Problem Set 1

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MACSS Perspective

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1 Part I: Model from Journal

1.1 Article Information

"The Great Housing Boom of China" by Kaiji Chen and Yi Wen, published in the American Economic Association [1]

References

[1] K. Chen and Y. Wen. The great housing boom of china. *American Economic Journal: Macroeconomics*, 9(2):73–114, April 2017.

1.2 The model

Chen and Wen define the agents in the economy through the use of over-lapping generations:

- F-firms: Fully financially integrated, thus does not any borrowing constraint. Furthermore, these firms behave as typical neoclassical firms

$$\underset{k_t^F, n_t^F}{\text{maximize}} \quad (k_t^F)^\alpha (A_t n_t^F)^{1-\alpha} - R k_t^F - w_t n_t^F$$

- E-firms: More productive than F-firms, but face a borrowing constraint. Chen and Wen characterize this borrowing constraint through the use of old-/young- entrepreneurs; the old entrepreneurs only maximize his value function while he is alive, the young chooses his savings and investment portfolio. When the old dies, the family business is passed on to the young-entrepreneur. Furthermore, the old entrepreneur pays a fraction (ψ) of total profits to young entrepreneur as management fees.

  Old Entrepreneur

$$\underset{n_t^E}{\text{maximize}} \quad (1-\psi)(k_t^E)^\alpha (A_t \chi n_t^E)^{1-\alpha} - w_t n_t^E$$

Young Entrepreneur (split into two steps: step 1, chooses saving; step 2, chooses investment portfolio by maximizing R^E_{t+1})

$$\underset{s^E_t}{\text{maximize}} \quad \log(\psi(k^F_t)^\alpha(A_t n^F_t)^{1-\alpha} - s^E_t) + \beta \log(R^E_{t+1} s^E_t)$$

- Workers: They inelastically supply labor to either E- or F- firms during period t (when they are young) earning a wage w_t, and does not work in period t+1, as they live off of their period t savings.

$$\begin{aligned} &\underset{c_t, c_{t+1}}{\text{maximize}} && \log(c_t) + \beta \log(c_{t+1}) \\ &\text{subject to} && (1) c_t + s_t = w_t \qquad\qquad (2) c_{t+1} = s_t R \end{aligned}$$

1.3 Endogenous & Exogenous Variables

Since the values of the following variables are determined through the model, they are endogenous.

- Worker and Young-entrepreneur savings in period t
- Housing prices of period t and t+1
- Worker wage rate
- E-firm employment level
- Young-entrepreneur investment portfolio

The following variables are treated as "given," they are exogenous.

- Intertemporal discount factor (β)
- Growth rate of the population (n)
- Growth rate of technology (z)
- Productivity wedge (χ) of E-firms to F-firms
- Cobb-Douglas production exponential factor (α) ... ie. output elasticity of capital.
- Interest rate (R)
- Profit share of young-entrepreneurs (ψ)

1.4 Model Classification

This model is a deterministic, nonlinear, dynamic model.

1.5 Model Improvement

Currently Chen and Wen approaches the problem of the Chinese housing bubble through only the market mechanisms of the housing market. Yet, the . Please see Yu (forthcoming) for this treatment.[1]

[1] Hahah, this is my thesis.

2 Part II: My Own Model

The goal is to "predict" whether or not someone gets married. Given the binary output of "married", "not married", I propose a model of the following form:

$$Y = \begin{cases} 0, & \text{if } f(\beta^\top X + \epsilon) \leq 0.5 \\ 1, & \text{otherwise} \end{cases} \tag{1}$$

Where Y=1 means "married" and Y=0 means "not married" and $f(\beta^\top X+\epsilon) = \frac{1}{1+e^{\beta^\top X+\epsilon}}$.

Let us look at the argument of f more closely. The ϵ term represents random error arising from different observations. In the vector of variables X, I include the following:

- x_1 The number of years one has been dating. I assume that people who have dated for longer will have a greater chance of getting married.
- x_2 Household income I assume that if the household is relatively poor (i.e. couch surfing), the likelihood of getting married is low.
- x_3 The count of friends in the individual's social group that are already married. I use this to capture the peer-pressure aspect of marriage.
- x_4 The horoscope (astrology) predictions/ ratings of the individual.[2]

Finally, the vector of $\beta^T = [\beta_0, \beta_1, \beta_2, \beta_3, \beta_4]$ corresponds to how big an impact each of the variables have on the probability of the outcome being 1; β_0 corresponds to x_0, a constant term. Thus, the argument of f is trivially,

$$\beta^T X = [\beta_0, \beta_1, \beta_2, \beta_3, \beta_4] \begin{bmatrix} x_0 \\ x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$$

This model is a complete data generating process. Furthermore, I have not included variables such as *age* (because some of this information is captured by x_1, and I do not believe that a 26 year old who has dated for 0 days will get married), *gender* (I suppose that men and women are alike in marriage decisions), and *self-identified cultural origin*(because with globalization, this data is difficult to obtain as an open source data).

[2]This was included for the laughs. And by horoscope ratings, I mean a score (out of 100) of compatibility between two individuals. (I think this type of things exist out there in the world.. If not, then x_4 could be the rating score (out of 100) provided by a psychic of the individual.