The COVID Vulnerable Workforce and the Recovery

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Health affects how an individual experiences a pandemic.

For those with a set of prior underlying chronic conditions:

1. The health consequences of contracting the virus are more severe.
2. The health risk of work outside the home is higher which can elevate income risk.
3. Their disability application is more likely to be awarded.

... and they are many: 18% of the U.S. Labor force.

Research Question

How will the COVID vulnerable workforce respond to the pandemic and how will their response affect aggregate outcomes?

Theory

- Health affects labor supply via dis-utility of work and SSDI option.
- Multi-sector model with work from home capability provides alternative to SSDI.

Quantitative

- Identify vulnerable individuals in the data.
- Calibrate to match cross-sectional participation prior to pandemic.
- Simulate lots of scenarios for the pandemic because ???

Main Results

Aggregate Participation

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Policy (preliminary)

- UI extensions greatly reduce DI enrollment at great cost.
- Nuanced budget implications over different pandemic lengths.
  - ▶ DI wait times more important than marginal UI extension

The COVID Vulnerable Workforce

Who is Vulnerable?

Higher risk of death or serious illness id'ed by CDC

- Chronic lung disease or severe asthma
- Chronic kidney, liver, or serious heart disease
- Diabetes of any type
- Severe obesity (BMI >40)
- Immunocompromised

Robustness:

- Follow-up studies of CDC confirm higher risk of death & severe illness
- Not statistically different from using conditions from Williamson et al. (2020) study of 24 million English patients.

Characteristics of COVID Vulnerable

2017 National Health Interview Survey, 19,890 persons age 18-65.

- 21.4% (20.7-22.1) have a condition that makes them vulnerable
- Make up 18.1% of the labor force.

	Vulnerable	Non-Vulnerable
In the Labor Force	66.3%	82.2%
Employed	63.2%	80.0%
Unemployed	3.1%	2.2%
Not in the Labor Force	33.7%	17.8%
Disabled	18.4%	3.5%
Retired	6.4%	3.2%
Student	1.9%	4.8%
Other	7.0%	6.4%

COVID Vulnerable are more Economically Vulnerable

	COVID Vulnerable	Non- Vulnerable
No College Degree	54.4	48.5
College Degree	45.5	51.6
$ 0-35,000	27.6	19.5
$ 35,000-100,000	45.4	42.8
$ 100,000+	27.1	37.8
Male	44.8	50.4
Female	55.2	49.6
White	62.4	61.8
Black	14.8	12.0
Asian	3.8	6.7
Hispanic	19.0	19.6
Live Alone	39.2	29.3

COVID Vulnerable have similar work arrangements to Non-Vulnerable

Follow Mongey, Pilossoph, Weinberg (2020) to classify occupations if more than 50% report a characteristic.

- Can work from home: 36.3%.
- High contact: 50.5%

Neither is statistically different from non-vulnerable.

Summary

The COVID vulnerable are:

- a sizeable part of the labor force
- closer to exiting the labor force
  - ▶ already participate less and go on DI more
  - ▶ are economically disadvantaged
  - ▶ aren't disproportionably sheltered from higher work related exposure

And SSDI rules seem to cover this circumstance

- Have a condition that is permanent or expected to result in death whereby cannot perform past work or adapt to work available.
- No data yet- require 5 months out of the labor force to apply.

A Model of a Pandemic with a Disability Option

Overview of Environment and Choices

Environment- discrete time with stochastic death.

- Sectors (j): differ by skill s and whether can work from home h
- Individuals (i) differ in fixed type: health d, skill s, disutility of work z.
- Poor health increases disutility of work, particularly outside the home.
- Pandemic increases disutility of work outside the home, particularly for unhealthy.
- Don't see pandemic coming. Rational expectations over path to pandemic ending.

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Choices:

- Whether to work and in which sector.
  - ▶ Must search in unemployment to switch sectors.
- Whether to apply for disability
  - ▶ Can't be working or on UI
- How much to consume c vs save a.

Institutions

Disability Insurance

- Must be not working and not collecting UI to apply.
- Imperfect and lengthy screening
  - $\pi(s, d)$ probability of acceptance, decreasing in s, increasing in d
- DI benefits are $SSDI^s w(s, 1)$
  - lower replacement rate for higher skilled
  - approx. function of prior wages using non-pandemic wage for skill type.

Unemployment Insurance

- UI benefits are $b^s w(s, 1)$
  - lower replacement rate for higher skilled
  - approx. function of prior wages using non-pandemic wage for skill type.

Other welfare transfers (TANF, etc)

- $\underline{c}$ when not receiving other transfers.

All funded with progressive income tax.

Labor Markets

Wages are competitive.

- $w(s, j)$ market wage for skill s in sector j
- Poor health means less efficiency units: income$= \kappa(d)w(s, j)$

Search is not.

- Job finding rate: λ^s
- Job loss rate: δ^s
- May choose to quit.

Production

Intermediate goods in sector $j \in S \times H$

$$\pi_j = \max_{n_j} p_j x_j - w_j n_j$$
$$st \quad x_j = n_j$$

Final Goods: nested CES

$$\Pi_j = \max_{X_j} Y - \sum_{j \in S \times H} p_j X_j$$
$$st \quad Y = (\sum_s (\nu_s Y_s)^{\frac{\sigma-1}{\sigma}})^{\frac{\sigma}{\sigma-1}}$$
$$st \quad Y_s = (\sum_h (\mu_{sh} X_{sh})^{\frac{\gamma-1}{\gamma}})^{\frac{\gamma}{\gamma-1}}$$

Value of Working

Individual of fixed type $X = \{s, d, z\}$ (skill s, health d, and disutility z)

Employed in sector j with aggregate state Z.

$$
\begin{aligned}
V^e(X, a, j; Z) &= \max_{c, a' \geq 0} u^e(c, s, d, z, j; Z) + \beta \mathbf{E}_{Z'|Z}((1 - \delta^s(Z))V(X, a', j; Z') \\
&+ \delta^s(Z) \max\{V^u(X, a', j'; Z'); V^A(X, a'; Z')\}) \\
st \quad & c + a' = \tau^s(Z)\kappa(d)w(s, j) + (1 + r)a
\end{aligned}
$$

Where $V(X, j; Z')$ includes the quitting option

$$
V(X, a, j; Z) = \max\{V^e(X, a, j; Z); V^u(X, a; Z); V^A(X, a; Z)\}
$$

Value of Unemployment

Individual of fixed type $X = \{s, d, z\}$ (skill s, health d, and dis-utility z)

Aggregate state Z.

$$
\begin{aligned}
V^u(X, a; Z) &= \max_{c, a' \geq 0} u^n(c) + \beta \mathbf{E}_{Z'|Z}(\lambda_s(Z) \max_{j' \in J^s} V(X, a', j; Z') \\
&+ (1 - \lambda_s(Z)) \max\{V^u(X, a'; Z'); V^A(X, a', ; Z')\}) \\
st \quad & c + a' = b^s(Z)\kappa(d)w(s, 1) + (1 + r)a
\end{aligned}
$$

Where $V(X, a, j; Z')$ does not require the job to be accepted.

$$
V(X, a, j; Z) = \max\{V^e(X, a, j; Z); V^u(X, a; Z); V^A(X, a; Z)\}
$$

Value of Applying for SSDI

Fixed individual of type $X = \{s, d, z\}$ (skill s, health d, and dis-utility z)
Aggregate state Z.

$$
\begin{aligned}
V^A(X, a; Z) &= \max_{c, a' \geq 0} u^n(c) + \beta \mathbf{E}_{Z'|Z}[\pi(s, d) V^D(X, a'; Z') \\
&+ (1 - \pi(s, d)) \max\{V^u(X, a'; Z'); V^A(X, a'; Z')\}] \\
st \quad &c + a' = \underline{c} + (1 + r)a
\end{aligned}
$$

Collecting SSDI is an absorbing state until death

$$
c + a' = SSDI^s \kappa(d) w(s, 1) + (1 + r)a
$$

No Pandemic Steady State Equilibrium

Objects

- Distribution of agents: $\Lambda^E(s, d, z, a, j)$, $\Lambda^U(s, d, z, a)$, $\Lambda^A(s, d, z, a)$, $\Lambda^D(s, d, z, a)$
- Labor demand: $\{n_j\}$, intermediate goods supplied $\{x_j\}$, intermediate goods demanded $\{X_j\}$
- Tax revenues TR and Expenditures G
- Prices $\{p_j, w_j\}$ and a tax rate τ^*

Satisfy

- Labor markets clear. $\sum_d (\int_z \tau(d) \Lambda^E(s, d, z, h, Z)) f(z) dz = n_{sh}$.
- Intermediate goods markets clears. $x_j = X_j$ for all j
- Tax revenues equal government expenditures.
- The evolution of workers across labor market states satisfies their optimization problems and satisfies stationarity.
  - ▶ Dead SSDI recipients are replaced by workers of the same individual state, but start life unemployed.
  - ▶ All others are replaced by workers of exactly the same state.

Calibration

Strategy

Want:

- Replicate NHIS pre-pandemic distribution of agents across education, health, sector of employment, and labor market state (employed, unemployed, applying, and on SSDI).

Constraints:

- Maintain labor supply elasticities from structural SSDI lit
  - ▶ Replicate elasticities from Low & Pistaferri (AER 2015).
  - ▶ Check against Michaud & Wiczer (2019-WP) response to aggregate shocks
- Elasticities of substitution across sector/education in line with lit.

Direct Calibration- Government

Government:

- DI replacement rate: 55% / 42% for non-college / college
- DI allowance probability:
  - 80% for poor health. 25% for good health
  - 15% lower for college
  - Discounted to provide median wait time of 13 months
- DI exit rate to provide DI stock by type as in NHIS
- UI replacement rate: 35%
- Consumption floor: 5% of median wage.
- Tax rates 2x for college

Direct Calibration- Labor Market

Technology

- Elasticities of substitution
  - ▶ College vs Non = 1.5 from Katz and Murphy(1992)
  - ▶ Can WFH vs Cannot = 2 . Also consider 0.8
- Matching a Mincer
  - ▶ 10% efficiency penalty for poor health
  - ▶ Wage premium for can't wfh: 16% / 11% for non / college
  - ▶ College premium: 46%
- Job Finding / Loss
  - ▶ Finding: 0.35 / 0.3 ; average duration about 3 months. Relative by education from Wolcott (2018 WP)
  - ▶ Loss: 0.018, 0.008 ; Match U rates by education 4.5%, 2.5%

Indirect Calibration- Preferences

Utility specification following Low & Pistaferri (2015)

$$u^e(c, s, d, z, j) = \frac{(ce^{(z\phi^{sh}(sh)+z\phi^{sdh}(sdh)+\phi^d(d))})^{1-\eta}}{1-\eta}$$

All ϕ's are negative

- ϕ^{sh}: dis-utility for working outside the home by education
- ϕ^{sdh}: extra dis-utility for outside the home if in poor health, by education
- ϕ^d: dis-utility for working if in poor health
- Restriction: L&P don't have sectors. Should add up to their values.

Distribution for z chosen as log normal, mean zero

Indirect Calibration- Preferences

crra=2; $\beta = 0.996$; $r = 0$.

- $8 + 1$ Targets: Sectoral employment and disability rates by healthXeducation type $+$ L&P restriction
- 8 Parameters: including stdev(z)

ϕ^d	-0.32	Vulnerable
ϕ^s	-0.12,-0.05	(no college, college)
ϕ^{0dh}	-0.053,-0.13	(no college X(non-Vulnerable, Vulnerable)
ϕ^{1dh}	-0.13,-0.18	(college X(non-Vulnerable, Vulnerable)
$stdev(z)$	1.33	idiosyncratic multiplier on ϕ^{sdh} and ϕ^s

- Nail disability rates by education
- Miss a bit on healthy college educated on DI

Simulating a Pandemic

What is a Pandemic?

Many choices

- What a pandemic does- increase utility cost of work outside home.
- How long- 1-3 years.
- Policy- UI benefit extension lengths.

First consider a pandemic that lasts forever.

No Pandemic to Pandemic Steady State

$$u^e(c, s, d, z, j) = \frac{(ce^{(z\phi^{sh}(sh) + z\phi^{sdh}(sdh) + \phi^d(d))})^{1-\eta}}{1 - \eta}$$
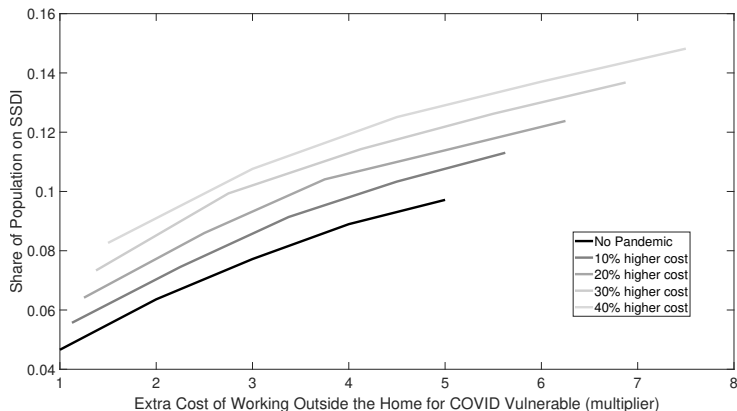
GDP falls 2-9.8% on 10% line, 4.7% at 2x   DI/GDP rises 26-190%, 74%

No Pandemic to Pandemic Steady State

Employment falls for the non-vulnerable too.
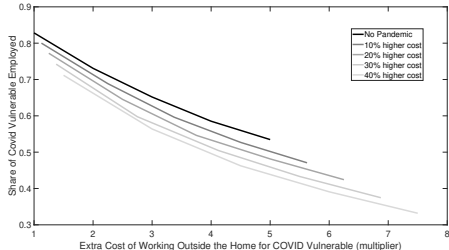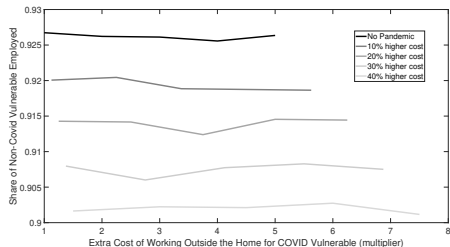
No Pandemic to Pandemic Steady State

Employment falls in non-WFH jobs; rises in WFH jobs
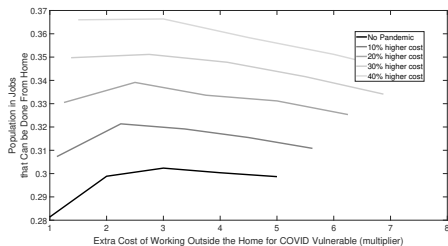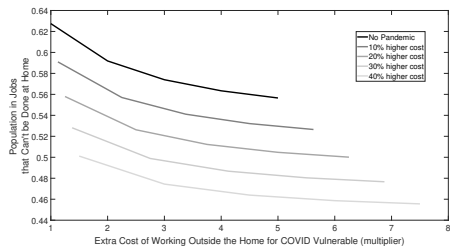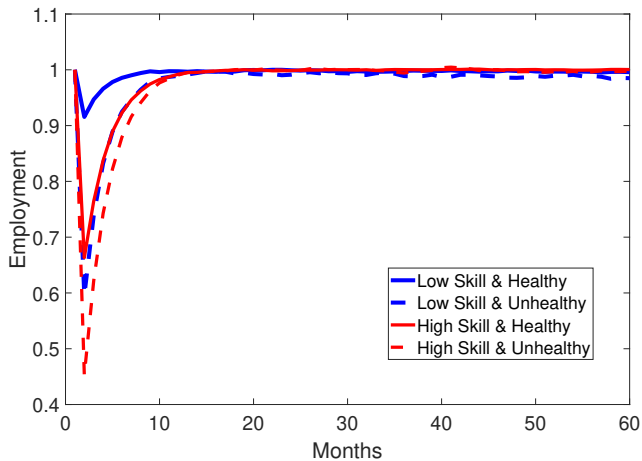
No Pandemic to Pandemic Steady State
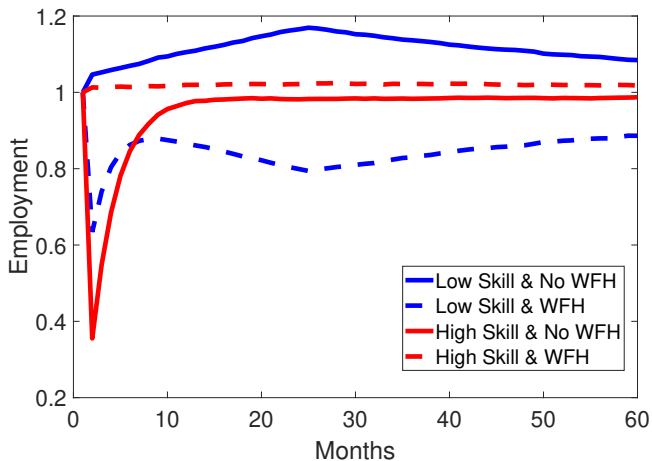
Employment falls more for College Educated
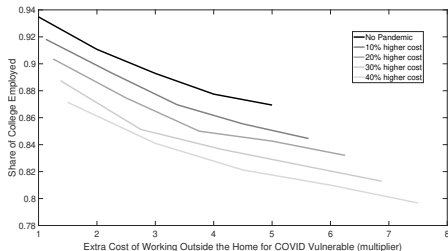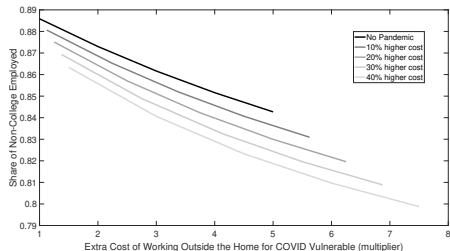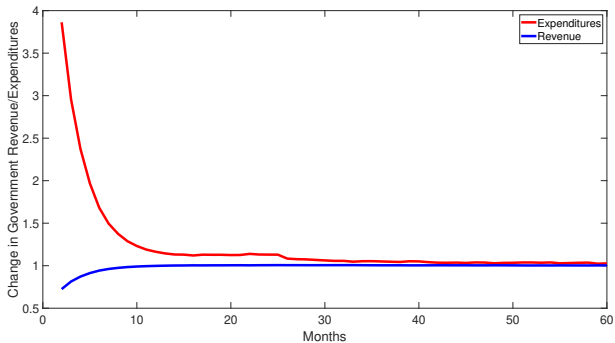
Various Length Pandemics
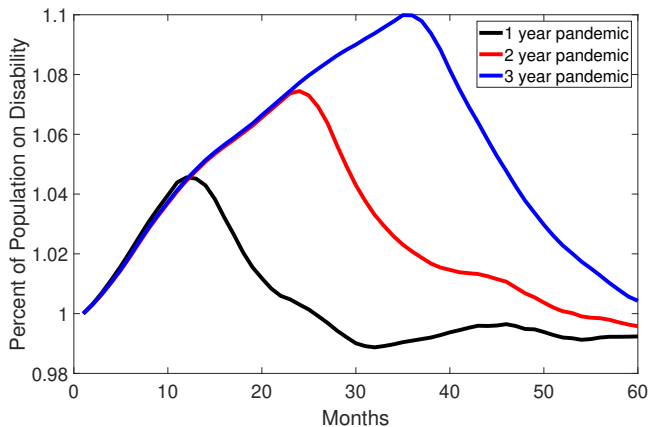
2 year Pandemic

2 year Pandemic

2 year Pandemic

# Robustness

Pandemic, but no recession?

- Lower job finding & higher job loss rates increase DI applications

Role of preferences

- Calibration chooses that college educated have higher disutility of work outside the home than non-college.
- If I give non-college preferences to college, there is a bigger effect.
    - Wages fall more for non-college
    - SSDI is always more attractive for non-college: higher replacement and award rates
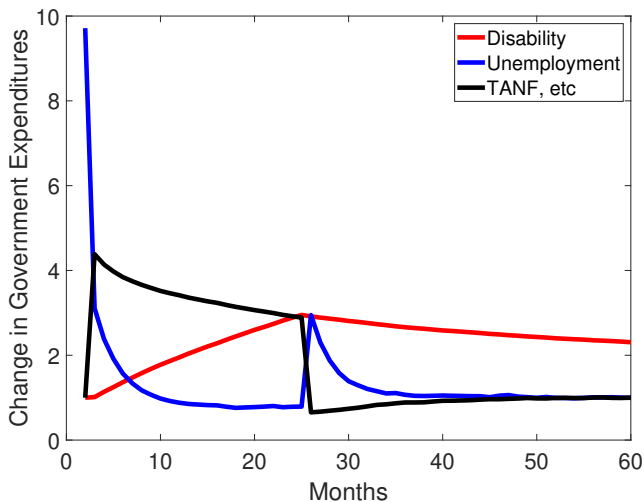
(!PRELIMINARY!) UI time out
Terminate UI benefits after 12 months
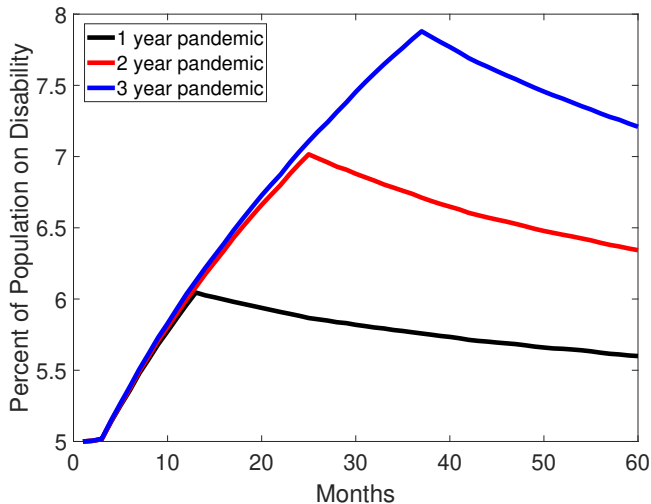
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Are these results reasonable?

vs. Prior recessions

- Maestas, Mullen, & Strand (2018)- Great Recession
- 400,000 extra allowances over 5 years ($+$ 10%)

Permanent vs transitory shocks

- Michaud & Wiczer (2020WP)- Rise in SSDI mostly from permanent shocks to occupations and stagnating wages
- Some of these permanent shocks coincide with recessions.
- Ties in w/ lit on UI extensions and SSDI (Karahan & Mercan)- what are the expectations about the shock length?

Caveats abound (as always)

- Barriers to applying and slowing of application reviews due to COVID
- How long do people really expect this to last? Will the vulnerable get vaccinated? Etc.

Summary

- 18% of the workforce is COVID vulnerable due to poor health.
- Likely will not all be accommodated in WFH.
- SSDI could as much as double from 5 to 10% of pop 18-65.
- ... but more likely to increase by less than 10%

Key mitigating factors, by importance

- Expect pandemic to be short-lived
- UI benefits are extended
- Competition for WFH jobs

More on inequality and welfare to come