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# Time to Produce and Emerging Market Crises

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# Summary

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- Multi-sector equilibrium model of a small open economy.
- Introduces a sector-specific time lag between the use of an input and the sale of the output: “time to produce”. Such wait implies an opportunity cost of investing in the inputs and provides a channel for interest rate shocks to affect the marginal cost of output.
- Explores whether the time lags in production and sales helped explain drops in output during emerging market crises:
  - Sectors with higher inventories relative to production costs experience a larger drop in output, especially 3-5 years after the beginning of the crisis.
- Uses cross-sectional data to discipline macroeconomic modeling: shock to the foreign interest rate vs. productivity shock. Quantitative model.

## Measuring Production time

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- Inventories (raw materials, work in process and finished goods): accumulate production costs that do not correspond to a good that has been sold.
- $\text{Inventories}_t = \text{Inventories}_{t-1} + \text{Current Costs}_t - \text{Costs of goods sold}_t$
- At a steady state the Current Costs and Costs of goods sold by the firm are the same and Inventories are constant. Then,
- $\text{Average time} = \text{Inventories} / \text{Cost of goods sold}$
- is the average time between the use of one dollar of input and the sale of the final good

## Basic set up: “time to produce” and the interest rate

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- $Y_t = Z_t (0)^{1-w} Z_{t-1}^w$
- Cost of goods sold<sub>t</sub> =  $Z_t(0) + RZ_{t-1}(1)$  (1)

where  $R$  is the one period interest rate. It multiplies  $Z_{t-1}(1)$ , as the opportunity cost of capital is part of the costs of the firm.

- Current Costs<sub>t</sub> =  $Z_t(0) + RZ_t(1)$  (2)
- (2)-(1) is change in inventory:  $\text{Inventories}_t - \text{Inventories}_{t-1} = RZ_t(1) - RZ_{t-1}(1)$

in s.s., and assuming zero initial inventories,  $\text{Inventories} = RZ(1)$

Then, for a cost minimizing firm:

- $\text{Inventories} / \text{Cost goods sold} = RZ(1) / [Z(0) + RZ(1)] = w$

## Basic set up: model response to exogenous shocks

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- Given  $Y_t$ , Inventories /Cost goods sold also captures the sensitivity of Cost of goods sold to  $R$ . “Time to produce” is a channel for  $R$  to affect the marginal cost of production.

### Shocks

- Shock to the foreign interest rate: lower wage and lower price of non tradables lead to boom in tradables if there is no “time to produce”.
- Shock to productivity: cannot account for cross-sectoral differences in data.

### Implications

- Financial shocks matter to explain emerging market crises.
- Cross-sectoral response helps identify the type of shocks affecting the economy and their transmission mechanism.

# Data and empirics

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- Events: drop in capital inflows and in GDP.
- “Time to produce” measure:
  - Inventories/Cost of goods sold from COMPUSTAT for US firms and
  - Inventories/Sales from Korean Financial Survey Analysis.
- Association between “time to produce” and sectoral performance:  $b < 0$

$$\text{Change in value added} = a + b \text{ TTP} + \text{controls} + \text{error}$$

# Questions and suggestions I

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- Focus on “time to produce”:
  - Differences with “time to build”?
  - Compare results: aggregate, sectoral.
- Focus on “emerging market crises”
  - Model could be applied to european economies
- Crisis episodes:
  - Definition: why not take Calvo/Mendoza’s list of sudden stop events?

## Questions and suggestions II

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- Data and empirics:
  - Cost of goods sold: does not include indirect labor (clerks, managers). Could be significant for service sector.
  - Use of Inventory/Sales for korean firms: sector-specific markups (Gable 2007, 2009, Jaimovich and Floetotto 2008).
  - Result: Rajan and Zingales' External Dependence measure is not significant in the regression for sectoral change in value added around a crisis event. Seems to contradict Dell'Ariccia et.al 2007 and Kroszner et.al 2006 who find an important role for external dependence in banking crises. Compare with banking crises (likely significant overlap with current event sample).

## Questions and suggestions III

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- Model calibration
  - Crises are extreme events with highly non linear dynamics and larger shifts than in regular downturns: log linearization around steady state may not be the most appropriate approach to capture their dynamics.
  - Household discounts future at rate  $\beta$ , where  $\beta^{-1}$  = steady state exogenous interest rate  $R$  (pp.26), and both are set to match moments in the data. However, Table 5 (pp.27) seems to set  $\beta^{-1} < \text{steady state } R$ .
  - Not clear how the model is closed (Schmitt-Grohe and Uribe 2003).

## Final Remarks

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- Very interesting paper. I enjoyed reading it.
- Introduces sector-specific “time to produce” in a multi-sector small open economy model.
- Explores whether “time to produce” was relevant to explain drops in output during emerging market crises, and the model environment under which the aggregate impact is stronger.
- Uses cross-sectional data to discipline macroeconomic modeling: transmission mechanism for a shock to the foreign interest rate vs. a productivity shock.