

Wage Inequality and the Rise in Labor Force Exit: The Case of US Prime-Age Men

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American men were working less and less

- Between 1980 and 2019, US prime-age (25-54) male labor force participation rate (LFPR) dropped from 94% to 89%

Background

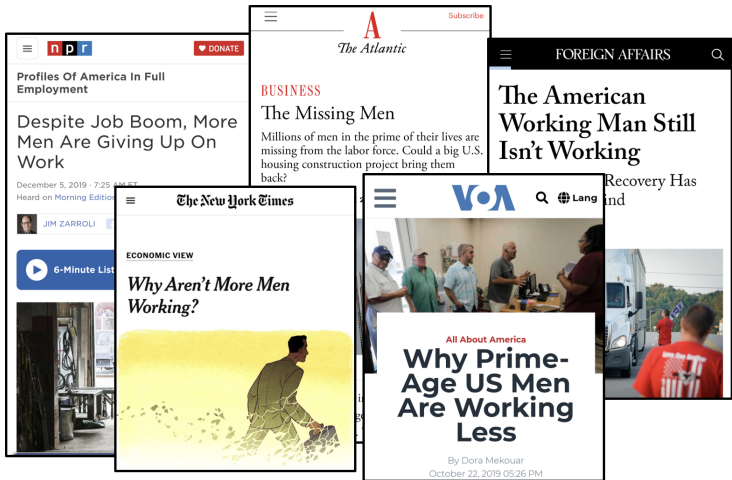


Figure 1

American men were working less and less

- Between 1980 and 2019, US prime-age (25-54) male labor force participation rate (LFPR) dropped from 94% to 89%
- Driven by **more frequent labor force exit among non-college men**

▶ More

Puzzle in literature

- Traditional neoclassical explanation [▶ Lit Review](#)
- Wage trends during this period
 - Stagnant real earnings [▶ figure](#)
 - Falling [relative earnings](#)

Research question

- Are non-college men more likely to leave the labor force when their **relative earnings** fall?

Non-college men's falling **relative earnings**

- *Relative earnings* = $\frac{\text{A worker group's median earnings}}{\text{Average earnings across all prime-age workers}}$
- Unequal earnings growth
 - Non-college men's relative earnings fallen by 30% on average

Trends in Relative Earnings

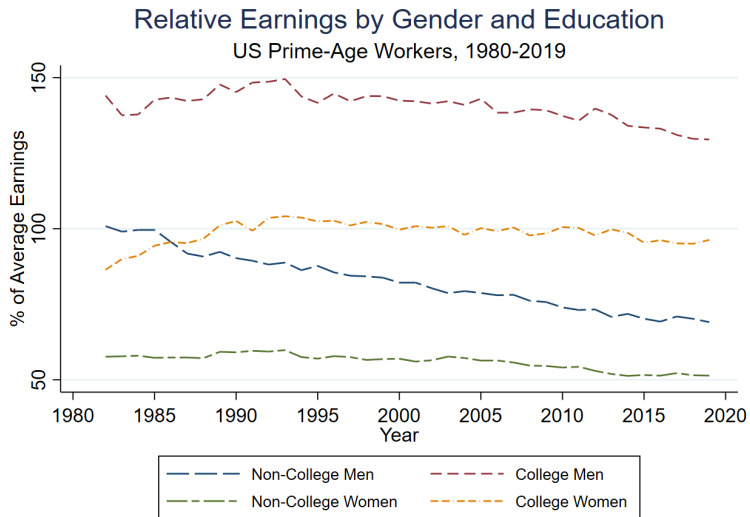


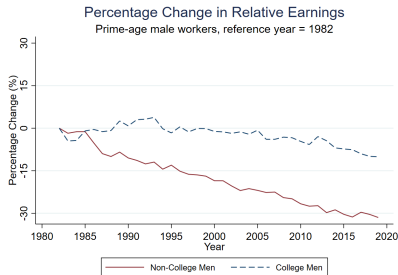
Figure 2: Relative Earnings by Education and Gender (Source: IPUMS-CPS, 1982-2019)

Low relative earnings

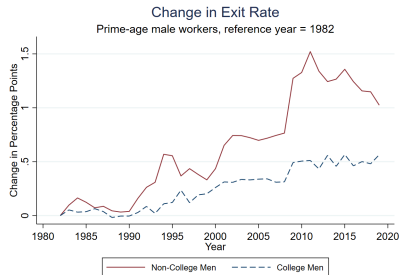
- Decrease job satisfaction, productivity, and labor supply in lab setting [Card et al. 2012, Breza et al. 2018, Bracha et al. 2015]
- Correlated with worse health/subjective well-being, lower marriage rate, and higher mortality [Marmot 2006, Luttmer 2005, Solnick and Hemenway 1998, Daly et al. 2013, Eibner and Evans 2005, Watson and McLanahan 2011]
- Reduce labor force participation incentives?

Relative Earnings and Exit Rate Showed Inverse Trends

Example 1: Non-college men vs. College men



(a)

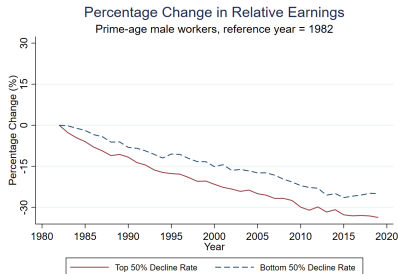


(b)

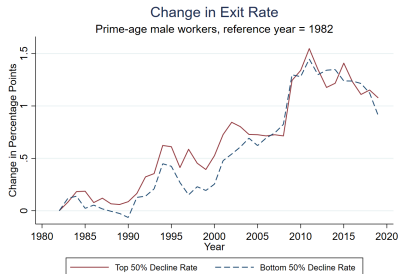
Figure 3: Change in earnings and exit rate, 1982-2019
Prime-age men by college status
(Source: IPUMS-CPS, 1982-2019)

Relative Earnings and Exit Rate Showed Inverse Trends

Example 2: States with higher decline rate vs. lower decline rate



(a)

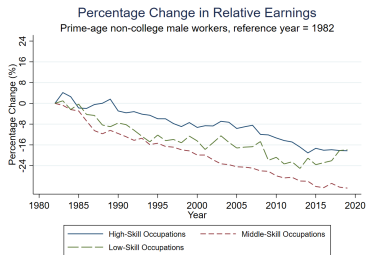


(b)

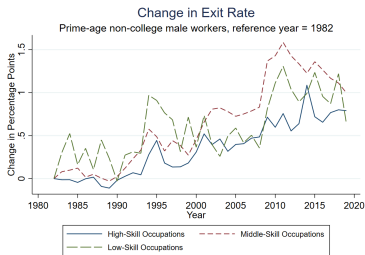
Figure 4: Change in earnings and exit rate, 1982-2019
Prime-age non-college men by state
(Source: IPUMS-CPS, 1982-2019)

Relative Earnings and Exit Rate Showed Inverse Trends

Example 3: High, middle, and low-skill occupations



(a)



(b)

Figure 5: Change in earnings and exit rate, 1982-2019
Non-college men by occupation (Source: IPUMS-CPS, 1982-2019)

- Observed patterns influenced by changes in job loss risks/job-finding rates, selection, etc.

- **Model**

- Reduced-form difference-in-differences

- **Data** [▶ details](#)

- State×occupation level panel data
- IPUMS-CPS, matched monthly data, non-college men
- 1982-2019, in five-year periods

- **Estimation**

- OLS and 2SLS

A model of exit choice

- Workers born to fixed location n and occupation z in period t
- Choose whether to exit the labor force
- Choice depends on expected earnings from participation
= Employment rate $E_{n,z,t}$ \times Earnings from own occupation $\omega_{n,z,t}$

- Workers discount expected earnings by reference earnings $\tilde{\omega}_{n,t}$
 - Expected utility = function of $E_{n,z,t} \times \omega_{n,z,t} \times \tilde{\omega}_{n,t}^{(-\gamma)}$
 - When discount factor $\gamma \rightarrow 0$, workers evaluate real earnings only
 - When discount factor $\gamma \rightarrow 1$, workers evaluate relative earnings

Baseline Model

$$\begin{aligned}\text{Exit Rate}_{n,z,t} &= \alpha - \beta \ln \frac{\omega_{n,z,t}}{\tilde{\omega}_{n,t}^\gamma} + \delta \ln E_{n,z,t} + \lambda_{n,z} + \theta_n t + \mu_t + \epsilon_{n,z,t} \\ &= \alpha - \beta \ln \omega_{n,z,t} + \beta \gamma \ln \tilde{\omega}_{n,t} + \delta \ln E_{n,z,t} + \lambda_{n,z} + \theta_n t + \mu_t + \epsilon_{n,z,t}\end{aligned}\quad (1)$$

z : occupation; n : state; E : employment rate;
 ω : earnings; $\tilde{\omega}$: reference earnings; γ : discount factor
 λ : state-occupation FE; $\theta_n t$: state time trend; μ_t : time FE

Concern 1: Job vacancies correlated with $\omega_{n,z,t}$ and $\tilde{\omega}_{n,t}$

- Demand change affects both earnings and vacancies
- Examples: ($\omega_{n,z,t} \downarrow$, vacancies \downarrow), ($\tilde{\omega}_{n,t} \uparrow$, vacancies \downarrow)
- May create bias *away from zero* for both coefficients

Concern 1: Job vacancies correlated with $\omega_{n,z,t}$ and $\tilde{\omega}_{n,t}$

Strategies:

- Besides employment rate, model controls for job displacement rate and employment-to-unemployment transition rate
- Additional test on biases from unobservables [Oster 2019, Altonji 2005]
- Controls on other confounding factors

Concern 2: Unobserved labor supply shocks or selection

- Examples: (labor supply \downarrow , $\omega_{n,z,t} \uparrow$), (exit rate \uparrow , $\omega_{n,z,t} \uparrow$)
- May create bias *towards zero* for coefficient of $\omega_{n,z,t}$ and $\tilde{\omega}_{n,t}$

Concern 2: Unobserved labor supply shocks or selection

Strategies:

- Supplement OLS result with 2SLS estimates
 - IV 1: State minimum wages \times occupation dummies
 - Relevance (-), exclusion restriction (+) [▶ more](#)
 - IV 2: Median occupation earnings across other states
 - Relevance (+), exclusion restriction (-)
 - **Purpose:** Demonstrate that the OLS result represents a *lower-bound* estimate of the relationship between relative earnings and exit rates

Estimation: Main Results

Table 1: Relative Earnings and Labor Force Exit Rate: 1982-2019, Non-College Men
Dependent variable: labor force exit rate (in % pts)

	(1)	(2)	(3)
In Earnings	-1.69*** (0.18)	-3.56*** (0.44)	-3.18*** (0.22)
In Reference Earnings	2.21*** (0.42)	3.63*** (0.61)	3.34*** (0.52)
Occupation-State Fixed Effects	✓	✓	✓
Time Fixed Effects	✓	✓	✓
State-Year Controls	✓	✓	✓
State Time Trend	✓	✓	✓
Occupation-State-Year Controls	✓	✓	✓
Specification Type	OLS	2SLS	2SLS
IV for Earnings	-	Min. Wages	US Median
Wage Equality Discount factor $\hat{\gamma}$	1.31	1.02	1.05
Within R^2	0.66	0.64	0.65
Kleibergen-Paap Wald 1st Stage F Statistic	-	20.15	715.88
Observations	2856	2856	2856

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. The results are weighted by the sum of the CPS weights for the individuals in each cell. Standard errors are clustered at the state level. See Appendix ?? for the full estimation result.

- OLS gives a more conservative estimate
- Both methods suggest workers put equal weights on real and reference earnings
 - Discount factor $\gamma \approx 1$: workers evaluate relative earnings instead of just real earnings
 - Correlation is not driven by unobserved changes in job vacancies according to Oster (2019) test [▶ table](#)

- Back-of-the-envelope calculation
 - 65% of the exit rate increase during the study period accounted for by decline in relative earnings
- Limitations

- No statistical difference across demographics [▶ table](#)
 - Weaker relationship observed among African-American men
- Results hold across alternative earnings measures
 - Highlight: Exit increases with both the level and the skewness of state earnings distribution [▶ table](#)
- Results hold for both absolute and relative changes in exit rate [▶ table](#)

- Offers a plausible explanation for the consistent decline in prime-age men's labor force participation post-1990s
- Relative earnings carry macroeconomic implications beyond individual workers' well-being

- Finding suggests decline in wage equality may have played a crucial role in prime-age men's participation decline
- Policy implications

Appendix

Demand-side explanation: Participation declines when real wages fall

- Accounts for the decline in participation among less-skilled men between 1970 and 1989 [Juhn et al. 1991]
- Cannot accounts for the consistent decline since the 1990s when non-college men's real earnings mostly stagnated [Juhn et al. 2002, Binder and Bound 2019]

Supply-side explanation: Limited explanatory power

- Increase in Social Security Disability Insurance (SSDI) recipients accounts for less than 10% of the decline [CEA 2016, Binder and Bound 2019]
- Men's participation was not substituted by their spouse's participation either [Tüzemen 2018]
- Mass incarceration and criminal convictions [Holzer et. al 2006, Pager 2007, Raphael 2014, Mueller-Smith 2015, Binder and Bound 2019]
- The rise of *In-and-Outs* [Coglianese 2018]

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Participation decline driven by growth in labor force exit rate

- $\Delta LFPR$ depends on the labor force [exit rate](#) and [entry rate](#)
 - Entry rate remained a stable decreasing function of the time elapsed since a worker exited the labor force [▶ graph](#)
 - Contrarily, exit rate grew over 70 percent between 1980 and 2019
 - [80% of the exit rate growth from non-college men](#) [▶ table](#)

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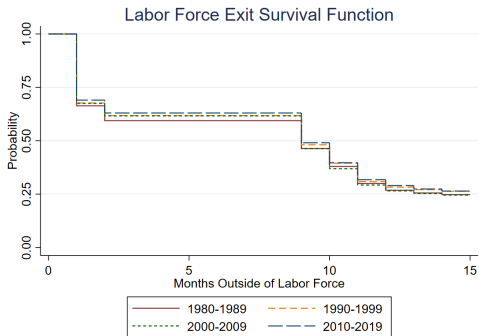


Figure 6: Probability Staying Outside of the Labor Force since Exit Event
 US Prime-Age Male Workers
 (Source: IPUMS-CPS, 1980-2019)

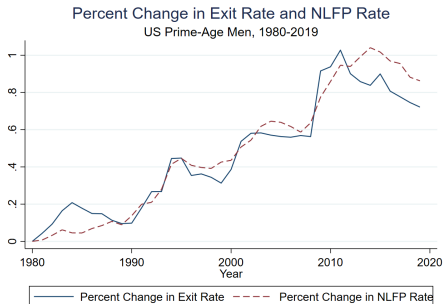


Figure 7

Table 2: Counterfactual Exercise: Δ Prime-Age Male Exit Rate

	1982	2019
Non-college Labor share, π^{nc}	73.4%	61.5%
College Labor Share, π^c	26.6%	35.5%
Non-college Exit Rate, ε^{nc}	1.4%	2.4%
College Exit Rate, ε^c	0.7%	1.2%
ΔPrime-age Male Exit Rate		
$(\pi_{19}^{nc} \times \varepsilon_{82}^{nc} + \pi_{19}^c \times \varepsilon_{19}^c) - (\pi_{82}^{nc} \times \varepsilon_{82}^{nc} + \pi_{82}^c \times \varepsilon_{82}^c)$		
Actual		0.7%
Counterfactual		
ε^{nc} fixed at 1982 level		0.1%
ε^c fixed at 1982 level		0.5%

[◀ return](#)

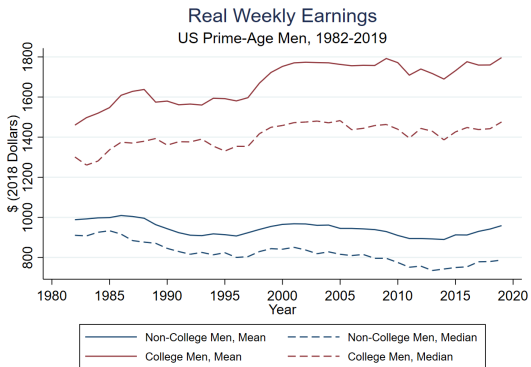


Figure 8: [← return](#)

Data Sources

● IPUMS-CPS

- IPUMS-CPS Basic Monthly: Exit Rate, Employment Rate, Emp-to-Unemp Transition Rate
- IPUMS-CPS Earner Study: $\omega_{n,z,t}$ & $\tilde{\omega}_{n,t}$
- IPUMS-CPS Displaced Worker Supplement: Displacement Rate
- IPUMS-CPS ASEC: Non-Work Income

● Other sources

- Federal Housing Finance Agency, University of Kentucky Center for Poverty Research National Welfare Data Series, US Department of Agriculture, Department of Health and Human Services, Department of Labor

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Minimum Wages as Instrumental Variable

- Minimum wages affect earnings for low-earners
- Exclusion restriction:
 - Existing literature: Employment effect of minimum wages concentrated on teenagers and young adults (16-24)
 - Present study: Minimum wages have no significant employment effect on US non-college prime-age men

Table 3

	Outcome: Employment-to-Population Ratio $\times 100$ (Five-Year Average)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
In Minimum Wage (5-year Average)	-0.38 (0.89)	-0.20 (0.82)	0.45 (0.33)	0.89 (0.92)	1.06 (1.21)	0.18 (1.68)	0.43 (0.68)
State-year controls	✓	✓	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Observations	408	408	408	408	408	408	408
R^2	0.86	0.82	0.79	0.95	0.83	0.95	0.87
Occupation	Mgmt & Bus	Engr & Sci	Healthcare	Services	Sales & Admin	Blue-Collar	Others

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$.

Table 4: 2SLS First Stage Estimates
Dependent variable: In Earnings

Occupation	Mgmt & Bus	Engr & Sci	Healthcare	Services	Sales & Admin	Blue-Collar	Others
In Minimum Wage	-5.45*** (1.06)	-6.10*** (1.73)	-6.39** (2.18)	-2.64 (1.45)	4.93*** (1.31)	2.98*** (0.71)	-1.68 (1.66)
In Minimum Wage ²	1.30*** (0.25)	1.49*** (0.41)	1.56** (0.52)	0.68 (0.35)	-1.24*** (0.31)	-0.71*** (0.17)	0.35 (0.40)

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. Other than the instrumental variables, the first-stage regression includes all the independent variables in equation ??.

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Table 5: Relative Earnings and Labor Force Exit: Selection on Unobservables
Dependent variable: labor force exit rate (in % pts)

Oster (2019) Test Statistics	
In Earnings	
β^*	-1.62
δ	6.87
In Reference Earnings	
β^*	1.89
δ	6.22

Note: R^2 upper bound set at 0.87. The value reflects the share of variation accounted for by the model and the equilibrium occupation employment share.

Robustness Test: Result by Demographics

Table 6: Relative Earnings and Labor Force Exit Rate, 1982-2019, Non-College Men: By Demographic Characteristics
Dependent variable: labor force exit rate (in % pts)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In Earnings	-1.39*** (0.26)	-1.22** (0.39)	-1.00* (0.43)	-1.67*** (0.29)	-1.36*** (0.26)	-0.99*** (0.17)	-1.86*** (0.31)	-0.85*** (0.20)
In Reference Earnings	2.44*** (0.47)	0.15 (2.16)	1.73 (1.36)	2.94** (0.93)	1.93** (0.72)	1.66 (1.03)	2.88** (0.95)	1.51** (0.49)
Occupation-State Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Time Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
State-Year Controls	✓	✓	✓	✓	✓	✓	✓	✓
State Time Trend	✓	✓	✓	✓	✓	✓	✓	✓
Occupation-State-Year Controls	✓	✓	✓	✓	✓	✓	✓	✓
Demographics	White	Black	Hispanic	25-34	35-44	45-54	Single	Married
Specification Type	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Within R^2	0.57	0.27	0.18	0.54	0.40	0.34	0.33	0.44
Observations	2852	2324	2246	2852	2835	2801	2833	2853

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. The results are weighted by the sum of the CPS weights for the individuals in each cell. Standard errors are clustered at the state level.

◀ return

Robustness Test: Alternative Reference Earnings

Table 7: Relative Earnings and Labor Force Exit Rate, 1982-2019, Non-College Men: Alternative Reference Earnings

Dependent variable: labor force exit rate (in % pts) [← return](#)

	(1)
In Earnings	-1.73*** (0.18)
Mean of In State Earnings	2.59*** (0.50)
S.D. of In State Earnings	1.77* (0.89)
Occupation-State Fixed Effects	✓
Time Fixed Effects	✓
State-Year Controls	✓
State Time Trend	✓
Occupation-State-Year Controls	✓
Specification Type	OLS
Within R^2	0.67
Observations	2856

Robustness Test: Alternative Reference Groups

Table 8: Relative Earnings and Labor Force Exit Rate, 1982-2019, Non-College Men: Alternative Reference Groups

Dependent variable: labor force exit rate (in % pts) [← return](#)

	(1)	(2)	(3)
In Earnings	-1.66*** (0.18)	-1.70*** (0.18)	-1.63*** (0.18)
In Reference Earnings	1.73*** (0.35)	1.87*** (0.56)	1.98*** (0.45)
Occupation-State Fixed Effects	✓	✓	✓
Time Fixed Effects	✓	✓	✓
State-Year Controls	✓	✓	✓
State Time Trend	✓	✓	✓
Occupation-State-Year Controls	✓	✓	✓
Reference Group	Men	Non-College Men	Women
Specification Type	OLS	OLS	OLS
Within R^2	0.66	0.66	0.66
Observations	2856	2856	2856

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. The results are weighted by the sum of the CPS weights for the individuals in each cell and standard errors are clustered at the state level.

Robustness Test: Alternative Earnings Measurement

Table 9: Relative Earnings and Labor Force Exit Rate, 1982-2019, Non-College Men: Alternative Earnings Measures

Dependent variable: labor force exit rate (in % pts) [return](#)

	(1)	(2)
In Earnings	-1.51*** (0.20)	-0.88*** (0.12)
In Reference Earnings	2.03*** (0.43)	1.47*** (0.40)
Occupation-State Fixed Effects	✓	✓
Time Fixed Effects	✓	✓
State-Year Controls	✓	✓
State Time Trend	✓	✓
Occupation-State-Year Controls	✓	✓
Earnings Specification Type	P25 Occ. Earnings OLS	P10 Occ. Earnings OLS
Within R^2	0.66	0.66
Observations	2856	2856

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$. The results are weighted by the sum of the CPS weights for the individuals in each cell and standard errors are clustered at the state level.

Robustness Test: Log Exit Rate as Outcome Variable

Table 10: Relative Earnings and Log Labor Force Exit Rate, 1982-2019, Non-College Men
Dependent variable: *log labor force exit rate* [← return](#)

	(1)
In Earnings	-0.75*** (0.12)
In Reference Earnings	1.34*** (0.29)
Occupation-State Fixed Effects	✓
Time Fixed Effects	✓
State-Year Controls	✓
State Time Trend	✓
Occupation-State-Year Controls	✓
Specification Type	OLS
Within R^2	0.61
Observations	2737

* for $P < 0.05$, ** for $P < 0.01$, *** for $P < 0.001$.
Observations with zero exit rate are dropped from the main sample. The results are weighted by the sum of the CPS weights for the individuals in each cell and standard errors are clustered at the state

Why do workers leave labor force when relative earnings fall?

- Discouraged [Krause & Sawhill 2017]
- Exit for schooling and up-skilling opportunities
- Change in marriage market return [Binder 2020]
- Worse health [Daly et al. 2013, Eibner and Evans 2005, Marmot 2006]