COVID-19: A Double Whammy of Financial and Economic Sudden Stops for Emerging Economies

Gianluca Benigno[1] Andrew Foerster[2] Christopher Otrok[3] Alessandro Rebucci[4]

[1]Federal Reserve Bank of New York, LSE, and CEPR

[2]Federal Reserve Bank of San Francisco

[3]University of Missouri and Federal Reserve Bank of St Louis

[4]Johns Hopkins Carey Business School, CEPR and NBER

CEMLA-FRBNY-ECB July 8, 2021

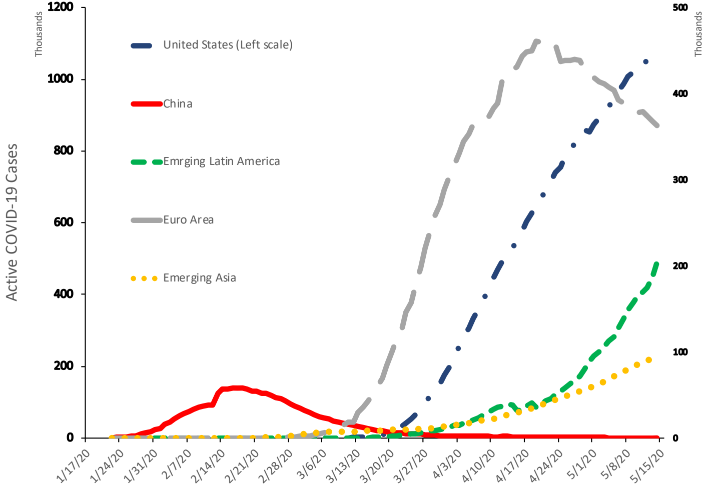
Motivation

- COVID-19: a global shock with singular mix of negative effects on aggregate supply and demand, as well as risks to financial intermediation.
- In sharp contrast to early expectations about V-shaped recoveries, in AEs and EMs alike, we saw and are seeing bankruptcies, corporate defaults, massive unemployment. Debt overhang and hysteresis are likely outcomes absent continued policy support.
- Experience with previous *financial* crises suggests that the disruptions caused by the COVID-19 pandemic could lead to prolonged stagnation through supply constraints and depressed investment due to low productivity growth.

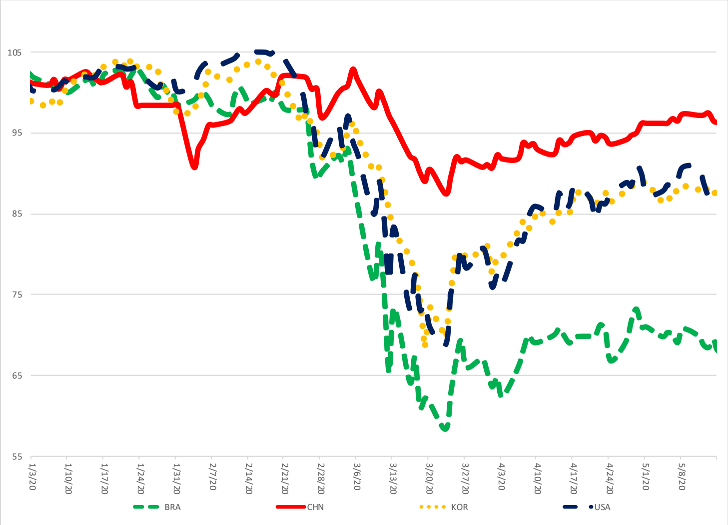
This Paper

- Documents that the financial sudden stop preceded the economic sudden stop
- Illustrates how demand and supply constraints can interact to generate protracted stagnation, even without considering the economic sudden stop
- Provided a best case scenario/lower-bound on the economic damage, even abstracting from the formidable health and social challenges posed by the pandemic

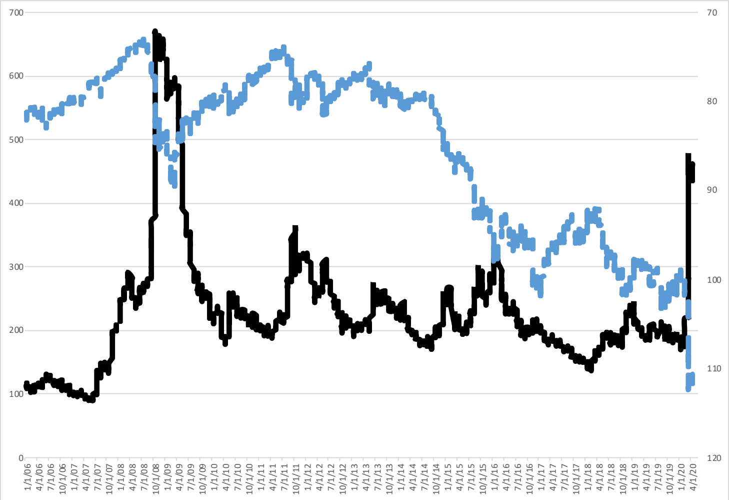
The COVID-19 pandemic spreaded in a staggered manner



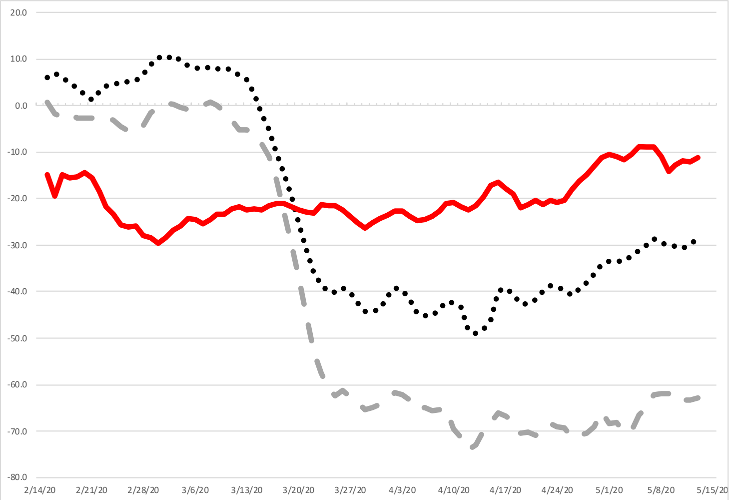
However, the financial market impact was simultaneous



Unprecedented sudden stop in capital flows before COVID-19 contaminated EMs



Mobility dropped simultaneously, but fell more and continued to drop after US stabilised



Model Overview

- A workhorse medium-scale DSGE model
  - Two endogenous state variables and six shocks
  - Structure same as in Mendoza (2010) except for the borrowing constraint formulation
  - A broad set of shocks as in Garcia-Cicco, et. al. (2010)
- Distinctive feature: economy endogenously switches between two regimes
  - Binding regime: the borrowing constraint holds with equality
  - Non-binding regime: borrowing is unconstrained
  - Switch is a *stochastic* rather then *deterministic* function of the endogenous level of leverage

Preferences and Technology

- Representative household-firm with preferences

$$U \equiv \mathbb{E}_0 \sum_{t=0}^{\infty} \left\{ d_t \beta^t \frac{1}{1-\rho} \left(C_t - \frac{H_t^{\omega}}{\omega} \right)^{1-\rho} \right\}$$

- GDP is gross output less intermediate expenditures

$$Y_t = A_t K_{t-1}^{\eta} H_t^{\alpha} V_t^{1-\alpha-\eta} - P_t V_t$$

- Investment with adjustment costs

$$I_t = \delta K_{t-1} + (K_t - K_{t-1}) \left(1 + \frac{\iota}{2} \left(\frac{K_t - K_{t-1}}{K_{t-1}} \right)^2 \right)$$

- Budget constraint: working capital ϕ, debt $B_t < 0$

$$C_t + I_t + E_t = Y_t - \phi r_t \left(W_t H_t + P_t V_t \right) - \frac{1}{(1+r_t)} B_t + B_{t-1}$$

Exogenous Processes

- Productivity (lockdowns, limited teleworkability, direct health impact on workforce)

$$\log A_t = \rho_A \log A_{t-1} + \sigma_A \varepsilon_{A,t}$$

- Intermediate input cost (supply chain disruption)

$$\log P_t = (1 - \rho_P) \log P^* + \rho_P \log P_{t-1} + \sigma_P \varepsilon_{P,t}$$

- Preference (sentiment and uncertainty)

$$\log d_t = \rho_d \log d_{t-1} + \sigma_d \varepsilon_{d,t}$$

- Expenditure (foreign demand and government net demand–or lack thereof)

$$\log E_t = (1 - \rho_E) \log E^* + \rho_E \log E_{t-1} + \sigma_E \varepsilon_{E,t}$$

- Interest rate shocks

$$r_t = r_t^* + \sigma_r \varepsilon_{r,t}$$

$$r_t^* = (1 - \rho_{r^*}) \bar{r}^* + \rho_{r^*} r_{t-1}^* + \sigma_{r^*} \varepsilon_{r^*,t}$$

Collateral Constraint

- Agent faces a regime-specific constraint
- In the binding regime ($s_t = 1$), borrowing is a fraction of the collateral value

$$\frac{1}{(1+r_t)} B_t - \phi (1+r_t) (W_t H_t + P_t V_t) = -\kappa q_t K_t, \qquad \text{with multiplier } \lambda_t$$

- In the non-binding regime ($s_t = 0$), borrowing is unconstrained with “borrowing cushion” defined as

$$B_t^* = \frac{1}{(1+r_t)} B_t - \phi (1+r_t) (W_t H_t + P_t V_t) + \kappa q_t K_t,$$

Endogenous Switching

- Assume transition between regimes is logistic
- In the non-binding regime, the probability that constraint binds next period is

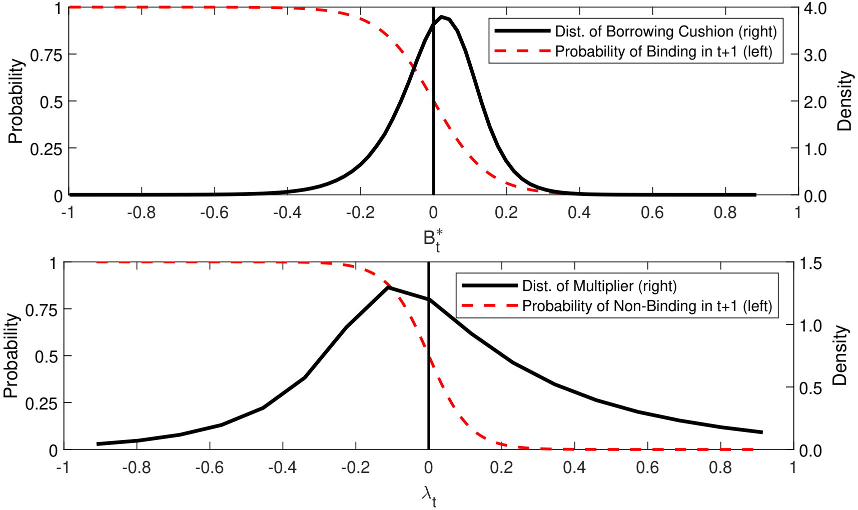
$$\Pr\left(s_{t+1}=1|s_t=0\right)=\frac{\exp\left(-\gamma_0 B_t^*\right)}{1+\exp\left(-\gamma_0 B_t^*\right)}$$

- In the binding regime, probability that constraint doesn't bind next period is

$$\Pr\left(s_{t+1}=0|s_t=1\right)=\frac{\exp\left(-\gamma_1 \lambda_t\right)}{1+\exp\left(-\gamma_1 \lambda_t\right)}$$

- Regime in t determined before shocks at t

Estimated Logistic Functions and Their Endogenous Drivers



Data for Estimation

- Data for Mexico from 1981:Q1 to 2016:Q4
- Observables
  - GDP growth
  - Consumption growth
  - Investment growth
  - Country interest rate constructed as in Uribe and Yue (2006)
  - Current account to GDP ratio
  - Import prices
- Measurement errors restricted to 5% of the variance of each observable

Model Fits Mexican Cycles and Crises Well without Large Shocks

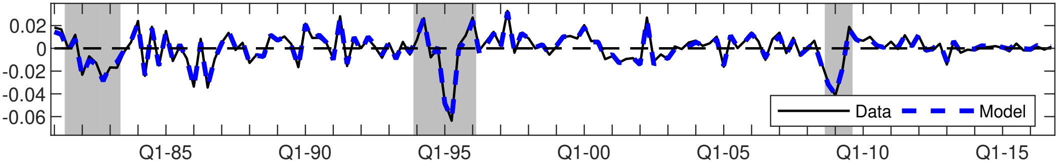
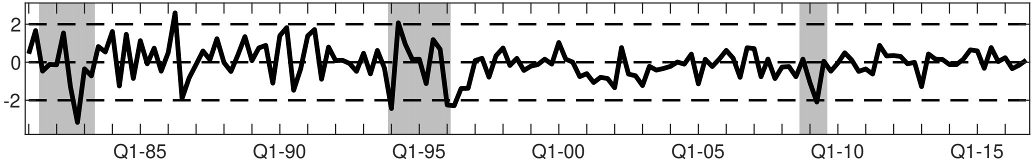


Figure: Fitted Output Growth

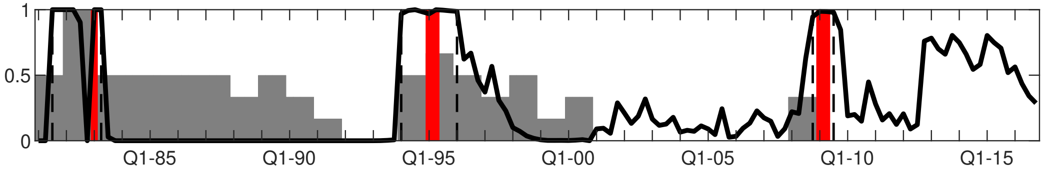
Figure: Estimated Technology Shock



Variance Decomposition: Different Shocks Drive Real/Financial Variables

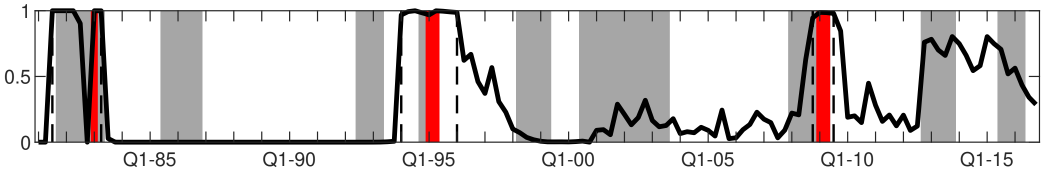
Variables / Shocks	TFP	Expend.	Import Prices	Pref.	Temp. Int. Rate	Pers. Int. Rate
Output	33.2	17.2	15.7	25.4	2.5	6.0
Consumption	30.3	23.4	14.3	20.6	3.8	7.6
Investment	19.2	29.8	10.3	25.6	4.6	10.5
Trade Bal/Output	9.5	35.2	8.8	17.2	9.2	20.1
Interest Rate	0.0	0.0	0.0	0.0	21.1	78.9
Borrowing Cush.	10.6	32.3	9.9	21.3	9.9	16.0
Debt/Output	15.2	25.5	7.6	40.9	1.4	9.5
Multiplier	9.5	40.5	9.5	18.1	9.6	12.8

Model Identifies Sudden Stops in Line with Mexico's History of Crises



- Crisis episodes defined as consecutive periods in which the smoothed probability of binding regime (solid black line) is larger than 90%
- Crisis episodes (dashed vertical lines): Debt crisis 8 quarters; Tequila crisis 9 quarters; GFC 4 quarters
- Narrative Crisis Tally Index of Reinhart and Rogoff (2009) (grey bars): historical crisis episodes much more persistent than traditional model-based episodes (red bars)

Model Does Not Mistake Recessions for Crises



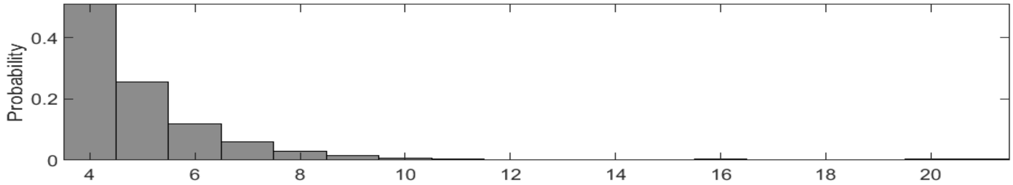
- OECD recession dates in light grey
- Recessions are not necessarily accompanied by binding borrowing constraint

Every Crisis Is Different

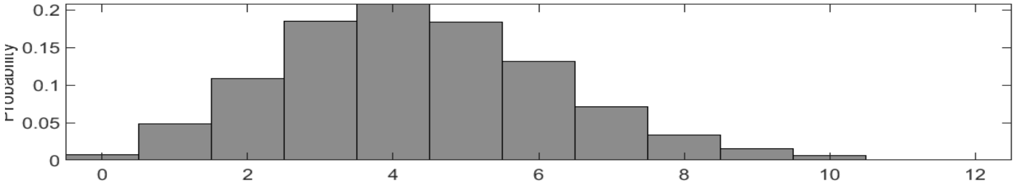
Time Period	TFP	Exp.	Imp. Prices	Pref	Trans Int Rt.	Persist Int Rt.
1983 Debt Crisis						
Two Quarters Prior (81Q1:Q2)	0.4	0.4	0.7	-3.2	0.9	0.8
During Crisis (81:Q3-83:Q2)	0.4	**5.3**	-2.0	-2.8	0.0	-0.8
Two-years After (83:Q3-85:Q2)	0.8	**1.0**	-0.6	0.2	-0.7	-0.7
1995 Tequila Crisis						
Two-years Prior (92:Q1-93:Q4)	-0.1	-1.0	0.4	0.7	0.1	-0.1
During Crisis (94:Q1-96:Q1)	-2.2	-0.7	0.5	1.3	0.2	0.9
Two-years After (96:Q2-98Q1)	-0.1	-0.2	0.2	1.1	-0.6	-0.4
2009 Global Fin. Crisis						
Two-years Prior (06:Q4-08:Q3)	-0.7	2.1	-0.7	-0.2	-0.7	0.2
During Crisis (08:Q4-09:Q3).	0.2	-1.2	0.3	0.5	0.2	0.0
Two-years After (09:Q4-11:Q3)	-0.4	-1.1	0.4	0.8	0.1	0.1

Model Generates Long-lasting Crises as Rare Events

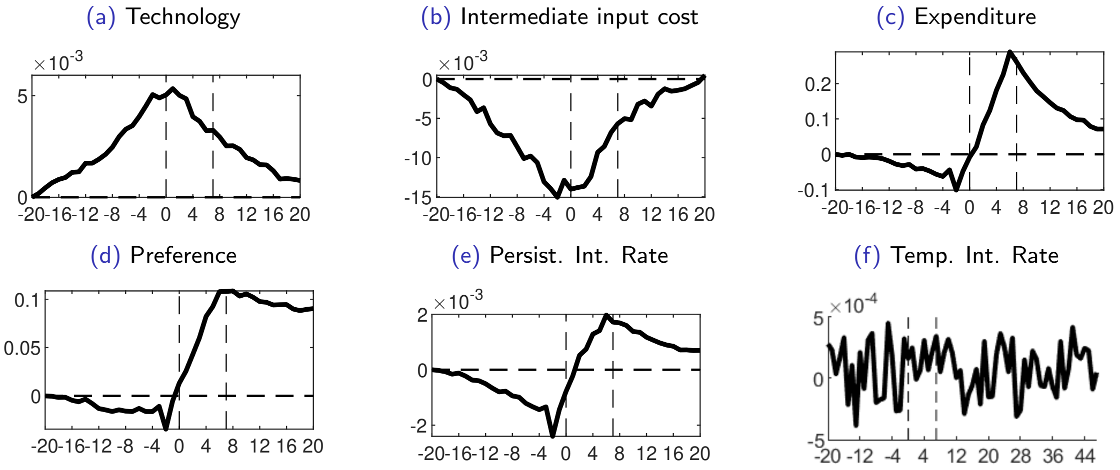
(a) Crisis Episodes of at least Four Consecutive Quarters



(b) Frequency of Crisis Episodes of Any Duration per Sample

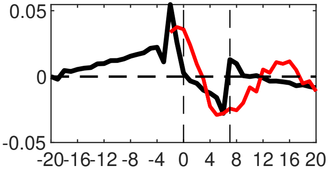


Cocktails of Shocks Driving Crisis Dynamics

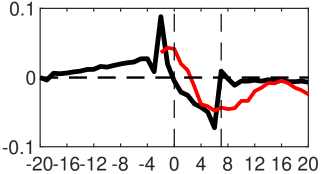


Sudden Stops Can Be Large Crashes Followed by Persistent Stagnations

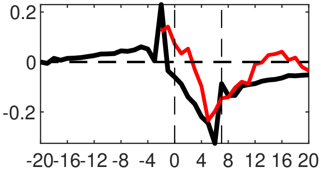
(a) Output



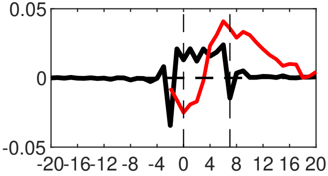
(b) Consumption



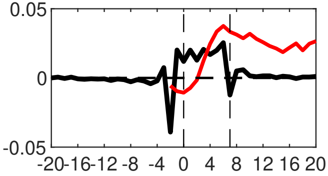
(c) Investment



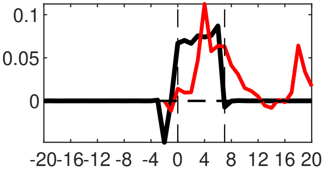
(d) CA/Y



(e) TB/Y

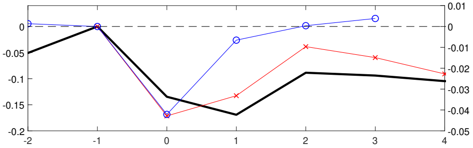


(f) EFPD

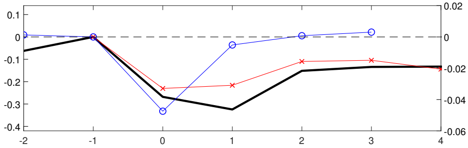


Stochastic specification of the borrowing constraint generates more persistence than in traditional sudden stop models

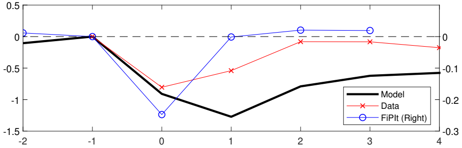
(a) Output



(b) Consumption



(c) Investment



Conclusions

- Even before COVID-19 hits them, EMs were hit by large sudden stop in capital flows, similar to that experienced during the GFC.
- Subsequently hit by economic sudden stop to halt the virus, larger than in AEs due to lower teleworkability lower fiscal sapce to support the economy.
- Based on a new estimated model of sudden stop crises, we show that crises propagated by financial frictions can be followed by an initial quick but partial rebound. Thereafter, protracted stagnation can follow. (Mexico's experience suggests that it may take up to 5-ten years for the economy to recover).
- COVID-19 is singular and is a major compounding factor, greatly increasing the chances that the recovery will be drawn out and anaemic. Policy needs to be designed taking the likely persistence of the shock into account.