Demand-Driven Labor Market Polarization

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Motivation

- Labor market outcomes in the US have polarized since the 1980s.

	Wage Bill			Wage			Employment		
	H	M	L	H	M	L	H	M	L
2016-1980	8.8	2.9	6.1	2.98	2.33	2.6	1.48	.18	.98
Relative to M	5.9		3.2	.65		.25	1.3		.8

- What drives the increase in inequality and polarization?
  - skilled biased technical change
  - trade
  - de-unionization
  - computerization and digitization of the economic activity
  - changes in the school curriculae

Contribution

- We present a novel mechanism that builds on the nonhomotheticity of demand
- High-income elastic sectors are intensive in occupations associated with high- and low-skill occupations
- As aggregate expenditures increase, a larger share of value added shifts to high income elastic sectors leading to larger increases in wage bill of high and low skilled workers
- This mechanism accounts for over 50 of observed polarization in wage bill across occupations from 1980 to 2016.

Figure 1: Sectoral Skill Intensity and Income Elasticity

(a) Low-skill　　(b) Middle-skill　　(c) High-skill

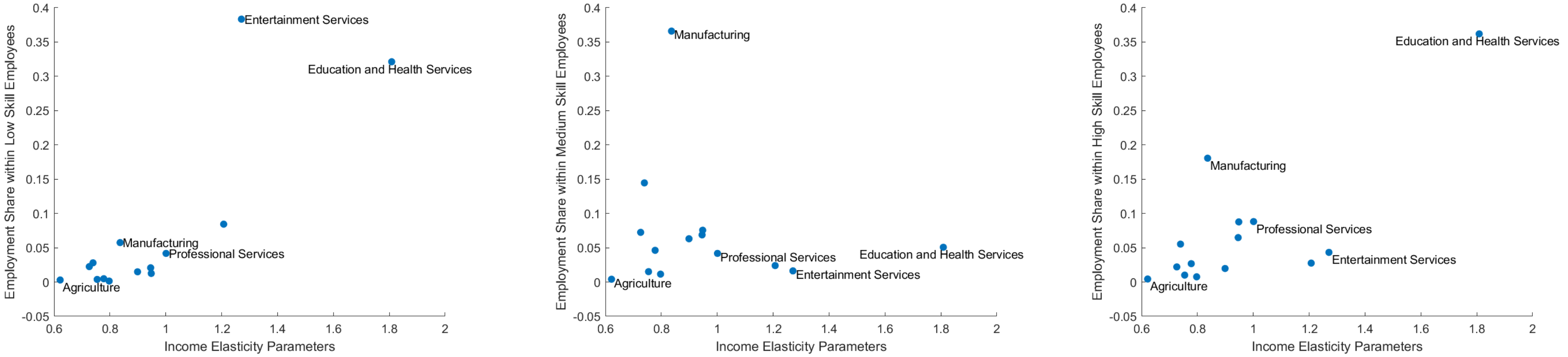

Illustration of mechanism

- Start with a one sector model

$$Y_t = A_t \prod_{j \in \{H,M,L\}} X_{jt}^{\alpha_{jt}},$$

$$w_{jt} X_{jt} = \alpha_{jt} Y_t.$$

$$\frac{w_{jt}X_{jt}}{w_{j't}X_{j't}} = \frac{\alpha_{jt}}{\alpha_{j't}}. \tag{1}$$

- Variation in relative wage bill must come from variation in factor intensity ($\alpha_{jt}/\alpha_{j't}$).
- Importance of trade, skilled biased technical change and other theories that change the effective factor intensity.

Multi-sector setting

$$Y_{st} = A_{st} \prod_{j \in \{H,M,L\}} X_{jst}^{\alpha_{jst}}, \tag{2}$$

with $\sum_{j \in \{H,M,L\}} \alpha_{jst} = 1$

$$w_{jt} X_{jst} = \alpha_{jst} P_{st} Y_{st} \equiv \alpha_{jst} VA_{st}. \tag{3}$$

$$w_{jt} X_{jt} = \sum_{s \in \mathcal{S}} \alpha_{jst} VA_{st}. \tag{4}$$

$$\alpha_{jst} VA_{st} = (\alpha_{js0} + \triangle \alpha_{jst})(VA_{s0} + \triangle VA_{st}) \tag{5}$$

$$\frac{\triangle\left(w_{jt}X_{jt}\right)}{w_{j0}X_{j0}} = \overbrace{\sum_{s\in\mathcal{S}}\gamma_{js0}\frac{\triangle VA_{st}}{VA_{s0}}}^{\text{Term 1}} + \overbrace{\sum_{s\in\mathcal{S}}\gamma_{js0}\frac{\triangle\alpha_{jst}}{\alpha_{js0}}}^{\text{Term 2}} + \overbrace{\sum_{s\in\mathcal{S}}\gamma_{js0}\left[\frac{\triangle VA_{st}}{VA_{s0}}\frac{\triangle\alpha_{jst}}{\alpha_{js0}}\right]}^{\text{Term 3}}$$

where $\gamma_{js0} \equiv \frac{\alpha_{js0}VA_{s0}}{\sum\limits_{s\in\mathcal{S}}\alpha_{js0}VA_{s0}}$

	H	M	L	H-M	L-M
Total	11.13	3.53	7.2	7.6	3.68
Term 1	7.5	4.9	8.1	2.52	3.18
Term 2	0.47	-.19	-.05	.66	.13
Term 3	3.19	-1.23	-.87	4.42	.35

What drives sectoral reallocation of production?

- There is a representative household that earns the total wages of the economy.
- It is easy to go beyond this unitary household model
- Preferences

$$\sum_{s \in \mathcal{S}} \left(C_t^{\varepsilon_s} \zeta_s \right)^{\frac{1}{\sigma}} c_{st}^{\frac{\sigma-1}{\sigma}} = 1. \tag{6}$$

- σ controls the price elasticity of substitution
- ε_s controls the income elasticity of sector s.
- If $\varepsilon_s = 1, \forall s$, this becomes teh homothetic CES aggregator.

Sectoral demand

$$c_{st} = \zeta_s E_t^{\sigma+\varepsilon_s} p_{st}^{-\sigma} P_t^{-\varepsilon_s} \tag{7}$$

where

$$E_t^{1-\sigma} = \sum_{s \in \mathcal{S}} \zeta_s C_t^{\varepsilon_s} p_{st}^{1-\sigma}$$

and

$$P_t = \left[\sum_{s \in \mathcal{S}} \left(\zeta_s p_{st}^{1-\sigma} \right)^{\chi_s} \left(x_{st} E_t^{1-\sigma} \right)^{1-\chi_s} \right]^{\frac{1}{1-\sigma}} \tag{8}$$

where $x_{st} = p_{st} c_{st} / E_t$ and $\chi_s \equiv (1-\sigma)/\varepsilon_s$

Labor demand

- The representative household spends all its income

$$E_t = \sum_s \sum_j w_{jt} X_{jst}$$

- Wage Bill for occupation j is

$$\begin{aligned} w_{jt} X_{jt} &= \sum_{s \in \mathcal{S}} \alpha_{jst} VA_{st} \\ &= \sum_{s \in \mathcal{S}} \alpha_{jst} \zeta_s E_t^{\sigma + \varepsilon_s} p_{st}^{1-\sigma} P_t^{-\varepsilon_s} \end{aligned}$$

$$
\begin{aligned}
\sum_{s\in\mathcal{S}} \gamma_{js0} \frac{\triangle VA_{st}}{VA_{s0}} &= \overbrace{\sum_{s\in\mathcal{S}} \gamma_{js0} \left[\frac{\triangle VA_{st}}{VA_{s0}}\right]_E}^{\text{Term1}} + \overbrace{\sum_{s\in\mathcal{S}} \gamma_{js0} \left[\frac{\triangle VA_{st}}{VA_{s0}}\right]_{p_s}}^{\text{Term 2}} \\
&\quad \underbrace{+\sum_{s\in\mathcal{S}} \gamma_{js0} \left[\frac{\triangle VA_{st}}{VA_{s0}}\right]_E \left[\frac{\triangle VA_{st}}{VA_{s0}}\right]_{p_s}}_{\text{Term 3}}
\end{aligned}
$$

Quantification of the mechanism

- How much of the relative variation in wage bill comes from increase in aggregate expenditures?

	H	M	L	H-M	L-M
Cont. actual sectoral growth to wage bill	7.47	4.95	8.13	2.52	3.19
Cont. model sectoral growth to wage bill	7.11	3.92	7.89	3.18	3.97
Induced by neutral increase in expenditures	5.57	4.02	5.93	1.55	1.91
Induced by growth in sectoral prices	0.16	-.05	0.24	.21	.29
Covariance	1.38	1.03	0.24	1.43	1.77

Conclusions

- Sectoral growth between 1980-2016 is highly correlated with the distribution of employment in high and low skill occupations
- One conequence of this new empirical finding is that changes in sectoral composition of output induced by increase in expenditures are a major driver of labor market polarization
- Our mechanism explains more than 50% of the changes in relative wage bill of high vs. medium and low vs. medium occupations
- Extensions of this basic analysis will explore the implications of this mechanism for the evolution of workers and wages by occupation.