The Economic Ripple Effects of COVID-19

...or a Really Large Transitory Shock

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ANCE
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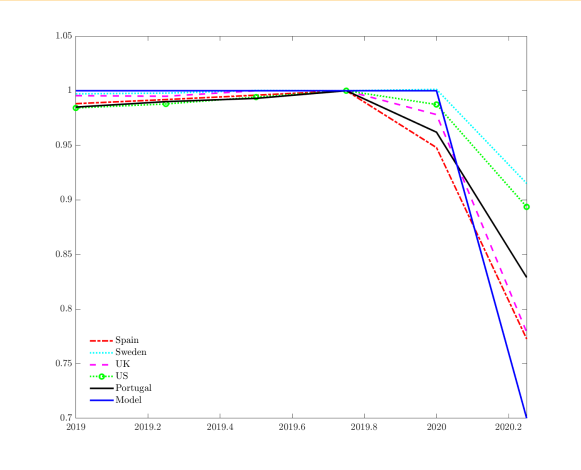
Motivation

- COVID+non-pharmaceutical interventions (NPIs):
  - largest (transitory ?) aggregate shock since... ⏩ Data table
  - more permanent reshuffling of what we consume and how we produce ⏩ News
- This paper:
  - Ripple effects of a LARGE transitory shock, e.g., lockdown?
  - Role of reallocation shock?

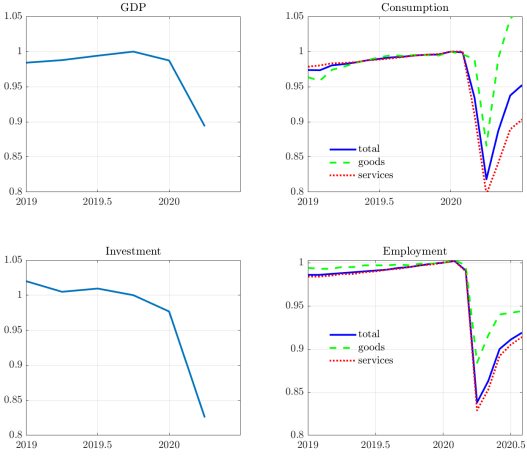
  Role of
  - financial frictions
  - labor market frictions
  - labor market policies and institutions
  - size of shock
  - demand shock
  - persistence of shock (not yet)

Motivation: How Bad, For How Long?



GDP in selected countries

Motivation: How Bad, For How Long? (cont'd)



US Data

to rest unemployment

Employment dynamics

How important is rest unemployment?

- People employed in February, but not employed in ...

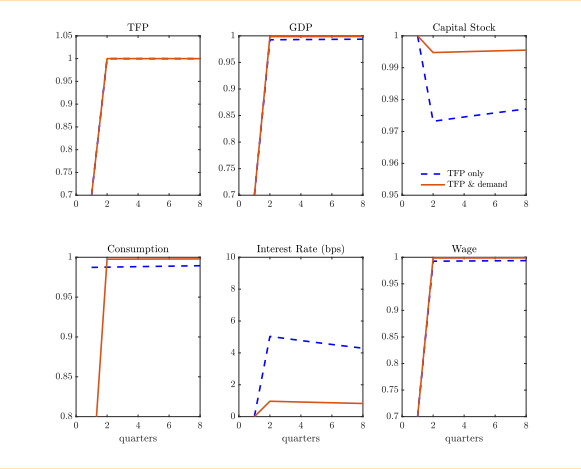
	2-Apr	4-Apr	2-May	4-May	2-Jun	4-Jun	2-Jul	4-Jul	2-Aug
Expects back	57	57	53	49	49	51	49	43	43
Unsure back	16	26	23	23	20	21	21	26	30
Sum	73	82	76	72	69	73	71	69	73

Real time population survey (Bick and Blandin, 2020)

- One third of job growth since April (US) is accounted for by the recall of February workers

  Bartik et al (2020), COVID-19 and labor markets, Brookings PEA

Neoclassical Dynamics of Lockdown: small ripples



30% TFP shock in a neoclassical growth model

Related Literature

- See NBER Working Papers 26867-27660 (26% of the WP since March!)

Roadmap

- Describe model
- Analyze macro and micro implications of:
  1. one-period lockdown shock in baseline model:
     - non-essential firms have zero employment/output/income
     - demand shock $\frac{I_1}{C_1} = 0.93 \frac{I_{ss}}{C_{ss}}$ (US Q2)
     - Firms liable for rental/debt payments
     - wage bill paid by government with future lump-sum taxes
  2. Added reallocation shock (non-essential/essential)
  3. Role of modeling assumptions in persistence of lockdown shock
     - demand shock
     - Firms liable for wage payments
     - employment recall

This Paper

- Heterogeneous Agents model
  - ▷ occupational choices
  - ▷ stochastic entrepreneurial ability

$$z_t = \begin{cases} z_{t-1} & \text{with prob } \psi \\ z \sim & \text{Pareto, otherwise} \end{cases}$$

  - ▷ **credit friction**: collateral constraints, $k_t \leq \lambda a_t$
  - ▷ **labor friction**: matching friction w/ rest unemployment

- Deterministic dynamics following unanticipated shocks:
  - ▷ Lockdown: fraction ϕ of all firms becomes Non-Essential (shut-down).
  - ▷ Demand: low marginal utility first period (equivalent to more patience)
  - ▷ Reallocation shock: firms in non-essential sector redraw their productivity, $\psi_2^{NE} < \psi = 0.97$

- Buera, Fattal-Jaef & Shin (2015)+ (simple version of) Alvarez & Shimer (2011)

Agent's Optimization Problem: Essential

$$v_t(z,a) = max_{a',oc}\left\{\frac{\left[\xi_t c_t\right]^{1-\sigma}}{1-\sigma} + \beta E v_{t+1}\left[z', a'\right]\right\}$$

$$c_t + a_{t+1} = max\left\{w_t, \pi_t\left(z, a_t; r_t, w_t\right)\right\} + \left(1 + r_t\right)a_t - \tau_t$$

where

$$\pi_t(z,a;r,w) = \max_{k,l} zk^{\alpha}l^{\theta} - (r+\delta)k - wl$$

$$\text{subject to } k \leq \lambda a$$

- Full replacement unemployment insurance: w_t
- Unemployment insurance financed with lump-sum taxes over T periods , $\sum_{t=1}^{T} q_t w_t U_t = \sum_{t=1}^{T} q_t \tau_t$

Agent's Optimization Problems: Non-Essential

- Businesses

$$v_1^{NE}(z,a) = max_{a'}\left\{\frac{\left[\xi_t c_t\right]^{1-\sigma}}{1-\sigma} + \beta E v_2\left[z', a'\right]\right\}$$

$$c_1 + a_2 = -\left(r+\delta\right)k_{1-} + \left(1+r_1\right)a_1 - \tau_1$$

- Workers

$$v_1^{W}(z,a) = max_{a'}\left\{\frac{\left[\xi c_t\right]^{1-\sigma}}{1-\sigma} + \beta E v_2\left[z', a'\right]\right\}$$

$$c_1 + a_2 = w_1 + \left(1+r_1\right)a_1 - \tau_1$$

- Non-essential entrepreneurs only pay rental cost, $-\left(r+\delta\right)k_{1-}$
  - ▷ employment at will (US) or generous government wage subsidies (Europe)
- non-essential become essential for $t \geq 2$

Labor Market Friction

- M_t unemployed workers matched to the hiring market

$$M_t = \gamma \left(U_t + JD_t \right)$$

- Evolution of Unemployment

$$\begin{aligned} U_{t+1} &= U_t + JD_t - M_t \\ &= (1 - \gamma) \left(U_t + JD_t \right) \end{aligned}$$

- Job Destruction

$$JD_t = \int \left[\max \left\{ l_{t-1} - l_t \left(a, z \right), 0 \right\} \right] dG_t \left(a, l_{t-1}, z \right) + \text{exiting entrep.}$$

- Walrasian Hiring Market Clearing

$$\underbrace{\int_{l_t(a,z)>0} \left[1 + l_t \left(a, z \right) \right] dG_t \left(a, l_{t-1}, z \right)}_{\text{labor demand}} = \underbrace{1 - U_{t+1}}_{\text{labor supply}}$$

Labor Market Friction with Rest Unemployment

- non-essential workers are not reallocated in the first period
- but can be rehired frictionlessly by their previous employers in the second period
  - ▷ only by surviving firms
  - ▷ if their net-worth constraint does not bind

Labor Market Friction with Rest Unemployment

- M_t unemployed workers matched to the hiring market

$$M_1 = \gamma \left(U_1 + JD_1 - R_2 \right)$$

and

$$R_2 = \psi \int \min \left\{ l_2 \left(a, z \right), l_{1-} \right\} dG_2^{NE} \left(a, l_{1-}, z \right)$$

  - ▷ i.e., job destruction by non-essential can be re-hired the following period

- Evolution of Unemployment

$$U_2 = (1 - \gamma)(U_1 + JD_1 - R_2)$$

- Walrasian Hiring Market Clearing

$$\underbrace{\int_{l_2(a,z)>0} \left[1 + l_2 \left(a, z \right) \right] dG_2 \left(a, l_{1-}, z \right)}_{\text{labor demand}} = \underbrace{1 - U_2}_{\text{labor supply}}$$

Calibration Strategy

- Parameter values set to match
  - distribution and dynamics of U.S. establishments
  - unemployment rate in U.S. (γ)
  - external finance to fixed capital in non-corporate sector in U.S. (λ)
    - also calibration to external finance in developing countries

Roadmap

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  3. Role of modeling assumptions in persistence of lockdown shock
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     - employment recall

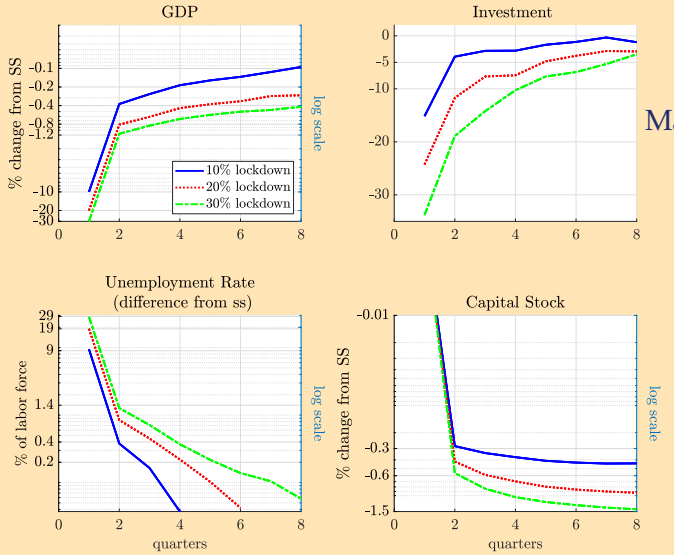
The Lock-Down Shock

- Start from stationary allocation
- Unexpected shock: fraction ϕ of businesses considered Non-Essential
  - magnitude and persistence of ϕ still open question
  - assume $\phi = 0.3,\ 0.2,\ 0.1$, 1-period shock $\rightarrow$emphasize model's propagation
  - shock realized after occupation and factor demand decisions, but before production
- labor costs in the first period are not paid by the firm, e.g., wage subsidies (Europe), furlough (US)
  - we look at the case in which firms must pay wage bill later

Propagation Forces

1. Burst of job destruction+matching friction $\rightarrow$ rise in (rest?) unemployment
2. Imperfect insurance $\rightarrow$ negative shock to net-worth of affected entrepreneurs
3. Lowered net worth + Financial Frictions $\rightarrow$
   - not all unemployed workers are recalled
   - persistent unemployment because of financial and labor market frictions
   - Capital stock and investment are affected
   - Impact on *TFP* (misallocation, operating organization capital)
4. Some expansion of essential firms $\rightarrow$ misallocation

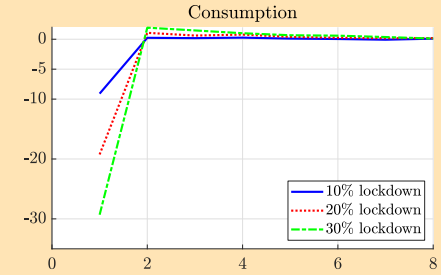
Lockdown: Aggregate Variables I

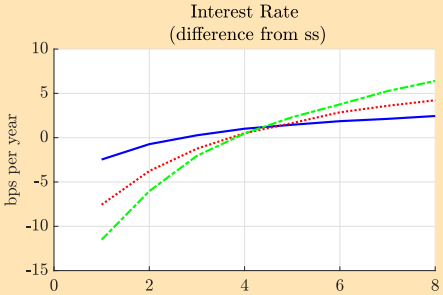


Main features

- Δ GDP = share locked down sector
- Rest U $\Rightarrow$ quick rebound in employment and GDP
- $t = 1$ TFP falls due to idle non-essential capital
- Lingering small(?) recession due to financial friction

Lockdown: Aggregate Variables II

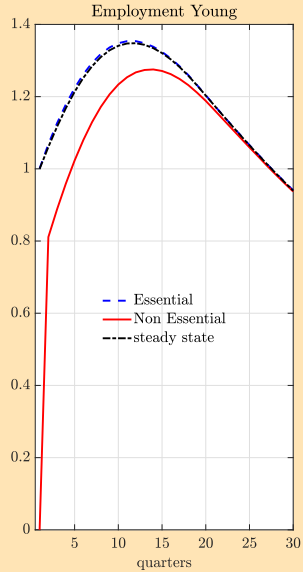


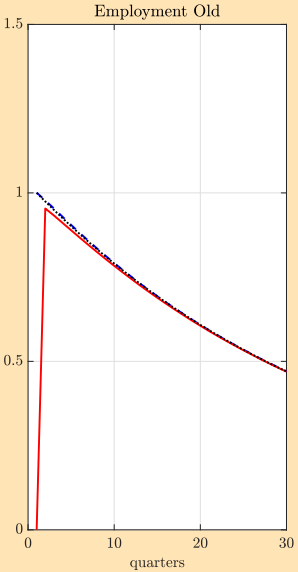


Main features

- Increase in savings despite fall in GDP
- Fast consumption rebound
- Investment rebound is constrained
- Change in prices is tiny
- Lingering recession–investment (aggregate demand)

Micro Implications (10% lockdown) I : Employment by Age

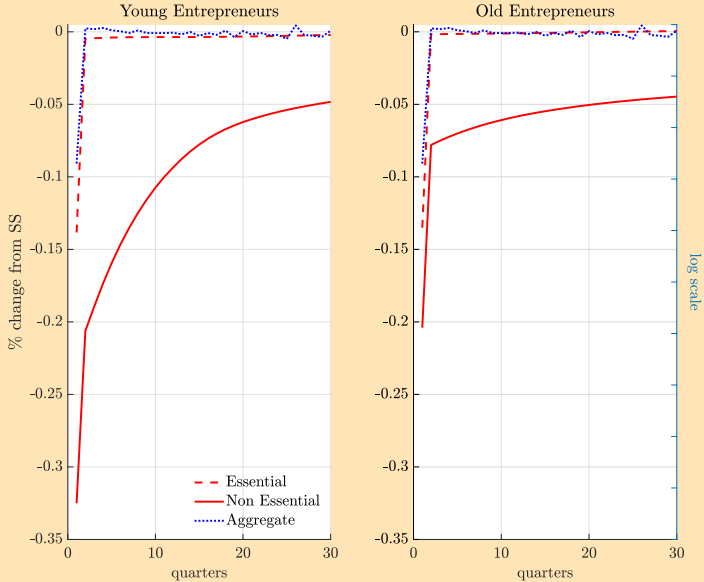




Young firms

- less than 5 years old
  - ▷ 20% of employment
  - ▷ non-essential 6% employment
- more financially constrained
- driving force of lingering recession
  - ▷ persistently below trend (20% in $t = 1$)

Micro Implications II: Consumption



Why does C fall?

- Demand shock
- Imperfect insurance hits entrepreneurs in non-essential sector
- Workers have unemployment insurance

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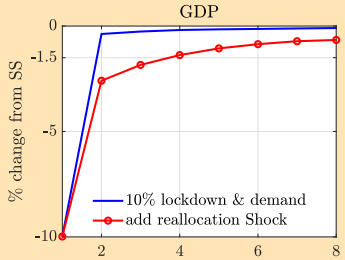
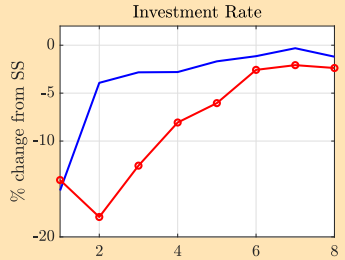
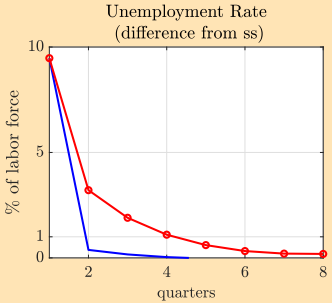
Added Reallocation Shock

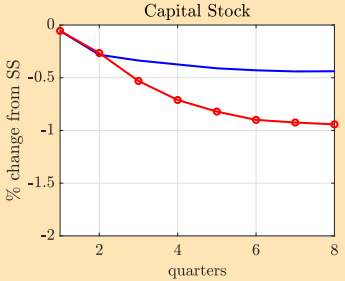
- Start from stationary allocation ⏩ tree
- At $t = 1$, 10% of firms are locked down (non-essential)
- At $t = 2$ an extra 30% of these firms redraw productivity z
  - ▷ It captures more permanent reshuffling of what/how we consume/produce
- in a neoclassical world there are no aggregate consequences
- recovery slowed down by financial and labor frictions

Added Reallocation Shock: Aggregate Variables I



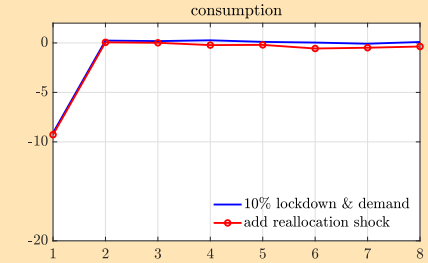


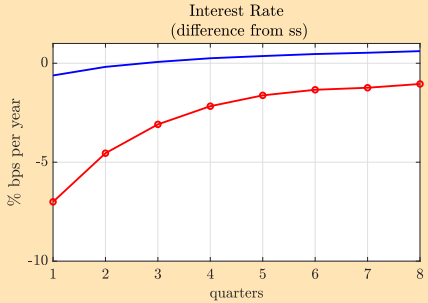




- Persistent recession.
- Two frictions at work
  - ▷ Redraw of productivity with financial constraint generate distortions due to mismatches between entrepreneurial productivity and wealth.
  - ▷ Entrepreneurs and workers in exiting firms are not reallocated immediately due to labor market friction (no rest unemployment in this case)

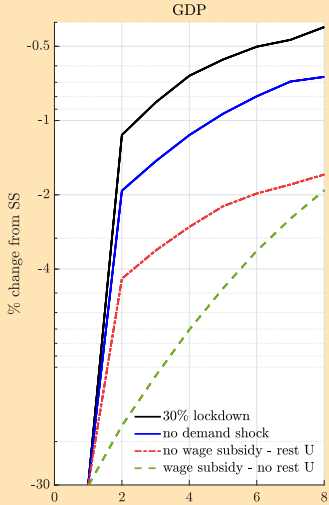
Pure Reallocation Shock: Aggregate Variables II

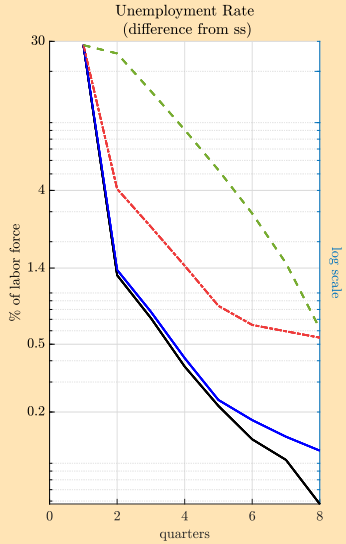




- Consumption rebounds fast
- The financial constraint is reducing investment and aggregate demand so that interest rates fall
- Price changes are tiny

Unpacking the ripples: shocks, policies, mechanisms





1. Start with 30% lockdown with demand shock
2. Eliminate demand shock (+ capital irreversibility)
3. Add firms pay lockdown wages instead of UI: delays recovery through balance sheet effect.
4. No rest unemployment (in 2): delays recovery

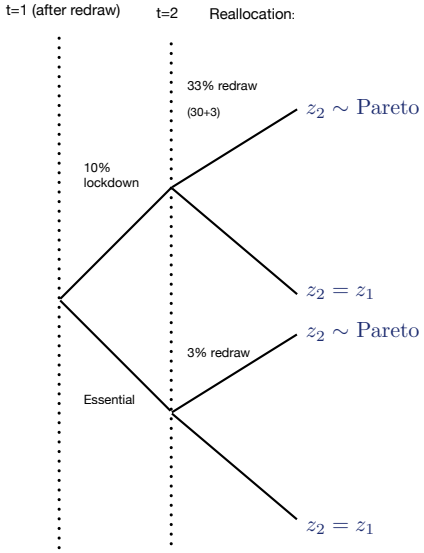
Summary of Results and lessons

1. In most cases there is a fast aggregate recovery from unprecedented contraction in GDP due to lockdowns,
   - which is possible due to wage support/flexible employment & rest unemployment,
   - but persistent effects remain after initial recovery due to balance sheet effects in young firms.
2. Inflexible employment with weak support policies (prolonged lockdowns ?) have large ripple effects.
3. Reallocation due to a new structure of demand and "entrepreneurial switching" has persistent effects

Work in Progress, Further Extensions

- Distribution of welfare costs
  - ▷ Who gain from wage subsidies, milder ripple effects?
- Lockdown of different duration
  - ▷ Are cost convex in the length?
- Small open economy and current account dynamics
- Differentiate essential and non-essential goods.

Extras



back reallocation

The COVID recession in historical perspective

	IMF growth forecast for 2020 (1)	Maddison Sample Period		Worse g since	Last $g_t \leq g_{2020}$	% of $g_t \geq g_{2020}$
Brazil	-9.1	1851	2015	1896	-9.3	98.2
United Kingdom	-10.2	1701	2016	1919	-11.9	99.1
South Africa	-8.0	1925	2016	1925		100
Canada	-8.4	1871	2016	1931	-16.8	97.3
Mexico	-10.5	1596	2016	1932	-16.7	99.7
Spain	-12.8	1851	2016	1936	-24.5	99.4
France	-12.5	1281	2016	1944	-15.3	99.3
Italy	-12.8	1801	2016	1944	-19.5	99.1
Netherlands	-7.7	1808	2016	1944	-33.4	97
Japan	-5.8	1871	2016	1945	-49.4	95.9
Germany	-7.8	1851	2016	1946	-50.9	95.8
United States	-8.0	1801	2016	1946	-9.5	97.7
India	-4.5	1885	2016	1979	-7.2	93.2
Nigeria	-5.4	1951	2016	1984	-6.3	89.4
Philippines	-3.6	1903	2016	1985	-9.6	91.7
Pakistan	-0.4	1951	2016	1997	-0.8	89.4
Malaysia	-3.8	1912	2016	1998	-9.8	89
Thailand	-7.7	1951	2016	1998	-8.6	98.5
Argentina	-9.9	1876	2016	2002	-11.8	96.5
Turkey	-5.0	1924	2016	2016	-9.7	86

Note. Historical statistics from Maddison Historical Statistics. IMF forecast is June 2020 World Economic Outlook update.

back motivation

Reallocation

back motivation

Recreational drugs

Drug dealers turn to home delivery as social distancing bites

EU drug agency says criminal networks have quickly adapted their operations in wake of Covid lockdowns

Coronavirus economic impact

Companies scramble to reverse UK back to office plans

Changes to Covid-19 guidance about returning to workplaces spark fears about impact on city centres

Deutsche Bank AG

Deutsche Bank plans to close 1 in 5 branches in Germany

German lender responds as coronavirus pandemic drives more customers online

'Covid-proof' Peloton enjoys stay-at-home fitness boom

Company says 1.1m people downloaded its app in six weeks, sending shares to record high

Lex Kingfisher PLC

Kingfisher: nailing it Premium

Pandemic is delivering the turnround previous chief executives failed to produce

NEW 39 MINUTES AGO