Consumer Default and Optimal Consumption Decisions

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Abstract

We examine the optimal consumption decisions of households in a micro-founded framework that introduces endogenous default. We study default in the context of two-period overlapping processes of consumer behavior, assuming that penalty costs are imposed on borrowers if they are delinquent in the first period and are subsequently refinanced by banks. The utility function of borrowing households is specified to include a term reflecting households real loan balances arising from strategic decisions as regards non-payment of debt. From the analytical solution of the household optimization problem, we derive an augmented Euler equation for consumption, which is a function inter alia of an expected default factor. We use this equation to calculate the static equilibrium value of the percentage of debt repaid and also provide an ordering by size of the household discount factors: borrowers who do not repay all of their loans have the lowest discount factor, followed in turn by borrowers who fully repay them and by savers.

Introduction

- We study optimal consumption decisions of households in a micro-founded framework by setting up a dynamic equilibrium model featuring two main characteristics: agent heterogeneity and endogenous default.
- We incorporate household heterogeneity, as in Iacoviello (2005) where the household sector consists of two types of households: saving (unconstrained or patient) households and borrowing (constrained or impatient) households.
- As to endogenous default, most models in the literature consider that default happens in a single step (Dubey et al., 2005; Goodhart et al., 2009). In our model, we extend the analysis of loan default to two periods. In a given period, some of the unpaid loans of households come to default, while the rest is delinquent debt refinanced by banks in the following period and carrying a penalty cost. A percentage of delinquent debt is recovered in the second period but the other part also comes to default. As in Dubey et al. (2005), default can either occur for strategic reasons or be due to ill fortune.

Interesting Features

- The household sector is split into two different sub-sectors, borrowing and saving households, who do not interact since borrowers always borrow while savers always save. Thus, optimal consumption decisions of these two groups are independent.
- We introduce a new decision variable, the percentage of debt repaid by borrowing households. The optimal value of this variable in a static equilibrium depends on the time preference rate, the borrowing interest rate, the percentage of unpaid debt which is refinanced by banks and the penalty premium added on the interest rate in case of refinancing.
- Consumer default is introduced in the Euler equation for consumption, as a factor affecting lending conditions.
- We introduce in the utility function a term reflecting borrowing households real loan balances arising from its strategic decisions but this does not affect the consumption Euler equation.

Materials and Methods

We form the Lagrangian of the households optimization problem and we derive the first and second-order conditions.

Mathematical Section

The optimization problem reads as follows:

$$\max_{C_t^b, N_t^b, L_t, \mu_t} E_t \sum_{j=0}^{\infty} \left(\beta^b\right)^j \left(\frac{\left(C_{t+j}^b\right)^{1-\sigma}}{1-\sigma} - \frac{\left(N_{t+j}^b\right)^{1+\phi}}{1+\phi} + \frac{\left(\Omega_{t+j}/P_{t+j}\right)^{1-\psi}}{1-\psi} \right) \tag{1}$$

s.t.

$$P_t C_t^b + \Omega_t + \left[\mu_t + k_t\left(1-\mu_t\right)\right]\left(1+i_{t-1}^L\right) L_{t-1} + \mu_t f_{t-1} k_{t-1}\left(1-\mu_{t-1}\right)\left(1+i_{t-2}^L\right) L_{t-2} = W_t N_t^b + \Omega_{t-1} + L_t.$$

An expression for the current periods household default rate (d_t) is given by:

$$d_t = \frac{\left(1-k_t\right)\left(1-\mu_t\right)\left(1+i_{t-1}^L\right)\left(L_{t-1}-B_{t-1}\right) + \left(1-\mu_t\right)\left(1+i_{t-1}^L+f_{t-1}\right) B_{t-1}}{\left(1+i_{t-1}^L\right) L_{t-1}} \tag{2}$$

where $B_t = k_t(1-\mu_t)(1+i_{t-1}^L)L_{t-1}$.

A log-linear approximation of the Euler equation for consumption (cf. Gali, 2008) is shown below:

$$c_t^b = E_t\left\{c_{t+1}^b\right\} - \frac{1}{\sigma}\left[i_t^L - E_t\left\{\pi_{t+1}\right\} - \rho^b + \frac{\left(1-E_t\left\{\mu_{t+1}\right\}\right) f_t k_t \left(1-\mu_t\right)\left(1+i_{t-1}^L\right) L_{t-1}}{\left(1+i_t^L\right) L_t}\right]. \tag{3}$$

The static equilibrium optimal value of the percentage of the debt repaid is:

$$\mu = 1 - \sqrt{\left(\rho^b - i^L\right)/fk}. \tag{4}$$

An ordering by size of the discount factors is provided:

$$\beta^s > \beta^w > \beta^b \tag{5}$$

where $\beta^s, \beta^w, \beta^b$ are the discount factors of savers, borrowers who fully repay their loans and borrowers who do not repay all of their loans.

Results

We obtain:

1. An augmented Euler equation, which determines the household optimal consumption, as a function *inter alia* of an expected default variable.
2. The optimal value of the new decision variable which refers to the percentage of debt repaid in a static (long-run) equilibrium.
3. An ordering by size for the discount factors.

Ongoing Research

- We introduce an extra decision variable in the utility function, i.e. the consumption of housing services, and we make use of two borrowing constraints.
- We are working on the optimization problem when there is one-period default.

References

Dubey, P., Geanakoplos, J. and Shubik, M. (2005), ‘Default and punishment in general equilibrium’, *Econometrica* **73**, 1–37.

Gali, J. (2008), *Monetary Policy, Inflation, and the Business Cycle*, Princeton: Princeton University Press.

Goodhart, C., Osorio, C. and Tsomocos, D. (2009), ‘Analysis of monetary policy and financial stability: A new paradigm’, *CESifo, Working Paper 2885* .

Iacoviello, M. (2005), ‘House prices, borrowing constraints, and monetary policy in the business cycle’, *American Economic Review* **95**, 739–764.

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