Unlucky Cohorts: Income, Health Insurance and AIDS Mortality of Recession Graduates.

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Motivation

- Recent studies show that graduating in a recession causes strong and persistent income losses.

- My paper asks whether these income losses affect subsequent health.

- The positive relationship of income and health is well established but the endogeneity of income makes it difficult to identify the direction of causality.

- Persistent income losses of recession graduates provide the opportunity to investigate long-term effects on health which might gradually accumulating over time.
Question: Do local recessions at the time when a cohort is of age 18 affect mortality in the subsequent 15 years?

- Vital Statistics mortality data: All deaths, for more than two decades, including state identifiers.

- Age 18 as a proxy for graduation age: Focus on high school graduates. CPS to show that proxy works.

- 1979-2004 includes outbreak of AIDS epidemic. Young adults died in large numbers, with higher death rates among the poor.
Preview of findings

Income

- 3%, fading out over 10+ years
- Results similar for actual graduation year and age 18 proxy → Proxy works.

Mortality

- Relatively strong positive effects during outbreak of AIDS epidemic (cumulative +2.9 per 10,000), mostly AIDS deaths.
- Smaller effects in extended period (+1.1 per 10,000), both on AIDS and non-AIDS deaths.

Potential mechanism: Health insurance

- 1 pp. private health insurance coverage
- +0.5 pp. Medicaid coverage, fading out over 5-10 years
Economic conditions at graduation and income

- Beaudry and DiNardo (1991); Kahn (2009); Oreopoulos, von Wachter and Heisz (2012); Hagedorn and Manovskii (2013)

Economic conditions and subsequent health

- Coile, Levine and McKnight (2012); Sullivan and von Wachter (2009)

Economic conditions and contemporaneous health

- Ruhm (2000); Miller et al. (2009); Stevens et al. (2011); Dehejia and Lleras-Muney (2004)
Outline

1. Data
2. Empirical Strategy
3. Effects on Mortality
4. Mechanisms
Data

- **Socio-economic outcomes: CPS**
  - State of residence
  - Graduation year: Birth year + 6 + years of educ, until 1991

- **Mortality: Vital Stats**
  - State of birth, 1979-2004
  - Graduation year: Birth year + 18
  - Supplemented with Census population estimates

- **Unemployment rates: Annual, state-level, since 1976**

  ⇒ Sample period: 1979-1991 (baseline), 1979-2004 (extended)
Identifying assumption: Graduation unemployment rate orthogonal to determinants of socioeconomic outcomes and mortality

- Graduation timing: actual graduation year (CPS) endogenous, but not year of birth (VS)

- Graduation state: state of residence affected (CPS) by endogenous migration, but not state of birth (VS)

- Confounders at the state, year, cohort level: controlled by fixed effects
Empirical specification

- Actual graduation year (following OWH):

\[ Y_{g,s,t} = \beta_e u_{g,s}^G + \gamma_e + \delta_g + \theta_t + \lambda_s + \epsilon_{g,s,t} \]

- \( u_{g,s}^G \): U-rate in state \( s \) at graduation year \( g \)
- \( \beta_e \): Separate coefficient for each year of pot. work experience \( e \)
Empirical specification

- Actual graduation year (following OWH):

\[ Y_{g,s,t} = \beta_e u_{g,s}^G + \gamma_e + \delta_g + \theta_t + \lambda_s + \epsilon_{g,s,t} \]

- \( u_{g,s}^G \): U-rate in state \( s \) at graduation year \( g \)
- \( \beta_e \): Separate coefficient for each year of pot. work experience \( e \)

- Age 18 as graduation year:

\[ Y_{c,s,t} = \beta_a u_{c,s}^{18} + \gamma_a + \delta_c + \theta_t + \lambda_s + \epsilon_{c,s,t} \]

- \( u_{c,s}^{18} \): U-rate in state \( s \) in year \( c + 18 \)
- \( \beta_a \): Separate coefficient for each year of age \( a \)
Effect of graduation unemployment rate on log real annual earnings

Years since Graduation

Effect on log earnings

CPS: Income

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Effect of graduation unemployment rate on log real annual earnings

Oreopoulos, von Wachter, Heisz (2012), Fig. 4
Canadian college graduates
Effect of graduation / age 18 unemployment rate on log real annual earnings

(a) Actual grad. year u-rate
CPS 1979-1991

(b) Age 18 u-rate
CPS 1979-1991

(c) Age 18 u-rate
CPS 1979 - 2004

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Effect of age 18 unemployment rate on log real annual earnings

Male

Female

White

Non-white
Mortality regressions

\[ H_{c,s,t} = \beta_a u_{c,s}^{18} + \gamma_a + \delta_c + \theta_t + \lambda_s + \epsilon_{c,s,t} \]

- \( H_{c,s,t} \): Death rate per 10,000 population

- \( u_{c,s}^{18} \): U-rate in state \( s \) in year \( c + 18 \)

- \( \beta_a \): Separate coefficient for each year of age \( a \)
Mortality over the life-cycle

U.S. Age-Specific Mortality Rates per 1000 in 1990, by Cause

Overall deaths  Disease related  Violent deaths

Age
Racial gaps in disease-related mortality

Disease-related Mortality per 1,000 in 1990, by Race and Cause

- Heart-related, Whites
- Heart-related, Nonwhites
- AIDS, Whites
- AIDS, Nonwhites

- Death rate per 1,000
- Age

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Racial gaps in AIDS mortality

Fraction of Deaths due to AIDS over Time, by Race and Cohorts

White

Non-white

0 0.1 0.2 0.3 0.4 0 0.1 0.2 0.3 0.4
Year

Fraction of Deaths due to AIDS over Time, by Race and Cohorts


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Effect of age 18 unemployment rate on death rate per 10,000
1979-1991

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Effect of age 18 unemployment rate on cause-specific death rate per 10,000
1979-1991

Disease-related deaths

Violent deaths

Effect of age 18 unemployment rate on cause-specific death rate per 10,000
1979-1991

- Disease-related deaths
- Violent deaths
- AIDS deaths
- Disease-related deaths, excl. AIDS
Effect of age 18 unemployment rate on cause-specific death rate per 10,000
1979-2004

Disease-related deaths

Violent deaths

Age

Death rate per 10,000
Effect of age 18 unemployment rate on cause-specific death rate per 10,000
1979-2004

- Disease-related deaths
- Violent deaths
- AIDS deaths
- Disease-related deaths, excl. AIDS
AIDS vs. non-AIDS deaths, 1979-2004

Effect of age 18 unemployment rate on cause-specific death rate per 10,000
1979-2004

Disease-related deaths

Violent deaths

AIDS deaths

Disease-related deaths, excl. AIDS

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Disease-related deaths excl. AIDS, by Gender and Race

Disease-related deaths excl. AIDS

Male

Female

White

Non-white
How big are these effects?

Recession (5 pp. u-rate increase) effect on disease-related deaths:

- Cumulative deaths per 10,000.
  - 1979-2004: 5.58

- Cumulative deaths per U.S. 1982 birth cohort.
  - 1979-1991: 5,920
  - 1979-2004: 2,250

- Effect on life expectation (year 2000 estimate).
  - 1979-1991: 76.84 → 76.77 (25.21 days)
  - 1979-2004: 76.84 → 76.81 (10.22 days)
Benchmark estimates

- **Ruhm/Miller/Stevens**: contemporaneous effect at age 18-34
  - 1pp increase: -451 deaths age 18-24; -200 deaths age 25-34
  → 5pp increase: 3,755 fewer deaths

- **Coile, Levine, McKnight (2012)**: Recession effects on elderly
  - Recession has strongest effect when hitting at age 58
  - Effect on survival at age 79: -4.5 per 10,000
  → 5pp increase at age 58: 22.5 cumulative deaths per 10,000
Possible mechanisms

- Health insurance
- Health care utilization
- Health behavior, in particular those leading to higher infection rates (marital status as proxy for number of sex partners?)
- Nutrition
Conclusion

- Recession graduates do not only have lower incomes but also higher mortality, in particular during the outbreak of a deadly epidemic.

- Findings are in line with positive income effect on the health of young adults.

- Health insurance is a plausible channel but more research needed to explore further mechanisms.

- Next steps: Adding more years of mortality and unemployment rate data; other data sources (e.g. NHIS, BRFSS).
APPENDIX
Effect of age 18 unemployment rate on probability of being MARRIED

(a) Male

(b) Female

(c) White

(d) Non-white
Appendix: Health insurance coverage, with CIs

Male

Female

White

Non-white

Effect on HI coverage

Any private HI (1988-2004)


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Appendix: Racial gaps in mortality due to violent deaths

Violent deaths per 1,000 in 1990, by Race and Cause

- Suicide
- Homicide
- Vehicle accident
- Other accident

Death rate per 1,000

Graphs show the death rate per 1,000 for Whites and Non-whites across different age groups for suicide, homicide, vehicle accident, and other accident categories.
Appendix: Deaths over time, by cohort
Appendix: Violent deaths, by cause

Effect of age 18 u-rate on violent deaths per 10,000, by cause
1979-2004

Suicides

Homicides

Vehicle accidents

Other accidents
Appendix: AIDS deaths, by Gender and Race

AIDS deaths

Male

Female

White

Non-white

Death rate per 10,000

Age

Death rate per 10,000

Age
Appendix: Violent deaths, by gender and race

Effect of age 18 u-rate on violent deaths per 10,000, by gender and race

Male

Female

White

Non-white

Death rate per 10,000

Age