# Explaining the Decline in the U.S. Employment-to-Population Ratio: A Review of the Evidence

**Melissa S. Kearney**
**University of Maryland and NBER**

**Katharine G. Abraham**
**University of Maryland, IZA and NBER**

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# Goals of the project

***What does the evidence tell us about the causes of the 1999-2016 decline in the U.S. employment-to-population ratio?***

**Overall E/POP for adults age 16+ fell from 64.3% in 1999 to 59.7% in 2016 (4.5 pp. decline)**

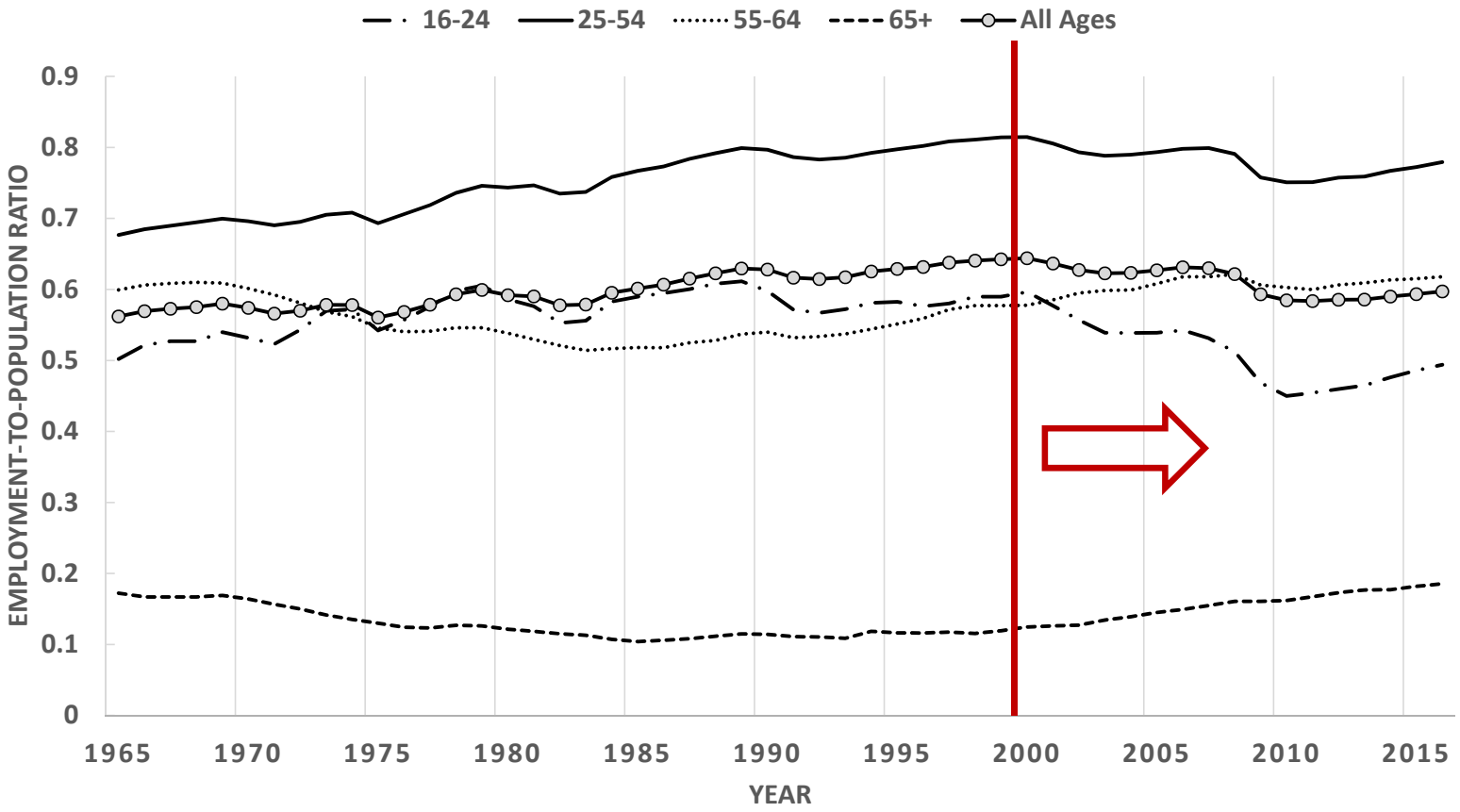
1. Document demographic and group-specific trends for this period
   - Decompose into demographic shifts and within group declines

2. Consider broad set of potential explanatory factors for within-group declines
   - Focus on longer-term decline, not cyclical effects of the Great Recession

**In reviewing evidence about different factors, ask ourselves:**

1. What is causal link between factor and employment?
2. Might changes in this factor have led to lower employment during the period?

# Employment-to-Population Ratio by Age, 1965-2016



| | TOTAL | | MALE | | FEMALE | |
|---|---|---|---|---|---|---|
| | **$E/P_{1999}$** | **$\Delta E/P_{99\text{-}16}$** | **$E/P_{1999}$** | **$\Delta E/P_{99\text{-}16}$** | **$E/P_{1999}$** | **$\Delta E/P_{99\text{-}16}$** |
| *Age 16-24* | 0.590 | -0.096 | 0.610 | -0.110 | 0.570 | -0.082 |
| *Age 25-54* | 0.814 | -0.035 | 0.890 | -0.040 | 0.741 | -0.030 |
| *Age 55+* | 0.310 | 0.076 | 0.385 | 0.060 | 0.249 | 0.086 |
| | | | | | | |
| *Age 16-24* | | | | | | |
| *Not In School* | 0.726 | -0.046 | 0.778 | -0.072 | 0.672 | -0.021 |
| *In School* | 0.443 | -0.116 | 0.424 | -0.121 | 0.461 | -0.111 |
| *Age 25-54* | | | | | | |
| *Less than HS* | 0.639 | -0.030 | 0.769 | -0.027 | 0.502 | -0.046 |
| *HS* | 0.796 | -0.071 | 0.878 | -0.075 | 0.718 | -0.086 |
| *Some College* | 0.838 | -0.051 | 0.903 | -0.049 | 0.781 | -0.052 |
| *College* | 0.882 | -0.024 | 0.941 | -0.021 | 0.822 | -0.017 |
| *Age 55+* | | | | | | |
| *Less than HS* | 0.171 | 0.047 | 0.236 | 0.053 | 0.120 | 0.035 |
| *HS* | 0.301 | 0.033 | 0.380 | 0.026 | 0.250 | 0.027 |
| *Some College* | 0.364 | 0.048 | 0.426 | 0.032 | 0.315 | 0.061 |
| *College* | 0.464 | 0.024 | 0.516 | 0.013 | 0.395 | 0.051 |
| | | | | | | |
| *TOTAL* | **0.643** | **-0.045** | **0.716** | **-0.059** | **0.574** | **-0.033** |

# (A Simple) Decomposition

***What are the contributions of changes in within-group employment rates versus changes in population shares to the overall E/POP decline?***

$$\Delta(E/P)_{t_0,t_1} = \sum_i s_{i,t_0}\,\Delta(E/P)_{i,t_0,t_1} + \sum_i (E/P)_{i,t_0}\,\Delta s_{i,t_0,t_1} + \sum_i \Delta s_{i,t_0,t_1}\,\Delta(E/P)_{i,t_0,t_1}$$

- We define groups over sex *x* age group OR sex *x* age group *x* education group
- Age groups used for decomposition are 16-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, and 75+ years
- Education groups are in/out of school (under age 25) OR <HS, HS Graduate, Some College, College Graduate (age 25 and older)

# (A Simple) Decomposition by Sex and Age: Results

| | |
|---|---|
| Changes in population shares | 3.1 pp decline |
| Employment declines among those age 16-54 | 3.7 pp decline |
| Employment increases among those age 55 plus | 1.3 pp increase |
| Interaction terms | 0.9 pp increase |
| Total | 4.5 pp decline |

# (A Simple) Decomposition by Sex/Age/Education: Results

| | |
|---|---|
| Changes in population shares | 2.1 pp decline |
| Employment declines among those age 16-54 | 4.1 pp decline |
| 16-24 year olds in school | 1.0 pp decline |
| 25-54 year olds with high school or some college | 2.0 pp decline |
| Employment increases among those age 55 plus | 0.7 pp increase |
| Interaction terms | 1.0 pp increase |
| Total | 4.5 pp decline |

# Potential causes of within-group E/POP declines

1. <u>Shifts in labor demand</u>

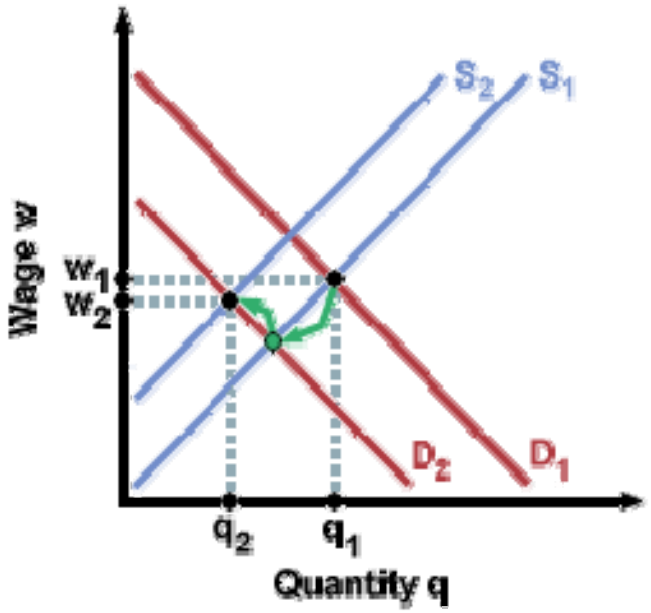
(e.g., imports, robots, technology)

2. <u>Shifts in labor supply</u>

(e.g., disability insurance, safety net, child care, opioids, leisure time)

3. <u>Institutional factors and labor market frictions</u>

(e.g., minimum wage, occupational licensing, mismatch, incarceration)



# Our approach to quantifying effects

- Critically assess literature that attempts to estimate causal relationship between factor and employment
  - Select parameter estimate
- Obtain data on how factor changed over 1999 to 2016 period
- Apply causal estimate from literature to (imperfect) data on changes in factor => rough estimate of how many people not working in 2016 because of change in factor

*Caveats:*

- Most estimates are partial equilibrium (have to extrapolate micro to macro)
- Interactions between factors ignored (context surely matters)

# Summarizing the evidence (1 of 3)

| *Factors* | *Estimated reduction in E/Pop (pp)* |
|---|---|
| Major contributing factor | |
| *Growth in imports from China* | 1.04 |
| *Adoption of industrial robots* | 0.55 |
| | |
| Significant contributing factor | |
| *Increased receipt of disability benefits (SSDI, VDC)* | (0.14+0.06)=.20 |
| *Increased rate of incarceration* | .13 |
| *Higher minimum wages* | .05 |

Total explained ~ 2 pp

# Summarizing the evidence (2 of 3)

| *Factors* | Estimated reduction in E/POP (pp.) |
|---|---|
| *Insignificant factors* | |
| *SNAP expansions* | ~0 |
| *Public health insurance expansions* | ~0 |
| *More generous EITC* | ~0 |
| *Increased rates of spousal employment* | ~0 |
| *Increased difficulties due to lack of family leave* | ~0 |
| *Immigration* | ~0 |

# Summarizing the evidence (3 of 3)

| *Factors* | Estimated reduction in E/POP (pp.) |
|---|---|
| *Indeterminate given state of evidence* | |
| *Increased difficulties due to lack of child care* | unclear |
| *Rise in occupational licensing* | unclear |
| *Increases in skill mismatch* | unclear |
| *Increases in geographic mismatch/declining mobility* | unclear |
| *Changes in leisure options/social norms* | unclear |
| *Opioid addiction* | unclear |

# Growth in imports from China

- From 1999 to 2011 Chinese imports valued in 2007 US dollars increased by 270%; over this period, employment in US manufacturing fell from 17.3M to 12.3M.
- Considerable evidence links manufacturing employment declines to China

- *Key estimate*: Acemoglu, Autor, Dorn, Hanson and Price (2016):

  From 1999 to 2011 Chinese imports valued in 2007 US dollars increased by 270%; associated with decline of 2.37 million workers

*Our extrapolation:*

- From 1999 to 2016, value of Chinese imports increased by 302%
- Approximation: (302/270)*2.37 => 2.65 million workers
- Adding those workers to 2016 workforce would raise E/POP by 1.04 pp

# Adoption of industrial robots

**"automatically controlled, reprogrammable, and multipurpose"**

- Stock of robots in US and Western Europe increased fourfold between 1993 and 2007
- One new robot per 1000 US workers
- Available evidence suggests notable effects of industrial robots on manufacturing employment; in contrast, little dis-employment due to computerization (albeit wage effects)
- *Key estimate*: Acemoglu and Restrepo (2017)

  Structurally adjusting for trade (assumption based): 0.34 pp reduction (5.6 workers per robot)

*Our extrapolation:*

- From IFR data, estimate that 250,475 robots installed in the United States as of 2016; apply AR (2017) estimate of 5.6 workers displaced per robot => 1.403M workers
- Adding these workers to 2016 workforce would raise E/POP by 0.55 pp.

# Increased receipt of SSDI

- Share of population on SSDI rose 1999-2016 for every five-year age category from 30-34 through 55-59.
- Many well-identified papers find negative employment effects

*Key estimate*: Maestes, Mullen, and Strand (2013)

> Benefit receipt lowers participation rate for marginal SSDI recipients (~23% of applicants) by 28 pp on average; effect ranges from 10 pp for those aged 60-64 to 37 pp for those aged 30-39

*Our extrapolation:*

- SSA data: SSDI caseload grew by 3.93M recipients between 1999 and 2016, from 4.88M to 8.81M; almost all growth occurred at age 45 and above
- Estimate excess SSDI caseload in 2016 within each five-year age bin, by comparing *actual* caseload to *projected* caseload with actual population changes but share of age group receiving benefits at 1999 level.
- Summing over age groups =>1.64M more people on SSDI at end of 2016 than would have occurred just from population growth and aging (19% of 2016 caseload).
- Apply age-group specific employment elasticities from MMS (2013) to excess caseload by age group => 360,869 additional workers.
- Adding these workers to 2016 workforce would raise E/POP by 0.14 pp.

# Increased receipt of Veterans Disability Compensation

- Veterans Disability Compensation (VDC) pays benefits to individuals with medical conditions resulting from military service; amount based on a determination of the severity of the impairment.
- Since 2001, VDC program has grown rapidly, due in part to liberalization of medical criteria. From 2000 to 2013, after having been stable for decades, share of veterans receiving VDC increased from 9% to 18%.

*Key estimate*: Autor, Duggan, Greenberg and Lyle (2016)

Estimate that expanded access to benefits from a policy change reduced eligible veterans' participation by 18 pp

*Our (very rough) extrapolation*:

- VA reports 4.36M VDC benefit recipients in 2016, compared to 2.3M in 1999.
- Estimate excess VDC caseload in 2016 as actual growth minus growth holding recipiency rates within broad age groups constant; apply Autor et al (2016) estimate of 18 pp reduction to excess VDC caseload age 35-54; assume half that for younger and older => rough estimate of 145,990 fewer workers over this period.
- Adding these workers to 2016 workforce would raise E/POP by 0.06 pp

# Increased rate of incarceration

- Dramatic growth: In 1980, 220 per 100,000 incarcerated; by 2012, 710 per 100,000 incarcerated.
- Attributable mostly to policy changes, i.e., mandatory sentencing
- (Note: Adding incarcerated to E/POP denominator would make decline even larger.)
- Incarceration not only takes individuals out of work force, but potentially harms post-release employment prospects.

*Key estimates*: Mueller-Smith (2015). Effect identified using random assignment of criminal defendants in Harris County, TX to courtrooms with different judges and prosecutors

- Significant prior earnings, 2-plus-year prison term: 39 pp reduction in p(employment)
- Significant prior earnings, 1-year prison term: 24 pp reduction
- Low prior earnings, 2-plus-year prison term : 11 pp reduction
- Low prior earnings, 1-year prison term: 9 pp reduction

# Increased rate of incarceration: Estimated E/POP decline

*Our (very uncertain) extrapolation*:

- Limitation: No public dataset tracks formerly incarcerated
- Bucknor and Barber (2016) estimate number of adults with prior prison time using BJS data on number of people of each age released each year 1968 thru 2014; adjust for recidivism and mortality.
  - Estimate 6.1-6.9M former prisoners age 18-64 as of 2014
  - We use midpoint of 6.5M in our calculation
- Use 2014 data from NLSY97 (sample age 30-34) to gauge time served
  - Suggests ~7% of this age group had been in prison; 43% for 2+ years, 27% for 1-2 years.
- Based loosely on observed trends, we assume 60% of those formerly incarcerated as of 2016 had served time in prison because of policy changes => 1.7M "excess" prisoners with 2+ year prison term; 1.0M with 1-2 year terms
- Further assume (based on Mueller-Smith sample) that 18% would have had significant earnings pre-prison and 58% would have had low earnings pre-prison
- Apply those estimates to estimated effects from Mueller Smith (4 groups) => loss of 324,000 workers.
- Adding these workers to 2016 workforce would raise E/POP by 0.13 pp.

# Often asserted, but more research needed

**Occupational licensing**

- Plausible that growth in occupational licensing (~5% in 1950s, ~30% today) hindered employment over this period, but no compelling evidence (yet)

**Child care**

- Evidence shows female employment responsive to price of child care; need more data on whether it has become more difficult to access high quality, affordable child care

**Skill mismatch**

- CEOs often complain that workforce lacks needed skills, but data to establish whether this is a widespread problem are lacking

**Geographic mismatch and worker mobility**

- Mobility clearly has fallen, but less clear whether and how this has affected employment rates

# Provocative ideas, evidence not yet clear

## Improved video game technology versus changing social norms

- Improved video game technology (Aguiar, Bils, Charles, and Hurst, 2017), young men spending more time gaming
- Young out-of-work men living with relatives
- But, hard to separate from cohort changes in norms –*how to document?*

## Role of opioid addiction/prescriptions

- Krueger (2017) shows increased rates of reported pain among those out of workforce; assuming increased opioid use is cause not effect of declining employment, can explain upper bound of 20% of decline in LFPR
- Currie, Jin and Schnell (2018) find increased prescription rates result in increased female employment; no decline in male employment.

# Summary

- Within-group declines in employment among those age 16-54 have had a larger effect on overall E/POP than aging of the population from 1999-2016

- Major factors: Imports from China and adoption of robots
- Significant, but less important: Disability insurance, veterans disability compensation, increasing incarceration, and to a lesser extent inc min wages
- Not significant as drivers of decline: Expanded safety net programs (other than disability insurance); immigration

- Need more evidence: Occupational licensing; child care access and affordability; skill mismatch; geographic mismatch; changing social norms; and opioid addiction