Discussion: 'International Recessions,' by Fabrizio Perri (University of Minnesota and FRB of Minneapolis) and Vincenzo Quadrini (University of Southern California)

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"The 2007-2009 crisis was characterized by an unprecedented degree of international synchronization as all major industrialized countries experienced large macroeconomic contractions around the date of Lehman bankruptcy."

The Contribution of the Paper

- "Usually comovement is explained as the result of **synchronized disturbances** (global or common shocks as in Crucini, Kose and Otrok (2011)) and/or as the result of **country-specific shocks that spill over to other countries** (international transmission of country-specific shocks)."
- Quadrini and Perri (2011) offers us an *alternative* interpretation:
    - They show that under certain conditions, two countries are financially integrated and the shadow cost of credit is equalized across countries → provides an endogenous mechanism for synchronization of real and financial variables in response to global credit disturbances.
    - They also show in this framework that global (perfectly correlated) credit disturbances may emerge endogenously as multiple self-fulfilling equilibria in the model.

The Contribution of the Paper

- The equalization of the shadow costs of credit across countries acts as a global (or perfectly-correlated) credit disturbance would → **synchronization in financial variables, not just real variables**.

- More importantly: Beliefs about the credit disturbance are endogenous and self-fulfilling, so the paper proposes **an alternative to treating shocks as exogenous**

  - The distribution of shocks as $F\left(\mu; \theta^{endo}\right) \leftarrow \theta^{endo} \equiv$ endogenous parameters vs. $F\left(\mu; \theta^{exo}\right) \leftarrow \theta^{exo} \equiv$ exogenous parameters

- "(...) treating shocks as exogenous does not help us understanding the causes of these shocks and the desirability of policy interventions to reduce the frequency of the shocks."

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2. I would claim that the model has very stark quantitative predictions on macro aggregates, but the argument can be enhanced if

   - Testable implications (particularly on financial variables) are spelled-out and contrasted with the data
   - The mechanism to pick among multiple equilibria clarified: What is it that triggers a change from a "good" equilibrium to a "bad" equilibrium?

Observation 1

- "The 2007-2009 crisis was characterized by an unprecedented degree of international synchronization as all major industrialized countries experienced large macroeconomic contractions around the date of Lehman bankruptcy."
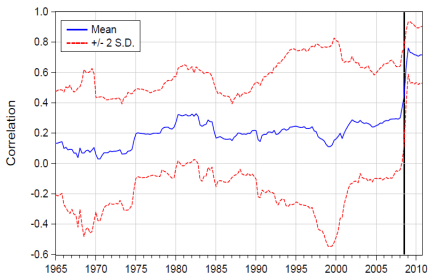

Figure 2: Rolling correlations of quarterly GDP growth among G7 countries.

- This figure plots the average correlation of 10 years rolling windows of quarterly GDP growth between all G7 countries.

Observation 1: Contagion?

- Forbes and Rigobon (2002): "No Contagion, Only Interdependence: Measuring Stock Market Comovements," Journal of Finance, vol. 57(5), pp. 2223-2261.
  - Evidence suggests synchronization (contagion) if defined as a significant increase in market comovement (i.e. $\uparrow \rho$) after a country-specific shock.
  - Forbes and Rigobon (2002) worry that "*correlations are conditional on market volatility*." E.g., let x_t and y_t both be related as follows,

$$y_t = \alpha + \beta x_t + \epsilon_t,$$

where $\mathbb{E}\left[\epsilon_t\right] = 0$, $\mathbb{E}\left[\epsilon_t^2\right] = c < \infty$, and $\mathbb{E}\left[x_t\epsilon_t\right] = 0$. The correlation coefficient can be re-expressed as,

$$\rho = \frac{\sigma_{xy}}{\sigma_x \sigma_y} = \beta \frac{\sigma_x}{\sigma_y}.$$

Despite the fact that the underlying relationship between the two variables remains unchanged, correlations may shift as volatility shifts.
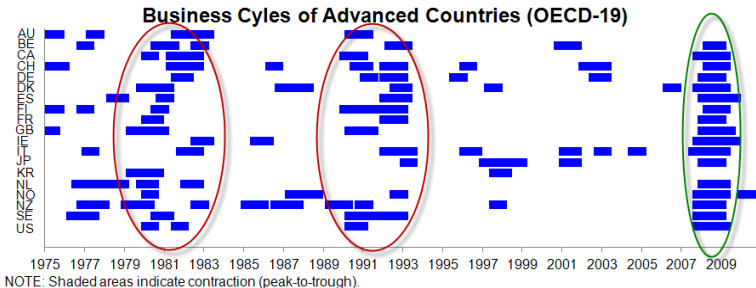
Observation 1: Contagion?

- Adjusting for this bias, Forbes and Rigobon (2002) found there was virtually no increase in *unconditional correlation coefficients* (i.e., no contagion) during the 1997 Asian crisis, 1994 Mexican devaluation, and 1987 U.S. market crash.

  - Maybe also an issue for the 2007-09 recession?

Observation 2: Interdependence, Synchronization?

- One way to look at the data synchronization and/or interdependence:
  - Describe an appropriate transformation of the series y_t and x_t using the Harding and Pagan (2002) rule to distinguish periods of contraction from periods of expansion, i.e.
    $S_t^y = T^y \left(\ln \left(y_{t-K} \right), ..., \ln \left(y_{t+K} \right) \right)$ and
    $S_t^x = T^x \left(\ln \left(x_{t-K} \right), ..., \ln \left(x_{t+K} \right) \right) \leftarrow$ Classical Cycles

Business Cyles of Advanced Countries (OECD-19)

NOTE: Shaded areas indicate contraction (peak-to-trough).

## Observation 2: Interdependence, Synchronization?

- The previous two recessions have also affected most advanced
  economies (**strong interdependence**), but the simultaneity
  of the contraction in real economic activity (**synchronization**)
  $\rightarrow$ question: how do we test the statistical significance of
  interdependence (against the null of independence) when
  changes in one country would influence the correlation with all
  others?

    - Previous two recessions are not necessarily regarded as
      primarily financial in nature.

Structure of Leads and Lags for Real GDP (Correlogram)

	US real GDP_t					
	s=-3	-2	-1	0	1	2
OECD real GDP_{t+s}						
1975Q1-2010Q4	0.12	0.22	0.52	0.82	0.62	0.32
1975Q1-1994Q4	-0.04	0.04	0.35	0.75	0.35	-0.04

Observation 3: Testable Financial Implications?

- One of the key strong, testable implications of the theory is the equalization of the shadow cost of credit—is that something that we observe in the data?
- Joao F. Gomes, Amir Yaron and Lu Zhang (2003): "Asset Prices and Business Cycles with Costly External Finance," Review of Economic Dynamics, vol. 6(4), pp. 767-788.
    - Are spreads countercyclical as some of the empirical evidence suggest (see e.g. Gomes, Yaron and Zhang (2003))?
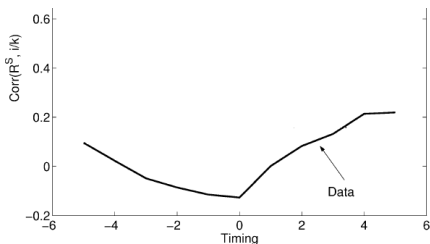
Observation 4: What Triggers a Shift from One Equilibrium to Another?

- "Constrained borrowing" is intratemporal and presumably the borrowing is not subject to aggregate risk. The multiple equilibria are self-fulfilling.

  - But then, what triggers a shift from a "good" to a "bad" equilibrium if aggregate shocks are not the reason?
  - In equilibrium: it seems either the borrowing constraint is binding in both countries in a given period or non-binding. Why is it that they do not end up with the same ζ and $\overline{p} = 0$? If not, how the aggregate state affects $p(s_t)$?

- How is the simulated exercise different from an unexpected and exogenous temporary/permanent change in the fraction of collateral ζ that can be pledged for borrowing?

  - "Therefore, a credit expansion is generated by a permanent switch from $\underline{\zeta}$ to $\overline{\zeta}$."

Observation 4: What Triggers a Shift from One Equilibrium to Another?

- "(...) the impulse responses take place in a range of states that admit multiple equilibria. Therefore, the selected draws of $\tilde{\zeta}_t$ are possible equilibrium outcomes." Why this particular 'selection'?