Household Sector Debt, the Real Estate Market and the Quality of Economic Development

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ABSTRACT
Based on the dynamic general equilibrium theory, this paper introduces the total factor productivity model to construct the correlation between household debt, real estate market and quality of economic development. It shows that when the quality of economic growth increases to a certain extent, it will increase the consumption level of the household sector, the output level of manufacturers and the housing value of the real estate market, and even will reduce the debt scale of the household sector, but the macroeconomic fluctuations will be magnified.

Keywords: *household debt, Housing Loans, Quality of Economic Development.*

1. INTRODUCTION

One of the critical problems of China's economy is family debt. According to figure 1, the number of bank cards, especially credit cards, increases year by year. The per capita holding of bank cards in households (Figure 2) is also soaring, so consumer loans, commercial loans (Figure 3), total credit (Figure 4) and so on are on the rise. This suggests that the family department has begun to emphasise consumption smoothing and financial credit planning. In October 2017, the 19th National Congress of the CPC formally concluded that China's economy was transforming from a stage of high-speed economic growth to a stage of high-quality development, which reflected China's adherence to economic development laws.

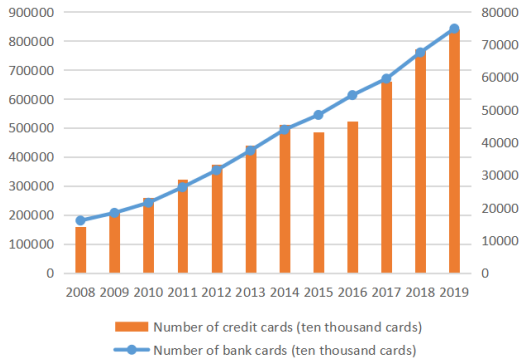

Figure 1 The number of Bank Cards and Credit Cards Issued by Banks.

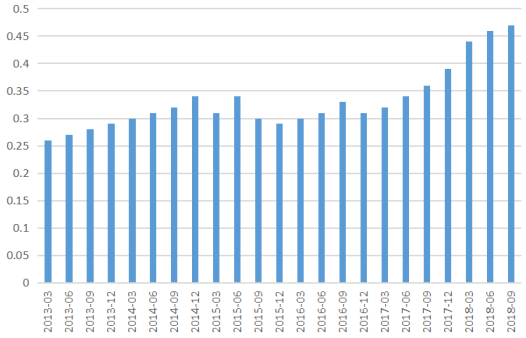

Figure 2 Changes in the Number of Bank Cards Held Per Person.

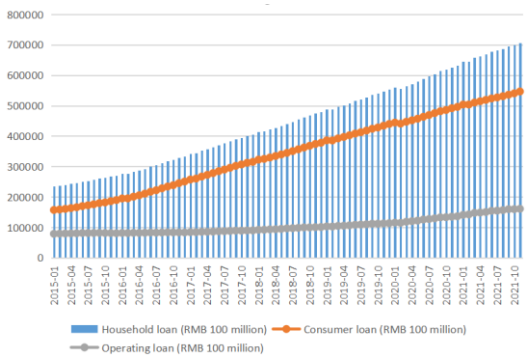

Figure 3 House Sector Loan in Commercial Banks.

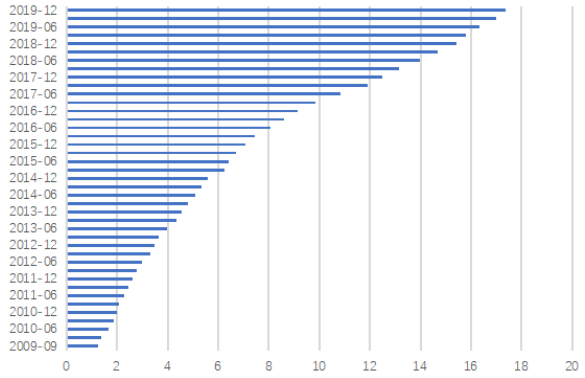

Figure 4 Changes in Total Credit Granting (One Trillion Yuan).

Given the high proportion of housing credit in household debt and the importance of the real estate market to economic development, this paper focuses on the correlation between the scale of household debt and the quality of economic development.

Western developed countries have studied family sector debt earlier. Since the beginning of the 19th century, the research in this field has been relatively perfect, including household borrowing constraints and loan choices, financial asset allocation and other lending behaviors. Throughout the existing literature, the literature on household debt research can be roughly divided into two categories: factors affecting household debt and the consequences of household debt change. Although there are studies on household debt and economic development in the existing literature, they are limited to the total amount of economic growth. They ignore the quality of economic growth. However, the positive quantitative impact has waned as the economy has grown. Based on the judgment of sustainable development and people's pursuit of a higher quality of life, the goal of high-quality product has become an essential indicator of the current development of all countries and the frontier direction of future growth.

Concerning the consequences of changes in household debt, they affect not only the micro-levels of household sector consumption, income and labour but also the macroeconomy. Based on life cycle theory, household sector's debt is created to smooth intergenerational consumption, so it has an essential impact on consumption, and it is influenced by the age ratio of the household sector (Besley, et al., 2008[1]), and the macroeconomic environment (Benito, 2007[2]), etc. Meanwhile, the amount of household debt has a significant influence on labor participation rates in the household sector (Belkar, et al., 2007[3]). The impact of household debt on labor participation rate is not the main content of this paper. Economic efficiency is an essential indicator of economic development, that is, output per unit of labor, so labor participation rate is a crucial factor affecting high-quality economic development. This paper constructs the index as an important influencing variable of total factor productivity in the model. The impact of household debt on the macroeconomy is an essential part of household debt research. In the existing literature, most scholars (Kim, 2011[4]) believe that average household debt can help improve the consumption level of residents and the quality of life, and promote steady economic development (Kelly & Natsem, 2004[5]). However, excessive household debt can also affect the ratio of consumer credit, cause drastic fluctuations in the financial system and macroeconomic shocks, and damage the quality of life of the household sector. Meng Xianchun and Zhang Yishan(2021)[6] found that the expansion of the household debt will reduce the total consumption, production, and investment to a certain extent, thus leading to the higher the macroeconomic loan-to-value ratio and the greater fluctuations.

Considering the real estate market, Tang Wenjin and Zhang Kun(2013)[7] found no significant relationship between household debt and housing price. Still, both housing price and household debt could positively impact consumption. In the existing literature on the correlation between family debt and real estate market fluctuations, in recent years, some scholars have studied the correlation among household debt, real estate market and economic volatility based on a dynamic equilibrium model. Zhao xiangqin (2021)[8] found a countercyclical relationship between family debt and housing price. Meng Xianchun and Zhang Yishan(2021)[9] added the household sector's housing risk preference and financial friction to the dynamic general equilibrium model. They found that the expansion of household debt promotes housing demand, and the increase of housing price further increases household debt, forming a positive feedback mechanism.

Compared with the existing literature, the main contribution of this paper is to expand the existing literature on household debt and high-quality economic development. In the current literature, most of the researches are on the relationship between household debt and economic growth(Kelly & Natsem, 2004[10]; Debelle, 2004[11]; Tian Xinmin and Xia Shiyuan, 2016[12]), or the impact of the changes on the economic outlook and future expectation (Benito, 2007[13]). It is widely believed that rising household debt can boost the economy in the short run but depress it in the long run. The existing literature is more limited to the influence of economic development trends compared with the household debt situation with high economic development quality level. At the same time, most of the researches are about household debt on the quality of economic development. However, this paper is the opposite. This paper considers the household debt, real estate market and high-quality economic development according to the above problems. It discusses the impact of high-quality economic development on the scale of household's credit, housing value and macro-economy,

which is a supplement to the theoretical analysis of this paper.

2. THEORETICAL ANALYSIS

To explore the impact of high-quality economic development on household debt scale and real estate market volatility, this paper introduces the change of total factor productivity. Total factor productivity refers to the ratio of the total output in an economy and the total factor input, which can fully reflect the production efficiency of the whole production per unit of the total input, including labour, capital, raw materials, energy and other production factors. Generally speaking, it can be expressed as the part of output growth rate exceeding factor input growth rate. Total factor productivity is influenced by R&D expenditure, intangible capital expenditure such as education and training, resource allocation, diffusion degree of technological innovation, internal scale determined by technological progress and economy of external scale, quality of human resources and abundance of natural resources and other factors. Therefore, total factor productivity can reflect the quality of economic development to a certain extent.

2.1. Hypothesis

Some basic assumptions need to be made clear before building the model:

Firstly, the increase in Chinese families is a sudden increase rather than a gradual process. It started under the influence of a policy and an ideology. In 1997, China put forward a series of consumption policies to stimulate the rapid growth of domestic consumer demand. Therefore, this paper treats the change of household debt as an exogenous influence.

Secondly, to explore the impact of the quality of economic development on household debt and housing market, this paper continues to use the assumption of total factor productivity in the standard Keynesian model.

Finally, families can invest and buy houses with their own money instead of borrowing from the bank. Although, with the development of the financial market, the households, even those with insufficient endowments, can achieve financial management investments, for simplicity, we will focus on endowment economy.

2.2. Model Design

There are household sectors, manufacturers, banking institutions and property developers in the economy, among which household sectors and manufacturers make a consumption, investment and production arrangements respectively to achieve the goal of benefits(utility) maximization. Family departments include patient families and non-patient families. The former prefers future consumption, so patient families have deposits in the banking institution for future consumption. In contrast, the latter tends to consume now, so non-patient families will borrow money from banking institutions to advance their future income.

2.2.1. Household

The utility function of the home department can be expressed as:

$$\max\ U = E_t \sum_{t=0}^{\infty} \beta_s^t \left[\gamma \log C_t + (1 - \gamma - x) \log(1 - L_t) + \frac{x H_t^{1-\rho}}{1-\rho} \right] \quad (1)$$

Assuming that the proportion of non-patient families is θ_t, the budget constraints of non-patient families and patient families can be expressed as, respectively:

$$\theta_t C_t + \theta_t Q_t^H (H_t - H_{t-1}) + B_{t-1}(1 + R_{t-1}) + \xi_t (B_t - B_{t-1})^2 = \theta_t w_t L_t + \psi_t B_t \quad (2)$$

$$(1 - \theta_t) C_t + (1 - \theta_t) Q_t^H (H_t - H_{t-1}) + D_t = (1 - \theta_t) w_t L_t + (1 + r_{t-1}) D_{t-1} \quad (3)$$

Among them, C_t is the consumption of the family department. L_t does the family department provide the labor. B_t is the non-patient family department extended the loan to the bank. And D_t refers to the total deposit of the patient family in the bank institution. w_t is the unit salary income of the family department. H_t means the housing scale of the household. Besides, r_t refers to the deposit rate, and R_t is the loan rate of the household. γ means the elasticity of household consumption, while x means the elasticity of housing demand. β_s^t is the discount rate and ρ is the elasticity of housing demand. ψ_t indicates that the impact of the family department debt expansion, which follows the AR (1) process, that is, $\psi_t = \rho_\psi \psi_{t-1} + \varepsilon_t^\psi$. $\xi_t (B_{F,t} - B_{F,t-1})^2$ can show the adjustment cost of the household loan, which reflects the family department's difficulty in obtaining loans.

According to the assumptions, household debt is an exogenous variable:

$$B_t = \rho_B B_{t-1} + \varepsilon_B \quad (4)$$

The decision-making problem for the household sector is to maximize the expected utility function(1) under budget constraints (2) and (3) to obtain the Euler condition for consumer demand in the household sector:

$$u'(C_t) = \beta_t E_t \left[u'(C_{t+1})(1 + r_t) \right] \quad (5)$$

2.2.2. Bank

The banking sector, as a financial intermediary, meets:

$$max E_0 \sum_{t=0}^{\infty} \beta_b^t (D_t + R_{t-1} B_{t-1} - r_{t-1} D_{t-1} - B_t) \quad (6)$$

$$s.t. R_t = R_{t-1}^{\eta} \left[R^e \left(\frac{Y_t}{Y} \right)^{\kappa_y} \left(\frac{r_t}{r} \right)^{\kappa_r} \right]^{1-\eta} \quad (7)$$

$$B_t = D_t \quad (8)$$

The bank department takes deposits from the patient family department and lends them to non − patient families to earn interest rates. R^e, Y, R represents the loan interest rate, output level and deposit interest rate at steady state, respectively. κ_y, κ_R indicates the degree of adjustment of the bank to the output level and the deposit interest rate respectively. η taking any value from 0 to 1, indicates the interest rate smoothing coefficient.

2.2.3. Manufacturer

Since the household sector, especially the patient's family, has a preference for future consumption, it is necessary to introduce a stochastic discount factor to describe the manufacturer's optimization problem:

$$\beta_F = \beta_t \frac{E_0 u'(C_t)}{u'(C_0)} = \beta_t \frac{C_0}{C_t} \quad (9)$$

Manufacturers maximize profits:

$$max \ E_0 \sum_{t=0}^{\infty} \beta_F [A_t L_t^{\alpha} - w_t L_t] \quad (10)$$

Among them, A_t means the total factor productivity. A_t represents the production technology impact, following the AR(1) process:

$$A_t = \rho_A A_{t-1} + \varepsilon_t^A \quad (11)$$

2.2.4. Real Estate Developer

$$V_t = \left[1 - \zeta_t \frac{1}{2}\left(\frac{I_t}{I_{t-1}} - 1\right)^2\right] I_t \quad (12)$$

$$V_t = H_t - H_{t-1} \quad (13)$$

Real estate developers buy the final product of the I_t units, convert the housing into $H_t - H_{t-1}$, and eventually sell them to the family department. ζ_t indicates the demand parameters (rigid demand) of the housing market, used to indicate the adjustment speed of housing supply. Then the utility function of the real estate developer is:

$$maxE_0 \sum_{t=0}^{\infty} \beta_h^t (Q_t^H V_t - I_t) \quad (14)$$

2.2.5. Discharge Conditions

$$Y_t = C_t + C_{b,t} + I_t \quad (15)$$

Formula (18) is the equilibrium market clearing condition.

Hypothesis 1: Family sector debt expansion will increase macroeconomic volatility.

According to equations (6), (7) and (8), banks set loan and deposit interest rates with the goal of profit maximization, and their interest rate determining function can be expressed as:

$$\frac{\kappa_r(1-\eta)R_t}{r} = R^e \left[\left(\frac{Y_t}{Y}\right)^{\kappa_y} \left(\frac{r_t}{r}\right)\right] - \left(\rho_B + \frac{\varepsilon_B^{t+1}}{B_t}\right) \beta\eta \left[R^e \left(\frac{Y_{t+1}}{Y}\right)^{\kappa_y} \left(\frac{r_{t+1}}{r}\right)\right] \quad (16)$$

Among them, B_t, ε_B^{t+1}, ρ_B are the relevant variables indicating the size of household debt which will affect the interest rate decision of the banking sector:

(1) The larger the family debt scale B_t in the current period is, the greater the repayment risk is. The loan rate is higher under normal circumstances to enforce the bank's profit principle.

(2) If the expansion impact of family debt ε_B^{t+1} and the adjustment factor of family debt ρ_B are higher, it shows that the banking sector has sufficient sources of profits in the future, so the interest rates on loans are lower in the current period.

Hypothesis 2: When the quality of economic development is high, economic development is negatively correlated with the quantity of labor demand of manufacturers, but there is no correlation between the quality of economic development and the labor supply of family departments.

According to Equations (1), (2) and (3), the labor supply function may be expressed as:

$$L_t = 1 - \frac{C_t(1-\gamma-\chi)}{\gamma w_t} \quad (17)$$

According to the labor supply function(17), the amount of labor provided by the family department depends on four factors: housing demand preference χ, unit salaryw_t, family sector wealthC_t, and consumption preference of the family sector γ.

(1) Preference for housing demand χ. The higher the housing preferences of the household sector, the more money is needed to meet the higher housing demand, and the supply of labor in the household sector increases to obtain higher wages.

(2) Salaries of family departments w_t. According to the theorem of supply, the higher the wage is, the higher the supply of labor in the family sector is.

(3) Family sector wealthC_t. The wealth effect in the household sector is expressed by total consumption, because the more wealth households have, the higher their consumption level. Therefore, the higher the wealth endowment is, the lower the wage preference of the family department is. And there is less labor supply.

(4) Consumer preference of the family sector γ. On the premise of consistent household wealth endowment, if the household sector has a higher consumption preference, higher wages are needed to meet it, and the supply of labor force will be larger.

According to the first-order condition of formula (10), the labor demand curve is obtained:

$$L_t = \left[\frac{\alpha A_t}{w_t}\right]^{\frac{1}{1-\alpha}} \quad (18)$$

It is known that the labor demand of manufacturers depends on two factors: wage costw$_t$and the quality of economic development A_t:

(1) Wage cost w_t. According to the law of demand, the higher the wage cost, the lower the manufacturer's demand for labor. This situation generally has a more significant impact when scale return decreases, while wage cost has a more minor effect when scale return increases.

(2) Quality of economic developmentA_t. When the quality of economic development is low, the manufacturer's return on scale and value for α is between 0 and 1. At this time, the cost of industrial upgrading is very high. With the improvement of the quality of economic development, manufacturers' demand for labor also increases. α is greater than 1. So when the rate of economic development improves, there is less demand for work.

Hypothesis 3: When the quality of economic development reaches a certain level, the quality of economic growth is positively correlated with consumption level and output level.

According to the above analysis, the decision function for consumption is obtained:

$$C_t = \left[1 - \left(\frac{\alpha A_t}{w_t}\right)^{\frac{1}{1-\alpha}}\right]\frac{\gamma w_t}{1-\gamma-\chi} \tag{19}$$

It is generally believed that the advanced industrial structure is closely related to the quality of economic development. When the rate of economic growth is high, manufacturers' returns to scale will increase (i. e. $\alpha > 1$). At this point, the quality of economic development will positively impact consumption. The higher the quality of economic development, the higher the household sector's consumption. However, when the quality of economic development is low, and the scale remuneration of manufacturers decreases (i.e. $0 < \alpha < 1$), there is a negative correlation between the quality of economic development and the consumption level of the family department. This is because the cost of improving the quality of economic development is high in the early stage.

According to the labor supply and demand function and the production function, we found that:

$$Y_t = (A_t)^{\frac{1}{1-\alpha}}\left(\frac{\alpha}{w_t}\right)^{\frac{\alpha}{1-\alpha}} \tag{20}$$

There is consistency between the production level of the household sector and the quality of economic development, as well as between the consumption level and the quality of economic development, which is negative when the quality of economic development is low and positive when the quality of economic development is high. Similarly, according to Equation(10), the quality of economic development will also have a particular impact on the decision-making of the loan interest rate and deposit interest rate of the banking sector. Therefore, the quality of economic development will significantly impact the macroeconomy.

Hypothesis 4: When the quality of economic development is high, the quality of economic development is positively correlated with the housing value in the real estate market.

On the relationship between the quality of economic development and the real estate market:

$$(A_t)^{\frac{1}{1-\alpha}}\left[\left(\frac{\alpha}{w_t}\right)^{\frac{\alpha}{1-\alpha}} + \frac{\gamma w_t}{1-\gamma-\chi}\left(\frac{\alpha}{w_t}\right)^{\frac{1}{1-\alpha}}\right] = \frac{\gamma w_t}{1-\gamma-\chi} + (R_{t-1} - r_{t-1})B_{t-1} + I_t \tag{21}$$

Since wages and loan interest rates are exogenous variables of the family sector, the debt of the family sector has been identified as the previous phase. According to formula (21), When the quality of economic development is high, the housing demand value of the household sector and the housing supply value of real estate manufacturers increase. That is, housing sales increase.

Hypothesis 5: When the quality of economic development is high, the quality of economic development is negatively correlated with the household debt scale.

This research abandons the biological premise of household debt scale to investigate the impact of high-quality economic development on the scale of household debt. According to the above analysis principle, the higher the level of consumption, the greater the wealth effect of the family sector; household debt, on the other hand, has the opposite effect. When economic quality development is low, the household debt scale is more prominent and vice versa.

3. CONCLUSION

This paper studies the correlation between the quality of economic development, household sector debt, and housing value in the real estate market. In the early stage of economic development, the high industrial upgrading costs harm macroeconomic household debt and the real estate market. However, when economic development improves to a certain extent, consumption levels in the household sector, output levels of manufacturers and housing values in the real estate market all improve, despite increasing macroeconomic volatility. For example, when the household sector's debt expands, the bank will weigh the repayment risk of the household sector against profits in the future to adjust the loan interest rate, which increases the fluctuation of the loan interest rate. The debt scale of the household sector will also be reduced. It can be seen that improving the quality of economic development is conducive to stabilizing the market operation and promoting the country's sustainable development.

However, there are still shortcomings in this paper.

Taking total factor productivity as an indicator of economic development quality, the research direction is limited to the impact of comprehensive indicators, without analyzing the heterogeneity of various aspects of economic development quality. In addition, although it is reasonable to replace the quality of economic development with total factor productivity, it is not entirely equivalent. Due to the wide range of total factor productivity index, the measurement methods of different regions are different. In empirical calculation, the index is not comparable. In the existing literature, many scholars use empirical data to construct a high-quality economic development index that is more comprehensive and representative than total factor productivity.

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