Financial Frictions

Macroeconomics B

Philippe Bacchetta

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Introduction

- Growing role of financial frictions in international macroeconomic models
  - Especially after the 2008 global financial crisis
  - Computer power and techniques make it easier to introduce these frictions
- Financial frictions come from informational asymmetries, transactions costs, policy distortions, etc.
- Typically lead to borrowing constraints by firms, households, or financial intermediaries
- Can explain many features and have policy implications

Financial Frictions and International Capital Flows

- Financial frictions are used to explain financial crises and the evolution of international capital flows

- Examples:

1. Volatility in emerging markets, including credit booms and sudden stops
2. Financial contagion
3. Role of financial frictions in global imbalances
4. Global Financial Cycle
5. Exchange rate dynamics

Policy Implications

- Financial frictions often generate externalities. Creates a role for optimal policy intervention
- May affect monetary, fiscal or exchange rate policies
- But also role for other policies
  1. Macroprudential regulation
  2. Capital controls
  3. FX intervention
- Example: IMF Integrated Policy Framework
  - New Keynesian open economy DSGE model with financial frictions
  - Combine optimal monetary policy with optimal macroprudential regulation, capital controls, FX intervention

Borrowing Constraints

- The macroeconomic literature initially focused on credit constraints on entrepreneurs
  - In the spirit of Bernanke-Gertler (AER 1989) or Kyiotaki-Moore (JPE, 1997)
- But there could also be constrained consumers, e.g., for mortgages
- Or short-selling constraints on investors
- Recently the focus has shifted to constraints on financial intermediaries, i.e. , banks or investors
  - Constraint on domestic banks or on international financial intermediaries
- Analyze some simple cases

A Simple Model with Credit Market

- One of the first papers was Gertler and Rogoff (1990) with a two-period model. It is presented in ch. 6 of Obstfeld-Rogoff
- We will see a somewhat simpler two-period model with investment
- Agents are both consumers and entrepreneurs
- There is asymmetric information between lenders and borrowers, leading to moral hazard

- Entrepreneurs have an incentive to cheat, either by not repaying or by not putting enough effort in their project
- Lender will typically lend less or charge a risk premium to limit moral hazard
- This limit in lending is similar to what happens with default in the sovereign debt literature
- But here the problem is at the level of entrepreneurs

- Consider a country with high productivity that wants to borrow
- To focus on debt, we use the notation $D_2 = -B_2$
- Entrepreneurs invest I_1 to produce $Y_2 = F(I_1)$
- There is no initial capital stock $(K_1 = 0)$
- Budget constraints:

$$C_1 = Y_1 + D_2 - I_1 \quad (1)$$
$$C_2 = F(I_1) + I_1 - (1+r)D_2 \quad (2)$$

- Assume that utility is $U = C_2$
- Then $C_1 = 0$
- Y_1 is also saving
- Investment is:

$$I_1 = Y_1 + D_2$$

  - Y_1: internal funds
  - D_2: external funds
  - I_1 / Y_1: leverage ratio

Moral Hazard

- Entrepreneurs have an incentive not to repay. Their cost of not repaying is

$$\phi I_1$$

- The cost increases with financial development, so that ϕ can measure financial development
- Repay when the cost is too high, i.e. when:

$$Y_2 - (1+r)D_2 \geq Y_2 - \phi I_1$$

- Repay when

$$D_2 \leq \frac{\phi I_1}{1+r} \tag{3}$$

- This basically assumes that the lender does not seize the collateral

- We have $I_1 = Y_1 + D_2$
- We can rewrite (3) as:

$$D_2 \leq \mu Y_1 \tag{4}$$

where:

$$\mu = \frac{\phi}{1 + r - \phi}$$

- μ is credit multiplier
- We can also write:

$$I_1 \leq (1 + \mu) Y_1 \tag{5}$$

- $1 + \mu$ is maximum leverage ratio

- μ increases with financial development

- Constraint more likely to bind when
  - μ small: low level of financial development
  - Y_1 small: low level of economic development or of economic activity

- Credit constraint more likely to bind in less developed countries or in crisis times

Optimal behavior

- max $C_2 + \lambda(\mu Y_1 - D_2)$
- Substitute C_2 and write Lagrangian:

$$F(Y_1 + D_2) + Y_1 + D_2 - (1 + r)D_2 + \lambda(\mu Y_1 - D_2)$$

- FOC are:

$$\begin{aligned} F'(I_1) - r &= \lambda \\ \lambda(\mu Y_1 - D_2) &= 0 \qquad \text{and} \qquad D_2 \leq \mu Y_1 \end{aligned}$$

Credit constraint

- Constraint not binding: $\lambda = 0$

$$F'(I_1) = r$$

- Constraint binding: $\lambda > 0$

$$\begin{aligned} F'(I_1) &> r \\ D_2 &= \mu Y_1 \end{aligned}$$

- Suboptimal investment

Constraint not binding

- When constraint is not binding, investment fully determined by productivity and by r
- Shocks to Y_1 have no impact as they can be smoothed by foreign borrowing D_2
- For example $Y_1 \uparrow$ implies $D_2 \downarrow$ and Y_2 constant
- Also, independence between saving Y_1 and investment I_1

Binding constraint

- When constraint is binding, shocks to Y_1 affect D_2 and I_1
- for example $Y_1 \uparrow$ implies $D_2 \uparrow$ and $I_1 \uparrow$. Then $Y_2 \uparrow$
- Shocks to Y_1 are amplified: C_2 varies more
- Shocks have a dynamic effect: *financial accelerator*
- Saving and investment are positively correlated: potential explanation to the Feldstein-Horioka puzzle
- Useful to look at a more dynamic model

Remarks on the credit constraint

- In the literature, there are different forms of credit constraints
- Often related to the stock of capital
- In our context we can write (3) as:

$$D_2 \leq \frac{\phi K_2}{1+r} \tag{6}$$

- K_2 could be used as collateral
- There could be a time-varying price of capital q_t so that:

$$D_2 \leq \frac{\phi K_2}{1+r} E(q_2) \tag{7}$$

- As in Kiyotaki-Moore (1997)

Remarks on the credit constraint

- In some papers they use q_2 instead of $E(q_2)$:

$$D_2 \leq \frac{\phi K_2}{1+r} q_2 \tag{8}$$

- Generates more volatility, but not really microfounded

- In recent models, it is the net worth of financial intermediaries that matters

Role for capital controls and macroeconomic policies

- Consider a model with traded and non-traded goods. Total output in period 1 is $Y_1^T + p_1 Y_1^N$. Assume the following contraint:

$$D_2 \leq \mu \left(Y_1^T + p_1 Y_1^N \right) \tag{9}$$

- p_1 is endogenous and is affected by external borrowing

- If D_2 increases for all households, p_1 increases (C_1^T increases). But indiviual households do not take into account the impact of their borrowing on p_1: **externality**

$\Rightarrow$ Excessive borrowing

$\Rightarrow$ Role for policy (e.g. Bianchi, AER 2011)

- Policies that restrict borrowing may be optimal
  - Macroprudential policies on banks
  - Capital Controls

Demand for liquid assets

- Credit constraints may also create a demand for liquid assets
- For example a consumer thinks that income may be lower tomorrow, and knows he will be prevented to borrow due to a credit constraint
  - Implies a precautionary demand for assets
- Another example is a firm who knows it might have future expenditures on a project (working capital or further investment).
  - Generates a demand for liquid assets at the time of the investment
- Need a more dynamic model (at least three periods)
- Papers applying this idea:
  - Bacchetta-Benhima-Kalantzis (*AEJMacro* 2013, *IMF Economic Review* 2014) on China; (*JME* 2020) on liquidity traps
  - Bacchetta-Benhima (*JEEA* 2015) on global imbalance
  - Bacchetta-Benhima-Poilly (*AEJMacro* 2019) on corporate cash and unemployment

Constrained Financial Intermediaries

- Investors buy and sell foreign assets through international financial intermediaries
  - Mutual funds, pension funds, hedge funds, investment banks
- Intermediaries may be constrained
  - regulation
  - moral hazard
- This limits capital flows and arbitrage
- The supply of funds is no longer fully elastic at interest rate r

The Gabaix-Maggiori Model

- Gabaix-Maggiori (QJE, 2015)
- Consider international financial intermediaries that arbitrage between domestic and foreign assets
- They invest in domestic bonds B^{H*}_{t+1} and have a discount factor M^*_{t+1}
- The excess return in domestic currency is XS^*_{t+1}
- Assume their objective function is:

$$V^*_t = E_t \left[M^*_{t+1} B^{H*}_{t+1} XS^*_{t+1} \right] \tag{10}$$

- Assume intermediaries can divert a fraction ΓB_{t+1}^{H*} of foreign assets
- Participation constraint for investors: $V_t^* \geq \Gamma (B_{t+1}^{H*})^2$
- Using (10) assuming the constraint is binding gives optimal demand for foreign bonds:

$$B_{t+1}^{H*} = \frac{E_t \left[M_{t+1}^* XS_{t+1}^* \right]}{\Gamma}$$

- Can also be rewritten as Gamma equation:

$$\Gamma B_{t+1}^{H*} = E_t \left[M_{t+1}^* XS_{t+1}^* \right]$$

- Discounted excess return depends on B_{t+1}^{H*} and Γ: limited arbitrage
- Gives a role for FX intervention and capital controls