Part IIB - International Economics
Additional Notes

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Supervision 8: Jeanne Model

There appears to be some confusion among many students with the Jeanne (2016) model, as discussed in the lectures. This handout is intended to provide additional explanation as further reading for this topic. There may be typos, do let me know if this is the case. Do note that I try to match notation as given in the lecture notes, rather than the time period conventions from the original paper.

Outline

The model lasts for two periods, indexed by 0 and 1. Domestic households have income given by $y_0 = 0$ and y_1, such that a lack of endowment in period-0 translates into a desire to borrow against future income, y_1, to increase overall utility (smoothing motive). Households borrow exclusively from global banks, which may be subject to a bank run (the key shock in the model). This arises with probability χ between periods 0 and 1. If a bank run arises a fraction of global banks, s, will seek to raise funds through a fire-sale of their assets. The timing of the model may then be represented as:

- Period 0 (morning): Households decide, b_0, m and c_0. Global banks agree to issue loans to households of value b_0, while holding international reserves worth m. Borrowing may only occur provided the global banks' value-at-risk constraint is met, $m \geq sb_0$. This VaR constraint ensures that, in aggregate, global banks are able to cover the costs of a potential bank run.

- Period 0 (afternoon): A fraction, s, of global banks undergo a fire-sale, selling sb_0 units of loans back to households in exchange for the entire stock of international reserves held in the home country, m. The price of this exchange, q therefore satisfies $qsb_0 = m$. This is tantamount to assuming that debt contracts, b_0 are not liquid, but international reserves, m are.

- Period 1: Households repay the remainder of their bank loans to the remaining global banks, with c_1 then being consumed.

Key Model Insight

The key conclusion to be drawn from this model is that, when left to their own devices, households may choose sub-optimal level of international reveres as the marginal private benefit of holding reserves will not in general coincide with the marginal social benefit of such holdings. This leaves space for government intervention, through capital controls, to encourage households to value international deposits/discourage the households valuation of borrowing.

We may show this in two steps, for the specific case when $\chi \to 0$. Initially we set out the household problem, and derive the optimal solution and show how this leads to $m \to 0$, and hence (due to the global banks' VaR constraint) households hold a sub-optimal level of international reserves, m. Then we solve the same problem through the lens of a social planner, who imposes that the value-at-risk constraint binds and that the country therefore has access to international borrowing.

Note - we will concentrate entirely upon the case with $\chi \to 0$, as the households portfolio decision (between b_0 and m) is difficult to determine in other cases.

Household Problem

Households in the emerging market have a utility function:

$$u(c_0) + \mathbb{E}_0[c_1],$$

subject to a period-0 budget constraint given by:

$$c_0 + m = b_0,$$

and a period-1 budget constraint given by:

$$c_1 = y_1 - R^W b_0 + m.$$

The timing structure, outlined above, infers that the period-1 budget constraint for the households may be rewritten as:

$$\begin{aligned} c_1 &= y_1 - R^W b_0 + m, && \text{if no bank run, with probability } (1-\chi), \\ c_1 &= y_1 - R^W b_0 + m + sR^W b_0 - qsb_0, && \text{if bank run, with probability } \chi. \end{aligned}$$

where the final two terms in the second constraint represent the reduction in required interest payments whenever households take part in the debt fire-sale ($sR^W b_0$) and the costs of taking part in the sale (qsb_0). For simplicity we assume that $R^W > q$, such that whenever $m > 0$ households will be both willing and able to take part in this fire-sale. This second constraint may then be simplified to become:

$$c_1 = y_1 - (1-s)R^W b_0 - qsb_0 + m.$$

We will exclusively focus on the case when $\chi \to 0$. In this instance the household's maximisation problem may be written as:

$$\max_{b_0,m}\{u(c_0) + \mathbb{E}_0[c_1]\} = \max_{b_0,m}\{u(b_0 - m) + y_1 - R^W b_0 + m\}.$$

The first order condition of the problem are then:

$$\begin{aligned} u'(c_0) &= R^W, \\ u'(c_0) &= 1, \end{aligned}$$

highlighting how international reserves are a strictly dominated asset. The first FOC highlights the private marginal costs of borrowing. The benefit to holding them (possibility of taking part in a fire sale and exchanging for debt) arises with a probability $\chi \to 0$, and hence $m \to 0$. This is true since the non-negativity constraint, $m \geq 0$, must be obeyed. As long as $\chi \rightarrow 0$, but $\chi > 0$ however, this can not be an optimal point, as with $m = 0$ the VaR constraint for banks, $m > sb_0$, will ensure $b_0 = 0$ also.

Benevolent Planner

Instead as $\chi \rightarrow 0$ a social planner would seek to find a solution to the problem:

$$\max_{b_0, m}\{u(c_0) + \mathbb{E}_0[c_1]\},$$

subject to the budget constraints:

$$\begin{aligned} c_0 + m &= b_0, \\ c_1 &= y_1 - R^W b_0 + m, \end{aligned}$$

and the additional VaR constraint:

$$m \geq sb,$$

which, we will assume binds.

The planner's problem may then be rewritten as:

$$\begin{aligned} &\max_{b_0, m}\{u(b_0 - m) + y_1 - R^W b_0 + m\}, \\ &\max_{b_0}\{u((1-s)b_0) + y_1 - (R^W - s)b_0\}, \end{aligned}$$

which is associated with the first order condition:

$$u'(c_0) = \frac{R^W - s}{1 - s},$$

The difference between the social and private marginal costs of borrowing may then be given as:

$$\frac{R^W - s}{1 - s} - R^W = \frac{s(R^W - 1)}{1 - s} > 0,$$

such that, left to their own devices, households would optimally seek to borrow more than is socially optimal.