and abstract wage compared to the routine wage. It is worth to note that, as expected, manual workers on average earn less than routine workers, while abstract workers earn more. However, over time, the advantage of routine jobs over manual jobs has been falling, and the advantage of abstract jobs over routine jobs has been rising. Thus, the middle earning group, the routine workers, lost both in terms of relative average wages and employment share to the benefit of manual and abstract workers. In other words, also in terms of these three broad occupations there is clear evidence for polarization.

A.1 Categorization of occupations

Following Acemoglu and Autor (2011) we classify occupations into three categories, which are used in Figure A-3:

- Manual (low-skilled non-routine): housekeeping, cleaning, protective service, food prep and service, building, grounds cleaning, maintenance, personal appearance, recreation and hospitality, child care workers, personal care, service, healthcare support;

- Routine: construction trades, extractive, machine operators, assemblers, inspectors, mechanics and repairers, precision production, transportation and material moving occupations, sales, administrative support;

- Abstract (skilled non-routine): managers, management related, professional specialty, technicians and related support.

A.2 Categorization of industries

Based on our theory we classify the industries into three sectors, which are used in Figure 3:

- Low-skilled services: personal services, entertainment, low-skilled transport (bus service and urban transit, taxicab service, trucking service, warehousing and storage, services incidental to transportation), low-skilled business and repair services (automotive rental and leasing, automobile parking and carwashes, automotive repair and related services, electrical repair shops, miscellaneous repair services), retail trade, wholesale trade;

- Manufacturing: mining, construction, manufacturing;

- High-skilled services: professional and related services, finance, insurance and real estate, communications, high-skilled business services (advertising, services to dwellings and other buildings, personnel supply services, computer and data processing services, detective and protective services, business services not elsewhere classified), communications, utilities, high-skilled transport (railroads, U.S. Postal Service, water transportation, air transportation), public administration.

Table A-1 summarizes the descriptive statistics for sectoral employment.

Table A-1: Descriptive statistics by industry

	low-skilled services		manufacturing		high-skilled services	
	1960	2007	1960	2007	1960	2007
Highschool Dropout	55.15%	10.45%	56.29%	13.34%	30.68%	2.60%
Highschool Graduate	29.43%	36.77%	27.19%	39.98%	30.82%	19.19%
Some College	11.09%	33.50%	9.86%	26.79%	16.94%	30.84%
College Degree	3.82%	14.88%	5.63%	14.42%	14.26%	27.86%
Postgraduate	0.51%	4.40%	1.03%	5.48%	7.29%	19.50%
Avg Yrs of Education	10.26	13.08	10.21	12.86	12.21	14.69
Female Share	33.13%	48.00%	18.66%	21.85%	38.09%	54.35%
Foreign-Born Share	6.23%	18.05%	6.63%	20.02%	5.04%	12.88%

A.3 Occupation and sector premia

Figures 3 and A-3 as well as our quantitative exercise focuses on relative average residual wages. We obtain these by regressing log hourly wages on sector dummies and on a set of controls, comprising of a polynomial in potential experience (defined as age - years of schooling - 6), dummies for gender, race, and born abroad.

Table A-2: Regression of log hourly wages: sector effects

Year	1950	1960	1970	1980	1990	2000	2007
low-sk. serv.	-0.28***	-0.31***	-0.22***	-0.19***	-0.20***	-0.17***	-0.18***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
high-sk. serv.	-0.03***	0.02***	0.08***	0.08***	0.14***	0.17***	0.21***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Controls	yes	yes	yes	yes	yes	yes	yes
Observations	113635	459564	579290	958318	1094458	1235282	1308885
R^2	0.21	0.25	0.21	0.21	0.21	0.18	0.19

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A-3: Regression of log hourly wages: occupation effects

Year	1950	1960	1970	1980	1990	2000	2007
manual	-0.41***	-0.42***	-0.33***	-0.28***	-0.24***	-0.19***	-0.10***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
abstract	0.17***	0.27***	0.32***	0.31***	0.39***	0.44***	0.50***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Controls	yes	yes	yes	yes	yes	yes	yes
Observations	113635	459564	579290	958318	1094458	1235282	1308885
R^2	0.23	0.28	0.25	0.26	0.27	0.26	0.26

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tables A-2 and A-3 show the regression results. Since we omit the dummy for manufacturing, the implied relative wage of a low-skilled (high-skilled) service worker is given by the exponential of the estimated coefficient on the low-skilled (high-skilled) service sector dummy. The regression specification to compute residual occupational wages is analogue, with the sector dummies replaced by occupation dummies; we omit the dummy for routine occupations, such that relative wages compared to routine occupations are given by the exponential of the occupation dummies.

In the text we show the coefficients on the sectoral dummies from the wage regressions, and in Figure A-3 the relative average occupational wages. In Figure A-4 we show the reverse: the sectoral relative average wages compared to manufacturing,

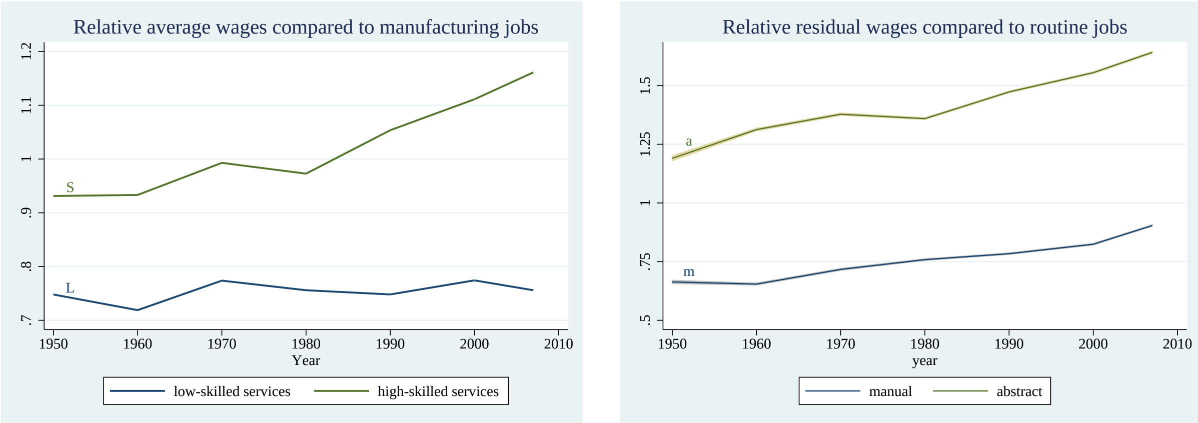

Figure A-4: Wage polarization for sectors and occupations

Notes: Same data and classification as in Figure 3 and A-3. The left panel shows the relative average wages of high-skilled and low-skilled service workers compared to manufacturing workers. The right panel shows the occupation premium for abstract and manual workers compared to routine workers, and their 95% confidence intervals, as estimated in Table A-3.

and the coefficients on occupational dummies from a wage regression. The patterns are unchanged.

A.4 Alternative wage specifications

In the main text we document the patterns of average low-skilled and high-skilled service wages relative to manufacturing by constructing the sector effects from a regression that controls for a set of observables, in order to remove effects stemming from changes in the composition of the workforce. In particular, we include a fourth-order polynomial in potential experience and dummies for gender, race, and foreign-born as covariates in the (log) wage regression. In Table A-4 we show how the predicted sectoral relative wages change when adding further covariates to the regression and when restricting the sample to only men.

The first three rows show the baseline specification's prediction for sectoral relative wages in 1960 and 2007 as well as their percentage change over this period. These are the numbers against which we evaluate our quantitative model. In the rows below alternative sets of further controls are included in the regression. While the quantitative predictions naturally change, the patterns remain, showing an increase of low- and high-skilled service wages relative to manufacturing.

Table A-4: Predicted sectoral relative wages in alternative wage regressions

Sample	additional controls	year	L to M	H to M
all	none	1960	0.731	1.021
		2007	0.833	1.238
		1960-2007	13.97%	21.16%
all	interaction of sectoral dummies and experience	1960	0.780	1.108
		2007	0.887	1.350
		1960-2007	13.77%	21.84%
all	dummies for three occupational categories	1960	0.771	0.998
		2007	0.857	1.100
		1960-2007	11.12%	10.20%
all	dummies for ten occupational categories	1960	0.743	0.937
		2007	0.807	1.032
		1960-2007	8.63%	10.11%
all	dummy for college degree	1960	0.734	0.960
		2007	0.832	1.057
		1960-2007	13.34%	10.09%
men	none	1960	0.7675	0.979
		2007	0.850	1.274
		1960-2007	10.75%	30.19%
men	interaction of sectoral dummies and experience	1960	0.788	1.032
		2007	0.880	1.357
		1960-2007	11.69%	31.52%
men	dummies for three occupational categories	1960	0.776	0.953
		2007	0.872	1.114
		1960-2007	12.41%	16.82%
men	dummies for ten occupational categories	1960	0.748	0.919
		2007	0.836	1.062
		1960-2007	11.78%	15.57%
men	dummy for college degree	1960	0.774	0.921
		2007	0.844	1.059
		1960-2007	9.05%	14.95%

Notes: The first 3 rows show the baseline specification's prediction for sectoral relative wages in 1960 and 2007 as well as their percentage change over this period. The subsequent blocks show the predictions when including (alternatively) additional covariates: interaction terms of sectoral dummies and experience, dummies for three occupational categories (manual, routine, abstract), dummies for ten occupational categories (as used in Figure 2), college dummy. The final set of rows show these predictions when restricting the sample to only men.

A.5 The role of gender and age composition changes

Figure A-5 demonstrates that the sectoral employment share changes are not driven by changes in the age, gender, race composition of the labor force. The counterfactual industry employment shares are generated by fixing the sectoral employment share of each age-gender-race cell at its 1960 level, and allowing the employment shares of the cells to change. While it can be seen that the counterfactual employment shares (the dashed lines) qualitatively move in the same direction as the actual employment shares (the solid lines), in terms of magnitude the counterfactual employment shares move much less. This implies that the changing composition of the labor force is not the main driving force of the evolution of sectoral employment.

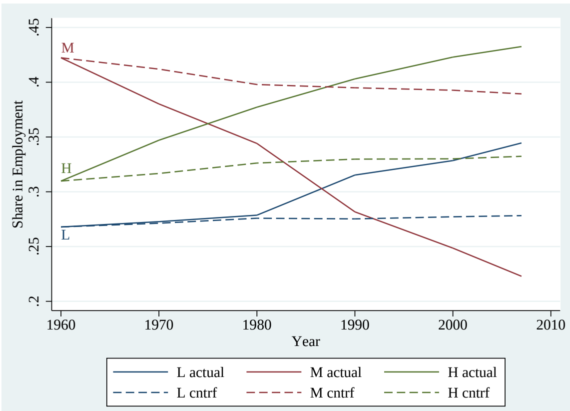

Figure A-5: Counterfactual exercise: only changes in the gender-age composition of the labor force

Notes: Employment shares (in terms of hours) are calculated from the same data as in Figure 3. The actual data is shown as solid lines, while the dashed line show how the employment shares of industries would have evolved if only the relative size of gender-age cells in the labor force had changed over time.

A.6 The role of industry shifts in occupational employment shares

In Table 1 of the main text we showed a shift-share decomposition for the changes in occupational employment between 1950 and 2007, and alternatively between 1960 and 2007. In Table A-5 we show this decomposition of employment share changes into a between-industry and a within-industry component for each decade. While we find a declining contribution of between-industry shifts since 1980, which might be due routinization then taking off, again we find that a sizable part of the occupational employment share changes is due to shifts between industries.

Table A-5: Decomposition of the changes in occupational employment shares by decade

	1950–60	1960–70	1970–80	1980–90	1990–00	2000–07
	3 occupations, 3 sectors					
Manual						
Total Δ	-2.71	-0.07	0.67	0.31	0.85	3.93
Between Δ	-0.94	0.55	0.47	0.95	0.47	0.44
Within Δ	-1.76	-0.63	0.21	-0.65	0.39	3.48
Routine						
Total Δ	-0.65	-3.86	-3.09	-5.57	-5.24	-1.39
Between Δ	0.94	-1.41	-1.22	-1.58	-0.98	-0.70
Within Δ	-1.59	-2.45	-1.86	-3.99	-4.26	-0.69
Abstract						
Total Δ	3.35	3.93	2.41	5.27	4.39	-2.54
Between Δ	0.00	0.85	0.76	0.63	0.51	0.26
Within Δ	3.35	3.08	1.66	4.63	3.87	-2.80
	10 occupations, 11 industries					
Manual						
Total Δ	-2.71	-0.07	0.67	0.31	0.85	3.93
Between Δ	-1.51	0.71	0.73	1.16	0.78	0.67
Within Δ	-1.19	-0.78	-0.06	-0.85	0.07	3.26
Routine						
Total Δ	-0.64	-3.86	-3.09	-5.57	-5.24	-1.39
Between Δ	0.85	-2.39	-1.96	-2.21	-1.80	-1.02
Within Δ	-1.49	-1.47	-1.12	-3.36	-3.44	-0.36
Abstract						
Total Δ	3.35	3.93	2.41	5.27	4.39	-2.54
Between Δ	0.67	1.69	1.23	1.05	1.02	0.36
Within Δ	2.69	2.25	1.18	4.21	3.37	-2.90

Notes: Same data as in Figure 1. For each occupational category, the first row presents the change in the share of employment (in terms of hours worked), the second the between-industry component, and the third the within-industry component for the time interval given at the top. The top panel uses 3 occupations and 3 sectors, the bottom panel 10 occupations and 11 industries.

As an alternative way to asses the importance of the employment reallocations between industries for the shifts in the broad occupation categories, we conduct the following counterfactual exercise: we fix the industry shares in employment (in terms of hours worked) at their 1960 levels and let the within-industry share of occupations follow their actual path, and compute how the occupational shares would have evolved in the absence of between-industry shifts. Figure A-6 shows the resulting time series (dashed) and the actual data (solid). This exercise shows that if there had been only within-industry shifts, qualitatively the employment of the occupation categories would have evolved as in the actual data, but that quantitatively they cannot explain all of the changes. We therefore conclude that also between-industry shifts account for the polarization of occupational employment.

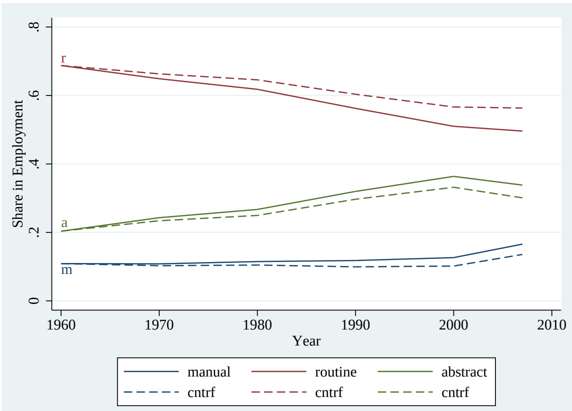

Figure A-6: Counterfactual exercise: only-within industry shift of occupations

Notes: Employment shares (in terms of hours) are calculated from the same data as in Figure A-4. The actual data is shown as solid lines, while the dashed line show how the occupational employment shares would have evolved in the absence of reallocations across industries.

A.7 Alternative shift-share decomposition

We also conduct an alternative shift-share decomposition, where we use industry level value added shares instead of employment shares. We construct hybrid occupational employment shares as

$$\tilde{E}_{ot} = \sum_i VA_{it}\lambda_{oit},$$

where VA_{it} is the share of industry i in total value added in period t, and λ_{oit} is the share of occupation o, industry i employment within industry i employment in period t, as defined earlier. In general $\tilde{E}_{ot} \neq E_{ot}$, where E_{ot} is simply the share of an occupation o in total employment, and which is given by $E_{ot} = L_{ot}/L_t = \sum_i E_{it}\lambda_{oit}$, where E_{it} is the share of a industry i in total employment, as before.

Given these hybrid occupational employment shares, we can decompose their change into a part that is driven by within industry occupational employment share changes, and a part that is driven by between industry shifts of value added.[3]

$$\Delta\tilde{E}_{ot} = \underbrace{\sum_i \lambda_{oi}\Delta VA_{it}}_{\equiv\Delta\tilde{E}^B_{ot}} + \underbrace{\sum_i VA_i\Delta\lambda_{oit}}_{\equiv\Delta\tilde{E}^W_{ot}} .$$

Table A-6: Decomposition of changes in hybrid occupational employment shares

	Constructed employment shares 1960–2007	
	3 x 3	**10 x 11**
Manual		
Total Δ	3.65	3.35
Between Δ	1.32	0.98
Within Δ	2.36	2.37
Routine		
Total Δ	-19.53	-18.50
Between Δ	-5.29	-6.46
Within Δ	-14.24	-12.50
Abstract		
Total Δ	16.09	15.36
Between Δ	4.18	5.69
Within Δ	11.90	9.68

Notes: Same occupational employment share data as in Figure 1. The value added industry data come from the BEA. For each occupational category, the first row presents the total change, the second the between-industry component, and the third the within-industry component over the period 1960-2007. The first column uses 3 occupations and 3 sectors, column two uses 10 occupations and 11 industries for the decomposition.

Table A-6 shows the changes in our hybrid occupational employment shares and their decomposition between 1960 and 2007, into a between-industry and a within-industry component. The value added data comes from the Bureau of Economic Analysis (BEA). Due to the lack of value added data for finer industry categories before the

[3]The change driven by shifts between sectors is calculated as the weighted sum of the change in sector i's value added share, ΔVA_{it}, where the weights are the average employment share of occupation o within sector i, $\lambda_{oi} = (\lambda_{oit} + \lambda_{oi0})/2$. The change driven by shifts within sectors is calculated as the weighted sum of the change in occupation o's share within sector i employment, $\Delta\lambda_{oit}$, where the weights are the average value added share of sector i, $VA_i = (VA_{it} + VA_{i0})/2$.

1960s, we decompose changes between 1960 and 2007. Table A-6 suggests that between one fourth and one third of occupational employment changes are driven by between industry phenomena, regardless of whether we decompose 3 occupations in 3 sectors, or 10 occupations in 11 sectors. The importance of the between-industry component seems to be somewhat smaller than in the standard shift-share decomposition shown in Table 1, but it is nonetheless quite a substantial share of the overall change.

A.8 Three-way decomposition of relative wage changes

There are three ways of conducting a three-way decomposition:

$$\Delta rw_{ot} = \underbrace{\sum_i \underbrace{\frac{p_{iot} rw_{it} + p_{io0} rw_{i0}}{2}}_{= rw_{io}} \Delta\chi_{iot} + \sum_i \chi_{io} p_{io} \Delta rw_{it}}_{\text{industry effect}} + \underbrace{\sum_i \chi_{io} rw_i \Delta p_{iot}}_{\text{occupation effect}} \tag{A-1}$$

$$= \underbrace{\sum_i p_{io} rw_i \Delta\chi_{iot} + \sum_i \frac{\chi_{iot} p_{iot} + \chi_{io0} p_{io0}}{2} \Delta rw_{it}}_{\text{industry effect}} + \underbrace{\sum_i \chi_{io} rw_i \Delta p_{iot}}_{\text{occupation effect}} \tag{A-2}$$

$$= \underbrace{\sum_i p_{io} rw_i \Delta\chi_{iot} + \sum_i \chi_{io} p_{io} \Delta rw_{it}}_{\text{industry effect}} + \underbrace{\sum_i \frac{\chi_{iot} rw_{it} + \chi_{io0} rw_{i0}}{2} \Delta p_{iot},}_{\text{occupation effect}} \tag{A-3}$$

where Δ denotes the change between period 0 and t, and the variables without a time subscript denote the average of the variable between period 0 and period t.

The first row is the decomposition we showed in the main body of the paper. The second row gives exactly the same results in terms of the breakdown between industry and occupation effects. The third row gives virtually the same results as summarized in Table A-7.

A.9 Decomposition of relative wage changes by decade

In Table 2 of the main text we showed a decomposition of changes in relative occupational wages between 1950 and 2007, and alternatively between 1960 and 2007. In Table A-8 we show this decomposition of relative wages changes into an industry and an occupation component for each decade.

Table A-7: Alternative decomposition of changes in relative occupational wages

	Relative wages			
	3 x 3		10 x 11	
	1950–2007	1960–2007	1950–2007	1960–2007
Manual/Routine				
Total Δ	0.289	0.310	0.289	0.310
Industry Δ	0.181	0.148	0.222	0.216
Occupation Δ	0.107	0.162	0.067	0.094
Abstract/Routine				
Total Δ	0.327	0.240	0.327	0.240
Industry Δ	0.310	0.254	0.381	0.323
Occupation Δ	0.016	-0.013	-0.054	-0.082

Notes: Same data as in Figure 1. For each occupational category, the first row presents the total change, the second the industry component, and the third the occupation component over the period 1950–2007 and over 1960–2007, based on the decomposition equation (A-3). The first two columns use 3 occupations and 3 sectors, columns three and four 10 occupations and 11 industries.

Table A-8: Decomposition of the changes in relative average wages by decade

	1950–60	1960–70	1970–80	1980–90	1990–00	2000–07
	3 occupations, 3 sectors					
Manual/Routine						
Total Δ	-0.022	0.085	0.023	0.033	0.036	0.134
Industry Δ	0.024	0.061	-0.014	0.034	0.032	0.043
Occupation Δ	-0.046	0.024	0.037	-0.001	0.005	0.091
Abstract/Routine						
Total Δ	0.086	0.052	-0.077	0.107	0.083	0.076
Industry Δ	0.061	0.052	-0.017	0.105	0.075	0.046
Occupation Δ	0.025	-0.000	-0.060	0.002	0.008	0.029
	10 occupations, 11 industries					
Manual/Routine						
Total Δ	-0.022	0.085	0.023	0.033	0.036	0.134
Industry Δ	-0.006	0.076	-0.022	0.042	0.045	0.065
Occupation Δ	-0.016	0.009	0.045	-0.010	-0.008	0.068
Abstract/Routine						
Total Δ	0.086	0.052	-0.077	0.107	0.083	0.076
Industry Δ	0.065	0.067	-0.024	0.124	0.087	0.047
Occupation Δ	0.021	-0.015	-0.054	-0.017	-0.004	0.029

Notes: Same data as in Figure 1. For each occupational category, the first row presents the total change, the second the industry component, and the third the occupation component for the time interval given at the top, based on the decomposition equation (A-1). The top panel uses 3 occupations and 3 sectors, the bottom panel 10 occupations and 11 industries.

A.10 Historical data

Given that our model suggests that structural transformation leads to the employment compression of occupations most intensively used in the shrinking sector of the economy, we look at pre-1950 data to see whether this prediction also holds over longer horizons. There are some caveats to note. First, hours worked and wage data are not available, so we can only look at employment patterns in terms of persons employed, and we cannot analyze wage patterns. Given the lack of wage data, it is also hard to verify whether these labor market patterns resemble polarization or have different implications. Second, in the period 1850–1900 the Census used the 1880 occupational classification system, where workers' occupations were to some extent inferred from their industry.[4] This means that by construction there is a significant overlap between industry and occupation classifications prior to 1900. With these caveats in mind, we analyze the patterns of employment between 1850 and 1940. Since in the 1850s a large fraction of the workforce was employed in agriculture, we do not drop agricultural workers, but instead add extra categories for them, both as an occupation and as a sector.

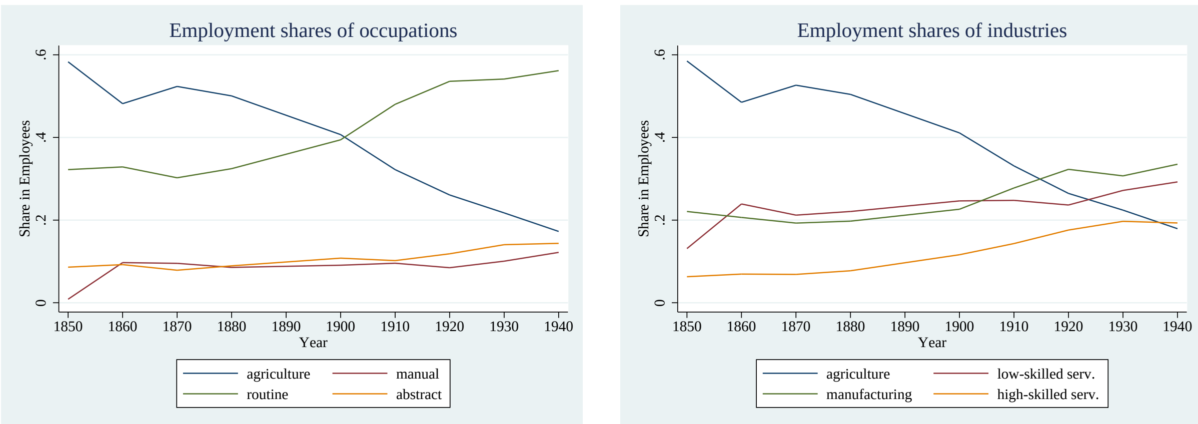

Figure A-7: Employment patterns 1850–1940

Notes: The graphs is based on Census data between 1850 and 1940. Each worker is classified into one of four occupations based on their occupation code (*occ1950*) and one of four sectors based on their industry code (*ind1950*). Both graphs show employment shares in terms of number of people. The left panel shows employment shares in terms of occupations, while the right panel shows them in terms of sectors.

The employment share patterns are shown in Figure A-7. This figure shows that the

[4]The IPUMS documentation writes: *"In 1850–1900, occupations are classified according to the 1880 system. The 1880 occupational classification was oriented more to work settings and economic sectors – what is now termed "industry" – than to workers' specific technical functions."*

defining trend in terms of sectors in the period 1850–1940 was the declining employment share of agriculture, and a slow increase in the other three sectors (low-skilled services, manufacturing and high-skilled services). In terms of occupations we see a parallel compression of agricultural occupations, a quite pronounced increase in routine workers, and a slow increase in manual and abstract workers. Thus even prior to 1950 we see quite a close connection between sectoral and occupational employment share trends.

Next we conduct a shift-share decomposition of occupational employment shares (as in section I.C). This decomposition, summarized in Table A-9, confirms what Figure A-7 already suggests, that sectoral and occupational employment patterns are quite closely connected. The decomposition shows that almost all of the decline in agricultural occupations is driven by employment moving away from the agricultural sector; that abstract and routine employment are expanding due to the movement of labor into sectors where these occupations are used more intensively; and that manual employment is also partly expanding due to sectoral labor reallocation.

The historical data confirms that the structural transformation of the economy has a significant impact on occupational employment patterns even prior to the 1950s. In particular it seems that in the period 1850–1940 as the agricultural sector was shrinking, while manufacturing and low-and high-skilled services were increasing, the employment share in agricultural occupations fell, while the employment share in routine and abstract occupations increased, largely driven by the sectoral reallocation labor.

Table A-9: Shift-share decomposition of occupational employment share changes

	4x4			12x14		
	1850–1900	1900–1940	1850–1940	1850–1900	1900-1940	1850-1940
Agricultural						
Total Δ	-17.62	-23.43	-41.04	-38.57	-23.57	-68.61
Between Δ	-17.28	-22.61	-39.72	-21.49	-23.36	-53.23
Within Δ	-0.34	-0.81	-1.32	-17.08	-0.20	-15.37
Manual						
Total Δ	8.23	3.10	11.33	16.00	1.93	15.34
Between Δ	2.48	2.42	4.13	6.25	1.21	6.03
Within Δ	5.75	0.68	7.20	9.75	0.72	9.32
Routine						
Total Δ	7.21	16.74	23.95	4.49	20.96	26.30
Between Δ	9.06	15.78	24.99	13.81	19.31	31.67
Within Δ	-1.86	0.97	-1.03	-9.32	1.65	-5.37
Abstract						
Total Δ	2.18	3.58	5.76	2.82	4.35	7.15
Between Δ	5.73	4.42	10.61	6.63	7.67	15.28
Within Δ	-3.55	-0.84	-4.85	-3.81	-3.32	-8.13

Notes: Same data as in Figure A-7. For each occupational category, the first row presents the total change, the second the between industry component, and the third the within industry component over the period 1850–1900, 1900–1940 and 1850–1940, based on the decomposition equation (1). The first three columns use 4 occupations and 4 sectors (as in Figure A-7), the last three 12 occupations and 14 industries (same categories as in Table 1 with the following additional occupations:'farmers and farm managers', 'farm laborers', and industries: 'agriculture', 'forestry' and 'fishing').

B Model appendix

Proof of Proposition 1. To simplify notation denote the relative unit wages by $\widehat{a}_m \equiv \frac{\omega_l}{\omega_m}$ and $\widehat{a}_h \equiv \frac{\omega_l}{\omega_h}$.
Starting from:

$$\frac{N_l\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)}{N_m\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)}\widehat{a}_m^{\varepsilon} = \left(\frac{A_m}{A_l}\right)^{1-\varepsilon}\left(\frac{\theta_m}{\theta_l}\right)^{-\varepsilon},$$
$$\frac{N_h\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)}{N_m\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)}\left(\frac{\widehat{a}_m}{\widehat{a}_h}\right)^{\varepsilon} = \left(\frac{A_m}{A_h}\right)^{1-\varepsilon}\left(\frac{\theta_m}{\theta_h}\right)^{-\varepsilon}.$$

A change in productivities triggers changes in the equilibrium cutoffs, $\widehat{a}_m$ and $\widehat{a}_h$, in such a way that the above conditions remain satisfied. Total differentiation then implies:

$$\varepsilon\frac{d\widehat{a}_m}{\widehat{a}_m} + \frac{dN_l}{N_l} - \frac{dN_m}{N_m} = (1-\varepsilon)\frac{d\frac{A_m}{A_l}}{\frac{A_m}{A_l}}, \tag{A-4}$$
$$\varepsilon\left(\frac{d\widehat{a}_m}{\widehat{a}_m} - \frac{d\widehat{a}_h}{\widehat{a}_h}\right) + \frac{dN_h}{N_h} - \frac{dN_m}{N_m} = (1-\varepsilon)\frac{d\frac{A_m}{A_h}}{\frac{A_m}{A_h}}. \tag{A-5}$$

Applying the Leibniz rule to the expressions for $N_l\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)$, $N_m\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)$ and $N_h\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right)$, we get the following expressions for the change in the effective and raw labor supplies as a function of the change in $\widehat{a}_m$ and in $\widehat{a}_h$ is

$$dN_l\left(\widehat{a}_m, \frac{\widehat{a}_m}{\widehat{a}_h}\right) = \frac{\partial N_l}{\partial \widehat{a}_m}d\widehat{a}_m + \frac{\partial N_l}{\partial \widehat{a}_h}d\widehat{a}_h = \underbrace{\int_0^\infty \int_0^{\widehat{a}_h a_l} a_l^2 f(a_l, \widehat{a}_m a_l, a_h)\,da_h\,da_l}_{\equiv C_1>0} \cdot \widehat{a}_m d\widehat{a}_m$$
$$+ \underbrace{\int_0^\infty \int_0^{\widehat{a}_m a_l} a_l^2 f(a_l, a_m, \widehat{a}_h a_l)\,da_m\,da_l}_{\equiv C_2>0} \cdot \widehat{a}_h d\widehat{a}_h, \tag{A-6}$$

$$dN_m\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=-\underbrace{\int_0^\infty\int_0^{\frac{\widehat{a}_h}{\widehat{a}_m}a_m}a_m^2 f(\frac{a_m}{\widehat{a}_m},a_m,a_h)da_h da_m}_{=C_3>0}\cdot\frac{1}{\widehat{a}_m^2}d\widehat{a}_m$$

$$-\underbrace{\int_0^\infty\int_0^{\frac{a_m}{\widehat{a}_m}}a_m^2 f(a_l,a_m,\frac{\widehat{a}_h}{\widehat{a}_m}a_m)da_l da_m}_{\equiv C_4>0}\cdot\frac{\widehat{a}_h}{\widehat{a}_m}\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right), \qquad \text{(A-7)}$$

$$dN_h\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=-\underbrace{\int_0^\infty\int_0^{\frac{\widehat{a}_m}{\widehat{a}_h}a_h}a_h^2 f(\frac{a_h}{\widehat{a}_h},a_m,a_h)da_m da_h}_{=C_5>0}\cdot\frac{1}{\widehat{a}_h^2}d\widehat{a}_h$$

$$+\underbrace{\int_0^\infty\int_0^{\frac{a_h}{\widehat{a}_h}}a_h^2 f(a_l,\frac{\widehat{a}_m}{\widehat{a}_h}a_h,a_h)da_l da_h}_{\equiv C_6>0}\cdot\frac{\widehat{a}_m}{\widehat{a}_h}\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right). \qquad \text{(A-8)}$$

Similarly

$$dL_l\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=\underbrace{\int_0^\infty\int_0^{\widehat{a}_h a_l}a_l f(a_l,\widehat{a}_m a_l,a_h)da_h da_l}_{\equiv\tilde{C}_1>0}\cdot\widehat{a}_m d\widehat{a}_m$$

$$+\underbrace{\int_0^\infty\int_0^{\widehat{a}_m a_l}a_l f(a_l,a_m,\widehat{a}_h a_l)da_m da_l}_{\equiv\tilde{C}_2>0}\cdot\widehat{a}_h d\widehat{a}_h, \qquad \text{(A-9)}$$

$$dL_m\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=-\underbrace{\int_0^\infty\int_0^{\frac{\widehat{a}_h}{\widehat{a}_m}a_m}a_m f(\frac{a_m}{\widehat{a}_m},a_m,a_h)da_h da_m}_{\equiv\tilde{C}_3>0}\cdot\frac{1}{\widehat{a}_m^2}d\widehat{a}_m$$

$$-\underbrace{\int_0^\infty\int_0^{\frac{a_m}{\widehat{a}_m}}a_m f(a_l,a_m,\frac{\widehat{a}_h}{\widehat{a}_m}a_m)da_l da_m}_{\equiv\tilde{C}_4>0}\cdot\frac{\widehat{a}_h}{\widehat{a}_m}\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right), \qquad \text{(A-10)}$$

$$dL_h\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=-\underbrace{\int_0^\infty\int_0^{\frac{\widehat{a}_m}{\widehat{a}_h}a_h}a_h f(\frac{a_h}{\widehat{a}_h},a_m,a_h)da_m da_h}_{\equiv\tilde{C}_5>0}\cdot\frac{1}{\widehat{a}_h^2}d\widehat{a}_h$$

$$+\underbrace{\int_0^\infty\int_0^{\frac{a_h}{\widehat{a}_h}}a_h f(a_l,\frac{\widehat{a}_m}{\widehat{a}_h}a_h,a_h)da_l da_h}_{\equiv\tilde{C}_6>0}\cdot\frac{\widehat{a}_m}{\widehat{a}_h}\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right). \qquad \text{(A-11)}$$

Plugging these into (A-4) and (A-5) and re-arranging we get:

$$\frac{d\widehat{a}_m}{\widehat{a}_m}\underbrace{\left[\varepsilon+\frac{C_1\widehat{a}_m^2}{N_l}+\frac{C_3\frac{1}{\widehat{a}_m}}{N_m}+\frac{C_4\frac{\widehat{a}_h}{\widehat{a}_m}}{N_m}\right]}_{\equiv B_1>0}+\frac{d\widehat{a}_h}{\widehat{a}_h}\underbrace{\left[\frac{C_2\widehat{a}_h^2}{N_l}-\frac{C_4\frac{\widehat{a}_h}{\widehat{a}_m}}{N_m}\right]}_{\equiv B_2}=\underbrace{(1-\varepsilon)\frac{d\frac{A_m}{A_l}}{\frac{A_m}{A_l}}}_{\equiv D_1},$$

$$\frac{d\widehat{a}_m}{\widehat{a}_m}\underbrace{\left[\varepsilon+\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}+\frac{C_3\frac{1}{\widehat{a}_m}}{N_m}+\frac{C_4\frac{\widehat{a}_h}{\widehat{a}_m}}{N_m}\right]}_{\equiv B_3>0}-\frac{d\widehat{a}_h}{\widehat{a}_h}\underbrace{\left[\varepsilon+\frac{C_5\frac{1}{\widehat{a}_h}}{N_h}+\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}+\frac{C_4\frac{\widehat{a}_h}{\widehat{a}_m}}{N_m}\right]}_{\equiv B_4>0}=\underbrace{(1-\varepsilon)\frac{d\frac{A_m}{A_h}}{\frac{A_m}{A_h}}}_{\equiv D_2}.$$

This leads to

$$\frac{d\widehat{a}_h}{\widehat{a}_h}=\frac{B_3D_1-B_1D_2}{B_3B_2+B_1B_4},$$
$$\frac{d\widehat{a}_m}{\widehat{a}_m}=\frac{D_2B_2+B_4D_1}{B_3B_2+B_1B_4},$$

where $B_3B_2+B_1B_4>0$ can be easily verified by multiplying out the terms. Hence to determine the response in $\widehat{a}_m$ and in $\widehat{a}_h$, we only need to consider the sign of the numerator. If $D_1=D_2>0$, i.e. the growth rate of A_l is equal to the growth rate of A_h, and lower than the growth rate of A_m, then the following expressions can be obtained:

$$\frac{d\widehat{a}_h}{\widehat{a}_h}=\frac{D}{B_3B_2+B_1B_4}(B_3-B_1)=\frac{D}{B_3B_2+B_1B_4}\left(\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}-\frac{C_1\widehat{a}_m^2}{N_l}\right), \tag{A-12}$$

$$\frac{d\widehat{a}_m}{\widehat{a}_m}=\frac{D}{B_3B_2+B_1B_4}(B_2+B_4)=\frac{D}{B_3B_2+B_1B_4}\left(\varepsilon+\frac{C_5\frac{1}{\widehat{a}_h}}{N_h}+\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}+\frac{C_2\widehat{a}_h^2}{N_l}\right)>0. \tag{A-13}$$

As this shows, $\frac{d\widehat{a}_m}{\widehat{a}_m}>0$. The sign of $\frac{d\widehat{a}_h}{\widehat{a}_h}$ is ambiguous in general, but it is straightforward that $\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}>0$:

$$\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right)=\frac{D}{B_3B_2+B_1B_4}\left(\varepsilon+\frac{C_1\widehat{a}_m^2}{N_l}+\frac{C_2\widehat{a}_h^2}{N_l}+\frac{C_5\frac{1}{\widehat{a}_h}}{N_h}\right)>0.$$

To summarize the changes in relative unit wages, $\omega_l/\omega_m=\widehat{a}_m$ and $\omega_h/\omega_m=\widehat{a}_m/\widehat{a}_h$ increases, while $\omega_l/\omega_h=\widehat{a}_h$ can increase or decrease.

These together with (A-7) and (A-10) imply that N_m and L_m always decrease. These changes are:

$$dN_m\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=-\left(C_3\frac{1}{\widehat{a}_m}\frac{d\widehat{a}_m}{\widehat{a}_m}+C_4\frac{\widehat{a}_h}{\widehat{a}_m}\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right)\right)<0,$$
$$dL_m\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=-\left(\tilde{C}_3\frac{1}{\widehat{a}_m}\frac{d\widehat{a}_m}{\widehat{a}_m}+\tilde{C}_4\frac{\widehat{a}_h}{\widehat{a}_m}\left(\frac{d\widehat{a}_m}{\widehat{a}_m}-\frac{d\widehat{a}_h}{\widehat{a}_h}\right)\right)<0.$$

By plugging in (A-12) and (A-13) into (A-6) we can show that effective employment in sector L increases:

$$\begin{aligned}dN_l\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)&=C_1\widehat{a}_m^2\frac{d\widehat{a}_m}{\widehat{a}_m}+C_2\widehat{a}_h^2\frac{d\widehat{a}_h}{\widehat{a}_h}\\&=\frac{D}{B_3B_2+B_1B_4}\left[C_1\widehat{a}_m^2\left(\varepsilon+\frac{C_5\frac{1}{\widehat{a}_h}}{N_h}+\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}\right)+C_2\widehat{a}_h^2\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}\right]>0.\end{aligned}$$

By plugging in (A-12) and (A-13) into (A-8) we can show that effective employment in sector H increases:

$$dN_h\left(\widehat{a}_m,\frac{\widehat{a}_m}{\widehat{a}_h}\right)=\frac{D}{B_3B_2+B_1B_4}\left[C_5\frac{1}{\widehat{a}_h}\frac{C_1\widehat{a}_m^2}{N_l}+C_6\frac{\widehat{a}_m}{\widehat{a}_h}\left(\varepsilon+\frac{C_6\frac{\widehat{a}_m}{\widehat{a}_h}}{N_h}+\frac{C_2\widehat{a}_h^2}{N_l}\right)\right]>0.$$

□

C Quantitative results appendix

C.1 Non-transitory wage dispersion in the PSID 1968–1975

To calibrate the distribution of labor efficiencies in the quantitative model, we target as a fifth moment (besides relative average sectoral wages and employment shares in the 1960 Census data) the variance of the non-transitory component of log wages, which we estimate similarly to Lagakos and Waugh (2013). To compute this statistic, we require panel data. We therefore use data from the PSID family index from its launch in 1968 to 1975. To ensure that we are tracking individuals correctly over time, we restrict the sample to households in which neither the household head nor the spouse changes over this period. We restrict the sample further to individuals who are between 16 and 65 years of age, employed outside of agriculture, report hourly wages that are not below the federal minimum wage, and whose wages are observed at least twice over 1968–1975.

Like Lagakos and Waugh (2013), we want to extract the non-transitory components in log wages to construct the calibration target for our model. We run a regression of log hourly wages on individual fixed effects and year fixed effects, and then compute the variance of the individual fixed effects. This gives a value of 0.187, which we use as our target for the dispersion of the non-transitory component in log wages.

C.2 Robustness

In section III.C of the main text we summarized how our result change when assuming a different underlying distribution of sectoral efficiencies and when varying the elasticity of substitution between goods and services (measured in value-added terms). Here we show in Table A-10 and A-11 the predictions of the model for various calibrations, assuming a (trivariate) log-normal distribution or a truncated normal distribution respectively.

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Table A-10: Robustness checks: different correlations vs the data

parameters								rel. avg. wage Δ	
ρ_{lm}	ρ_{mh}	ρ_{lh}	σ_l^2	σ_m^2	σ_h^2	τ_l	τ_h	L to M	H to M
0.0	0	0.0	0.13	0.36	0.45	0.56	0.86	10.53	10.13
0.0	0	0.3	0.13	0.36	0.40	0.53	0.83	10.76	10.67
0.0	0	0.6	0.13	0.37	0.34	0.50	0.79	10.90	11.19
0.0	0.3	0.0	0.14	0.32	0.39	0.58	0.84	9.79	7.75
0.0	0.3	0.3	0.13	0.33	0.34	0.56	0.81	10.31	8.49
0.0	0.3	0.6	0.14	0.34	0.29	0.53	0.77	10.81	9.13
0.0	0.6	0.0	0.14	0.30	0.34	0.61	0.82	8.88	5.34
0.0	0.6	0.3	0.14	0.31	0.29	0.58	0.78	9.76	6.37
0.0	0.6	0.6	0.14	0.32	0.24	0.55	0.74	10.67	6.96
0.3	0	0.0	0.12	0.32	0.45	0.54	0.89	8.53	8.68
0.3	0	0.3	0.12	0.32	0.41	0.51	0.85	8.74	9.28
0.3	0	0.6	0.12	0.33	0.35	0.49	0.81	8.68	9.79
0.3	0.3	0.0	0.13	0.29	0.40	0.57	0.87	7.71	6.24
0.3	**0.3**	**0.3**	**0.12**	**0.30**	**0.35**	**0.54**	**0.84**	**8.25**	**7.14**
0.3	0.3	0.6	0.13	0.31	0.30	0.51	0.80	8.59	7.91
0.3	0.6	0.0	0.13	0.27	0.35	0.60	0.85	6.54	3.54
0.3	0.6	0.3	0.13	0.28	0.31	0.57	0.81	7.56	4.94
0.3	0.6	0.6	0.13	0.29	0.27	0.54	0.77	8.30	6.00
0.6	0	0.0	0.13	0.28	0.46	0.52	0.92	6.41	6.91
0.6	0	0.3	0.12	0.29	0.41	0.50	0.88	6.57	7.52
0.6	0	0.6	0.12	0.29	0.35	0.47	0.84	6.25	7.85
0.6	0.3	0.0	0.13	0.25	0.41	0.55	0.90	5.41	4.31
0.6	0.3	0.3	0.12	0.26	0.36	0.52	0.87	6.11	5.42
0.6	0.3	0.6	0.12	0.27	0.32	0.49	0.83	6.33	6.21
0.6	0.6	0.0	0.14	0.23	0.36	0.58	0.89	3.47	0.78
0.6	0.6	0.3	0.13	0.24	0.32	0.55	0.85	5.18	2.96
0.6	0.6	0.6	0.13	0.25	0.28	0.52	0.81	5.99	4.36
Data								**14.00**	**21.17**

Notes: This table shows the calibration of the lognormal distribution as described in section III.A for all possible combinations of correlation structures where each correlation is from the $\{0, 0.3, 0.6\}$ set. The bold row in the middle shows our baseline calibration. The first three columns show the assumed correlations, the next five the calibrated parameters, and the final two show the implied relative average wage change of the low- and high-skilled service sector compared to manufacturing. The last row contains the change in these same measures between 1960 and 2007 in the data.

Table A-11: Robustness checks: truncated normal distribution

parameters								**rel. avg. wage Δ**	
ρ_{lm}	ρ_{mh}	ρ_{lh}	σ_l^2	σ_m^2	σ_h^2	τ_l	τ_h	L to M	H to M
0.0	0.0	0.0	0.28	0.80	2.19	0.57	0.89	24.39	23.76
0.0	0.3	0.3	0.28	0.78	1.43	0.56	0.84	25.04	23.05
0.3	0.0	0.3	0.22	0.65	1.72	0.52	0.88	21.55	21.89
0.3	0.3	0.0	0.25	0.63	1.85	0.56	0.90	21.14	20.36
0.3	0.3	0.3	0.28	0.80	2.19	0.55	0.89	23.69	22.73
0.3	0.3	0.6	0.26	0.67	1.10	0.51	0.84	22.95	21.94
0.3	0.6	0.3	0.25	0.66	1.20	0.57	0.85	21.91	19.45
0.6	0.3	0.3	0.22	0.51	1.55	0.52	0.91	18.91	18.83
0.6	0.6	0.6	0.25	0.55	0.95	0.52	0.85	20.26	18.58
Data								**14.00**	**21.17**

Notes: This table shows the calibration of the truncated normal distribution as described in section III.A for nine correlation structures where each correlation is from the $\{0, 0.3, 0.6\}$ set. The first three columns show the assumed correlations, the next five the calibrated parameters, and the final two show the implied relative average wage change of the low- and high-skilled service sector compared to manufacturing. The last row contains the change in these same measures between 1960 and 2007 in the data.