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檢視中國之債務陷阱

Examining the Debt Trap from China

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Introduction

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Model

International debt often lacks perfect enforcement, therefore the government holds the decision of whether to repay the debts or go default, based on the comparison of the future values (Eaton and Gersovitz, 1981). Thus, default can be considered an optimal policy for a country. If a country chooses to default, it faces the consequence of being excluded from the international credit market for a period of time and would have to rely solely on its own financial resources. However, it would also benefit from not having to pay the interest on the debt. Moreover, studies have pointed out that sovereign debt defaults are often accompanied by a devaluation of the currency; Reinhart (2002) refers to this phenomenon as "Twin Ds." Empirical analysis by Na et al. (2018) further observes that the devaluation rate often decreases after the time of default, suggesting that the Twin Ds phenomenon is the joint result of an optimal policy. They proposed a model that incorporates two key frictions: limited commitment to repay external debts and downward nominal wage rigidity. The model predicts that default will occur only after a series of increasingly negative output shocks. Prior to default, domestic absorption experiences a severe contraction, which leads to a decline in demand for labor. However, due to downward nominal wage rigidity, real wages fail to adjust downward, resulting in involuntary unemployment. To prevent this situation, the optimal policy is to devalue the domestic currency, thereby reducing the

real value of wages. As a result, both the model and the data show that default episodes are usually accompanied by significant currency devaluations (Na et al., 2018).

For the sovereign debt model, I closely follow Na et al. (2018), as it allows me to match certain stylized facts about the sovereign debt defaults and examine the set of conditions where default is the optimal decision. The calibrated model will then serve as a benchmark metric that allows us to examine whether China had set the heavily indebted poor counties into a default trap, following the method proposed by Hinrichsen (2020).

3.1 Households

The model assumes that the economy is populated by a large number of representative households who maximize their expected lifetime utility

$$E_0 \sum_{t=0}^{\infty} \beta^t U(c_t), \tag{1}$$

where $\beta \in (0, 1)$ denotes the discount factor, and c_t represents the consumption good, which is composed of tradable consumption c_t^T and nontradable consumption c_t^N. Assume that c_t follows an aggregate technology

$$c_t = A(c_t^T, c_t^N), \tag{2}$$

where A is an increasing, concave, and linearly homogeneous function that captures characteristics such as the ratio or elasticity of substitution between tradable and nontradable consumption. The period utility function $U(c_t)$ follows the standard assumption, which is a strictly increasing and strictly concave function.

Assume that households only have access to the one-period and state non-contingent bond. The households spend on consumption of tradable and untradable goods, along with their debt which is realized at this period. Their resources consist of labor incomes,

dividend incomes, lump-sum transfers, as well as debt incomes. The households are also endowed with tradable goods, which follow a stochastic process. The budget constraint of the representative household is then

$$P_t^T c_t^T + P_t^N c_t^N + P_t^T d_t = P_t^T \tilde{y}_t^T + W_t h_t + (1 - \tau_t^d) P_t^T q_t^d d_{t+1} + F_t + \Phi_t, \tag{3}$$

where $P_t^T (P_t^N)$ denotes the nominal price of tradable (nontradable) goods, d_t the bond denominated in tradable goods which is due in period t, q_t the price of debt to be repaid at $t+1$, $\tilde{y}_t^T$ the endowment of traded goods to the household, W_t the nominal wage, h_t the hours worked, τ_t^d the tax on debt, F_t a lump-sum transfer from the government, and finally Φ_t the nominal profits from owning firms. Households' working hour is bounded by an upper limit

$$h_t \leq \bar{h}, \tag{4}$$

and they take the working hours h_t as given.

The households' problem is to choose $\{c_t, c_t^T, c_t^N, d_{t+1}\}$ such that their utility (1) is maximized subjected to the budget constraints (2) – (4) and the no-Ponzi-game debt limit. Further denote the relative price of nontradable in terms of tradable goods as $p_t \equiv \frac{P_t^N}{P_t^T}$, we have the following first order conditions

$$p_t = \frac{A_2(c_t^T, c_t^N)}{A_1(c_t^t, c_t^N)} \tag{5a}$$

$$\lambda_t = U'(c_t) A_1(c_t^T, c_t^N) \tag{5b}$$

$$(1 - \tau_t^d) q_t^d \lambda_t = \beta E_t \lambda_{t+1}, \tag{5c}$$

where λ_t is the Lagrange multiplier.

3.2 Firms

Perfectly competitive firms produce nontradable goods y_t^N according to the production technology

$$y_t^N = F(h_t), \tag{6}$$

where F is strictly increasing and strictly concave. Each firm maximizes its profit by choosing the amount of labor. Profit is given by

$$\Phi_t(h_t) = P_t^N F(h_t) - W_t h_t, \tag{7}$$

and the optimal labor demand is then

$$P_t^N F'(h_t) = W_t.$$

Dividing both side by the price of tradable goods, and define $w_t \equiv \frac{W_t}{P_t^T}$ as the real wage in terms of tradable goods, the first order condition can be written as

$$p_t F'(h_t) = w_t. \tag{8}$$

3.3 Downward Nominal Wage Rigidity

The key assumption in Schmitt-Grohe and Uribe (2016) and Na et al. (2018) is the downward nominal wage rigidity. As the wage is unable to be adjusted to a lower level, involuntary unemployment is inevitable, hence the government have the incentive to allow devaluation. The model imposes a lower bound to the grwoth rate of nominal wage

$$W_t \geq \gamma W_{t-1}, \qquad \gamma > 0. \tag{9}$$

This implies that the growth rate $\frac{W_t - W_{t-1}}{W_{t-1}} \geq \gamma - 1$. When this inequality is unbinding ($W_t > \gamma W_{t-1}$), the economy is fully employed ($h_t = \bar{h}$). However, if the condition binds, the economy must have unemployment ($h_t < \bar{h}$). This relationship can be written as the following equation

$$(\bar{h} - h_t)(W_t - \gamma W_{t-1}) = 0. \tag{10}$$

3.4 Government

The model considers a small open economy. The government borrows on international credit market. Due to the lack of enforcement in the market, the government can choose to default or not. Denote I_t as the indicator of whether the government chooses to honor its debts in period t. If the government repays in this period ($I_t = 1$), the country can borrow in the following period, hence $d_{t+1} > 0$. However, if the government chooses to default ($I_t = 0$), then the country enters the status of financial autarky and is unable to have any sovereign debt in the next period, hence $d_{t+1} = 0$. The above scenario can be written as a slackness condition

$$(1 - I_t)d_{t+1} = 0. \tag{11}$$

To model the duration of financial exclusion, assume that once the country is in bad standing in the international credit market, it can regain reputation with probability θ, and remain in bad standing with probability $1-\theta$. This implies that the country has an average exclusion duration of $1/\theta$ periods.

Assume that the government distributes the proceeds from the debt tax to households as a lump-sum payment. If the government honors the debt, it repays d_t, but if the government decides to default, it will not make any payments to foreign lenders, and instead will return any payments made by households to the lenders back to the households. The budget

constraint for the government can then be expressed as

$$f_t = \tau_t^d q_t^d d_{t+1} + (1 - I_t) d_t, \tag{12}$$

where $f_t \equiv \frac{F_t}{P_t^T}$ is the lump-sum transfer in terms of tradable goods. Right-hand side of the equation states that the transfer will include d_t only if $I_t = 0$, meaning that the country decides to default. Nevertheless, the debt tax will be zero after default, according to Equation (11)

Chapter 4

Result

Chapter 5

Conclusion

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