The Economic Ripple Effects of COVID-19

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World Bank’s Development Policy e-Seminar  
The Macroeconomics of Pandemics  
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Background

- First response: epidemics+lock-down+economics
  - rich epidemiology, rather stylized production side of economy
  - Alvarez et.al., Eichenbaum et.al, Kaplan et.al.
- Our response: no epidemics, lock-down shock with rich, heterogeneous propagation mechanisms
  - credit and labor market frictions
  - imperfect insurance
  - modeling individual business owners
- Characterize responses to lock-down shocks
  - developed vs under-developed credit markets
  - Palliative policies
Environment

• Heterogeneous households: stochastic ability, wealth
  ▶ occupational choices
  ▶ imperfect insurance: risk-free asset
• Frictional factor markets
  ▶ collateral constraints
  ▶ matching friction in labor market
• Unanticipated lock-down Shock
  ▶ Fraction $\phi$ of all firms becomes Non-Essential (shut-down)
• Extreme form of social insurance
  ▶ Unemployment insurance for non-essential entrepreneurs
Agent’s Optimization Problems

- **Essential Businesses**

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

\[
c_t + a_{t+1} = \max_{o_c(z, a)} \left\{ w_t, \pi_t (z, a; r, w) \right\} + (1 + r_t) a_t - T_t
\]

\[
k_{td} (z, a_t) \leq \lambda a_t
\]

- **Non-Essential Businesses**

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

\[
c_t + a_{t+1} = w_t + (1 + r_t) a_t - T_t
\]

- Full wage insurance (conservative results)
Labor Market Friction

- $M_t$ unemployed workers matched to the hiring market
  
  \[ M_t = \gamma (U_t + JD_t) \]

- Evolution of Unemployment
  
  \[ U_{t+1} = U_t + JD_t - M_t \]

- Extension with rest unemployment:
  
  ▶ Job destruction from non-essential can be re-hired immediately
Calibration Strategy

- Parameter values set to match
  - distribution and dynamics of establishments
  - unemployment rate in U.S. ($\gamma$)
  - external finance to fixed capital in non-corporate sector in U.S. ($\lambda$)
    - also calibration to external finance in developing countries
The Lock-Down Shock

- Start from stationary allocation
- Unexpected shock: fraction $\phi$ of businesses considered Non-Essential
  - magnitude and persistence of $\phi$ still open question
  - assume $\phi = 0.3$, 1-period shock $\rightarrow$ emphasize model’s propagation
Propagation Forces

1. Burst of job destruction + matching friction $\rightarrow$ rise in Unemployment
2. Imperfect insurance $\rightarrow$ reallocation of net-worth
3. Financial Frictions $\rightarrow$ \textit{TFP} and investment dynamics
Output Dynamics

The diagram illustrates the comparison of GDP relative to the steady state (SS) in the U.S. and Developing countries over several periods. The x-axis represents the number of periods, and the y-axis shows the GDP relative to SS. The solid line represents the U.S., and the dashed line represents Developing countries. The GDP values range from 0.80 to 1.00, indicating a gradual approach to the steady state over time.

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**GDP**

Periods: 2 4 6 8 10 12 14

Relative to SS

U.S., Developing

GDP
Behind Output Effects: TFP and Unemployment

TFP

Unemployment Rate

relative to SS

rate

U.S. Developing

periods

periods

0.85 0.95 1.05

0.05 0.10 0.15 0.20
Investment and Capital Stock

Investment Rate

- Difference from SS
- Periods

Capital Stock

- Relative to SS
- Periods
Assume that firms pay \( (r_t + \delta) k^d_t (z, a) \) prior to lock-down shock:
- no capital reallocation among essential
- capital under-utilization from non-essential
Extensions in Pipeline

• Extensions to the Framework
  ▶ Setup and fixed costs of operation: more realistic interaction between shock and exit
  ▶ Rest unemployment: important for persistence of unemployment

• Palliative Policies
  ▶ Labor Market: firing costs
  ▶ Credit Markets: government guaranteed loans from Central Bank to pay wage bill (Peru’s package)
  ▶ Lump-sum transfers