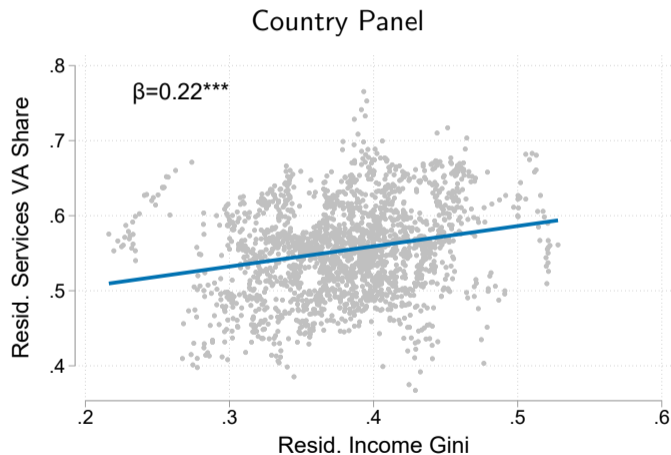


The Dual Role of Inequality for Structural Change: Cause and Consequence

Lukas Wiedemann
London School of Economics

STEG Annual Conference 2026 – Theme 0
January 7, 2026

Positive Correlation between Inequality and Sectoral Composition



Controlling for log GDPpc, log GDPpc squared, and year x region.

Structural Change

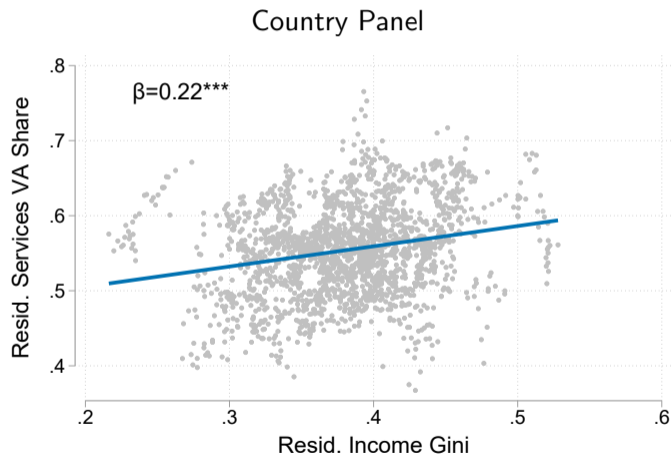
Inequality

Literature

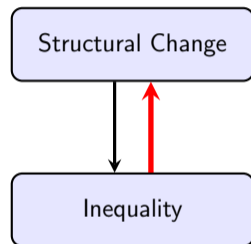
More Country Panel

U.S. Motivation

Positive Correlation between Inequality and Sectoral Composition



Controlling for log GDPpc, log GDPpc squared, and year x region.

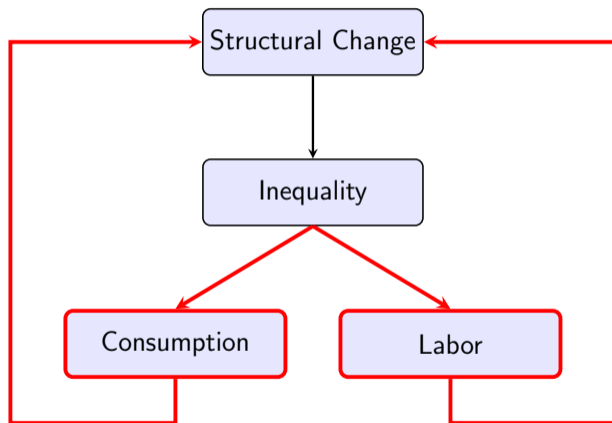


Literature

More Country Panel

U.S. Motivation

RQ: To What Extent Does Inequality Drive Structural Change?

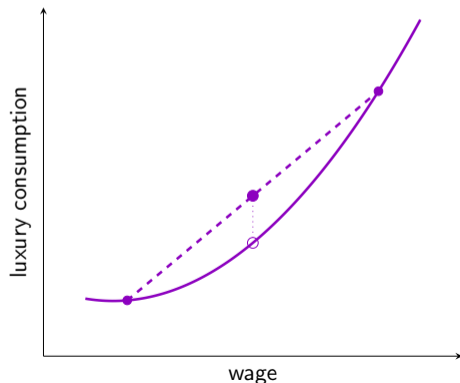


Inequality Affects Structural Change through Two Mechanisms

Consumption: luxury/necessity

- ▶ Rich spend **disproportionately** more on luxuries than poor

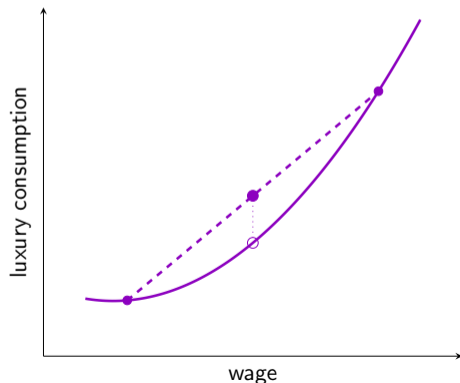
Labor:



Inequality Affects Structural Change through **Two Mechanisms**

Consumption: luxury/necessity

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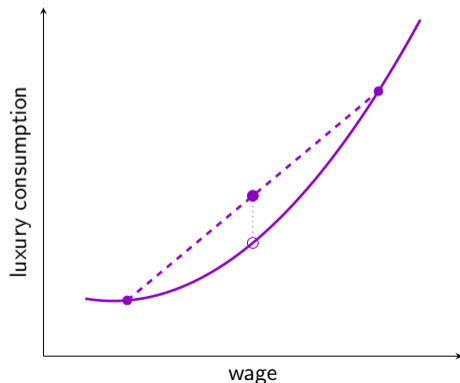
Labor: marketization of home production

- ▶ Low-skilled **opportunity cost** of home production becomes relatively cheaper than market substitute [Details](#)

Inequality Affects Structural Change through **Two Mechanisms**

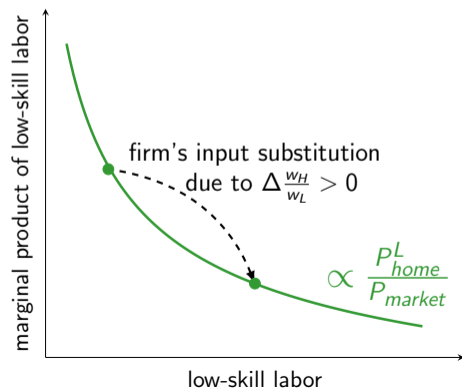
Consumption: luxury/necessity

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This Paper

1. **Micro data evidence:** luxury/necessity and marketization mechanisms
2. **Theory:** direct effects of inequality on structural change + reverse direction
3. **Quantitative analysis:** U.S. 1980–2016

This Paper

1. **Micro data evidence:** luxury/necessity and marketization mechanisms
 - ▶ Luxury/necessity mechanism: high-skill services are a **luxury**, but including home production makes low-skill services a **necessity** [Details](#)
 - ▶ Marketization mechanism: non-college graduates **increase** home hours relative to college graduates with rising inequality [Details](#)
2. **Theory:** direct effects of inequality on structural change + reverse direction
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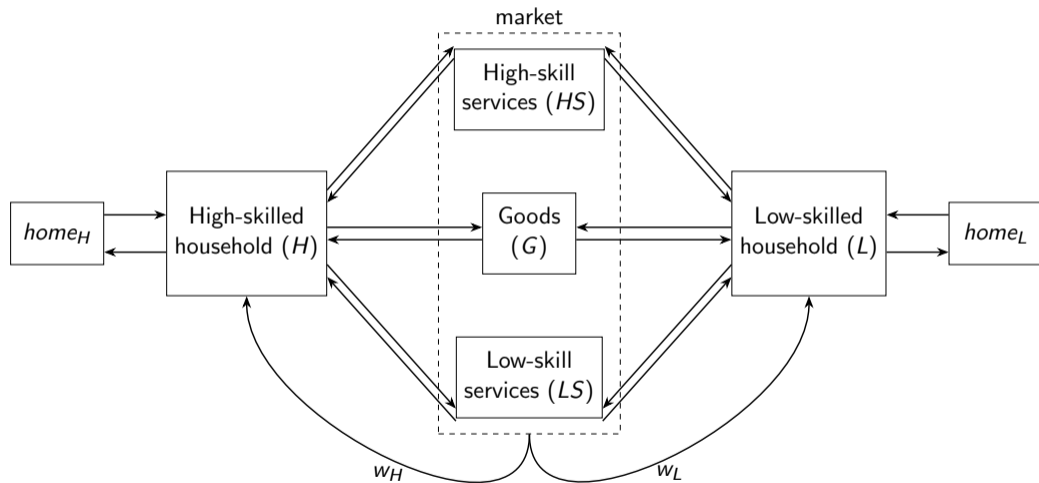
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2. **Theory:** direct effects of inequality on structural change + reverse direction
 - ▶ Two types with nonhomothetic preferences and market/home consumption
 - ▶ Three market sectors: high-skill services (HS), low-skill services (LS), goods (G)
 - ▶ Skill-neutral vs. **skill-biased productivity**
3. **Quantitative analysis:** U.S. 1980–2016

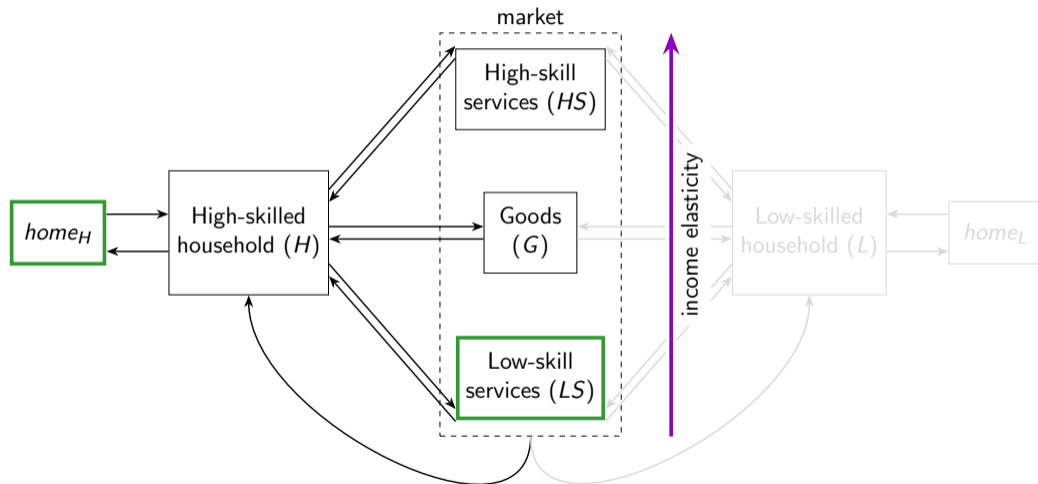
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 - ▶ Skill-neutral vs. skill-biased productivity
- 3. Quantitative analysis:** U.S. 1980–2016
 - ▶ Inequality drives **> 50%** of high-skill services expansion via luxury mechanism
 - ▶ Necessity mechanism **offsets** marketization mechanism for low-skill services
 - ▶ Substantial **amplification** between structural change and inequality

Model: Environment



Model: Environment



Model: Households

- ▶ Nonhomothetic CES preferences over sectors $i \in \{HS, LS, G\}$:

$$\sum_i \tilde{\Omega}_i^{\frac{1}{\sigma}} \left(\frac{c_i}{U^{\epsilon_i}} \right)^{\frac{\sigma-1}{\sigma}} = 1$$

- ▶ Sector LS is a composite of market (m) and home (h):

$$c_{LS} = \left[\psi^{\frac{1}{\nu}} c_m^{\frac{\nu-1}{\nu}} + (1-\psi)^{\frac{1}{\nu}} c_h^{\frac{\nu-1}{\nu}} \right]^{\frac{\nu}{\nu-1}}$$

- ▶ Home production: $c_h = A_h h_j$. $p_h \equiv \frac{w_j}{A_h}$, $j \in \{H, L\}$

- ▶ Budget constraint: $\sum_i p_i c_i = w_j$, $j \in \{H, L\}$

Model: Firms & Market Clearing

- ▶ Firms in sector $i \in \{HS, LS_m, G\}$:

$$Y_i = A_i \left[\alpha_i H_i^{\frac{\zeta-1}{\zeta}} + (1 - \alpha_i) L_i^{\frac{\zeta-1}{\zeta}} \right]^{\frac{\zeta}{\zeta-1}}$$

- ▶ Extended GDP:

$$GDP^{ext.} \equiv GDP^{mkt.} + H p_h^H c_h^H + L p_h^L c_h^L$$

Proposition: Luxury/Necessity

Proposition: Marketization

Skill-premium

Market Clearing

Aggregation

Model: Firms & Market Clearing

- Firms in sector $i \in \{HS, LS_m, G\}$:

$$Y_i = A_i \left[\alpha_i H_i^{\frac{\zeta-1}{\zeta}} + (1 - \alpha_i) L_i^{\frac{\zeta-1}{\zeta}} \right]^{\frac{\zeta}{\zeta-1}}$$

$$\text{FOC: } \frac{w_H}{w_L} = \frac{\alpha_i}{1 - \alpha_i} \left(\frac{H_i}{L_i} \right)^{-\frac{1}{\zeta}}$$

- Extended GDP:

$$GDP^{\text{ext.}} \equiv GDP^{\text{mkt.}} + H p_h^H c_h^H + L p_h^L c_h^L$$

Proposition: Luxury/Necessity

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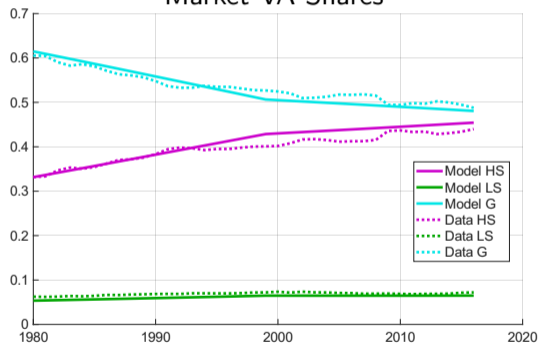
Calibration Strategy: U.S. 1980-2016

- ▶ Calibrate technology parameters to skill-premium, sectoral wage bill compensation share, relative prices, real GDP growth [Parameters](#)
 - ▶ Independent from demand parameters
 - ▶ In growth rates with break mid-sample
- ▶ Estimate demand parameters from household-level market consumption mapped into industry value added, augmented with home production [Parameters](#)
 - ▶ Independent from aggregate moments
 - ▶ Constant over time
- ▶ Choose preference weights to match 1980 sectoral value added shares and skill-premium

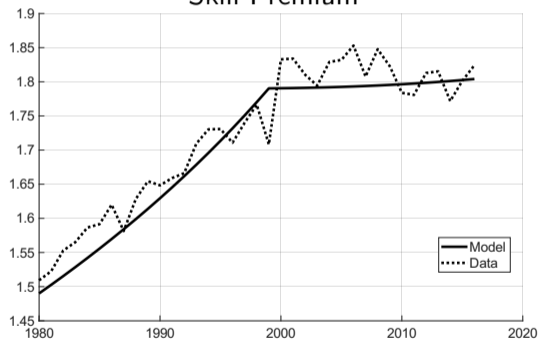
[Classification Stability](#)[Classification Detail](#)[Mapping](#)[Mapping example](#)[Home Production](#)

Model versus Data

Market VA Shares



Skill-Premium



Validation

Isolate Channels with Counterfactual Analyses

Parameter	Description	Direct Effect on
H_t	Share of high-skilled in population	Relative labor supply
$A_{i,t}$	Sectoral skill-neutral productivity	Aggreg. income & relative prices traditional drivers of structural change
$\alpha_{i,t}$	Sectoral skill-biased productivity	Skill-premium : $\frac{w_H}{w_L} = \frac{\alpha_i}{1-\alpha_i} \left(\frac{H_i}{L_i}\right)^{-\frac{1}{\zeta}}$

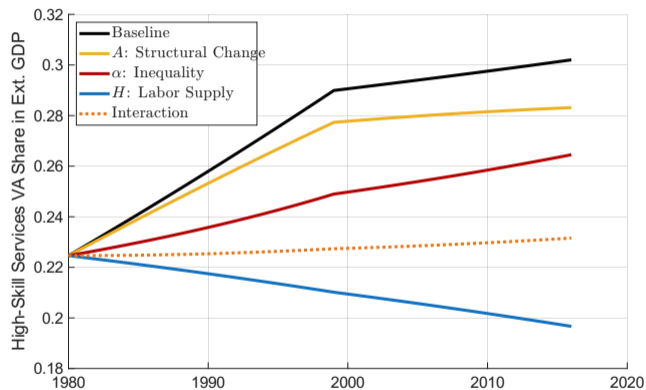
Counterfactuals: vary one parameter, hold others fixed at 1980 values

Equation

Skill-premium

Traditional Drivers through A

Inequality Drives 52% of Increase in High-Skill Services Share

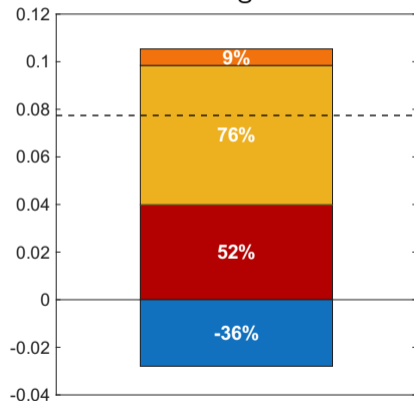


Table

Data

Yrly Contrib.

Cumulative Change: 1980-2016

 α : Inequality

A: Structural Change

H: Labor Supply

Interaction

Without Inequality: **Threefold** Low-Skill Services Share Increase

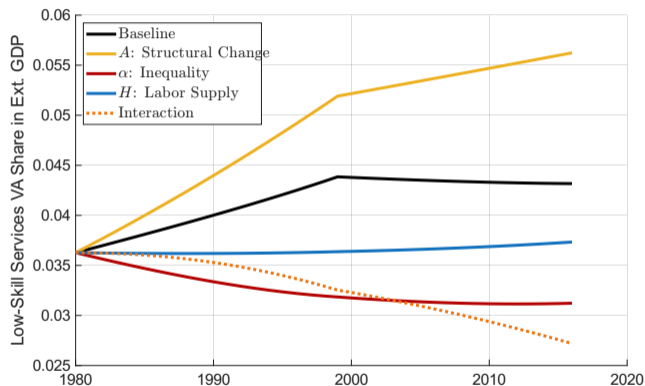
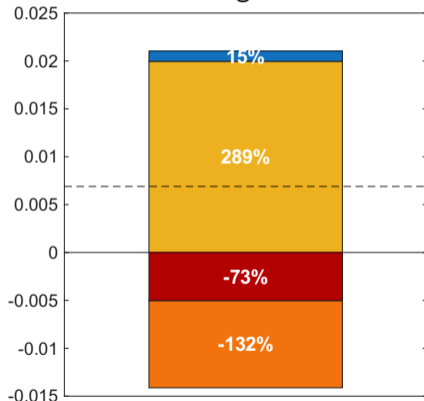


Table Data Yrly Contrib.

Cumulative Change: 1980-2016



A: Structural Change α : Inequality
H: Labor Supply Interaction

Mechanisms: Luxury/Necessity vs. Marketization vs. GE

α - counterfactual with:

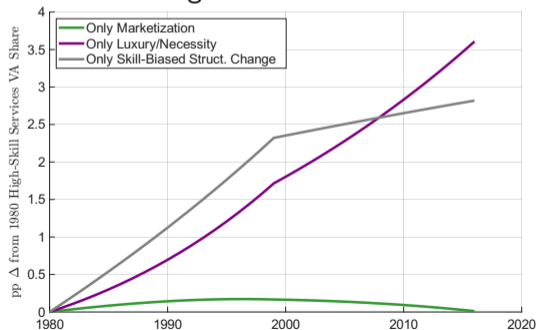
- ▶ $\Delta GDP^{ext.} = 0$: mean-preserving increase in inequality
- ▶ Equal preference weights ($\Omega_i^H = \Omega_i^L$): only endogenous channels

Luxury/Necessity Mechanism > GE > Marketization Mechanism

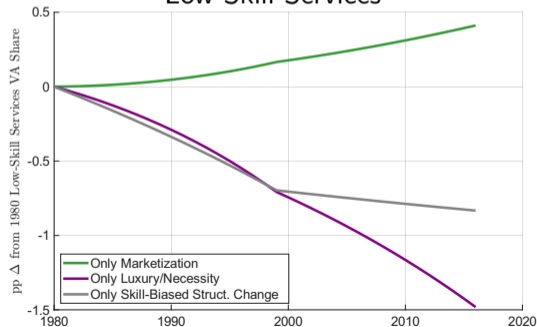
α - counterfactual with:

- ▶ $\Delta GDP^{ext.} = 0$: mean-preserving increase in inequality
- ▶ Equal preference weights ($\Omega_i^H = \Omega_i^L$): only endogenous channels

High-Skill Services

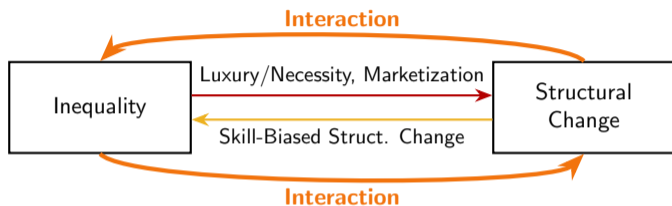


Low-Skill Services



Table

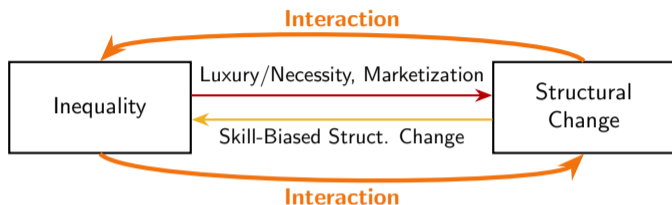
Interaction between Inequality and Structural Change



Mean-preserving ($\Delta GDP^{ext.} = 0$), endog. channels ($\Omega_i^H = \Omega_i^L$), const. rel. pop. ($H = 2016$):

$$\Delta Y(\Delta A, \Delta \alpha) = \overbrace{\Delta Y(A_0, \Delta \alpha)}^{\text{Ineq.} \Rightarrow \text{Struct. Change}} + \overbrace{\Delta Y(\Delta A, \alpha_0)}^{\text{Struct. Change} \Rightarrow \text{Ineq.}} + \text{Interaction}$$

Amplification between Inequality and Structural Change



Mean-preserving ($\Delta GDP^{ext.} = 0$), endog. channels ($\Omega_i^H = \Omega_i^L$), const. rel. pop. ($H = 2016$):

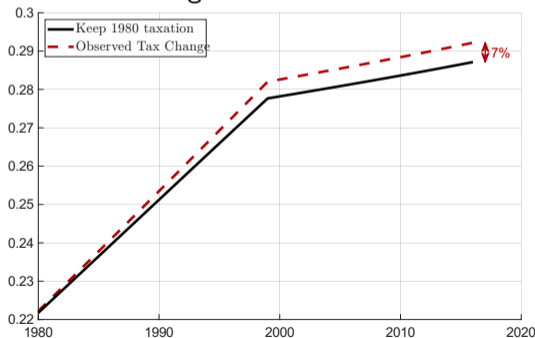
$$\Delta Y(\Delta A, \Delta \alpha) = \overbrace{\Delta Y(A_0, \Delta \alpha)}^{\text{Ineq.} \Rightarrow \text{Struct. Change}} + \overbrace{\Delta Y(\Delta A, \alpha_0)}^{\text{Struct. Change} \Rightarrow \text{Ineq.}} + \text{Interaction}$$

	Skill-Premium	High-skill Services VA Share
Interaction	7%	11%

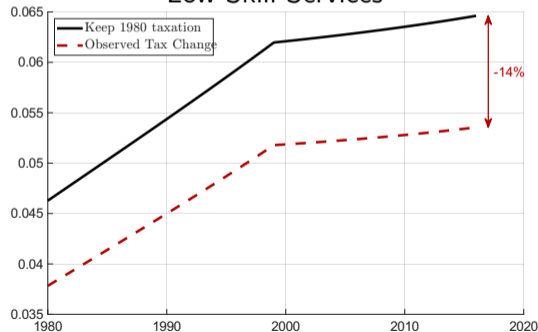
Real-World Inequality Change: Reagan Tax Cuts (sensitive to \mathcal{T})

BC with income taxation: $\sum_i p_i c_i^j = (1 - \lambda) w_j^{1-\tau} + \mathcal{T}, \quad \lambda \downarrow \& \tau \downarrow$

High-Skill Services



Low-Skill Services


[Details](#)

More Results and Robustness

Other Real-World Counterfactual

- ▶ No 2000s growth slowdown →

Partial Equilibrium Exercises

- ▶ Variance decomposition: split yearly variation into avg. income effects, price effects, marketization effects and inequality effects →
- ▶ Within-between decomposition exercise →

Other Variables of Interest

- ▶ Sectoral value added shares in *market* GDP →
- ▶ Sectoral labor shares →
- ▶ College-premium and relative labor share →

Robustness Checks

- ▶ Homogeneous growth in skill-biased technologies across sectors →
- ▶ Skill-biased technologies with observed GDP and observed college premium →

Inequality \Leftrightarrow Structural Change

This paper

- ▶ Luxury/necessity mechanism and marketization of home production mechanism
- ▶ Model quantifying two-way relationship between inequality and structural change

Research agenda

- ▶ Middle-income and developing country perspective
- ▶ Effects of AI ($\alpha \downarrow$) on sectoral composition

Thank you!

L.Wiedemann@lse.ac.uk

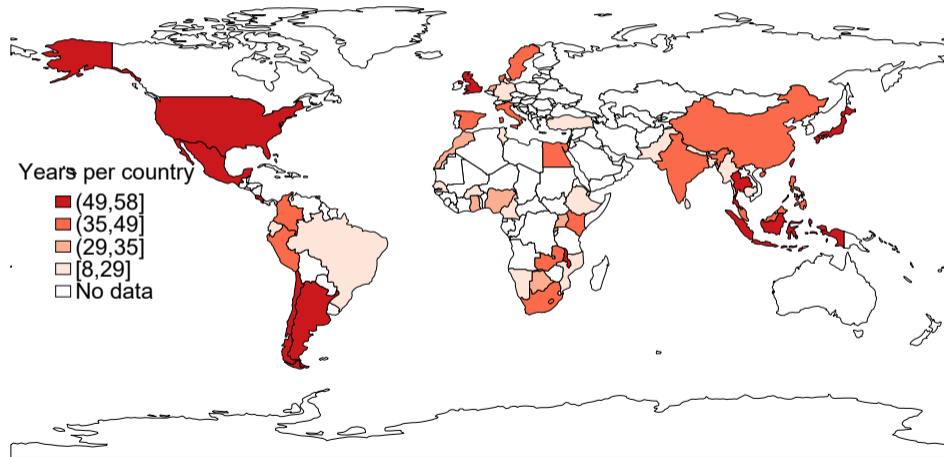
More Macro Motivation

- ▶ Panel description →
- ▶ Selected countries →
- ▶ Scatter plots: alternative fixed effects →
- ▶ Table: alternative fixed effects →
- ▶ Table: alternative GDP controls →
- ▶ Table: alternative dependent variables →
- ▶ Table: market income Gini →
- ▶ Table: high-skill vs. low-skill services →

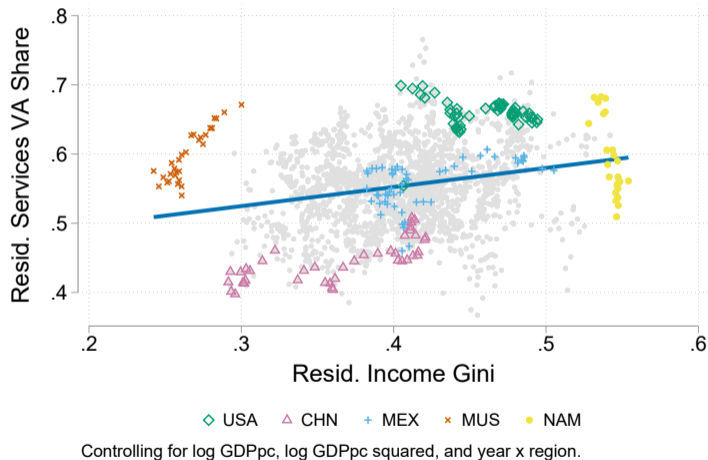
[back](#)

Unbalanced Panel: 54 Countries from 1960-2018

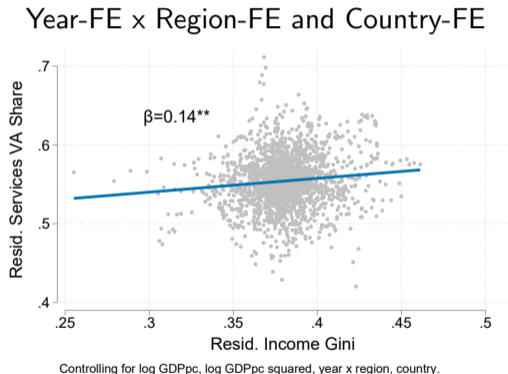
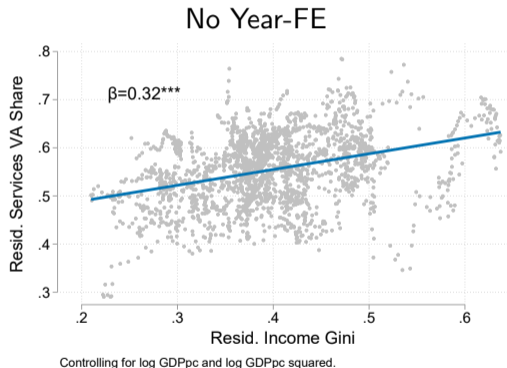
Yearly average: 35 countries, 60% of world pop., 65% of world GDP



Selected Countries



Scatter Plots: Alternative Fixed Effects



back

Table: Alternative Fixed Effects

	(1)	(2)	(3)	(4)	(5)
	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.
Income Gini	0.32*** (0.03)	0.24*** (0.03)	0.20*** (0.04)	0.22*** (0.04)	0.14** (0.07)
GDP	Yes	Yes	Yes	Yes	Yes
GDP squared	Yes	Yes	Yes	Yes	Yes
Year-FE	No	Yes	No	Yes	Yes
Region-FE	No	No	Yes	Yes	Yes
Country-FE	No	No	No	No	Yes
Year-FE x Region-FE	No	No	No	Yes	Yes
Observations	2040	2040	2040	2040	2040

Services VA share includes government. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[back](#)

Table: Alternative GDP Controls

	(1)	(2)	(3)	(4)	(5)	(6)
	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.
Income Gini	0.21*** (0.04)	0.16** (0.07)	0.22*** (0.04)	0.14** (0.07)	0.27*** (0.04)	0.18*** (0.07)
GDP	Yes	Yes	Yes	Yes	No	No
GDP squared	No	No	Yes	Yes	No	No
GDP 5 bins	No	No	No	No	Yes	Yes
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-FE	No	Yes	No	Yes	No	Yes
Year-FE x Region-FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2040	2040	2040	2040	2040	2040

Services VA share includes government. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[back](#)

Table: Alternative Dependent Variables

	(1) VA: Serv.	(2) VA: Serv. w/ Gov.	(3) Emp: Serv.	(4) Emp: Serv. w/ Gov.
Income Gini	0.13*** (0.04)	0.22*** (0.04)	0.14*** (0.04)	0.15*** (0.05)
GDP	Yes	Yes	Yes	Yes
GDP squared	Yes	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes	Yes
Year-FE x Region-FE	Yes	Yes	Yes	Yes
Observations	2040	2040	2089	2089

Odd columns without government, even columns include government. Columns (1) and (2) is services value added share. Columns (3) and (4) is services employment share. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table: Market Income Gini

	(1)	(2)	(3)	(4)	(5)
	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.	Serv. VA Sh.
Market Income Gini	0.30*** (0.03)	0.26*** (0.03)	0.24*** (0.05)	0.25*** (0.05)	0.21** (0.08)
GDP	Yes	Yes	Yes	Yes	Yes
GDP squared	Yes	Yes	Yes	Yes	Yes
Year-FE	No	Yes	No	Yes	Yes
Region-FE	No	No	Yes	Yes	Yes
Country-FE	No	No	No	No	Yes
Year-FE x Region-FE	No	No	No	Yes	Yes
Observations	2040	2040	2040	2040	2040

Regressor is Gini coefficient of market (pre-tax, pre-transfer) income. Services VA share includes government. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table: High-skill vs. Low-skill Services

	(1) HS VA Sh.	(2) HS Emp Sh.	(3) LS VA Sh.	(4) LS Emp Sh.
Income Gini	0.19*** (0.04)	0.05*** (0.01)	-0.06* (0.03)	0.08** (0.03)
GDP	Yes	Yes	Yes	Yes
GDP squared	Yes	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes	Yes
Year-FE x Region-FE	Yes	Yes	Yes	Yes
Observations	2040	2089	2040	2089

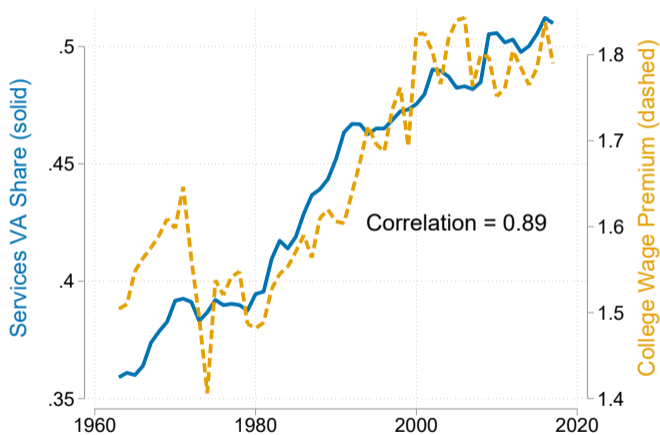
High-skill services includes business, finance, and realestate. Low-skill services includes trade, transport, and other. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

More U.S. Motivation

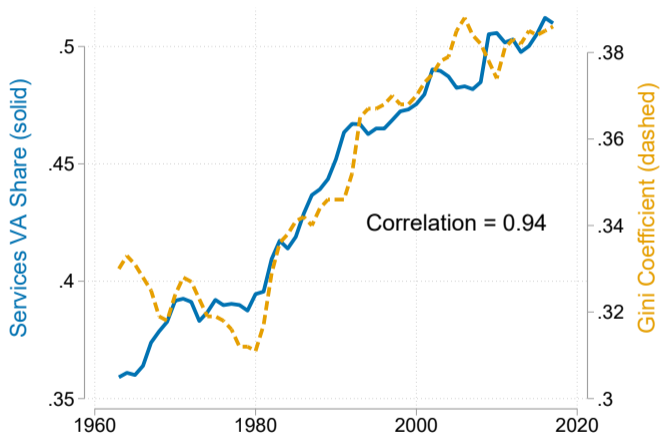
- ▶ Including time before 1980 →
- ▶ Gini coefficient of income (includes before 1980) →
- ▶ Correlation figure across different measures of inequality →
- ▶ Correlation table across different measures of inequality →
- ▶ High-skill and low-skill services separately →
- ▶ High-skill and low-skill services in extended VA shares →

[back](#)

More U.S. Motivation: including time pre-1980

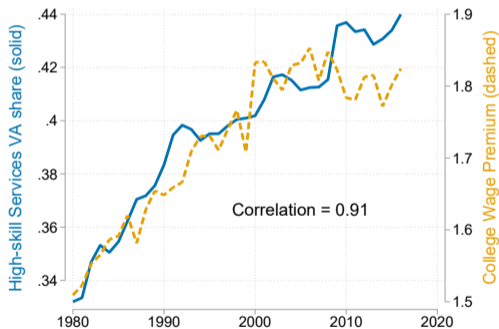


More U.S. Motivation: Gini coefficient

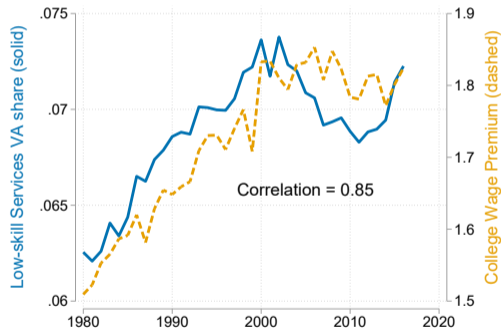


High-skill and Low-skill Services Separately

High-Skill Services



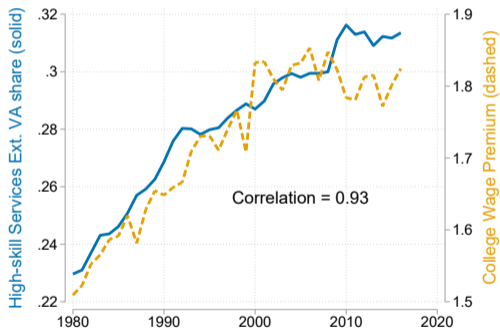
Low-Skill Services



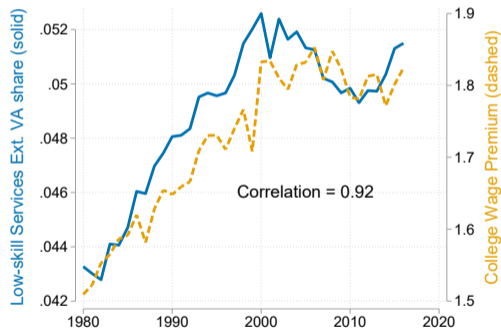
[back](#)

Extended VA Shares: High-skill and Low-skill Services

High-Skill Services



Low-Skill Services



[back](#)

Related Literature

Structural change affecting inequality

- ▶ Barany, Siegel (2018); Buera, Kaboski, Rogerson, Vizcaino (2022); Comin, Danieli, Mestieri (2022); Fan, Peters, Zilibotti (2023); Hubmer (2023); Ngai, Sevinc (2025)
 - ▶ Contribution: focus on **opposite direction**

Marketization of home production and structural transformation

- ▶ Manning (2004); Ngai, Pissarides (2008); Rogerson (2008); Mazzolari, Ragusa (2013); Bridgman, Duernecker, Herrendorf (2018); Buera, Kaboski, Zhao (2019); Cerina, Moro, and Rendall (2021)
 - ▶ Contribution: **asymmetric** marketization in general equilibrium

Drivers of structural change

- ▶ Kuznets (1966); Baumol (1967); Kongsamut, Rebelo, Xie (2001); Caselli, Coleman (2001); Ngai, Pissarides (2007); Herrendorf, Rogerson, Valentinyi (2013); Boppart (2014); Leonardi (2015); Moro, Moslehi, Tanaka (2017); Comin, Lashkari, Mestieri (2021)
 - ▶ Contribution: role of **cross-sectional distribution** and accounting for home production

Intuition Labor Mechanism

Firm optimization:

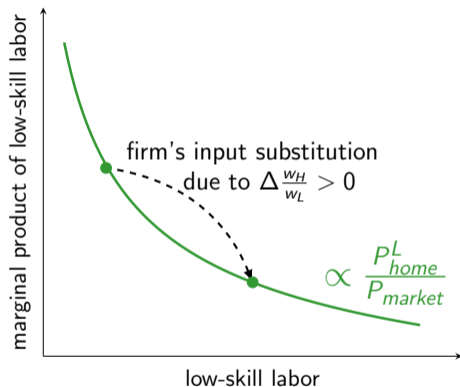
$$P_{\text{market}} MP_L = w_L$$

$$MP_L = \frac{w_L}{MP_{\text{home}}} MP_{\text{home}}$$

$$= \frac{P_{\text{home}}^L}{P_{\text{market}}} MP_{\text{home}}$$

$$\Delta \frac{MP_H^G}{MP_L^G} \Rightarrow \Delta \frac{w_H}{w_L} \Rightarrow \Delta \frac{H_{LS}}{L_{LS}} \Rightarrow \Delta MP_L \Rightarrow$$

$$\Delta \frac{P_{\text{home}}^L}{P_{\text{market}}}$$



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Luxury/Necessity Mechanism

Data

- ▶ Map market expenditure (*Consumer Expenditure Survey* 1980-2016) into industries using input-output tables (Buera et al. 2022)
- ▶ Classify industries as high-skill services, (substitutable) low-skill services, goods
- ▶ Add imputed home production

Luxury/Necessity Mechanism

Data

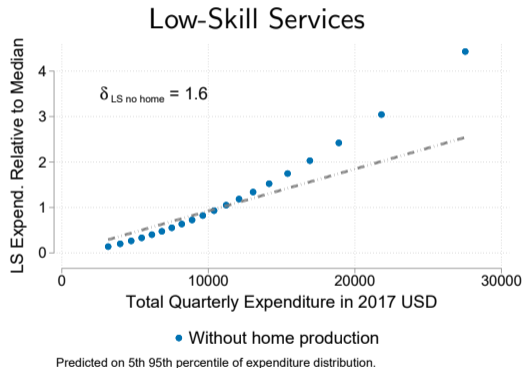
- ▶ Map market expenditure (*Consumer Expenditure Survey* 1980-2016) into industries using input-output tables (Buera et al. 2022)
- ▶ Classify industries as high-skill services, (substitutable) low-skill services, goods
- ▶ Add imputed home production

Reduced form elasticity regression of $i \in \{HS, LS, G\}$ (Aguiar, Bils 2015) :

$$\ln y_{k,i,r,t} - \ln \bar{y}_{i,t} = \delta_i \ln e_{k,r,t} + \Gamma X_{k,r,t} + \gamma_t + \gamma_r + u_{k,i,r,t}$$

- ▶ $y_{k,i,r,t}$: expenditure on sector i by household k in region r in year t
- ▶ Instrumenting for expenditure with income and income quintile
- ▶ Controls: dummies for age bins, number of household members, number of earners

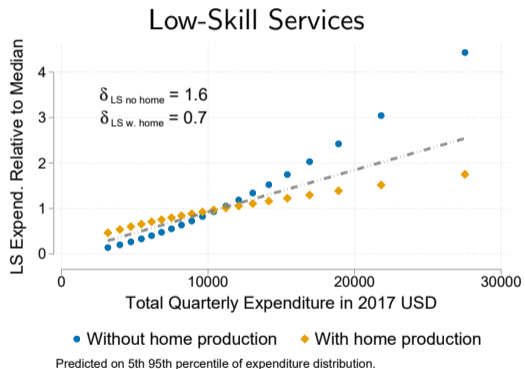
Low-Skill Services are Luxuries ?



back

Details

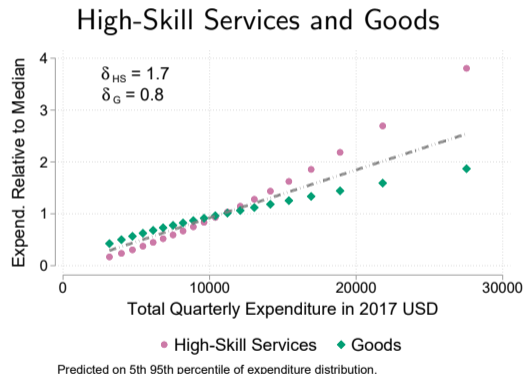
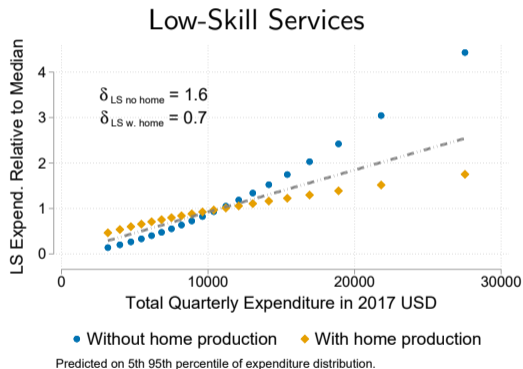
Low-Skill Services are Necessities



back

Details

Low-Skill Services are Necessities, High-Skill Services are Luxuries



[back](#)

[Details](#)

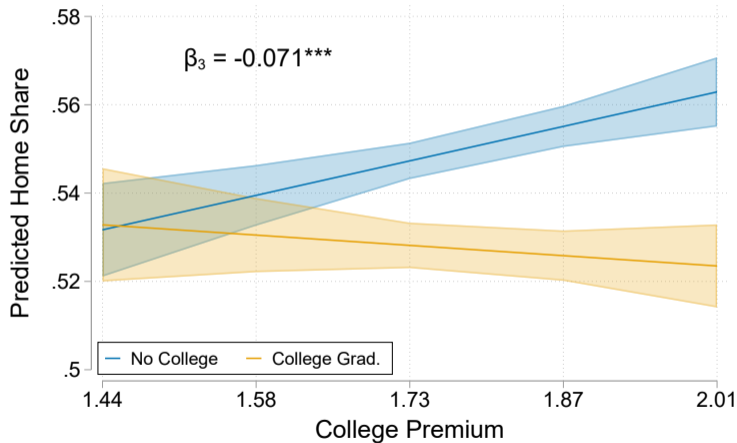
Opportunity Cost Mechanism

Data: time-use surveys (ATUS) and state-level (CPS) college wage premia (2003-19)

$$\begin{aligned} home_{k,r,t} = & \beta_1 \mathbb{1}\{College_{k,r,t}\} + \beta_2 \left(\frac{w_H}{w_L}\right)_{r,t} + \beta_3 \mathbb{1}\{College_{k,r,t}\} \times \left(\frac{w_H}{w_L}\right)_{r,t} \\ & + \Gamma X_{k,r,t} + \gamma_t + \gamma_r + u_{k,r,t} \end{aligned}$$

- ▶ $home_{k,r,t}$: hour share on “household activities” + “consumer purchases” + “caring for household members” by household k in state r in year t
- ▶ Control dummies: number of household members, age, income, year, state
- ▶ $\beta_3 < 0$: supports opportunity cost mechanism

Home Hour Shares Respond Asymmetrically to Inequality



College premium range: observed 5th-95th percentile.

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[Robustness](#)

Sectoral Heterogeneity of Expenditure Elasticities [back](#)

	(1) HS	(2) LS	(3) G
Log Total Expenditure	1.7*** (0.005)	0.7*** (0.003)	0.8*** (0.003)
Controls	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes
Instruments	Income	Income	Income
R-squared	0.728	0.607	0.833
Observations	372992	372992	372992

Standard errors clustered at household level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Detailed Data Mapping

Map market expenditure to industries (following (Buera et al. 2022)) [example](#)

- ▶ Consumer Expenditure Survey (CEX): 1980-2016 (over 600 expenditure *UCC* categories)
- ▶ Bridge to Personal Consumption Expenditure (PCE) categories (76 lines)
- ▶ Map into 69 NIPA commodity-industry pairs
- ▶ Use Input-Output tables to (i) distribute final expenditure on transportation and trade margins, (ii) obtain final output demand for each industry by PCE line, (iii) translate industry final output demand into total output demand using the total requirements table, (iv) get industry value added from output using the direct requirements table
- ▶ Aggregate 69 NIPA industries into high-skill intensive services, low-skill intensive services, and goods based on integrated BEA-BLS industries' high-skill labor compensation share

Add imputed aggregate home production

Consumption to Industries Mapping Example

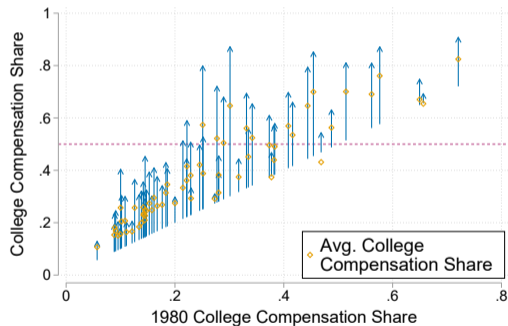
1. UCC 790410 "Dining out at restaurants, cafeterias, drive-ins, etc."
2. PCE line 83 "Purchased Meals and Beverages"
3. Commodity codes (NIPA lines) 481 "Air Transportation", 482 "Rail Transportation", 512 "Motion picture and sound recording industries", 711AS "Performing arts, spectator sports, museums, and related activities", 722 "Food services and drinking places"
 - ▶ Allocate proportional shares to distribution margins
 - ▶ Input-output tables: total requirement tables gives shares
4. How much of which industries goes into producing 1\$ of PCE line 83: 53ct of NIPA line 722, 4ct of NIPA line 311FT "Food and beverage and tobacco products", 2ct of NIPA line 111CA "Farms", ...
 - ▶ From high-skill compensation share by industry: which industry is HS, LS, G
5. Sum. across all 69 industries: 1\$ on PCE line 83 splits into 18ct HS, 55ct LS, 27ct G

Stability of Sectoral Classification

1980 versus 2016



Increase and Average over Time



[Detailed List](#)

[back: Stylized Fact](#)

[back: Calibration](#)

Classification of Industries into Sectors

69 BEA-NAICS industries

- ▶ *High-skill* if average college compensation share is larger than 0.5:

17 private industries + 4 government industries = HS [List](#)

- ▶ Market industries that substitute for home production time-use = LS_m

Home Production Activity	Matched Market Industry	Example Title
Housework	Food Services and Drinking Places (722)	Restaurants
	Other services, except government (81)	Repair and maintenance
	Accommodation (721)	Hotels
Consumer purchases	Other transportation and support activities (4870S)	Couriers and messengers
Caring activities	Nursing and residential care facilities (623)	Nursing care facilities
	Social Assistance (624)	Child day care services

- ▶ Remaining 42 *low-skill* industries = G [List](#)

[Stability](#)

[back: Stylized Fact](#)

[back: Calibration](#)

High-Skill Industries

Computer and electronic products (334), Chemical products (325), Publishing industries, except internet (includes software) (511), Motion picture and sound recording industries (512), Data processing, internet publishing, and other information services (514), Federal Reserve banks, credit intermediation, and related activities (521CI), Securities, commodity contracts, and investments (523), Insurance carriers and related activities (524), Funds, trusts, and other financial vehicles (525), Legal services (5411), Computer systems design and related services (5415), Miscellaneous professional, scientific, and technical services (5412OP), Management of companies and enterprises (55), Educational services (61), Ambulatory health care services (621), Hospitals (622), Performing arts, spectator sports, museums, and related activities (711AS), Federal general government (GFG), Federal government enterprises (GFE), State and local general government (GSLG), State and local government enterprises (GSLE)

Low-Skill Industries

Other transportation and support activities (4870S), Nursing and residential care facilities (623), Social assistance (624), Accommodation (721), Food services and drinking places (722), Other services, except government (81)

[back](#)

Goods Industries [back](#)

Farms (111CA), Forestry, fishing, and related activities (113FF), Oil and gas extraction (211), Mining, except oil and gas (212), Support activities for mining (213), Utilities (22), Construction (23), Wood products (321), Nonmetallic mineral products (327), Primary metals (331), Fabricated metal products (332), Machinery (333), Electrical equipment, appliances, and components (335), Motor vehicles, bodies and trailers, and parts (3361MV), Other transportation equipment (3364OT), Furniture and related products (337), Miscellaneous manufacturing (339), Food and beverage and tobacco products (311FT), Textile mills and textile product mills (313TT), Apparel and leather and allied products (315AL), Paper products (322), Printing and related support activities (323), Petroleum and coal products (324), Plastics and rubber products (326), Wholesale trade (42), Motor vehicle and parts dealers (441), Food and beverage stores (445), General merchandise stores (452), Other retail (4A0), Air transportation (481), Rail transportation (482), Water transportation (483), Truck transportation (484), Transit and ground passenger transportation (485), Pipeline transportation (486), Warehousing and storage (493), Broadcasting and telecommunications (513), Real estate (531), Rental and leasing services and lessors of intangible assets (532RL), Administrative and support services (561), Waste management and remediation services (562), Amusements, gambling, and recreation industries (713)

Home Production

Value home production using income approach (Bridgman 2016)

$$\text{Aggreg. Home Production Value} = \underbrace{r_h K_h}_{\text{Bridgman (2016)}} + w_h \text{labor}_h$$
$$w_h \text{labor}_h = w_h^H H_h + \underbrace{w_h^L}_{\text{Bridgman (2016)}} L_h$$

- ▶ Theory: $w_h^H = \frac{w_H}{w_L} \times w_h^L$
- ▶ Time use surveys: average hours on home production by year \times gender \times employment \times college
- ▶ Aggregate hours by college = cell avg. hours \times population (BLS 2025)
- ▶ Home production by college = valued aggregate hours $+ 0.5 r_h K_h$
- ▶ Divide on underlying households using survey weights

Fig: total hours + home prod.

Fig: rel. hours + labor supply

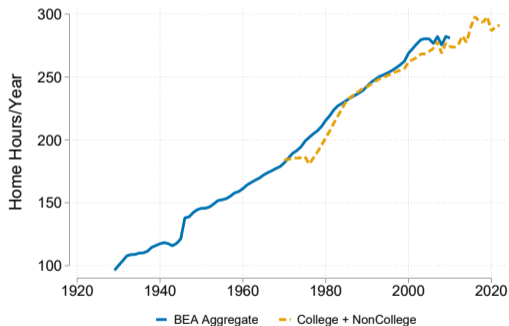
back: Stylized Fact

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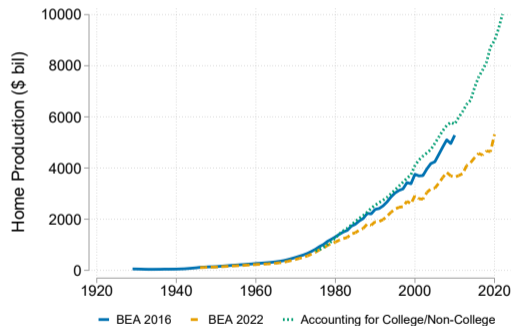
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Total Home Hours and Home Production

Total Home Hours



Total Home Production



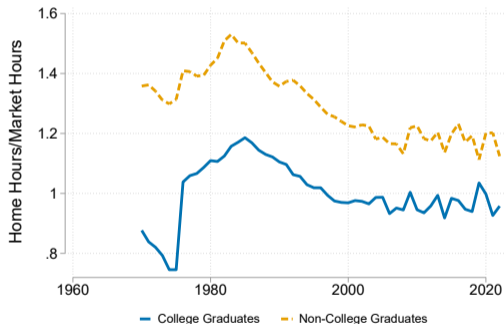
[back: home production](#)

[back: Stylized Fact](#)

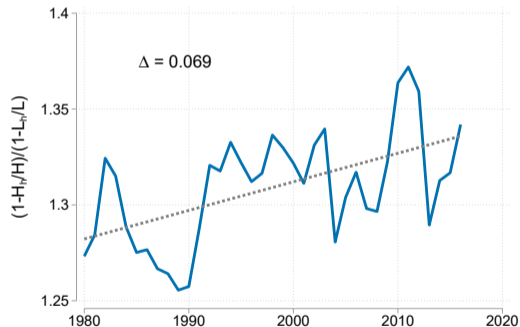
[back: Calibration](#)

Relative Home Hours and Relative Market Labor Supply Share

Relative Home Hours



Relative Market Labor Supply Share



[back: home production](#)

[back: Stylized Fact](#)

[back: Calibration](#)

Opportunity Cost Mechanism

- ▶ Regression Table and Average Marginal Effects →
- ▶ State-Level College Premium →
- ▶ Alternative Income-Type Controls →
- ▶ Alternative Demographic Controls →
- ▶ Alternative Construction of State-Level Skill-Premium →
- ▶ Alternative Dependend Variables: Shares →
- ▶ Alternative Dependend Variables: Levels →
- ▶ Alternative Time Periods →
- ▶ Alternative Clustering →

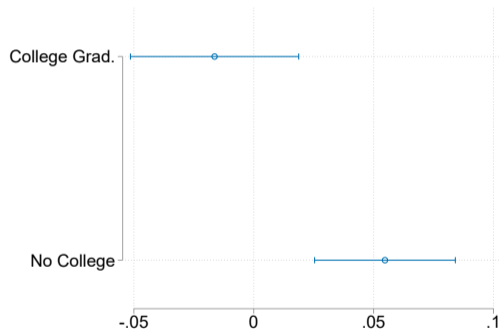
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Regression Table and Average Marginal Effects

College Grad.	0.104*** (0.036)
Prem.	0.055*** (0.015)
College Grad. \times Prem.	-0.071*** (0.020)
Demogr. Controls	Yes
Income Controls	Yes
Adj. R-squared	0.032
N	132630

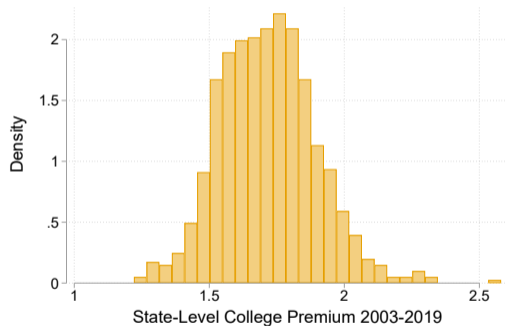
Dependent variable is home hours share. Controlling for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Standard errors clustered at state \times year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Average Marginal Effects of College Prem.

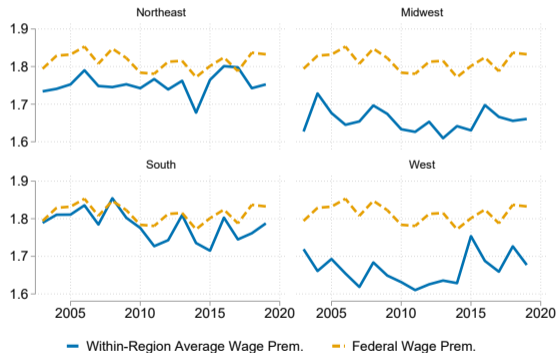


State-Level College Premium

Variation



State-Level vs. Federal College Premium



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Alternative Income-Type Controls

	(1)	(2)	(3)	(4)
College Grad.	0.104*** (0.036)	0.096*** (0.037)	0.067** (0.028)	0.060* (0.031)
Prem.	0.055*** (0.015)	0.063*** (0.015)	0.039*** (0.012)	0.033*** (0.013)
College Grad. × Prem.	-0.071*** (0.020)	-0.088*** (0.021)	-0.039** (0.016)	-0.037** (0.017)
Demogr. Controls	Yes	Yes	Yes	Yes
Income Controls	Yes	No	Yes	Yes
Employ. Controls	No	No	Yes	No
Work Types Controls	No	No	No	Yes
Adj. R-squared	0.032	0.017	0.317	0.280
N	132630	132630	132630	132630

Dependent variable is home hours share. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Employment controls are dummies for employed, unemployed etc. Controls for work types are dummies for government, private, self-employed etc. Standard errors clustered at state × year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [back](#)

Alternative Demographic Controls

	(1)	(2)	(3)	(4)
College Grad.	0.104*** (0.036)	0.096*** (0.036)	0.088** (0.035)	0.098*** (0.036)
Prem.	0.055*** (0.015)	0.053*** (0.015)	0.051*** (0.014)	0.054*** (0.015)
College Grad. × Prem.	-0.071*** (0.020)	-0.067*** (0.020)	-0.066*** (0.020)	-0.069*** (0.020)
Female			0.171*** (0.003)	
Demogr. Controls	Yes	Yes	Yes	Yes
Income Controls	Yes	Yes	Yes	Yes
Marital Stat. Controls	No	Yes	No	No
Children	No	No	No	Yes
Adj. R-squared	0.032	0.036	0.072	0.036
N	132630	132630	132630	132630

Dependent variable is home hours share. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Bins for marital status and number children (0, ≥ 1). Standard errors clustered at state × year level. * p<0.10, ** p<0.05, *** p<0.01. [back](#)

Alternative Construction of State-Level Skill-Premium

	(1)	(2)	(3)
College Grad.	0.104*** (0.036)	0.098*** (0.036)	0.112*** (0.036)
Prem.	0.055*** (0.015)		
College Grad. × Prem.	-0.071*** (0.020)		
Prem. (keep < .5 min.wage)		0.052*** (0.015)	
College Grad. × Prem. (keep < .5 min.wage)		-0.068*** (0.020)	
Prem. (keep age >65)			0.058*** (0.014)
College Grad. × Prem. (keep age >65)			-0.075*** (0.020)
Demogr. Controls	Yes	Yes	Yes
Income Controls	Yes	Yes	Yes
Adj. R-squared	0.032	0.032	0.032
N	132630	132630	132630

Dependent variable is home hours share. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Standard errors clustered at state × year level. * p<0.10, ** p<0.05, *** p<0.01.

Alternative Dependent Variables: Shares

	(1)	(2)	(3)	(4)
College Grad.	0.104*** (0.036)	0.090** (0.037)	0.097*** (0.036)	0.070*** (0.022)
Prem.	0.055*** (0.015)	0.052*** (0.015)	0.054*** (0.015)	0.032*** (0.010)
College Grad. × Prem.	-0.071*** (0.020)	-0.068*** (0.021)	-0.068*** (0.020)	-0.033*** (0.013)
Demogr. Controls	Yes	Yes	Yes	Yes
Income Controls	Yes	Yes	Yes	Yes
Adj. R-squared	0.032	0.033	0.032	0.039
N	132630	131447	133263	137980

Dep. variables: (1): $(H_{hact} + \text{childcare}) / (H_{hact} + \text{childcare} + \text{work})$. (2): $(H_{hact}) / (H_{hact} + \text{work})$. (3): $(H_{hact} + \text{any care}) / (H_{hact} + \text{any care} + \text{work})$. (4): $(H_{hact} + \text{childcare}) / (H_{hact} + \text{childcare} + \text{work} + \text{leisure})$. H_{hact} is household activities and consumer purchases. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Standard errors clustered at state × year level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [back](#)

Alternative Dependent Variables: Levels

	(1)	(2)	(3)	(4)
College Grad.	102.211 (74.139)	196.844** (87.336)	161.254* (88.462)	258.106** (100.940)
Prem.	90.040*** (33.324)	110.536*** (37.763)	122.313*** (38.498)	125.280*** (43.206)
College Grad. × Prem.	-77.529* (41.772)	-94.373* (49.192)	-85.179* (49.897)	-119.549** (57.030)
Demogr. Controls	Yes	Yes	Yes	Yes
Income Controls	Yes	Yes	Yes	Yes
Adj. R-squared	0.016	0.045	0.037	0.047
N	138283	138283	138283	138283

Dep. variables in hours/year: (1): Hhact. (2): Hhact + child care. (3): Hhact + any care. (4): Hhact + child care (BLS definition). Hhact is household activities and consumer purchases. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Standard errors clustered at state × year level. * p<0.10, ** p<0.05, *** p<0.01. [back](#)

Alternative Time Periods

	(1)	(2)	(3)	(4)
College Grad.	0.104*** (0.036)	0.103*** (0.039)	0.084** (0.035)	0.088** (0.036)
Prem.	0.055*** (0.015)	0.052*** (0.016)	0.045*** (0.014)	0.047*** (0.014)
College Grad. × Prem.	-0.071*** (0.020)	-0.072*** (0.022)	-0.059*** (0.020)	-0.060*** (0.020)
Demogr. Controls	Yes	Yes	Yes	Yes
Income Controls	Yes	Yes	Yes	Yes
Adj. R-squared	0.032	0.031	0.030	0.031
N	132630	114119	147634	142147

Time periods (1) 2003-2019, (2) 2003-2016, (3) 2003-2023, (4) 2003-2023 without 2019-2020. Dependent variable is home hours share. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). Standard errors clustered at state × year level. * p<0.10, ** p<0.05, *** p<0.01. [back](#)

Alternative Clustering

	(1)	(2)	(3)	(4)
College Grad.	0.104*** (0.036)	0.104*** (0.035)	0.104*** (0.031)	0.104 (0.047)
Prem.	0.055*** (0.015)	0.055*** (0.017)	0.055*** (0.015)	0.055* (0.021)
College Grad. × Prem.	-0.071*** (0.020)	-0.071*** (0.020)	-0.071*** (0.017)	-0.071* (0.028)
Demogr. Controls	Yes	Yes	Yes	Yes
Income Controls	Yes	Yes	Yes	Yes
Adj. R-squared	0.032	0.032	0.032	0.032
N	132630	132630	132630	132630

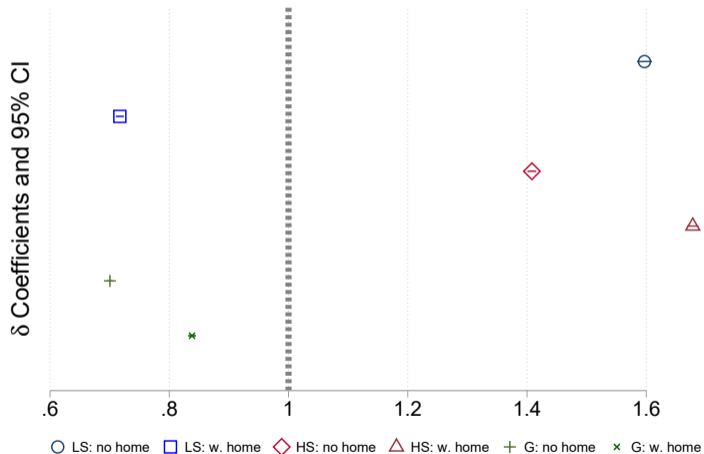
(1): Standard errors clustered at state × year level. (2): Standard errors clustered at state and year level. (3): Standard errors clustered at region × year level. (4): Standard errors clustered at region and year level. All regressions control for year and state fixed effects. Demographic controls are bins for age (25-37, 38-50, 51-64) and for number of household members (1-2, 3-4, >4). Income controls are family income bins (<30k, 30k-60k, 60k-100k, >100k). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [back](#)

Luxury/Necessity Mechanism

- ▶ Income Elasticity Coefficients Plot [→](#)
- ▶ Low-Skill Services Income Elasticity Regression [→](#)
- ▶ High-Skill Services Income Elasticity Regression [→](#)
- ▶ Goods Income Elasticity Regression [→](#)
- ▶ Non-Trimmed and Residualized Low-Skill Services Figure [→](#)

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Income Elasticity Coefficients Plot



Low-Skill Services Income Elasticity Regression

	(1) Mkt.	(2) Mkt. + RC non-mkt.	(3) Mkt. + OC non-mkt.
Log Total Expenditure	1.597*** (0.00648)	0.556*** (0.00264)	0.717*** (0.00341)
Controls	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes
Instruments	Income	Income	Income
P-val of H0: coef. = 1	0.000	0.000	0.000
R-squared	0.518	0.637	0.607
N	372992	372992	372992

Controls are dummies for 5-year age bins, number of household members, number of earners. Dependent variable in log deviation from average. Expenditure in constant USD. Column (1) is only market expend., column (2) imputes non-market. expend. using the replacement cost approach, column (3) imputes non-market expend. using the opportunity cost approach. Standard errors clustered at household level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [back](#)

High-Skill Services Income Elasticity Regression

	(1) Market	(2) Mkt. + RC non-mkt.	(3) Mkt. + OC non-mkt.
Log Total Expenditure	1.408*** (0.00378)	1.733*** (0.00501)	1.678*** (0.00482)
Controls	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes
Instruments	Income	Income	Income
P-val of H0: coef. = 1	0.000	0.000	0.000
R-squared	0.782	0.699	0.728
N	372992	372992	372992

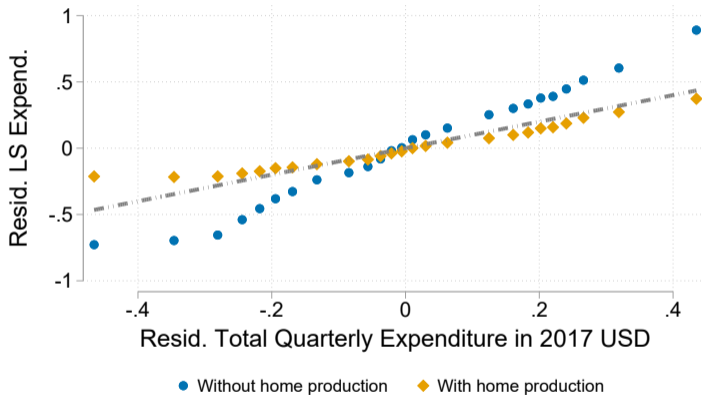
Controls are dummies for 5-year age bins, number of household members, number of earners. Dependent variable in log deviation from average. Expenditure in constant USD. Column (1) is only market expend., column (2) imputes non-market. expend. using the replacement cost approach, column (3) imputes non-market expend. using the opportunity cost approach. Standard errors clustered at household level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [back](#)

Goods Income Elasticity Regression

	(1) Market	(2) Mkt. + RC non-mkt.	(3) Mkt. + OC non-mkt.
Log Total Expenditure	0.700*** (0.00255)	0.866*** (0.00316)	0.838*** (0.00337)
Controls	Yes	Yes	Yes
Year-FE	Yes	Yes	Yes
Region-FE	Yes	Yes	Yes
Instruments	Income	Income	Income
P-val of H0: coef. = 1	0.000	0.000	0.000
R-squared	0.839	0.861	0.833
N	372992	372992	372992

Controls are dummies for 5-year age bins, number of household members, number of earners. Dependent variable in log deviation from average. Expenditure in constant USD. Column (1) is only market expend., column (2) imputes non-market. expend. using the replacement cost approach, column (3) imputes non-market expend. using the opportunity cost approach. Standard errors clustered at household level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [back](#)

Non-Trimmed and Residualized Low-Skill Services Figure



Residualized on demographic controls (age bins, number earners, number hh members), year- and region-FE and instrumented total expenditure (after-tax income and income quintiles).

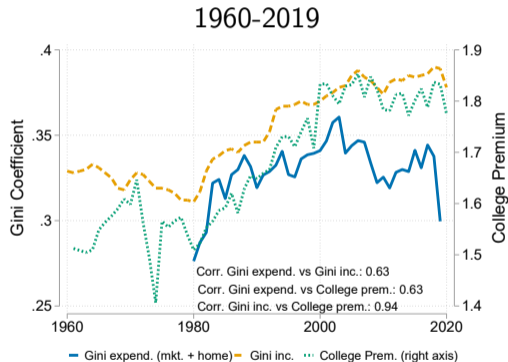
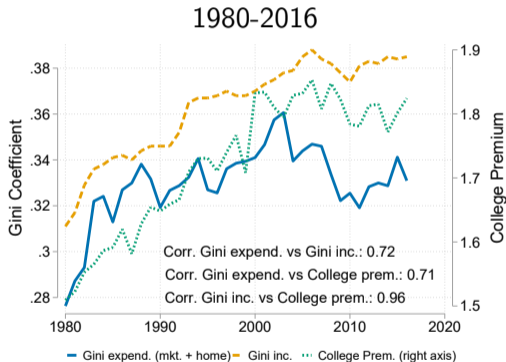
Measures of Inequality: Correlations

	Gini: mkt. expend.	Gini: mkt. + home expend.	Gini: disposable income	Gini: market income	College premium
Gini: mkt. expend.	1.000				
Gini: mkt. + home expend.	0.922***	1.000			
Gini: disposable income	0.628***	0.720***	1.000		
Gini: market income	0.457**	0.559***	0.953***	1.000	
College premium	0.622***	0.710***	0.964***	0.906***	1.000

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

back

Measures of Inequality



[back](#)

Model - Nonhomothetic CES Details (I) [back to setup](#)

Nonhomothetic CES preferences implicitly define utility $U = F(C)$ through the constraint:

$$\sum_i \tilde{\Omega}_i^{\frac{1}{\sigma}} \left(\frac{c_i}{U^{\varepsilon_i}} \right)^{\frac{\sigma-1}{\sigma}} = 1$$

- ▶ c_i are quantities consumed of sector i , σ is elasticity of substitution, $\tilde{\Omega}$ is a taste parameter, ε_i is the non-homotheticity parameter
- ▶ Nests homothetic CES for $\varepsilon_i = \varepsilon \forall i$

Implied Hicksian demand and expenditure function:

$$c_i = \tilde{\Omega}_i \left(\frac{p_i}{e(U, \mathbf{p})} \right)^{-\sigma} U^{(1-\sigma)\varepsilon_i}$$
$$e(U, \mathbf{p}) = \sum_i p_i c_i = \left(\sum_i \tilde{\Omega}_i U^{(1-\sigma)\varepsilon_i} p_i^{1-\sigma} \right)^{\frac{1}{1-\sigma}}$$

Model - Nonhomothetic CES Details (II) [back to setup](#)

Expenditure Elasticity:

$$\delta_i \equiv \frac{\partial \ln c_i}{\partial \ln e} = \sigma + (1 - \sigma) \frac{\epsilon_i}{\bar{\epsilon}},$$

where $\bar{\epsilon} \equiv \sum_i x_i \epsilon_i$

Implicit Marshallian Demand for sectors $i \neq b$:

$$\frac{p_i c_i}{e} \equiv x_i = \left(\frac{p_i}{p_b} \right)^{(1-\sigma)} \left(\frac{e}{p_b} \right)^{(1-\sigma)(\frac{\epsilon_i}{\epsilon_b} - 1)} x_b^{\frac{\epsilon_i}{\epsilon_b}} \frac{\tilde{\Omega}_i}{\tilde{\Omega}_b^{\frac{\epsilon_i}{\epsilon_b}}}$$

► Uniform scalings of ϵ and $\tilde{\Omega}$ yield same choices. Reparametrize:

$$\epsilon_i \equiv \frac{\epsilon_i}{\epsilon_b}, \quad \Omega_i \equiv \frac{\tilde{\Omega}_i}{\tilde{\Omega}_b^{\epsilon_i/\epsilon_b}}$$

Model - Setup Details

Measure of high-skilled: $H = \sum_i H_{i,m} + H_h$

- ▶ Every individual $\in H$ has 1 unit of time and same preferences
- ▶ Income taxation: indiv.'s after-tax income $= (1 - \lambda)w_H^{1-\tau}(1 - \frac{H_h}{H}) + \mathcal{T}$
- ▶ Market BC:
$$\sum_i p_{i,m} c_{i,m} = (1 - \lambda)w_H^{1-\tau}(1 - \frac{H_h}{H}) + \mathcal{T}$$
- ▶ Extended BC $\left(p_h^H \equiv \frac{(1-\lambda)w_H^{1-\tau}}{A_h} \right)$:
$$\sum_i p_{i,m} c_{i,m} + p_h^H c_h^H = (1 - \lambda)w_H^{1-\tau} + \mathcal{T}$$

Measure of low-skilled: $L = \sum_i L_{i,m} + L_h$

- ▶ Every individual $\in L$ has 1 unit of time and same preferences
- ▶ Income taxation: indiv.'s after-tax income $= (1 - \lambda)w_L^{1-\tau}(1 - \frac{L_h}{L}) + \mathcal{T}$
- ▶ Market BC:
$$\sum_i p_{i,m} c_{i,m} = (1 - \lambda)w_L^{1-\tau}(1 - \frac{L_h}{L}) + \mathcal{T}$$
- ▶ Extended BC $\left(p_h^L \equiv \frac{(1-\lambda)w_L^{1-\tau}}{A_h} \right)$:
$$\sum_i p_{i,m} c_{i,m} + p_h^L c_h^L = (1 - \lambda)w_L^{1-\tau} + \mathcal{T}$$

[back: setup](#)

[back: tax](#)

Model - Aggregation

Aggregation within household types of extended BC:

$$H : H \sum_i p_{i,m} c_{i,m}^H + H p_h^H c_h^H = \lambda w_H^{1-\tau} H + HT$$

$$L : L \sum_i p_{i,m} c_{i,m}^L + L p_h^L c_h^L = \lambda w_L^{1-\tau} L + LT$$

Aggregation across household types and gov. for market sector $i \in \{HS, LS_m, G\}$:

$$p_{i,m} C_{i,m} = H p_{i,m} c_{i,m}^H + L p_{i,m} c_{i,m}^L$$

$$p_i Y_i = p_{i,m} C_{i,m} + (1 - v) o_i \text{Gov. Rev}$$

Aggregation across sectors:

$$GDP^{mkt.} = p_{HS} Y_{HS} + p_{LS,m} Y_{LS,m} + p_G Y_G$$

$$GDP^{ext.} = GDP^{mkt.} + H p_h^H c_h^H + L p_h^L c_h^L$$

Model - Market Clearing

H produces own home production c_h^H and L produces own home production c_h^L

$$Y_i = Hc_i^H + Lc_i^L + (1 - v)o_i \text{Gov.Rev } i \in \{HS, LS_m, G\}$$

$$H = \sum_i H_i + H_h$$

$$L = \sum_i L_i + L_h$$

back

Direct Effects of Inequality: Luxury/Necessity Mechanism

Household type $j \in \{H, L\}$'s optimal expenditure share of sector $i \in \{HS, LS, G\}$:

$$\frac{p_i^j c_i^j}{w_j} \equiv x_i^j = \left(\frac{p_i^j}{p_G} \right)^{(1-\sigma)} \left(\frac{w_j}{p_G} \right)^{(1-\sigma)(\epsilon_i-1)} (x_G^j)^{\epsilon_i} \Omega_i^j$$

Proposition 1

Mean-preserving changes in inequality have direct effects on sectoral value added shares if sectors have heterogeneous nonhomotheticity parameters $\epsilon_i \neq 1$.

Intuition: Jensen's inequality

Legend: sectors $i \in \{HS, LS, G\}$, households $j \in \{H, L\}$, p_i^j : j 's price index of sector i , c_i^j : j 's consumption of sector i , w_j : j 's income,

σ : elasticity of substitution across sectors, ϵ_i : nonhomotheticity parameter of sector i , Ω_i : taste for sector i .

[back](#)

[Stone-Geary Pref.](#)

[Proof](#)

Direct Effects of Inequality: Opportunity Cost Mechanism

Household type $j \in \{H, L\}$'s market share of low-skill services:

$$\frac{p_m c_m^j}{p_{LS}^j c_{LS}^j} \equiv z_{LS}^j = \left[1 + \frac{1 - \psi}{\psi} \left(\frac{p_h^j}{p_m} \right)^{1-\nu} \right]^{-1}$$

Proposition 2

Valuing home production by the opportunity cost of forgone market work implies opposite marketization responses to inequality between H and L .

Intuition: inequality **increases** rel. home price for H but **decreases** rel. home price for L

Legend: households $j \in \{H, L\}$, p_m : LS market price, c_m^j : j 's market consumption of LS, $p_{LS}^j c_{LS}^j$: j 's composite expenditure on LS,

ψ : market weight in CES preferences, p_h^j : j 's implicit price of home production, ν : elasticity of substitution between home and market LS.

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[Details](#)

Stone-Geary Preferences as Knife-Edge: Independence of Inequality

$$u(c_G, c_S) = \left[a_G c_G^{\frac{\sigma-1}{\sigma}} + (1 - a_G)(c_S + \bar{c}_S)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

$$s.t. \quad p_G c_G + p_S c_S = w$$

$$\text{Optim.:} \quad x_S(w) = \frac{1}{1 + \frac{p_G}{p_S} \Theta} - \frac{1}{w} \frac{p_G \bar{c}_S \Theta}{1 + \frac{p_G}{p_S} \Theta}, \quad \text{where } \Theta \equiv \left(\frac{p_S}{p_G} \frac{a_G}{1 - a_G} \right)^\sigma$$

$$p_S c_S(w) = \frac{w}{1 + \frac{p_G}{p_S} \Theta} - \frac{p_G \bar{c}_S \Theta}{1 + \frac{p_G}{p_S} \Theta}$$

$$\text{Aggreg.:} \quad p_S Y_S = H p_S c_S(w_H) + L p_S c_S(w_L) = p_S c_S(\bar{w})$$

$$\frac{p_S Y_S}{\bar{w}} = \frac{1}{1 + \frac{p_G}{p_S} \Theta} - \frac{1}{\bar{w}} \frac{p_G \bar{c}_S \Theta}{1 + \frac{p_G}{p_S} \Theta} = x_S(\bar{w})$$

Proof: Luxury/Necessity Mechanism (I)

Assume:

- ▶ Inequality in nonhomothetic CES index of real consumption:

$$\left[\log w_H + \frac{1}{1-\sigma} \log x_G^H \right] > \left[\log w_L + \frac{1}{1-\sigma} \log x_G^L \right]$$

- ▶ $\epsilon_i > \epsilon_k \forall k \neq i$ (reverse flips signs)

- ▶ $p_i = 1, \Omega_i^j = 1$ (i.e. abstract from price effects): $\frac{x_k^j}{x_i^j} = w_j^{(1-\sigma)(\epsilon_k - \epsilon_i)} (x_G^j)^{(\epsilon_k - \epsilon_i)}$

Recall nonhomothetic CES expenditure elasticity:

$$\delta_i^j \equiv \frac{\partial \ln c_i^j}{\partial \ln e_j} = \sigma + (1 - \sigma) \frac{\epsilon_i}{\bar{e}^j}, \text{ where } \bar{e}^j \equiv \sum_i x_i^j \epsilon_i$$

To show: mean-preserving rise in inequality leads to $dY_i > 0$ if $\epsilon_i > 1$

Proof: Luxury/Necessity Mechanism (II)

Mean-preserving increase in inequality: $\frac{\partial w_L}{\partial t} = -1 \Rightarrow \frac{\partial w_H}{\partial t} = \frac{L}{H}$

$$\begin{aligned} dY_i &= H \frac{\partial c_i^H}{\partial w_H} \frac{\partial w_H}{\partial t} + L \frac{\partial c_i^L}{\partial w_L} \frac{\partial w_L}{\partial t} \\ &= L \left[\eta_i^H \frac{c_i^H}{w_H} - \eta_i^L \frac{c_i^L}{w_L} \right] \\ &= L(1 - \sigma) \epsilon_i \frac{1}{p_i} \underbrace{\left[\frac{x_i^H}{\sum_k x_k^H \epsilon_k} - \frac{x_i^L}{\sum_k x_k^L \epsilon_k} \right]}_{\mathcal{A}} \end{aligned}$$

Next step: show that $\mathcal{A} > 0$

Proof: Luxury/Necessity Mechanism (III)

Show that $\mathcal{A} > 0$:

$$\frac{x_i^H}{\sum_k x_k^H \epsilon_k} - \frac{x_i^L}{\sum_k x_k^L \epsilon_k} > 0$$
$$\Leftrightarrow \sum_{k \neq i} \epsilon_k \underbrace{\left(w_L^{(1-\sigma)(\epsilon_k - \epsilon_i)} (x_G^L)^{(\epsilon_k - \epsilon_i)} - w_H^{(1-\sigma)(\epsilon_k - \epsilon_i)} (x_G^H)^{(\epsilon_k - \epsilon_i)} \right)}_{\mathcal{B}} > 0$$

Show that $\mathcal{B} > 0$:

$$w_L^{(1-\sigma)(\epsilon_k - \epsilon_i)} (x_G^L)^{(\epsilon_k - \epsilon_i)} - w_H^{(1-\sigma)(\epsilon_k - \epsilon_i)} (x_G^H)^{(\epsilon_k - \epsilon_i)} > 0$$
$$\Leftrightarrow \left[\log w_H + \frac{1}{1-\sigma} \log x_G^H \right] > \left[\log w_L + \frac{1}{1-\sigma} \log x_G^L \right]$$

□

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Opportunity Cost Mechanism

$$\frac{p_{LS:m}^j c_{LS}^j}{p_{LS}^j c_{LS}^j} \equiv z_{LS}^j = \left[1 + \frac{1 - \psi}{\psi} \left(\frac{p_{LS:h}^j}{p_{LS:m}} \right)^{1-\nu} \right]^{-1}$$

$$\frac{p_{LS:h}^H}{p_{LS:m}} = \frac{w_H}{w_L} \frac{p_{LS:h}^L}{p_{LS:m}}, \text{ where } \frac{p_{LS:h}^L}{p_{LS:m}} = \frac{A_{LS}}{A_h} (1 - \alpha_{LS}) \left((1 - \alpha_{LS})^\zeta + \alpha_{LS}^\zeta \left(\frac{w_H}{w_L} \right)^{1-\zeta} \right)^{\frac{1}{\zeta-1}}$$

$$\frac{\partial \frac{p_{LS:h}^L}{p_{LS:m}}}{\partial \frac{w_H}{w_L}} = -\frac{A_{LS}}{A_h} \alpha_{LS}^\zeta (1 - \alpha_{LS}) \left(\frac{w_H}{w_L} \right)^{-\zeta} (\cdot)^{\frac{1}{\zeta-1}-1} < 0$$

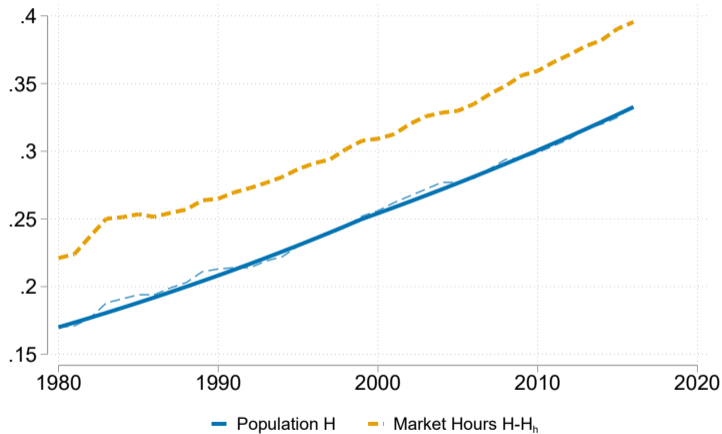
$$\frac{\partial \frac{p_{LS:h}^H}{p_{LS:m}}}{\partial \frac{w_H}{w_L}} = \frac{A_{LS}}{A_h} (1 - \alpha_{LS})^{1+\zeta} (\cdot)^{\frac{1}{\zeta-1}-1} > 0$$

Technology Parameters: Calibration Details

- ▶ College graduate share [Figure](#)
- ▶ Skill-biased technologies [Derivation](#) [Figure](#)
- ▶ Skill-neutral relative market technologies [Derivation](#) [Figure](#)
- ▶ Skill-neutral relative home technology [Derivation](#) [Figure](#)
- ▶ Skill-neutral technology growth [Derivation](#) [Figure](#)

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College Graduate Share



Yearly variation in dashed lines.

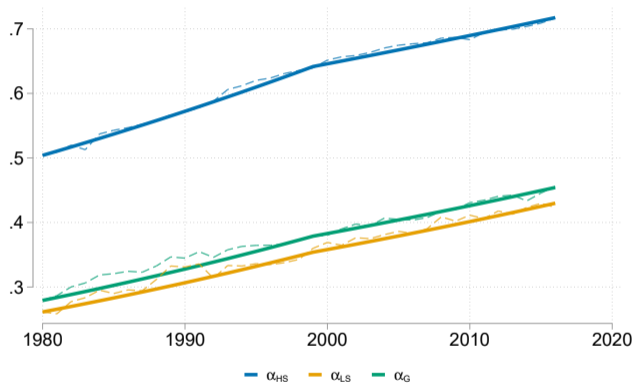
Skill-Biased Technologies: Derivation

$$\alpha_{i,t} = \left[1 + \left(\frac{1 - \left(\frac{w_H H_i}{p_i Y_i} \right)_t}{\left(\frac{w_H H_i}{p_i Y_i} \right)_t} \right)^{\frac{1}{\zeta}} \left(\frac{w_H}{w_L} \right)_t^{\frac{1-\zeta}{\zeta}} \right]^{-1}$$

	$\frac{w_H}{w_L}$	$\frac{w_H H_{HS}}{p_{HS} Y_{HS}}$	$\frac{w_H H_{LS}}{p_{LS} Y_{LS}}$	$\frac{w_H H_G}{p_G Y_G}$
$t = 1980$	1.51	0.46	0.16	0.18
\vdots	\vdots	\vdots	\vdots	\vdots
$t = 2016$	1.82	0.74	0.36	0.38

Table: Data Moments

Skill-Biased Technologies



Yearly variation in dashed lines.

[back](#)

[Derivation](#)

Skill-Neutral Relative Market Technologies: Derivation

$$\left(\frac{A_i}{A_j}\right)_t = \left(\frac{p_j}{p_i}\right)_t \left(\frac{(1 - \alpha_{i,t})^\zeta + \alpha_{i,t}^\zeta \left(\frac{w_H}{w_L}\right)_t^{1-\zeta}}{(1 - \alpha_{j,t})^\zeta + \alpha_{j,t}^\zeta \left(\frac{w_H}{w_L}\right)_t^{1-\zeta}} \right)^{\frac{1}{1-\zeta}}$$

	$\frac{w_H}{w_L}$	$\frac{PHS}{PG}$	$\frac{PLS}{PG}$
$t = 1980$	1.51	1	1
\vdots	\vdots	\vdots	\vdots
$t = 2016$	1.82	1.24	1.61

Table: Data Moments

Skill-Neutral Relative Home Technologies: Derivation

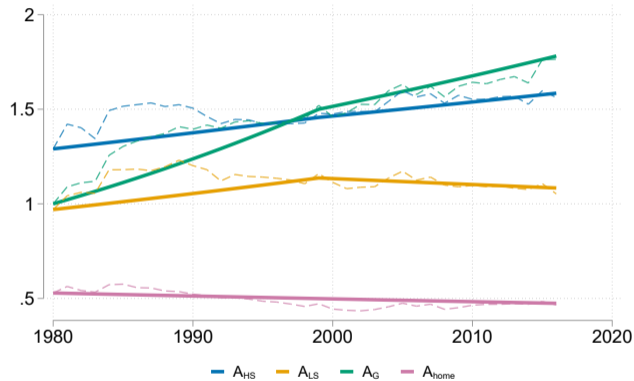
$$\left(\frac{A_{LS}}{A_{home}}\right)_t = \left(\frac{p_{home}^L}{p_{LS}}\right)_t \left((1 - \alpha_{LS,t})^\zeta + \alpha_{LS,t}^\zeta \left(\frac{w_H}{w_L}\right)_t^{1-\zeta} \right)^{\frac{1}{1-\zeta}}$$

- Assumption: household sector price corresponds to p_{home}^L

	$\frac{w_H}{w_L}$	$\frac{p_{home}^L}{p_{LS}}$
$t = 1980$	1.51	1
\vdots	\vdots	\vdots
$t = 2016$	1.82	1.08

Table: Data Moments

Skill-Neutral Technologies



Yearly variation in dashed lines.

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[Derivation: market](#)

[Derivation: home](#)

Skill-Neutral Technology Growth: Derivation

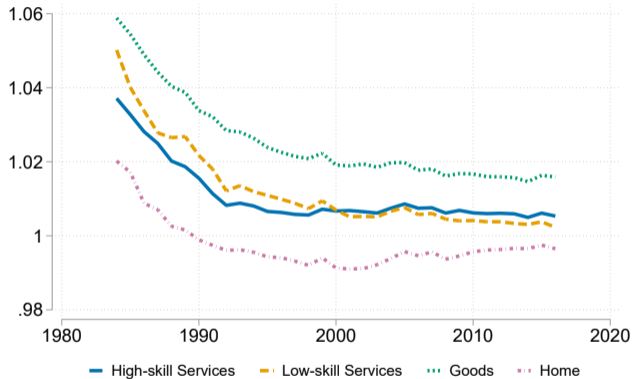
$$\frac{A_{i,t+1}}{A_{i,t}} = \frac{\frac{w_{H,t}}{w_{L,t}}}{\frac{w_{H,t+1}}{w_{L,t+1}}} \left(\frac{(1 - \alpha_{G,t+1})^\zeta + \alpha_{G,t+1}^\zeta \left(\frac{w_{H,t+1}}{w_{L,t+1}} \right)^{1-\zeta}}{(1 - \alpha_{G,t})^\zeta + \alpha_{G,t}^\zeta \left(\frac{w_{H,t}}{w_{L,t}} \right)^{1-\zeta}} \right)^{\frac{1}{1-\zeta}}$$

$$\times \frac{GDP_{t+1}^{mkt.}}{GDP_t^{mkt.}} \frac{H_t - H_{h,t}}{H_{t+1} - H_{h,t+1}} \left(\frac{\sum_i \frac{w_{H,t+1} H_{i,m,t+1}}{p_{i,t+1} Y_{i,t+1}} \frac{p_{i,t+1} Y_{i,t+1}}{GDP_{t+1}^{mkt.}}}{\sum_i \frac{w_{H,t} H_{i,m,t}}{p_{i,t} Y_{i,t}} \frac{p_{i,t} Y_{i,t}}{GDP_t^{mkt.}}} \right)$$

	$\frac{w_H}{w_L}$	$\frac{w_H H_S}{p_H Y_H}$	$\frac{w_H H_L}{p_L Y_L}$	$\frac{w_H H_G}{p_G Y_G}$	$\frac{p_H Y_H}{GDP^{mkt.}}$	$\frac{p_L Y_L}{GDP^{mkt.}}$	$\frac{p_G Y_G}{GDP^{mkt.}}$	$\frac{GDP^{mkt.}}{pop.}$	$\frac{H}{pop.}$	$\frac{H - H_h}{H}$
$t = 1980$	1.51	0.46	0.16	0.18	0.33	0.06	0.61	36k (2019\$)	0.17	0.48
\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots
$t = 2016$	1.82	0.74	0.36	0.38	0.44	0.07	0.49	62k (2019\$)	0.33	0.51

Table: Data Moments

Skill-Neutral Technology Annualized Growth Rates



From 1984 onwards.

[back](#)

[Derivation](#)

Demand Parameters Estimation

Data (repeated cross-section)

- ▶ Market consumption value added (CEX to NIPA) [Mapping](#) [Mapping example](#)
- ▶ Imputed home consumption [Details](#)
- ▶ Sectoral Fisher price indices + home price

Steps:

1. Intra-sectoral optimization: ψ [Details](#)
2. Construct \hat{p}_{LS}^H and \hat{p}_{LS}^L using $\hat{\psi}$ [Details](#)
3. Inter-sectoral optimization: ϵ_i, σ [Details](#)
4. Internally calibrate Ω_i^j to match 1980 moments [Details](#)

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Intra-sectoral optimization: ψ and construct \hat{p}_{LS}^j

$$\ln \frac{p_{LS,m}}{p_h^j} = \frac{1}{\nu - 1} \ln \left(\frac{\psi}{1 - \psi} \right) + \frac{1}{\nu - 1} \ln \left(\frac{p_h^h c_h^k}{p_{LS} c_{LS}^k} \right) + \xi_{r,t}^k + u_{k,t}$$

- ▶ Controls: age-bin, number hh members, number of earners, region- and time FE
- ▶ Observations: approx. 375,000
- ▶ $\hat{\psi} = 0.09$
- ▶ Construct \hat{p}_{LS}^H and \hat{p}_{LS}^L using $\hat{\psi}$:

$$\hat{p}_{LS}^j = \left[\hat{\psi} p_{LS:m}^{1-\nu} + (1 - \hat{\psi}) (p_h^j)^{1-\nu} \right]^{\frac{1}{1-\nu}}$$

Inter-Sectoral Optimization: ϵ_i, σ

$$\ln e_i^k = \sigma(1 - \epsilon_i) \ln e^k + (1 - \sigma) \ln \hat{p}_i^h - \epsilon_i(1 - \sigma) \ln p_G + \epsilon_i \ln e_G + \xi_{i,r,t}^k + u_{k,t}$$

- ▶ Instruments for total extended expenditure: after-tax income and income quintile
- ▶ Controls: age-bin, number hh members, number of earners, region- and time FE
- ▶ Observations: approx. 375,000
- ▶ $\sigma \geq 0$: estimate unconstrained $b_1 = \ln(\sigma)$, then transform

σ	ϵ_{HS}	ϵ_{LS}	ϵ_G
0.01	2.01***	0.50***	1 [normalized]
(0.054)	(0.067)	(0.014)	-

Internally Calibrate Ω_j^i to Match 1980 Targets

	$\frac{w_H}{w_L}$	$\frac{P_{HS} Y_{HS}}{GDP^{mkt.}}$	$\frac{P_{LS} Y_{LS}}{GDP^{mkt.}}$	$\frac{P_G Y_G}{GDP^{mkt.}}$
Data	1.51	0.33	0.06	0.61
Model	1.49	0.33	0.05	0.61

Table: 1980 Targets vs. Model

	H	L
Ω_{HS}^i : taste-weight for HS	3.30	1.88
Ω_{LS}^i : taste-weight for LS	0.24	0.44

- Compositional and demographic differences: on average fewer high-skilled households in the 51 to 64 age bin, fewer high-skilled households with family sizes above 4, fewer high-skilled households with only a single earner.

Calibrate Technology Parameters

Parameters	Value		Description	Source/Method
	1980-1998/99	1998/99-2016		
H	2.0% p.a.	1.7% p.a.	College share in population	Census
ζ	- 1.4 -		Elast. of subst. in production	Katz, Murphy (1992)
α_G	1.6% p.a.	1.1% p.a.	G skill-biased productivity	Calibrated to H comp. share
α_{HS}	1.3% p.a.	0.7% p.a.	HS skill-biased productivity	Calibrated to H comp. share
α_{LS}	1.6% p.a.	1.1% p.a.	LS skill-biased productivity	Calibrated to H comp. share
A_G	2.2% p.a.	1.0% p.a.	G skill-neutral productivity	Calibrated to GDP growth
A_{HS}	0.6% p.a.	0.5% p.a.	HS skill-neutral productivity	Calibrated to rel. prices
A_{LS}	0.8% p.a.	-0.3% p.a.	LS skill-neutral productivity	Calibrated to rel. prices
A_{home}	- 0.3% p.a. -		Home labor productivity	Calibrated to rel. prices

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[Details](#)

Estimate Demand Parameters

1. Intra-sectoral optimization: estimate ψ
2. Inter-sectoral optimization: estimate ϵ_i, σ

Parameters	Value	Description	Source/Method
ν	2.3	Elast. of subst. within LS CES	Aguiar et al. (2012)
ψ	0.09	Market weight in LS CES	Estimated from demand system
σ	0.01	Elast. of subst. across sectors	Estimated from demand system
ϵ_{HS}	2.01	HS non-homotheticity	Estimated from demand system
ϵ_{LS}	0.50	LS non-homotheticity	Estimated from demand system
ϵ_G	1	G non-homotheticity	normalized
Ω_i^j		j -type rel. taste for sector i	Target 1980 VA shares and $\frac{w_H}{w_L}$

Model Validation

- ▶ Figure: VA Shares Individually →
- ▶ Table: Levels and Difference →
- ▶ Model Validation: Matching Stylized Facts →
- ▶ Untargeted Moment: Correlation btw. Services Share & College Premium →
- ▶ Untargeted Moment: Relative Market Labor Supply Share →
- ▶ Income Elasticities →

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Model Validation: Matching Stylized Facts

Luxury/necessity mechanism

Nonhomothetic CES expenditure elasticity:

$$\delta_i^j = \sigma + (1 - \sigma) \frac{\epsilon_i}{\bar{e}^j}, \text{ where } \bar{e}^j \equiv \sum_i x_i^j \epsilon_i$$

Marketization mechanism

Time-use regression:

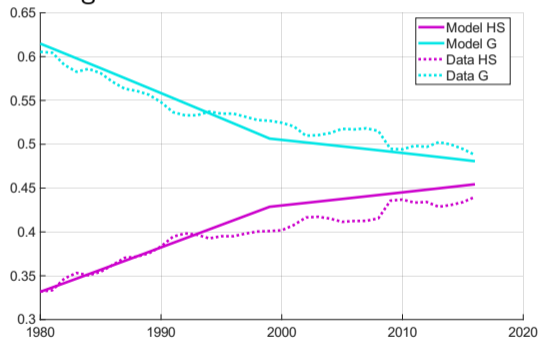
$$home_t^j = \dots + \beta_3 \mathbb{1}\{College^j\} \times \left(\frac{w_H}{w_L} \right)_t$$

	Model	Data
	Expenditure weighted	Reduced-Form
δ_{HS}	1.87	1.68
δ_{LS}	0.47	0.72
δ_G	0.93	0.84

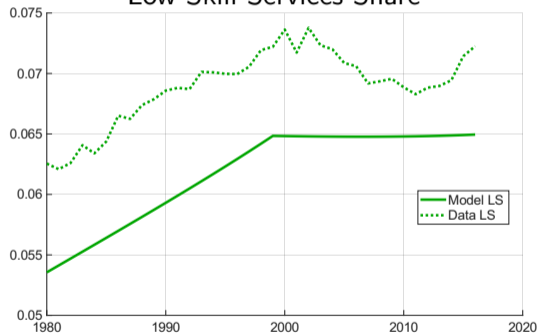
	Model	Data
	Regression	Reduced-Form
β_3	-0.08*** (0.00)	-0.07*** (0.02)

VA Shares Individually

High-Skill Services and Goods Share



Low-Skill Services Share



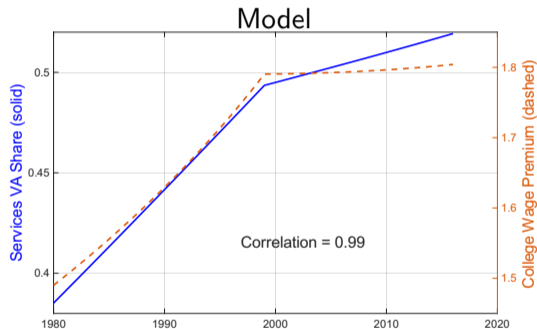
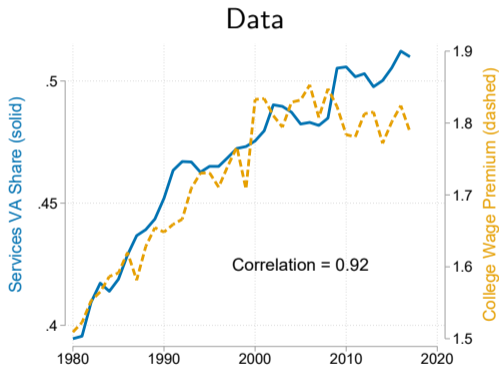
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Table: Levels and Difference

	$\frac{P_{HS} Y_{HS}}{GDP_{ext.}}$	$\frac{P_{LS} Y_{LS}}{GDP_{ext.}}$	$\frac{P_G Y_G}{GDP_{ext.}}$	$\frac{w_H}{w_L}$
<i>Data</i>				
1980	23.0 pp	4.3 pp	41.9 pp	1.51
2016	31.4 pp	5.1 pp	34.8 pp	1.82
Difference	8.4 pp	0.8 pp	-7.1 pp	0.31
<i>Model</i>				
1980	22.5 pp	3.6 pp	41.6 pp	1.49
2016	30.2 pp	4.3 pp	32.0 pp	1.80
Difference	7.7 pp	0.7 pp	-9.7 pp	0.31

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Untargeted Moment: Correlation Services Share & College Premium

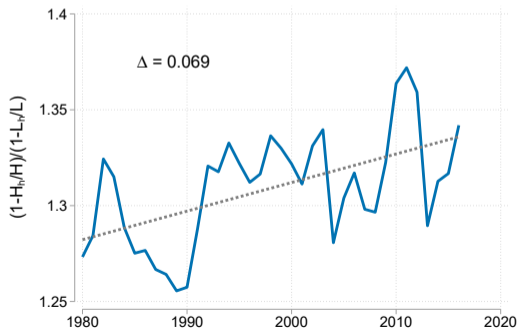


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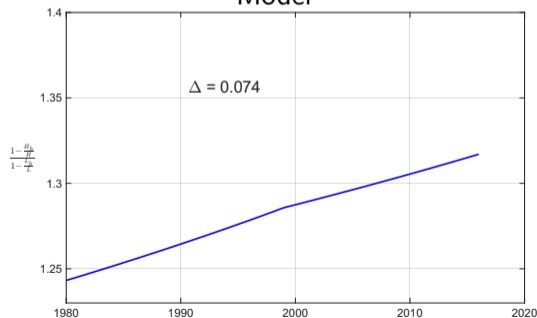
Untargeted Moment: Relative Market Labor Supply Share

$$\text{Relative Market Labor Supply: } \frac{H - H_h}{L - L_h} = \frac{H}{L} \times \frac{1 - \frac{H_h}{H}}{1 - \frac{L_h}{L}}$$

Data



Model



Income Elasticities

Nonhomothetic CES expenditure elasticity (i.e. consumption value added elasticity):

$$\delta_i^j = \sigma + (1 - \sigma) \frac{\epsilon_i}{\bar{e}^j}, \text{ where } \bar{e}^j \equiv \sum_i x_i^j \epsilon_i$$

	Model: Expenditure weighted	Data: Reduced-Form	Data: Nonhomothetic CES
δ_{HS}	1.87	1.68	1.67
δ_{LS}	0.47	0.72	0.42
δ_G	0.93	0.84	0.83

Details: Traditional Drivers of Structural Change

Aggregate income effects through A -growth:

$$GDP^{ext.} = A_G \left((1 - \alpha_G)^\zeta + \alpha_G^\zeta \left(\frac{w_H}{w_L} \right)^{1-\zeta} \right)^{\frac{1}{\zeta-1}} \left[(1 - H)(1 - \alpha_G) + H\alpha_G \left(\frac{H_G}{L_G} \right)^{-\frac{1}{\zeta}} \right]$$

Relative price effects through sectoral differences in A -growth:

$$\frac{p_i^j}{p_G} = \left(\frac{A_G}{A_i} \right) \left(\frac{(1 - \alpha_i)^\zeta + \alpha_i^\zeta \left(\frac{w_H}{w_L} \right)^{1-\zeta}}{(1 - \alpha_G)^\zeta + \alpha_G^\zeta \left(\frac{w_H}{w_L} \right)^{1-\zeta}} \right)^{\frac{1}{1-\zeta}} \left[\psi_i + (1 - \psi_i) \left(\frac{p_{i,h}^j}{p_{i,m}} \right)^{1-\nu} \right]^{\frac{1}{1-\nu}}$$

Decomposition Equation

For $Y \in \left\{ \frac{PHS Y_{HS}}{GDP^{ext.}}, \frac{PLS Y_{LS}}{GDP^{ext.}}, \frac{w_H}{w_L}, \frac{H - H_h}{L - L_h} \right\}$:

$$\begin{aligned} \Delta Y &= Y(A_{2016}, \alpha_{1980}, H_{1980}) - Y(A_{1980}, \alpha_{1980}, H_{1980}) \\ &\quad + Y(A_{1980}, \alpha_{2016}, H_{1980}) - Y(A_{1980}, \alpha_{1980}, H_{1980}) \\ &\quad + Y(A_{1980}, \alpha_{1980}, H_{2016}) - Y(A_{1980}, \alpha_{1980}, H_{1980}) \\ &\quad + \text{Interaction} \end{aligned}$$

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Details: Skill-Premium

From firm optimization:

$$\frac{w_H}{w_L} = \frac{\alpha_i}{1 - \alpha_i} \left(\frac{H_{i,m}}{L_{i,m}} \right)^{-\frac{1}{\zeta}}$$
$$= \begin{cases} \frac{\alpha}{1 - \alpha} \left(\frac{H}{L} \right)^{-\frac{1}{\zeta}} \left(\frac{1 - \frac{H_h}{H}}{1 - \frac{L_h}{L}} \right)^{-\frac{1}{\zeta}} & \text{if } \alpha_i = \alpha \forall i \\ \frac{\frac{p_i Y_i}{L_i} - \frac{GDP^{mkt}}{L - L_h}}{\frac{H_i}{H - H_h} - \frac{p_i Y_i}{GDP^{mkt}}} \left(\frac{H}{L} \right)^{-1} \left(\frac{1 - \frac{H_h}{H}}{1 - \frac{L_h}{L}} \right)^{-1} & \text{otherwise} \end{cases}$$

[back: Setup](#)

[back: Results](#)

Isolating Drivers of Structural Change

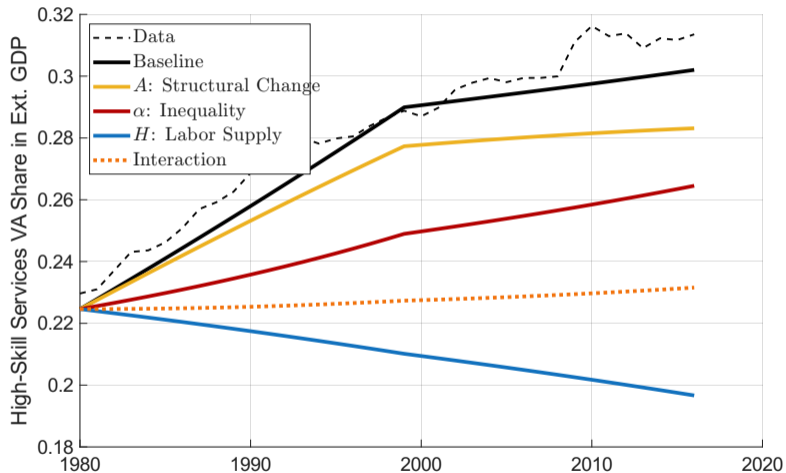
	$\Delta \frac{PHS Y_{HS}}{GDP_{ext.}}$	$\Delta \frac{PLS Y_{LS}}{GDP_{ext.}}$
Data	8.4 pp	0.8 pp
Model: Baseline	7.7 pp	0.7 pp
Model: Struct. Change (A)	76%	289%
Model: Inequality (α)	52%	-73%
Model: Labor Supply (H)	-36%	15%
Interaction	9%	-132%

Table: Counterfactual Analyses in General Equilibrium

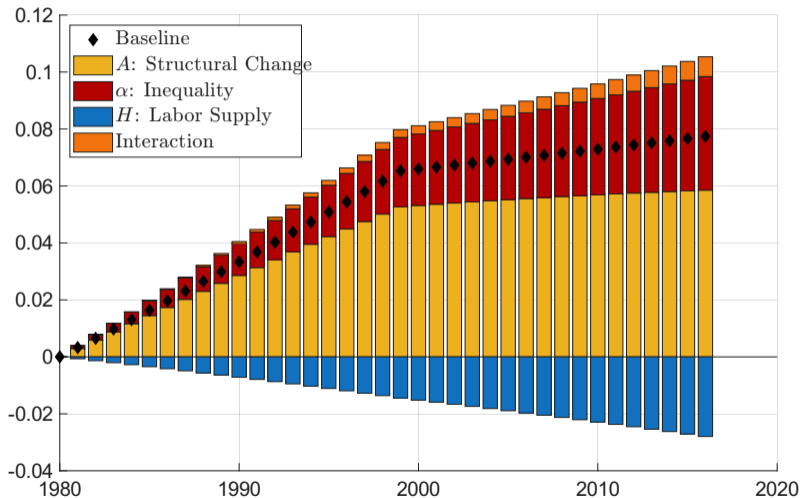
back: HS

back: LS

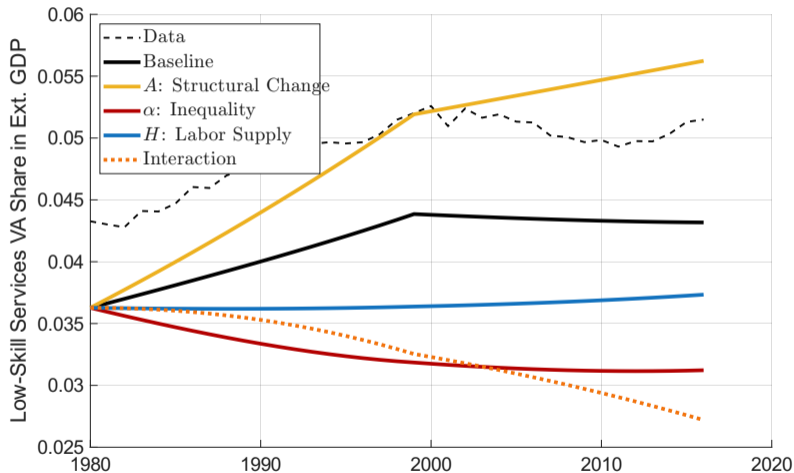
High-Skill Services Drivers and Data



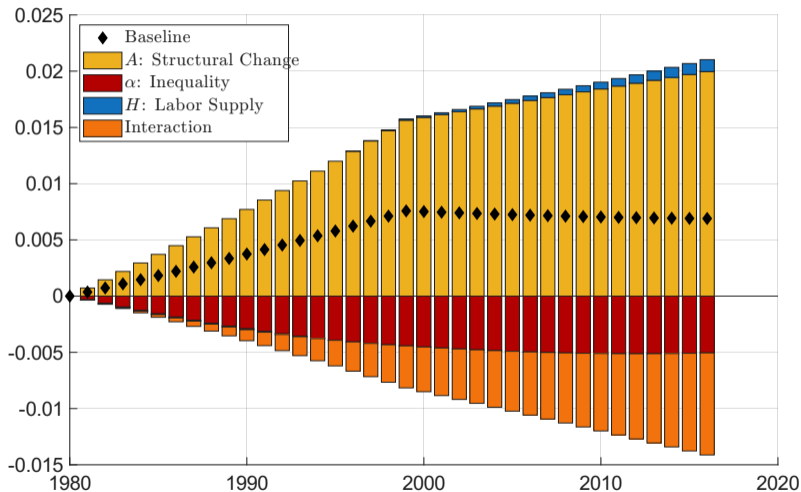
Yearly Contribution to Change in High-Skill Services Share



Low-Skill Services Drivers and Data



Yearly Contribution to Change in Low-Skill Services Share



Mechanisms of Direct Effects of Inequality

c.p. $\Delta\alpha \Rightarrow \Delta GDP$. Solution: let $A_{i,t} \equiv \tilde{A}_{i,t} \times A_{i,t}^{SBTC}$, where $A_{G,t}^{SBTC}$ offsets ΔGDP

	$\Delta \frac{PHS Y_{HS}}{GDP^{ext.}}$	$\Delta \frac{PLS Y_{LS}}{GDP^{ext.}}$
Baseline	7.7 pp	0.7 pp
Raw Ineq. (only α)	4.0 pp	-0.5 pp
Mean-preserving ineq., pref. differences (α and $\Delta GDP = 0$)	9.7 pp	-0.8 pp
Mean-preserving ineq. (α and $\Delta GDP = 0$ and $\Omega_i^H = \Omega_i^L$)	6.1 pp	0.3 pp
M-p ineq.: only marketization ($\epsilon_i = 1$ and $\alpha_i = \bar{\alpha}$)	0.0 pp	0.4 pp
M-p ineq.: only luxury/necessity ($\psi_{LS} = 1$ and $\alpha_i = \bar{\alpha}$)	3.6 pp	-1.5 pp
M-p ineq.: only skill-biased struct. change ($\epsilon_i = 1$ and $\psi_{LS} = 1$)	2.8 pp	-0.8 pp

Table: Mechanisms of Direct Inequality Effects

Variance Decomposition in Partial Equilibrium

$$\begin{aligned} \text{Var} \left[\log \frac{p_i Y_i}{p_G Y_G} \right] &= \text{Var} \left[(1 - \hat{\sigma}) \log p_i^L \right] \\ &+ \text{Var} \left[\log z_i^L \right] \\ &+ \text{Var} \left[(1 - \hat{\sigma})(\hat{\epsilon}_i - 1) \log w_L + (\hat{\epsilon}_i - 1) \log x_G^L \right] \\ &+ \text{Var} \left[\log \left(\frac{L + H \frac{w_H}{w_L} \frac{x_i^H}{x_i^L} \frac{z_i^H}{z_i^L}}{L + H \frac{w_H}{w_L} \frac{x_G^H}{x_G^L}} \right) \right] \\ &+ \text{Cov} [\cdot] \end{aligned}$$

Variance Decomposition in Partial Equilibrium

	$\log(\frac{HS}{G})$	$\log(\frac{LS}{G})$
Explained/Total Variance	1.61	1.97
Rel. Price Effects	0.40	0.76
Marketization Effects	-	0.07
Avg. Income Effects	0.04	0.01
Inequality Effects	0.56	0.16

Table: Variance Decomposition: Drivers of Structural Change

Skill-premium and Relative Market Labor Supply Share

	$\Delta \frac{w_H}{w_L}$	$\Delta \frac{H-H_h}{L-L_h}$
Data	21%	158%
Model: Baseline	21%	158%
Model: Struct. Change (A)	32%	5%
Model: Inequality (α)	604%	-2%
Model: Labor Supply (H)	-240%	94%
Interaction	-295%	3%

Table: Counterfactual Analyses in General Equilibrium: Labor Variables

Skill-premium and Relative Market Labor Supply Share

	$\Delta \frac{w_H}{w_L}$	$\Delta \frac{H-H_h}{L-L_h}$
Data	0.315	0.412
Baseline	0.314	0.402
Raw Ineq. (only α)	1.895	-0.009
Mean-preserving ineq., pref. differences (α and $\Delta GDP = 0$)	2.175	-0.015
Mean-preserving ineq. (α and $\Delta GDP = 0$ and $\Omega_i^H = \Omega_i^L$)	2.356	-0.002

Table: Mechanisms of Direct Inequality Effects: Labor Variables

Homogeneous Growth Rates Across Sectoral Skill-Biased Technologies

	$\Delta \frac{P_{HS} C_{HS}}{GDP^{ext.}}$	$\Delta \frac{P_{LS} C_{LS}}{GDP^{ext.}}$	$\Delta \frac{H-H_h}{L-L_h}$	$\Delta \frac{w_H}{w_L}$
Inequality (α): heterog. α -growth rates	52%	-73%	604%	-2%
Inequality (α): homog. α -growth rates	72%	-14%	456%	-2%

Table: Robustness wrt Skill-Biased Growth Differences

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Mechanisms of Direct Effects of Inequality

	$\Delta \frac{PHS Y_{HS}}{GDP^{ext.}}$	$\Delta \frac{PLS Y_{LS}}{GDP^{ext.}}$
Baseline	7.7 pp	0.7 pp
Raw Ineq. (only α)	4.0 pp	-0.5 pp
Mean-preserving ineq. (α and $\Delta GDP = 0$)	9.7 pp	-0.8 pp
Mean-preserving observed ineq. (α and $\Delta GDP = 0$ and $\Delta \frac{w_H}{w_L} = 0$)	1.6 pp	-0.5 pp

Table: Robustness: Skill-Biased Technological Change

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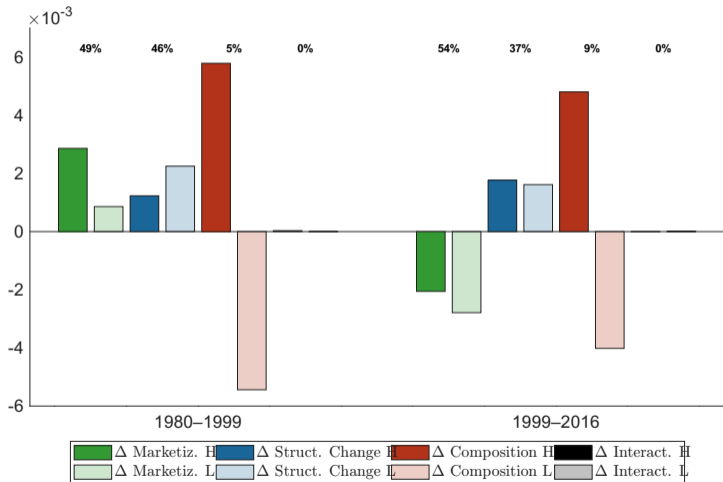
Within-Between Decomposition (Partial Equilibrium)

$$\frac{p_{i,m} Y_{i,m}}{GDP^{ext.}} = \underbrace{\frac{Hw_H}{\bar{w}}}_{\equiv \Lambda^H} z^H x^H + \underbrace{\frac{Lw_L}{\bar{w}}}_{\equiv \Lambda^L} z^L x^L$$
$$\Delta \frac{p_{i,m} Y_{i,m}}{GDP^{ext.}} = \Delta z^H \bar{x}^H \bar{\Lambda}^H + \Delta z^L \bar{x}^L \bar{\Lambda}^L$$
$$+ \bar{z}^H \Delta x^H \bar{\Lambda}^H + \bar{z}^L \Delta x^L \bar{\Lambda}^L$$
$$+ \bar{z}^H \bar{x}^H \Delta \Lambda^H + \bar{z}^L \bar{x}^L \Delta \Lambda^L$$

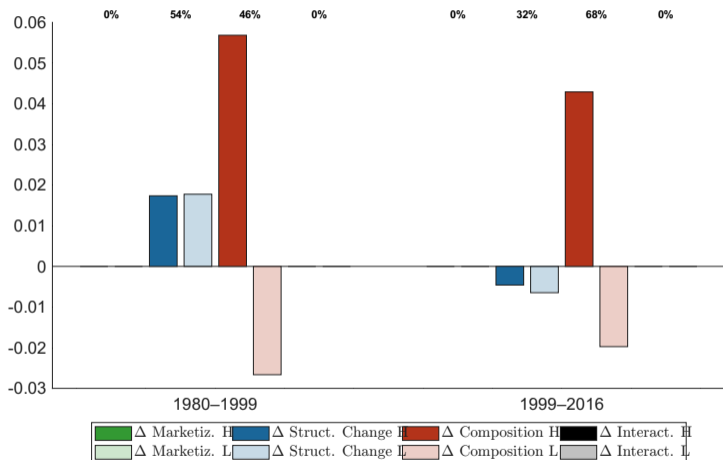
+ Interaction

- ▶ Low-skill services →
- ▶ High-skill services →

Within-Between Decomposition (PE): Low-Skill Services



Within-Between Decomposition (PE): High-Skill Services



Isolating Drivers of Structural Change: Market VA Shares

	$\Delta \frac{PHS Y_{HS}}{GDP_{mkt.}}$	$\Delta \frac{PLS Y_{LS}}{GDP_{mkt.}}$
Data	10.8 pp	1.0 pp
Model: Baseline	12.3 pp	1.1 pp
Model: Struct. Change (A)	98%	317%
Model: Inequality (α)	26%	-93%
Model: Labor Supply (H)	-32%	16%
Interaction	9%	-140%

Table: Counterfactual Analyses: Market VA Shares

Isolating Drivers of Structural Change: Labor Shares

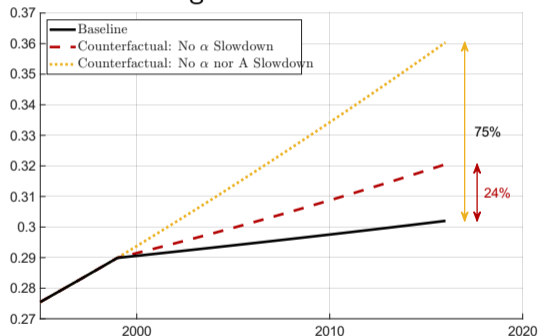
	$\Delta \frac{L_{HS}}{L}$	$\Delta \frac{L_{LS}}{L}$
Model: Baseline	-1.1 pp	1.4 pp
Model: Struct. Change (A)	-442%	163%
Model: Inequality (α)	183%	-14%
Model: Labor Supply (H)	309%	6%
Interaction	50%	-55%

Table: Counterfactual Analyses: Labor Shares

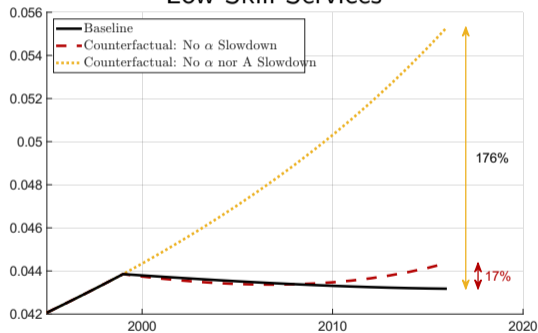
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Real-World Inequality Change: 2000s Growth Slowdown

High-Skill Services



Low-Skill Services



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Counterfactual: No 1980s Reagan Tax Cuts

1980-2016: $\tau \downarrow$ from 0.19 to 0.14, $\lambda \downarrow$ from 0.15 to 0.08 Wu (2021)

- ▶ (a) rebating all gov. revenues
- ▶ (b) gov. revenues spend on sectoral expenditure (1/3 each)

Change **with** tax cut - change **without** tax cut:

	$\Delta \frac{PHS Y_{HS}}{GDP^{ext.}}$	$\Delta \frac{PLS Y_{LS}}{GDP^{ext.}}$
Full rebate	-0.1 pp	0.2 pp
No rebate	0.5 pp	-0.3 pp

Table: Income Tax Reduction: pp Difference from No-Tax-Change