

# **New Frontiers: The Evolving Content of New Work in the 20th Century**

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A dramatic scene with a large, bright orange sun in the center, set against a deep red sky. Numerous dark helicopters are flying in a formation across the sky. The overall atmosphere is intense and apocalyptic.

# Robocalypse Now

# Why are we not automating ourselves out of work?

- **Complementarity** between tech & humans
- **Insatiability** – rising product & labor demand from rising incomes
  - ‘Uber effects’
  - ‘Walmart effects’
  - Network effects
- **Completely new labor-using tasks (‘new work’) emerging**

# Why does new work matter?

- Task automation sans new work: **asymptotic task encroachment**
  - Even if no shortage of work, shrinking scope of activities performed by humans
- Yet very little direct empirical evidence on new work and who performs it
- This project: document **new work** emerging over 1900-2016 (*1940-2016 so far*) and study its **content and origins**

# New Frontiers: The Evolution of New Work in the 20th Century

1. Why new work matters
- 2. Measurement**
3. New work 'types'
4. The evolution of new work
  - By occupation group
  - By skill (college/non-college)
  - By wage level and skill
5. Conclusion

3.223/22: 90-R-3

U.S. Department of Commerce  
Economics and Statistics Administration  
BUREAU OF THE CENSUS

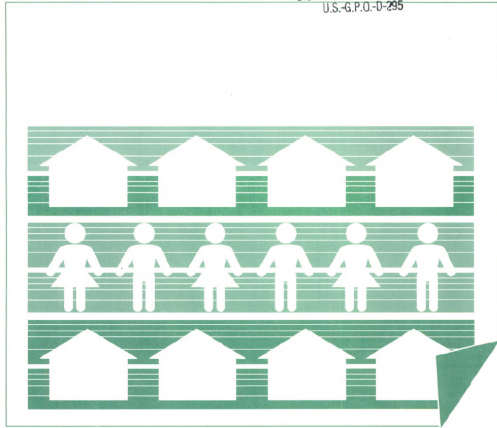
CENSUS '90



1990 CPH-R-3  
1990 Census of  
Population and Housing

## Alphabetical Index of Industries and Occupations

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Original from  
UNIVERSITY OF MINNESOTA

9-696A  
DEPARTMENT OF COMMERCE  
U. S. BUREAU OF THE CENSUS  
SAM. L. ROGERS, DIRECTOR

Fourteenth census of the United States.

## ALPHABETICAL INDEX TO OCCUPATIONS



Reprint, October 1, 1920

WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1920

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Original from  
HARVARD UNIVERSITY

# Census Alphabetical Index of Occupation (CAIO) volumes

- Detailed occ'1 titles (~15,000-30,000 per volume), classified to Census occs
- Intended as coding aide for occupation write-ins
- Cover 1900-2016

# Example of CAIO

entries, 1990

Job titles classified to  
Census occupation  
codes

→ Compare successive  
CAIO editions to extract  
new work by occupation  
(Lin 2011)

## 1990 ALPHABETICAL INDEX—OCCUPATION

Blunger	261	756	Bobbin doffer	132-150	738
Blurb writer		195	Bobbin drier	180	749
Board attendant	810	336	Bobbin dumper	132-150	749
Board boy	132-150	859	Bobbin fixer	132-150	749
Board boy	710	386	Bobbin girl	132-150	859
Board catcher	100-392	878	Bobbin hauler	132-150	859
Board chairman	700-702	022	Bobbin man	Glass 250	777
Board filler	142,181	859	Bobbin marker	132-150	749
Board finisher	132	749	Bobbin painter	132-150	749
Board finisher	231-242	726	Bobbin presser		749
Board-hammer operator		713	Bobbin sorter	132-150	799
Board liner operator		753	Bobbin stripper	132-150	749
Board machine set-up operator		777	Bobbin trucker	100-222,231-392	859
Board member		022	Bobbin turner	241	777
Board operator	Stock exchange 710	386	Bobbin washer	180	749
Board runner	261	883	Bobbin winder	132-150	738
Board-saw runner		727	Bobbin winder	221	745
Board setter	220	889	Body-and-fender man		514
Board stacker		859	Body-and-fender worker		514
Board turner	231-242	883	Body builder	351	785
Board winder	132-150	738	Body bumper	351,590,612-622,750,751	514
Board writer	810	389	Body cleaner	351	887
Boarder	132-150	749	Body-design checker	351	217
Boardhanger, drywall		573	Body designer	351	217
Boarding children	<b>870</b>	468	Body finisher	351	709
Boarding machine operator		749	Body fitter	351	785
Boarding mother	<b>870</b>	468	Body former	290,291,300	777
Boardinghouse keeper	770	469	Body hanger	351	889
Boardman	200	777	Body joiner	352,362	785
Boardman	252	799	Body liner	352,362	785
Boardman	800	523	Body maker	290,291,300	717
Boardman	810	389	Body-maker machine setter		717
Boardmarker	710	386	Body man	352,362	785
Boat builder, wood	<b>360</b>	567	Body man	351,590,612-622,750,751	514
Boat-camp operator	<b>810</b>	456	Body masker	351	795
Boat canvas installer		674	Body press operator	351	706
Boat-canvas maker and installer		674	Body sander	351,590,612-622,750,751	759
Boat captain, fishing		497	Body shopman	351,590,612-622,750,751	514
Boat captain, exc. fishing		828	Body specialist	351,590,612-622,750,751	514
Boat carpenter	360,420	567	Body straightener	351,590,612-622,750,751	514
Boat deckhand	060,420	829	Body stylist	351	185
Boat deckhand	032,810	498	Body trimmer, upholsterer	351	688

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1. Why new work matters
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- 3. New work 'types'**
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# Categories of New Jobs



**FRONTIER JOBS**



LAST MILE WORK



WEALTH WORK



## Robotic Systems Integration Lead

Ve Robotics

Boston, MA

via Glassdoor

🕒 15 days ago 📁 Full-time



## I. Frontier Jobs Added by Decade

- Automatic welding machine operator ('40)
- Air conditioning mechanic ('40)
- Airplane designer ('50)
- Textile chemist ('60)
- Engineer, computer application ('70)
- Supervisor, word processing ('80)
- Controller, remotely-piloted vehicle ('80)
- Circuit layout designer ('90)
- Robotic machine operator ('90)
- Artificial intelligence spclst ('00)
- Programmer-analyst ('00)
- Chief information officer ('00)
- Echocardiographer ('00)
- Molecular physicist ('00)
- Technician, wind turbine ('10)
- Intelligence analyst ('10)
- Computing services director ('16)



## Integration & Test Engineer

Ve Robotics

Boston, MA

via Glassdoor

🕒 22 days ago 📁 Full-time



## Solutions Integration Engineer

RightHand Robotics

Somerville, MA

via Glassdoor

🕒 6 days ago 📁 Full-time



# Categories of New Jobs



FRONTIER JOBS



LAST MILE WORK



WEALTH WORK



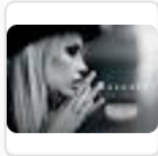
## Kids Content Tagger

Netflix

Remote, OR

via Career Square

🕒 Over 1 month ago 📁 Full-time



## Data entry/ Tagger assistant

KALLATI

North Hempstead, NY

via ZipRecruiter

🕒 Over 1 month ago 💰 \$ 12–15 an hour



## Content Tagger

Axius Technologies Inc

New York, NY

via EmployZone

🕒 Over 1 month ago 📁 Full-time



## II. Last Mile Jobs Added by Decade

- Radio adjuster ('40)
- Blueprint trimmer ('40)
- Ampoule sealer ('50)
- Bolt sorter ('50)
- Bottle labeler ('50)
- Wrapping checker ('60)
- Wiener packer ('60)
- Breakdown man, sorts items for dishwasher ('70)
- Check writer ('80)
- Tamale-machine feeder ('80)
- Vending-machine attendant ('90)
- Inspector-hand packager ('90)
- Film touch-up inspector ('90)
- Chat room host/monitor ('00)
- Bicycle messenger ('00)
- Teleprompter ('16)
- Sampler ('16)

# Categories of New Jobs



FRONTIER JOBS



LAST MILE WORK



WEALTH WORK



## Integrative Medicine Animal Rehabilitation Therapist

University of California, Davis

Los Angeles, CA

via Los Angeles CA Free Classifieds Ads...

🕒 3 days ago 📁 Full-time



## Social Worker/Therapist- Animal Therapy

Princeton HealthCare System

Hamilton, MA

via CareerBuilder

🕒 13 days ago



## Social Worker/Therapist- Animal Therapy

Princeton HealthCare System

Princeton, NJ

via Glassdoor



## III. Wealth Work Jobs Added by Decade

- Acrobatic dancer ('40)
- Gigolo ('40)
- Tattooer ('50)
- Book critic ('50)
- Pageants director ('60)
- Bowling-alley refinisher ('70)
- Hypnotherapist ('80)
- Gift wrapper ('80)
- Fingernail former ('90)
- Counselor, marriage-family ('90)
- Barista ('00)
- Horse exerciser ('00)
- Employee wellness coordinator ('00)
- Oyster preparer ('00)
- Exercise physiologist ('10)
- Golf cart mechanic ('16)
- Professional poker player ('16)



# What drives the invention of new work?



FRONTIER JOBS



LAST MILE WORK



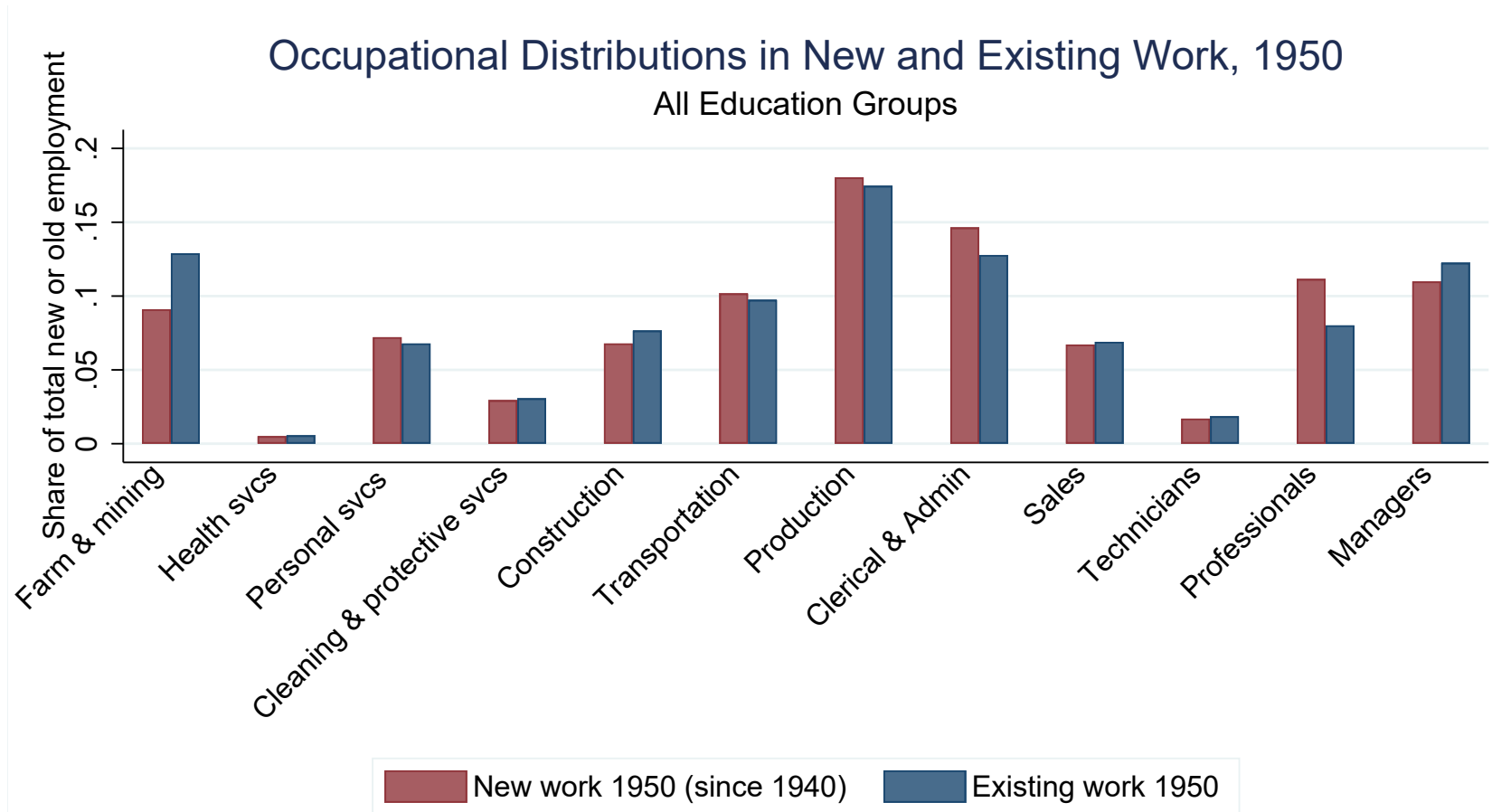
WEALTH WORK

# New Frontiers: The Evolution of New Work in the 20th Century

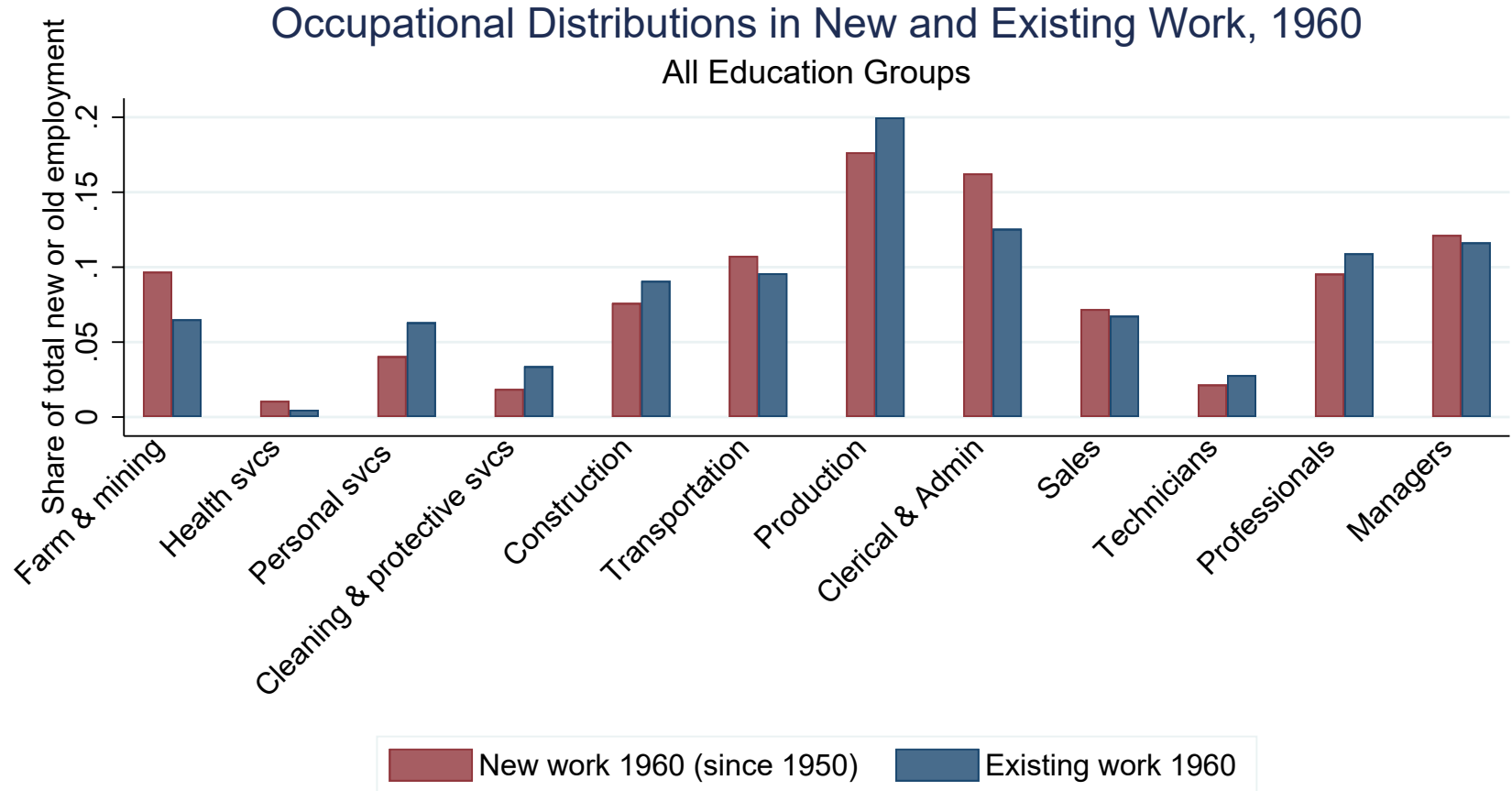
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# New work added 1940 – 50: Concentrated in the middle



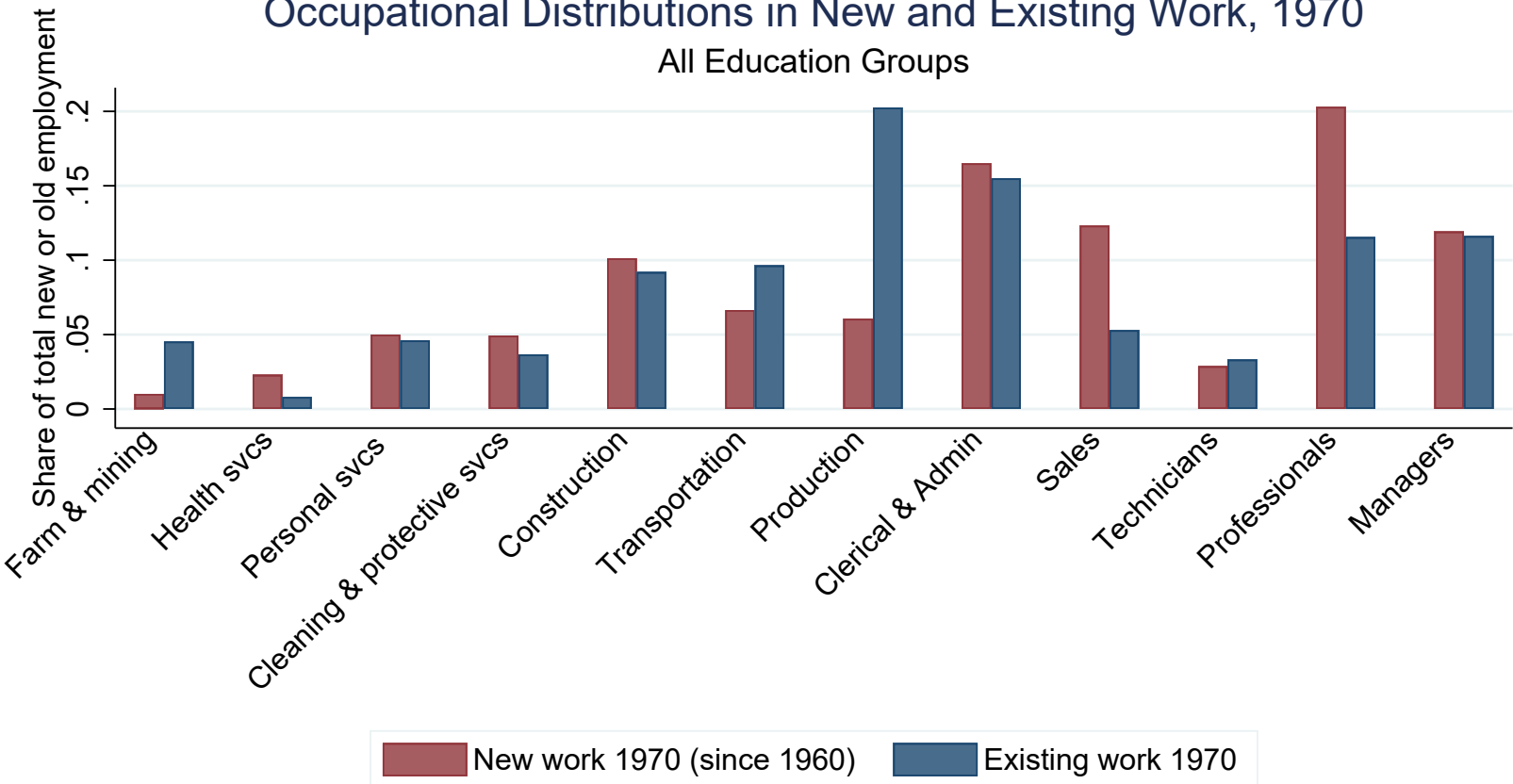
# New work added 1950 – 60: Rise of clerical & admin



# New work added 1960 – 70: Falling production, rising clerical and sales

## Occupational Distributions in New and Existing Work, 1970

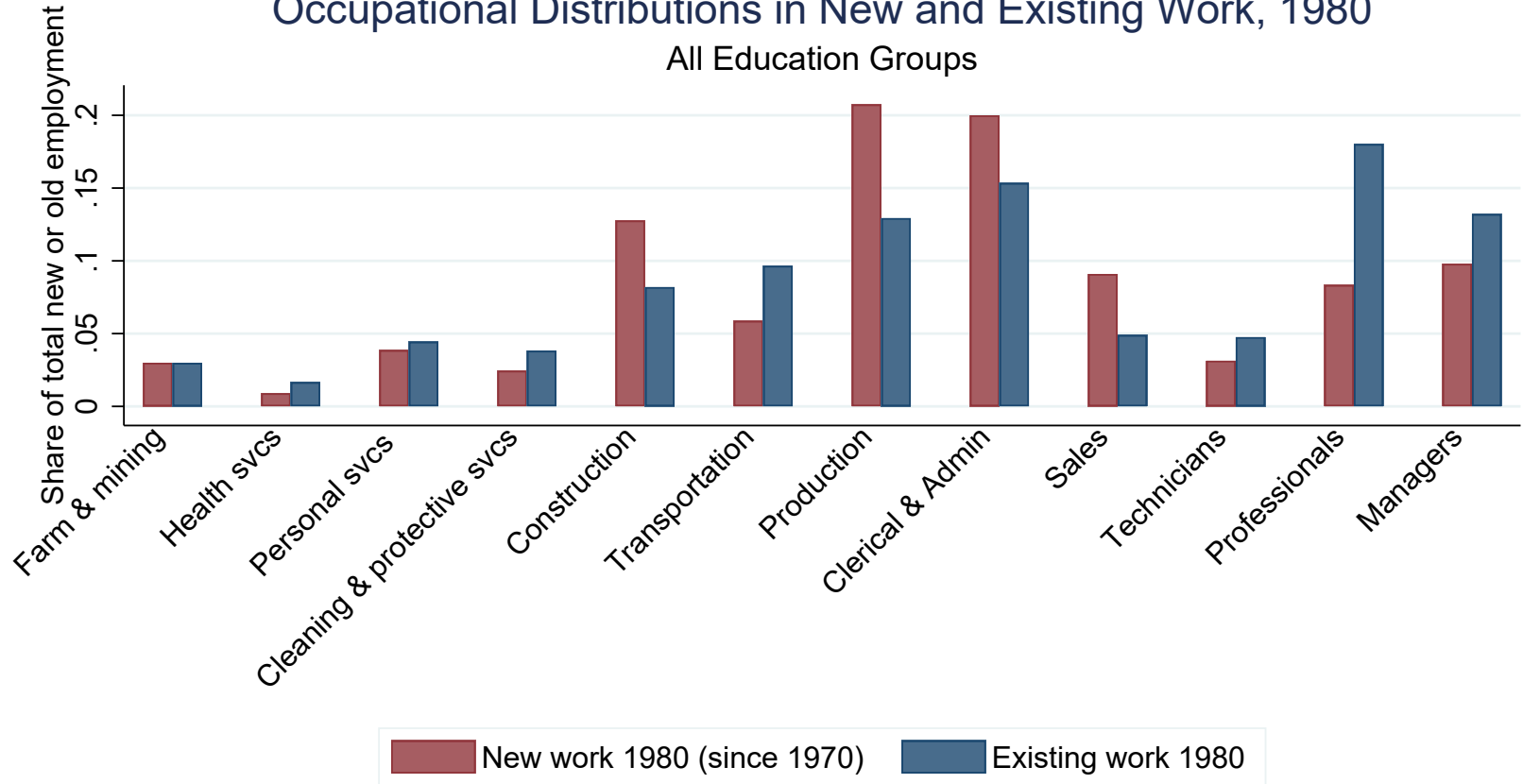
All Education Groups



# New work added 1970 – 80: Office & production work growing

## Occupational Distributions in New and Existing Work, 1980

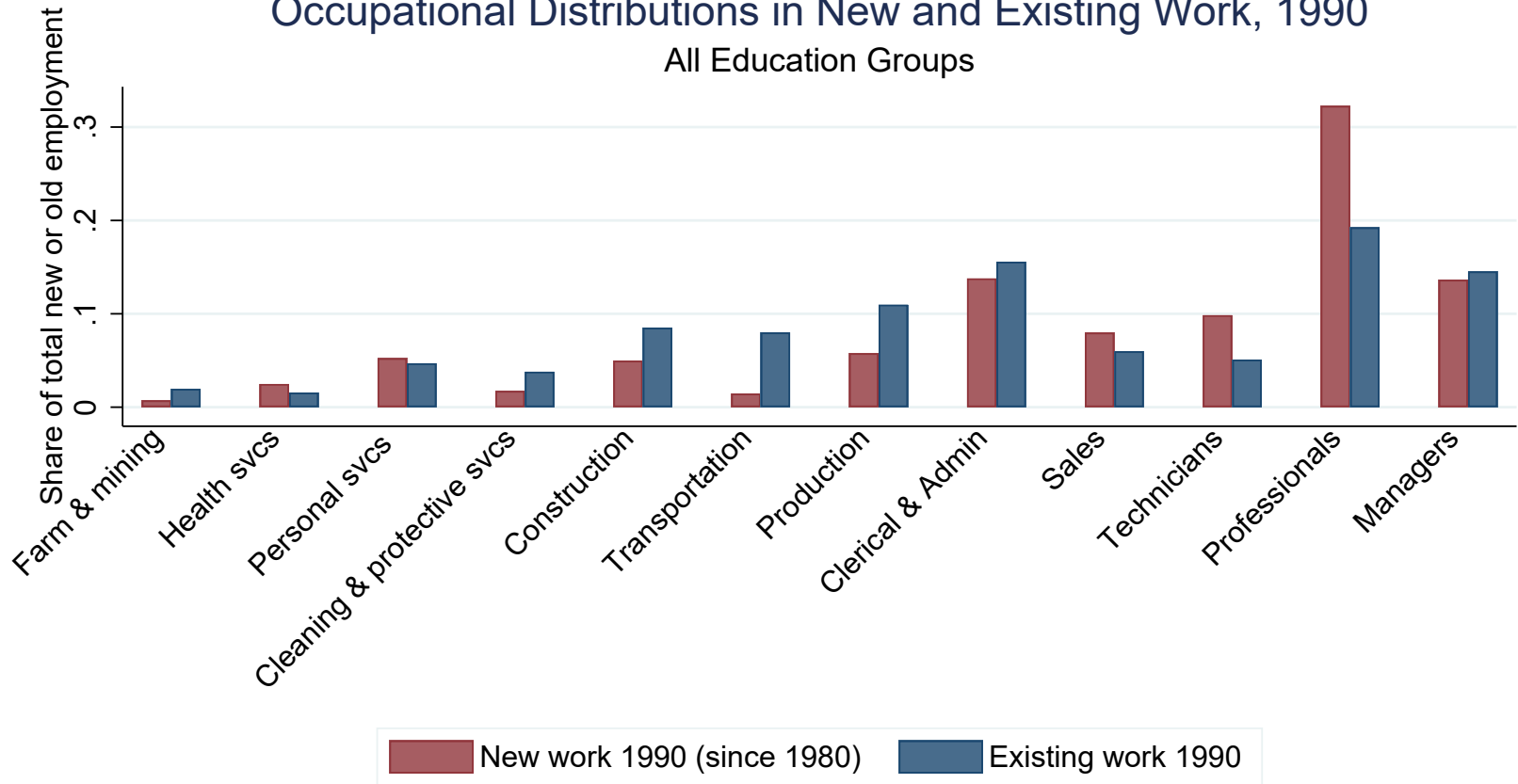
All Education Groups



# New work added 1980 – 90: Professionals & personal services growing

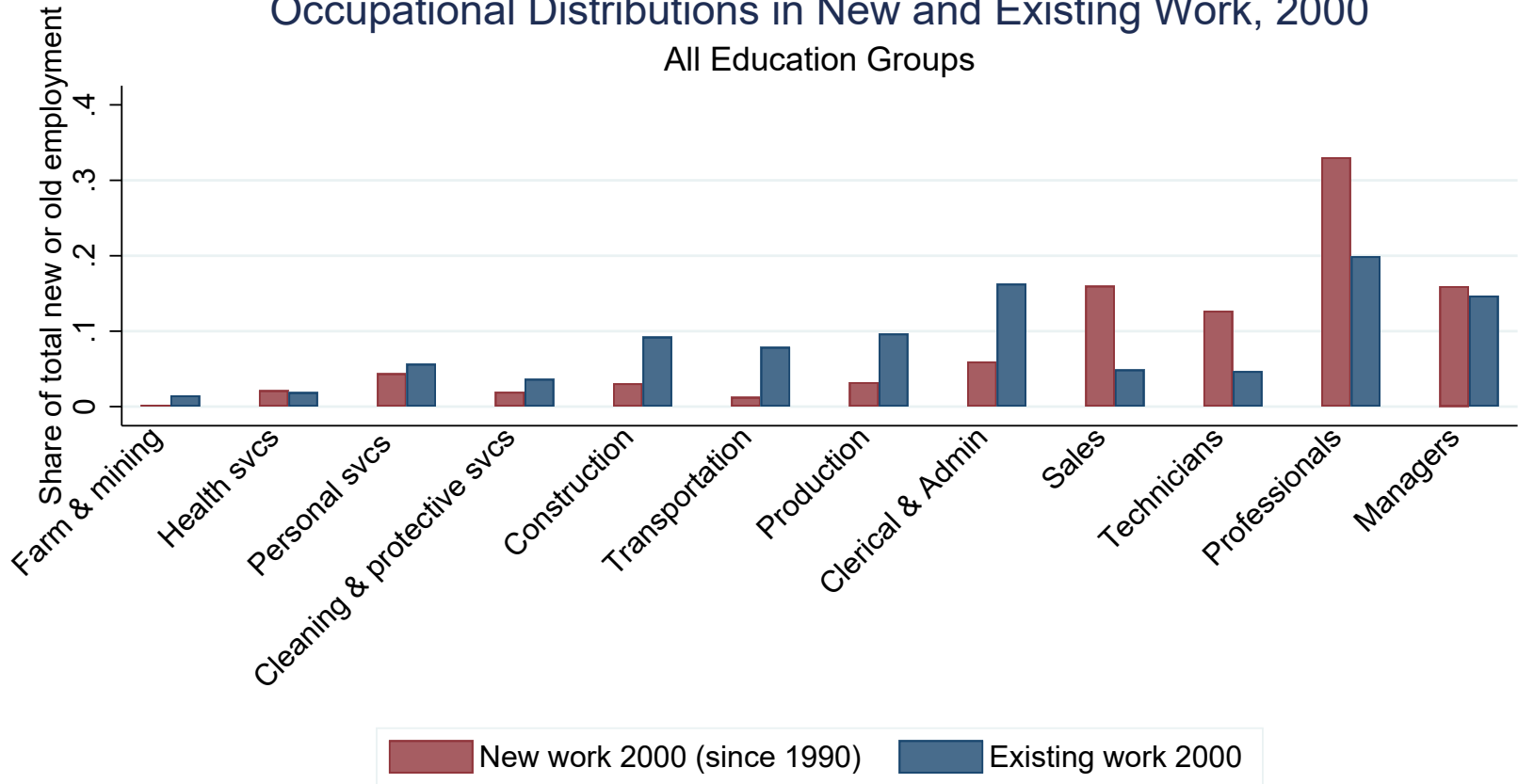
## Occupational Distributions in New and Existing Work, 1990

All Education Groups



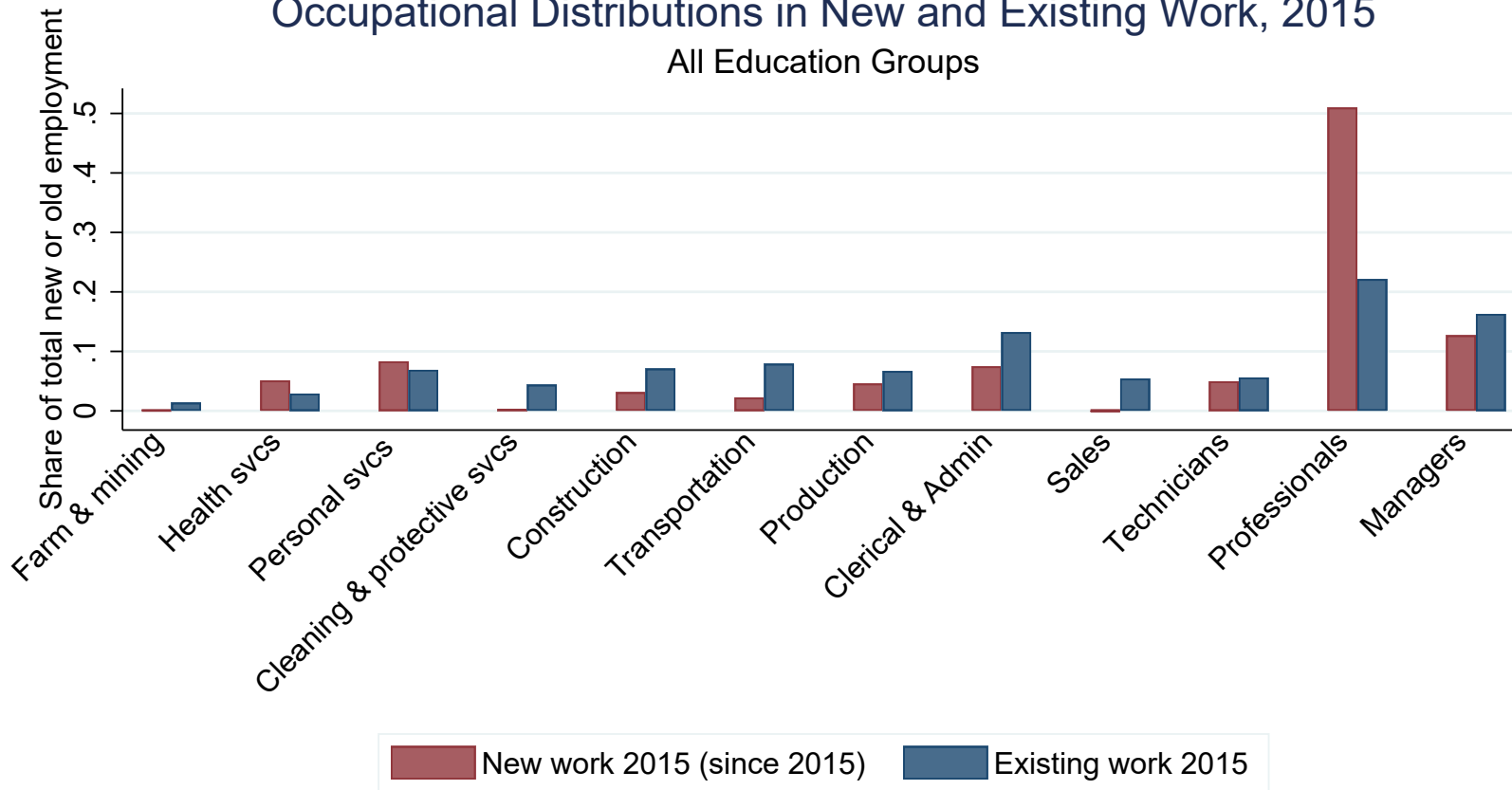
# New work added 1990 – 2000: Rise of technical and professional work, clerical falling

Occupational Distributions in New and Existing Work, 2000  
All Education Groups



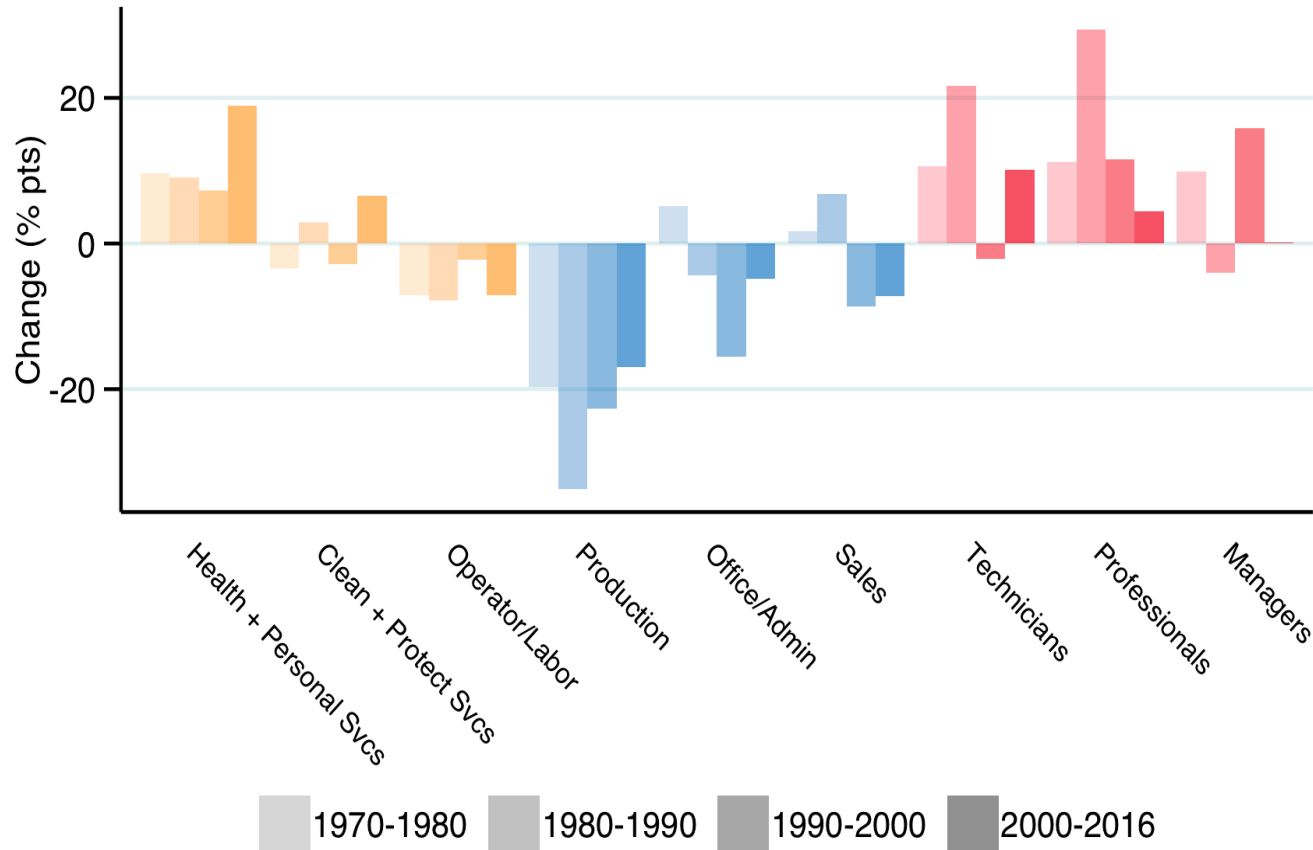
# New work added 2000 – 2015: Growing professional, health, and personal services

## Occupational Distributions in New and Existing Work, 2015 All Education Groups



# Changes in Occupational Employment Shares, 1970-2016

Working Age Adults (Percent Change Over Decade)



## Key Observation: Polarization of Work

### High skill jobs

- **Rising** employment in professional, technical and managerial work

### Low skill jobs

- **Rising** employment in personal services — Cleaning, security, recreation, health aides

### Mid skill jobs

- **Falling** employment in production work, office/clerical, and sales



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New work by education: After 1980, non-college share in new work falls faster than non-college share in old work (or all work)

Share of Non-College Workers in New and Old Work



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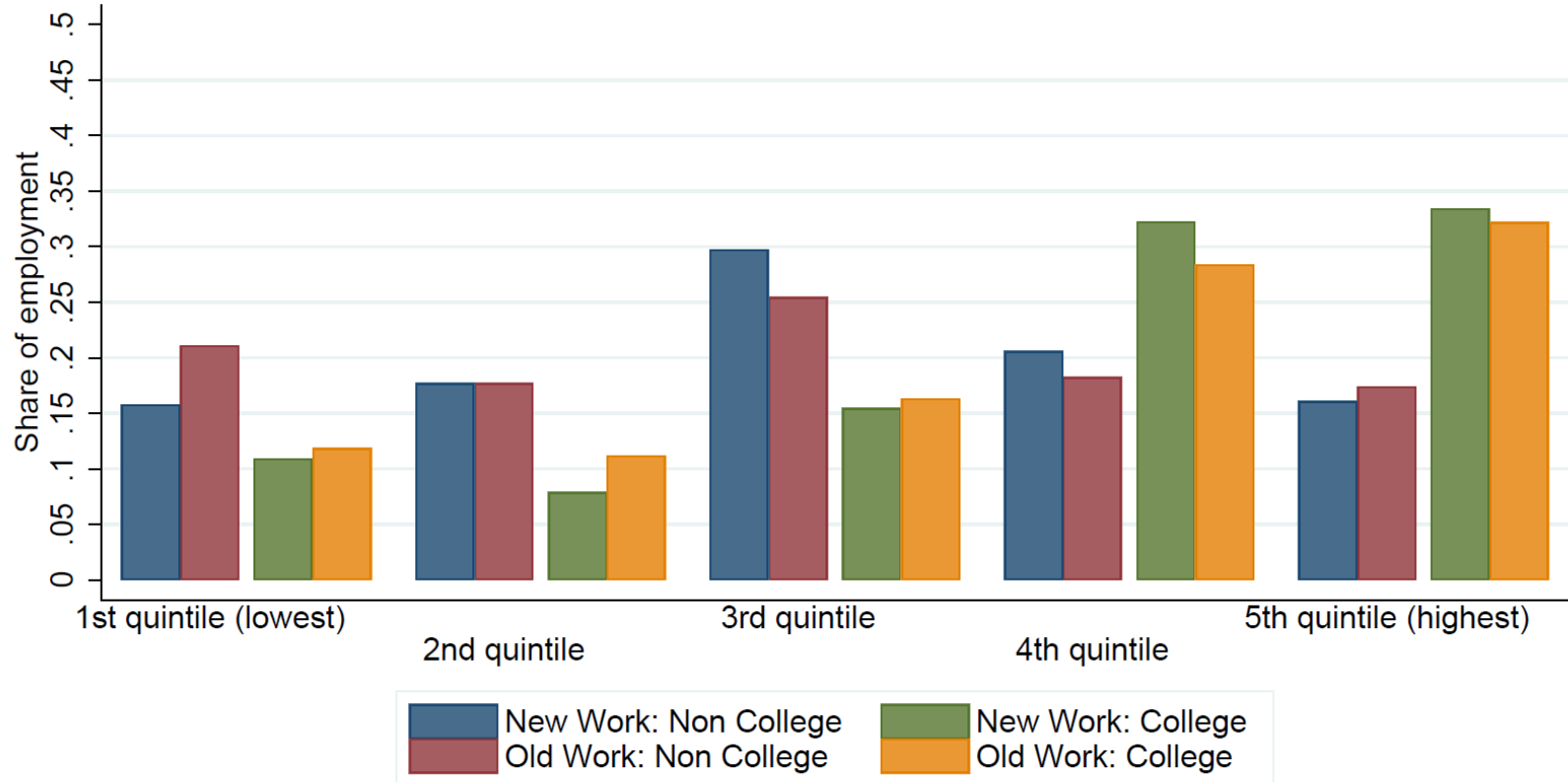
# New work added 1940 – 2015: After 1990, above average wage

## Mean Log Wage in New and Old Work



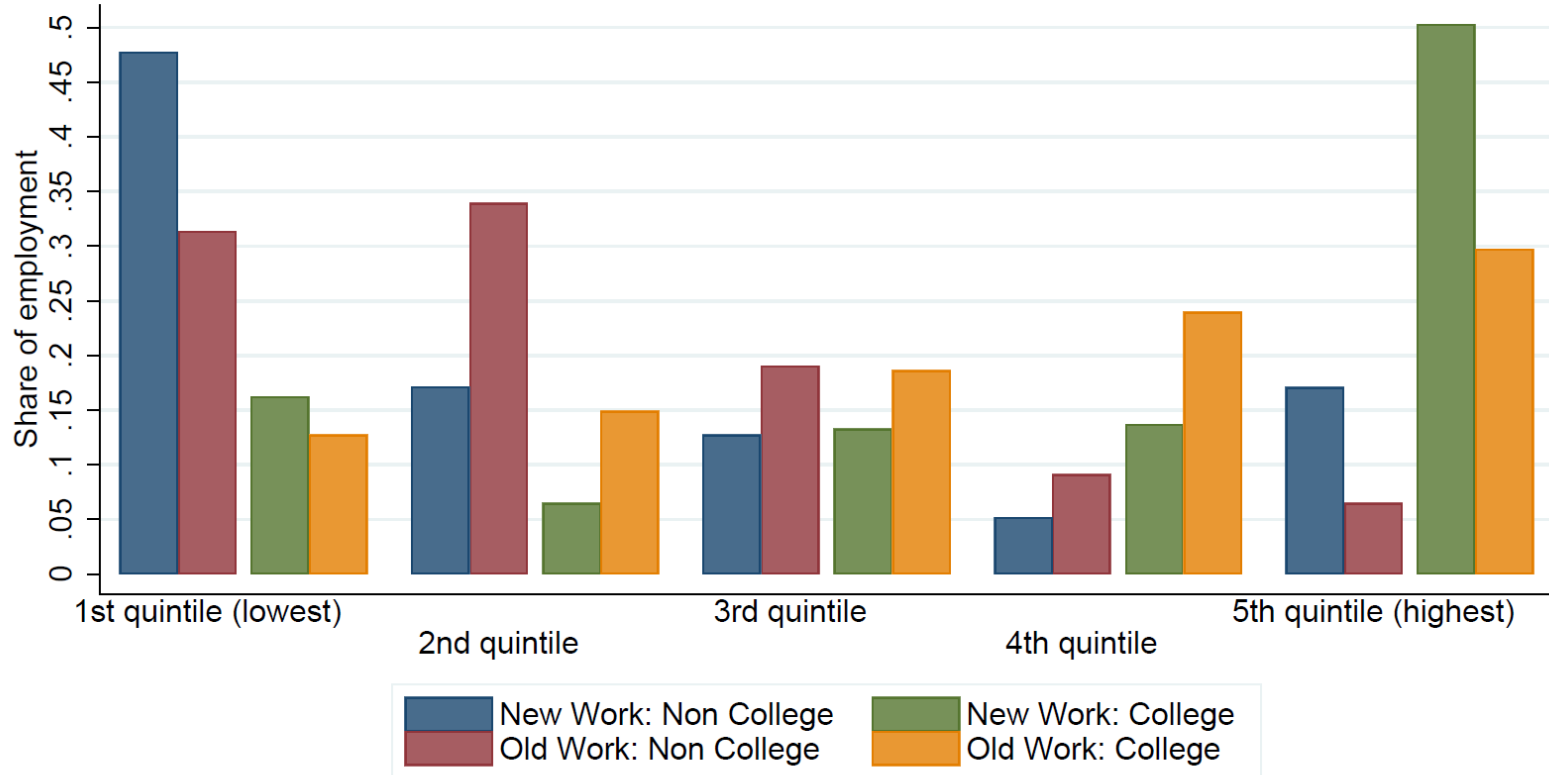
# Wage distribution in new work 1950: College & non-college workers

New and Old Work Prevalence by Wage Quintile, 1950



# Wage distribution in new work 2015: College & non-college workers

## New and Old Work Prevalence by Wage Quintile, 2015



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## Concluding observations

- **Locus of new work has changed substantially**, as measured by occupation, education, wage
- **Evolution of new work matches overall change in skill demands**
  - Concentrated in blue-collar and office work in post-War decades
  - Concentrated in technical and professional and svcs from 80s onward
- **Question for audience:**
  - How are the AI technologies you are developing and/or implementing leading to new work; and how are they impacting the locus of new work?



# Acknowledgments

- The U.S. Census Bureau: Social, Economic and Housing Statistics Division
- Rebecca Jackson (MIT) and Pepe Morales (MIT) for work on the 1940 Census Complete Count data
- Fiona Chen (MIT), Liam Miller (MIT), Edwin Song (MIT), Sunny Tan (Duke), & Whitney Zhang (MIT) for helping to implement new title identification rules
- Sammy Mark, Fredrick Soo, & Mary Wakarindy from Digital Divide Data for digitizing Hathitrust CAIO volumes 1910-1990