Households' debt, demand creation patterns, and economic stability

西, 洋

https://doi.org/10.15017/3000429

出版情報：経済論究. 130, pp.139-153, 2008-03. 九州大学大学院経済学会
バージョン：
権利関係：

Households' Debt, Demand Creation Patterns, and Economic Stability

Hiroshi NISHI*

1 Introduction

The aim in this paper is to examine demand creation pattern and stability of an economy in the context of the augmentation of the households' debt. This can be seen in the American economy especially after the 1990s. For this purpose, we develop a post-Keynesian approach for aggregate demand determination and the *régulation* approach which emphasizes the role of institutional adjustments in the contemporary capitalism.

In the post-Keynesian theory of growth and distribution, it has often been assumed in accordance with the Kaleckian-Classical supposition that 'capitalists earn what they spend, and workers spend what they earn' (Lavoie [1992]). This means that the households receive and spend wage income, and they cannot borrow funds. In other words, they are subject to an extreme liquidity constraint. However, the American experience after the 1990s invalidates this supposition, which motivates our examination about increasing households' debt.

On the other hand, Hyman Minsky's 'financial instability hypothesis' better emphasizes the financial side of economy. This hypothesis is explained by a pro-cyclical pattern of borrowing. In an economic boom, optimistic expectations reduce risks of the lender and the borrower, which allows demand and supply for funds to expand.In a recession, on the contrary, pessimistic expectations become dominant and risks of the lender and of the borrower rise, which largely decreases demand and supply for funds. As a consequence, there is a possibility of debt deflation through decrease in profit and the asset value. Minskians describe such process as transition from 'hedge finance', 'speculative finance' to 'Ponzi finance' (Foley [2003]; Lima and Meirelles [2007]).

However, some issues remain in the proposition of the Minskian that the financial activities always lead to similar type of financial instability. It would differ according to institutional forms embedded in the contemporary capitalism. Epstein [1994] and Noshita [2001], for example, argued that the forms of income distribution, firms, finance and monetary policy differ according to institutional structures such as industrial relations, finance-industry nexus and

* Graduate school of Economics, Kyushu University. email: nishi@en.kyushu-u.ac.jp

central bank-state relationship. In addition, it is well known that the types of financial institutions of an economy can be ideally distinguished as 'bank-based system' or 'capital market-based system', according to the dominant channel of finance. Schaberg [1999] and Uni [2004] showed that the relationship between internal funds and borrowing of firms was almost uncorrelated until the late 1980s in the bank-based systems, but positive in the capital market-based systems.

Therefore, this paper focuses on the institutional form embedded in the private economy. We relate the institutional background which supported households' borrowing and consumption in the American economy after the 1990s to the dynamics of macroeconomy. Taking into consideration the institutional foundation concerning the borrowing and lending patterns, we present an institutionally reinterpreted post-Keynesian model and examine the macroeconomic dynamics.

We also examine the effect of income distribution on economic growth in this context. We can show conventional wage- and profit-led demand regimes. However, these demand regimes and growth patterns might change by introduction of the households' borrowing, since the distributional variables play an important role in the interaction of financial and real sides of economy. Therefore, the compatibility of income distribution, demand creation, and borrowing patterns matters. By developing a model which incorporates their interaction, we show how demand and growth regimes change.

This paper proceeds as follows: In section 2, we develop a dynamic model composed of aggregate demand and households' debt. In section 3, we discuss its stability and present detailed results of the model and examine the compatibility of income distribution, house holds' borrowing, and demand creation patterns. Finally in conclusion, we summarize the main implication of each section.

2 The Model

2.1 Economic Background of Model

Let us first summarize main notation employed in this paper. X: output (total income), X^*: potential output, K: capital stock, E: effective employment level, σ: wage share, $1-\sigma$: profit share, $X^*/K=\nu$: potential output-capital ratio (constant and set to unity for simplicity), $u=X/K$: output-capital ratio (effective demand), $r=(1-\sigma)u$: profit rate, C_w: consumption from disposable wage income, C_b: consumption from borrowing, I: investment demand, $g=I/K=\dot{K}/K$: actual rate of capital accumulation, W: nominal wage rate, P: price level, D_h: stock of households' debt in real terms, $\lambda_h=D_h/K$: debt-capital ratio (households' debt to capital ratio)[1].

We set macroeconomic circulation with institutional arrangements. This is summarized in Figure 1.

The economy consists of one sector. A single commodity is produced by the firms with two

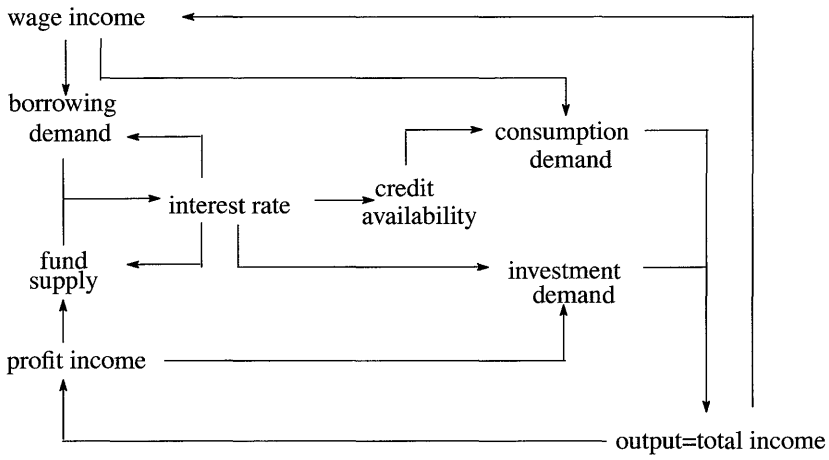

Figure 1: Cumulative Causation of Macroeconomy with Households' Borrowing

factors of production, labor and capital, using a fixed coefficient technology. The total income (output) is determined by consumption and the investment demand. Then, it is distributed to the wage income and profit income. The income distributions is set to be constant by firms' markup pricing. Then, regardless of demand level, the wage and profit shares are determined by $\sigma = wE/PX = 1/(1+z)$, and $1-\sigma = rPK/PX = z/(1+z)$, respectively. The term $z>0$ is the mark-up rate.

As a feature of the demand formation pattern peculiar to the US economy, we assume that the consumption demand depends partly on borrowing which shows pro-cyclical pattern with disposable wage income[2]. The borrowing of the households has two effects on the macroeconomy. On the one hand, the consumption expenditure by the borrowing contributes to aggregate demand and supports the profit rate. It might bring a cumulative debt accumulation, on the other hand. For simplicity, we assume that there is no consumption from profit income. The profit stimulates the investment of firms. In addition, it is also assumed that they borrow implicitly from

1) We call this variable 'debt-capital ratio' simply. We set the model by normalizing the variables by capital stock. The debt-capital ratio $\lambda_h = D_h/K$ means correctly the ratio of 'firms capital' to 'household debt'. This notation itself may not seem to make sense as an economic variable. However, λ_h shows the debt dependence level of economy. Remember that we assumed the potential output-capital ratio is constant. $X^*/K = \nu$, where ν is constant. Then, $\Delta X^* = \nu \Delta K$, where Δ means increment operator, and X^* grows at the same rate as K. We can rewrite $\lambda_h = D_h/K = (D_h/X^*)(X^*/K)$, therefore its change is $:\Delta\lambda_h = \left(\frac{\Delta D_h X^* - D_h \Delta X^*}{X^{*2}}\right)\frac{X^*}{K} + \left(\frac{\Delta X^* K - \Delta K X^*}{K^2}\right)\frac{D_h}{X^*}$. By substituting the relationship $X^* = \nu K$ and $\Delta X^* = \nu \Delta K$, we can show the second term of the equation above, $\Delta X^* K - \Delta K X^*$ is always zero. Therefore, the term λ_h reflects the variation of the households' debt- potential output ratio, D_h/X^*. Thus, we can regard the augmentationof λ_h as a proxy of debt dependence of the economy.

2) Space restriction does not allow us to present the institutional foundation set in the background of this paper. With regard to brief summary of the background of setup, see also Nishi [2007].

banks and their investment suffers a negative impact of rise in interest rate (the lending interest rate for the firms is assumed to be the same as to the households).

The banking sector is introduced into this circulation. We call this sector financial institutions and classify their lending attitudes towards the households' borrowing demand. One of the idea types of the capital market-based economy is said that the allocation of funds is based on the price signals (Ikeo [2006]). In order to embody this point, following Fujita [2006], we define the fund supply function and introduce profit rate, debt-capital ratio and interest rate into this function as the representative macroeconomic signals. The financial institutions decide how much they supply funds based on these signals, which concerns the macroeconomic dynamics. The profit rate represents the general trend of economy, and the debt-capital ratio represents a risk on landing. The interest rate is supposed to compensate the risk for the financial institutions in lending. It is then determined so that excess demand for funds in the loanable fund market can be cleared. This type of institutional adjustment is close to the market-type adjustment in a sense that the credit available for the households and the interest rate are determined by way of demand and supply for funds.

2.2 Households' Borrowing and Aggregate Demand

2.2.1 Demand Regime

Let us first define households' borrowing from financial institutions. Since their desired level of borrowing demand is proportional to their disposable income (the wage income minus interest payment), it is defined as follows[3]:

$$\dot{D}_h=\alpha K+\gamma[\sigma X-iD_h], \qquad \alpha>0, \qquad \gamma>0. \tag{2.1}$$

where α represents a trend of borrowing, and γ means the sensitivity of borrowing to change in the disposable income. Although α is an exogenous variable, to some extent, we can read in this variable that the wealth effect by a rise in the housing price can stimulate the households' borrowing.

The households are assumed to spend a constant fraction of the disposable wage income and the borrowing, respectively. Total consumption by them C, is then determined as follows:

$$\begin{aligned} C&=C_w+C_b, \\ &=(1-s_w)(\sigma X-iD_h)+(1-s_b)[\alpha K+\gamma(\sigma X-iD_h)], \\ &=[(1-s_w)+(1-s_b)\gamma](\sigma X-iD)+(1-s_b)\alpha K. \end{aligned} \tag{2.2}$$

where $s_w\in[0,\ 1)$ and $s_b\in[0,\ 1)$ represent the saving rate from the disposable wage income and

3) Dutt [2005] and Dutt [2006] defined the desired level of households' borrowing by eq.(2.1), and regarded the value of γ as both demand side factor (e.g.propensity of workers to borrow) and supply side factor (e.g.bank lending practices). However, we regard eq.(2.1) as determined by demand side, and define separately supply side factor by the following eq.(2.5) which constrains the lending volume.

from the borrowing, respectively.

The investment function is defined by Marglin and Bhaduri type:

$$\dot{K}=I=(g_0+g_1(1-\sigma)u-g_2 i)K, \tag{2.3}$$

where g_0 is a positive constant term. The reaction coefficients of the investment function to profit rate and interest rate $g_i(i=1, 2)$ are assumed to be positive.

The dynamics of the effective demand is as follows:

$$\begin{aligned}\dot{u}&=\phi\left[\frac{C_w}{K}+\frac{C_b}{K}+\frac{I}{K}-\frac{X}{K}\right],\\&=\phi[u(\Delta\sigma+g_1-g_1\sigma-1)+g_0+(1-s_b)\alpha-(g_2+\Delta\lambda_h)i].\end{aligned} \tag{2.4}$$

where $\Delta=(1-s_w)+(1-s_b)\gamma>0$, and ϕ represents a positive adjustment speed in the goods market. Eq(2.4) means that firms are supposed to adjust the excess demand by increasing output. We define the demand regime, by the steady state of this dynamics.

2.2.2 Demand and Supply for Funds

Our model is basically inspired by the post-Keynesian theory of endogenous money supply. Let us explain briefly the outline of the endogenous money supply theory.

Moore [2001] lists three points that post-Keynesians share concerning this theory: Firstly, credit money is 'credit-driven and demand-determined'. Secondly, bank loans are made first, which creates a deposit, the high-powered money is supplied in consequence. Thirdly, the interest rate is determined exogenously as a policy variable of the central bank.

However, there are two views with regard to the third point: one is 'horizontalist' which regards banks' lending as perfectly passive at a fixed interest rate to borrowing demand, and the other is 'structuralist' which emphasizes a change in the interest rate according to the increase and decrease of banks' lending. Although such a difference exists, it is commonly admitted that borrowing demand of economic actors accompanies their expenditure plan.

As explained above, we consider interest rate, debt-capital ratio and profit rate as the macroeconomic signals. Note that the borrowing demand function of households is eq.(2.1), then we can define below the excess demand function of loanable funds F normalized by the capital stock K:

$$F(i,\ r,\ \lambda_h)=\alpha+\gamma(\sigma u-i\lambda_h)-d_S(i,\ r,\ \lambda_h)=0. \tag{2.5}$$

where $d_S(\cdot)$ means the fund supply function. For this fund supply function, we assume that lending volume increases when interest rate rises, since financial institutions can compensate credit risks by it. In addition, when the profit rate rises lending increases due to their optimistic expectation for a future prosperity. On the contrary, when the debt-capital ratio rises, they reduce lending because of a possibility of default. Hence, the signs of this function are as follows:

$$\frac{\partial d_S}{\partial i}\geq 0, \quad \frac{\partial d_S}{\partial \lambda_h}\leq 0, \quad \frac{\partial d_S}{\partial r}\geq 0.$$

Taking these equations into consideration, we can show below the partial differentials of the excess demand function of loanable funds:

$$F_i=\frac{\partial F}{\partial i}=-\gamma\lambda_h-\frac{\partial d_S}{\partial i}<0, \tag{2.6}$$

$$F_u=\frac{\partial F}{\partial u}=\gamma\sigma-(1-\sigma)\frac{\partial d_S}{\partial r}\lesseqgtr 0, \tag{2.7}$$

$$F_{\lambda_h}=\frac{\partial F}{\partial \lambda_h}=-\gamma i-\frac{\partial d_S}{\partial \lambda_h}\lesseqgtr 0. \tag{2.8}$$

The total differential on eq.(2.5) must satisfy the following condition:

$$F_i di+F_u du+F_{\lambda_h} d\lambda_h=0.$$

Since the profit rate can be written as $r=(1-\sigma)u$, the change in the profit rate is explained by the change in capacity utilization. We can summarize below the effect of capacity utilization and debt-capital ratio on the interest rate, respectively:

$$\frac{\partial i}{\partial u}=-\frac{F_u}{F_i}, \tag{2.9}$$

$$\frac{\partial i}{\partial \lambda_h}=-\frac{F_{\lambda_h}}{F_i}. \tag{2.10}$$

The sign of F_i is always negative from eq.(2.6). However, the sign and absolute value of F_u and F_{λ_h} depend on the relative response of demand and supply for funds in eq.(2.7) and eq.(2.8). Therefore, we cannot determine *a priori* them. In the next section, by classifying the lending attitude of financial institutions, we define some lending regimes.

2.3 Lending Attitudes of the Financial Institutions

2.3.1 Horizontalist Lending Regime

In the economy of the so-called post-Keynesian-horizontalist, the lending to borrower is determined at a given interest rate. In other words, the elasticity of funds supply to the change of interest rate is infinite. Since this type can be formalized as $\partial d_s/\partial i=+\infty$, eq.(2.6) results in $F_i=-\infty$. In this case, if the response of lending volume to the profit rate and debt-capital ratio is finite, then we can obtain in eq.(2.7) and eq.(2.8) the following values:

$$\frac{\partial i}{\partial u}=-\frac{F_u}{F_i}=-\left\{\frac{\gamma\sigma-(1-\sigma)\partial d_s/\partial r}{-\gamma\lambda_h-\partial d_s/\partial i}\right\}=0, \tag{2.11}$$

$$\frac{\partial i}{\partial \lambda_h}=-\frac{F_{\lambda_h}}{F_i}=-\left\{\frac{-\gamma i-\partial d_s/\partial \lambda_h}{-\gamma\lambda_h-\partial d_s/\partial i}\right\}=0. \tag{2.12}$$

Then, we define the horizontalist lending regimeas follows:

Definition 1 (Horizontalist Lending Regime). *We call the horizontalist lending regime the case in which the change of lending volume to the profit rate and the debt-capital ratio is finite, but the*

change of lending volume to the interest rate is infinite.

In the horizontalist lending regime, the lenders accommodate perfectly the borrowing demand at a given interest rate. In other words, the interest rate is controlled by them. In this case, the feedbacks on the interest rate from change of capacity utilization rate and debt-capital ratio do not occur.

2.3.2 Structuralist Lending Regime

According to the structuralist view, financial institutions change the interest rate with their lending schedule. Therefore, the change in lending volume is not infinite for the variation of interest rate. Some cases can be classified according to the lending attitudes of financial institutions for change of debt-capital ratio and profit rate. We define the following two lending attitudes.

Definition 2 (Excessive Attitude). *We call the excessive attitude the case in which lending supply changes much more than the borrowing demand of households. That is, when the effective demand changes,* $|\gamma\sigma| \ll |(1-\sigma)\partial d_s/\partial r|$ *is realized in eq.(2.7). Similarly, when the debt-capital ratio changes,* $|\gamma i| \ll |\partial d_s/\partial \lambda_h|$ *is realized in eq.(2.8). As a result, the absolute values of* $|\partial i/\partial u|$ *and* $|\partial i/\partial \lambda_h|$ *are sufficiently large in eq.(2.9) and eq.(2.10), respectively.*

Definition 3 (Moderate Attitude). *We call the moderate attitude the case in which lending supply changes as much as the borrowing demand of households. That is, when the effective demand changes,* $|\gamma\sigma| \simeq |(1-\sigma)\partial d_s/\partial r|$ *is realized in eq.(2.7). Similarly, when the debt-capital ratio changes* $|\gamma i| \simeq |\partial d_s/\partial \lambda_h|$ *is realized in eq.(2.8). As a result,* $|\partial i/\partial u| \simeq 0$ *and* $|\partial i/\partial \lambda_h| \simeq 0$ *are satisfied, in eq.(2.9) and eq.(2.10), respectively.*

The interest rate does not change in the moderate structuralist lending attitude. This point is very similar to that of the horizontalist lending regime, but the principle is not the same. In the horizontalist case, lending supply is perfectly accommodative at a given interest rate. However, in the moderate structuralist case, feedback effect on the interest rate is offset as a result of the fact that funds supply responds just as much as borrowing demand for the change in capacity utilization and debt-capital ratio. In other words, the former results from the supply side factor only, but the latter from both demand and supply factors.

3 Dynamics and Steady State

3.1 Dynamic System and Steady State

The dynamics of the economy consists of the excess demand adjustment by capacity utilization, evolution of the debt-capital ratio, and the determination of the interest rate.

We have already defined the dynamics of capacity utilization rate in eq.(2.4). The evolution of

the debt-capital ratio is defined by its time derivative:

$$\dot{\lambda}_h=\frac{\dot{D}_h}{K}-\lambda_h\frac{\dot{K}}{K}. \tag{3.1}$$

By substituting eq.(2.1) and eq.(2.3) for eq.(3.1), we can obtain the dynamics of the debt-capital ratio. Then, the dynamic system with households' borrowing is defined as follows:

$$\dot{u}=\phi[u(\Delta\sigma+g_1-g_1\sigma-1)+g_0+(1-s_b)\alpha-(g_2+\Delta\lambda_h)i], \tag{3.2}$$

$$\dot{\lambda}_h=\alpha+\gamma\sigma u-\gamma i\lambda_h-\lambda_h(g_0+g_1(1-\sigma)u-g_2i), \tag{3.3}$$

$$\alpha+\gamma(\sigma u-i\lambda_h)=d_S(i,\ r,\ \lambda_h). \tag{3.4}$$

We get the steady state of the economy composed of two dimensional dynamics systems, eq. (3.2) and eq.(3.3). Firstly, $\dot{u}=0$ locus is obtained from eq.(3.2):

$$u=\frac{g_0+(1-s_b)\alpha-(g_2+\Delta\lambda_h)i}{(1-\Delta\sigma)+g_1(\sigma-1)}. \tag{3.5}$$

Secondly, from eq.(3.3), the $\dot{\lambda}_h=0$ locus is as follows:

$$u=\frac{-\alpha+[g_0+(\gamma-g_2)i]\lambda_h}{\gamma\sigma-\lambda_hg_1(1-\sigma)}. \tag{3.6}$$

In addition, we assume the following condition for the equilibrium in the funds market:

$$\forall u\geq 0,\ \ \forall\lambda_h\geq 0:\lim_{i\to 0}F>0,\ \ \lim_{i\to\infty}F<0. \tag{3.7}$$

We assume 'Keynesian stability condition' in eq.(3.5), which means that the production changes by a greater extent than the aggregate demand (or equivalently, the savings change by a greater extent than the investment) for change of capacity utilization. In addition, constant term α and coefficient g_1 are assumed to be sufficiently small. The sensitivity of house holds' borrowing to change in interest rate is assumed to be greater than impact to investment, i.e. $\gamma-g_2$ is positive. However, γ is assumed to be sufficiently small so that both denominator and numerator of eq.(3.5) and eq.(3.6) can take a positive value.

By substituting eq.(3.5) for eq.(3.6), and arranging it, we can obtain the steady state value of debt-capital ratio:

$$\lambda_h^*=\frac{-z_2\pm\sqrt{z_2^2-4z_1z_3}}{2z_1}. \tag{3.8}$$

where $z_1=g_1(1-\sigma)\Delta i$, $z_2=-\{(g_0+(1-s_b)\alpha-g_2i)g_1(1-\sigma)+\Delta i\gamma\sigma+(\gamma i+g_0-g_2i)[(1-\Delta\sigma)-g_1(1-\sigma)]\}$, and $z_3=\alpha[(1-\sigma\Delta)-g_1(1-\sigma)]+(g_0+(1-s_b)\alpha-g_2i)\gamma\sigma$. By assumption, it is trivial that $z_1>0$, $z_2<0$ and $z_3>0$. We proceed our discussion by assuming that at least one significant value of the debt-capital ratio exists (i.e., the imaginary number solution is excluded). Lastly, substituting the steady state value of the debt-capital ratio in eq.(3.8) for eq.(3.5), we can obtain that of the capacity utilization at a given interest rate.

3.2 Local Stability Analysis

We examine the local stability of the dynamic system according to the lending attitudes of the

financial institutions. Firstly, we examine it only from the formal aspect, and then discuss some details.

3.2.1 Case 1: Horizontalist Regime

In the horizontalist regime, the supply of funds is determined at a constant interest rate. As explained above, the interest rate is controlled by the supply side.

Proposition 1. *The economy with households' debt is locally stable under the horizontalist regime.*

Proof. The form of Jacobian matrix of the system for eq.(3.2) and eq.(3.3) is given by

$$\boldsymbol{J}^*_1=\begin{bmatrix} j_{11} & j_{12} \\ j_{21} & j_{22} \end{bmatrix}.$$

In this regime, the elements of the Jacobian matrix are given as follows:

$$j_{11}=\frac{\partial \dot{u}}{\partial u}=-\phi[(1-\Delta\sigma)+g_1(\sigma-1)], \tag{3.9}$$

$$j_{12}=\frac{\partial \dot{u}}{\partial \lambda_h}=-\phi\Delta i, \tag{3.10}$$

$$j_{21}=\frac{\partial \dot{\lambda}_h}{\partial u}=\gamma\sigma-g_1\lambda_h{}^*(1-\sigma), \tag{3.11}$$

$$j_{22}=\frac{\partial \dot{\lambda}_h}{\partial \lambda_h}=-[g_0+g_1(1-\sigma)u^*+(\gamma-g_2)i]. \tag{3.12}$$

From discussion above, the signs of the elements are given as follows:

$$\boldsymbol{J}^*_1=\begin{bmatrix} - & - \\ + & - \end{bmatrix}. \tag{3.13}$$

Therefore, it is trivial that the necessary and sufficient conditions for the local stability, Trace $\boldsymbol{J}^*_1<0$ and Det $\boldsymbol{J}^*_1>0$, are satisfied.

3.2.2 Case 2: Structuralist Regime

Let us next consider the cases of structuralist regime. In this regime, according to the reaction patterns of financial institutions for profit rate and the debt-capital ratio, we can distinguish two lending attitudes: excessive and moderate.

Proposition 2. *As long as the financial institutions keep a moderate attitude for both profit rate and debt-capital ratio, in structuralist regime, the economy with households' debt is locally stable.*

On the other hand, we get the following proposition.

Proposition 3. *In the structuralist regime, even though the financial institutions keep a moderate attitude for debt-capital ratio, if they show an excessive attitude for profit rate, then the economy with households' debt will be locally unstable.*

The proof of the proposition 2 and 3 is in Appendix.

3.3 Discussion

3.3.1 Stability of Dynamic System

We can summarize the main results of the previous section in the following figures. The stable dynamics can be obtained in two cases. One is the horizontalist regime where the financial institutions accommodate the borrowing demand at a constant interest rate. Since the interest rate is controlled by the financial institutions in this case, there is no feedback from interest rate when effective demand and debt-capital ratio change. The other is the moderate structuralist case when they accommodate moderately funds demand when both effective demand and debt-capital ratio change. In both cases, in the $(\lambda_h,\ u)$ space, $\dot{u}=0$ locus is a downward-sloping and $\dot{\lambda_h}=0$ locus is an upward-sloping at the neighborhood of equilibrium.

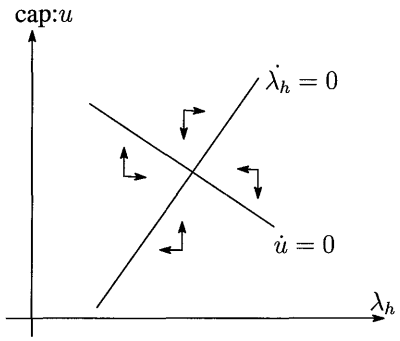

Figure 2: Horizontalist Regime

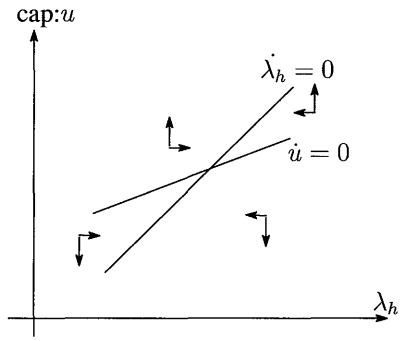

Figure 3: Instable Structuralist Regime

The economy becomes unstable, however, in the case where the lending attitude of financial institutions for the profit rate is especially excessive. This can be understood as a case in which the interest rate is left to be determined by a market oriented adjustment which emphasizes demand and supply determination. This type involves the following cumulative fluctuation:

$$u\downarrow\Rightarrow r\downarrow\Rightarrow i\uparrow\Rightarrow u\downarrow\Rightarrow r\downarrow\Rightarrow i\uparrow\Rightarrow\ldots$$

This case means that the lending attitude of the financial institutions is sensitive to the business condition. Let us assume that the aggregate demand drops by a shock. Then, the households suffer loss of their disposable income. They are forced to cut the consumption demand, which leads to further decline of the aggregate demand. The fall of the aggregate demand, on the other hand, makes the profit rate lower. If the attitude of financial institutions is very severe for the profit rate, then they tighten the supply of funds since they hold a pessimistic expectation for the business condition. It results in an excess demand for loanable funds. As a result, the interest rate must rise sufficiently to bring the equilibrium of demand and supply for the funds. The rise of the interest rate, in turn, imposes a heavy burden of interest payments on the households, which restrains further their consumption demand on the one hand, and the investment demand is

negatively affected on the other hand. In consequence, both consumption and investment are reduced cumulatively. Thus, in our model, the instability results not from the real side, but from the financial side such as feedback form the interest rate variation.

3.3.2 Income Distribution, Demand Creation Patterns, and Dynamic Configuration of Growth

Let us next consider the impact of change in income distribution. The issue is, which type of demand regime is more compatible under the interaction of real and financial sides ? We take only the horizontalist regime as a stable case, in which the interest rate is controlled by the supply side. By differentiating eqs.(3.5) and (3.6) with respect to the wage share σ, we get the shifts of steady state loci as follows:

$$\left.\frac{\partial u}{\partial \sigma}\right|_{\dot{\lambda}_h=0}=-\left\{\frac{-\alpha+[(\gamma-g_2)i+g_0]\lambda_h}{[\gamma\sigma-\lambda_h g_1(1-\sigma)]^2}\right\}[\gamma+\lambda_h g_1]<0, \tag{3.14}$$

$$\left.\frac{\partial u}{\partial \sigma}\right|_{\dot{u}=0}=\left\{\frac{g_0+(1-s_b)\alpha-(g_2+\Delta\lambda_h)i}{[(1-\Delta\sigma)-g_1(1-\sigma)]^2}\right\}[\Delta-g_1]. \tag{3.15}$$

When wage share rises (profit share rises), the $\dot{\lambda}_h=0$ locus shifts downward (upward). However, shift of the $\dot{u}=0$ locus depends on the demand regime:

$$\left.\frac{\partial u}{\partial \sigma}\right|_{\dot{u}=0}\begin{cases}>0, & \text{wage-led, iff. } \Delta>g_1,\\ <0, & \text{profit-led, iff. } \Delta<g_1.\end{cases} \tag{3.16}$$

If consumption from wage and borrowing is relatively active (small s_w and s_b), then the value of Δ becomes large and it would result in wage-led demand. Under the wage-led demand regime, the $\dot{u}=0$ locus shifts upward with a rise in wage share. On the other hand, under the profit-led demand regime, the $\dot{u}=0$ locus shifts upward with a rise in profit share. Figure 4 depicts the former case where the steady state shifts from E_0 to E_w. Figure 5 depicts the latter case where the steady state shifts from E_0 toE_p.

As eq.(2.1) means, an increase in wage induces households' borrowing at a constant interest rate. While it stimulates effective demand, it rises debt-capital ratio. The rise in the debt-capital ratio restrains in turn the borrowing and consumption, since this means fall in their

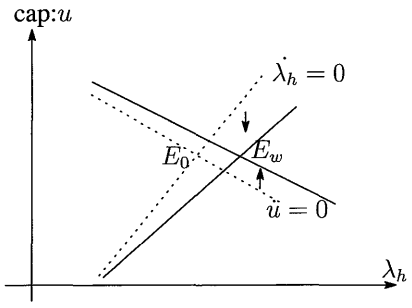

Figure 4: Rise in Wage Share under Wage-led Demand

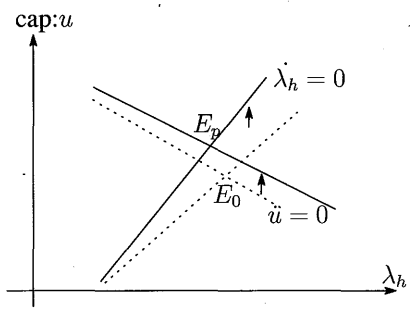

Figure 5: Rise in Profit Share under Profit-led Demand

disposable income. The effective demand may fall due to this in case of the wage-led demand regime.

In order to explore this point, let us examine the distribution effect to the growth rate under each demand regime[4]. The growth rate of the output is the same as the capital stock, since the capacity utilization rate $u=X/K$ is constant at a steady state. Note that the steady state value of the capacity utilization rate u^* depends on the distributional variable. Then, by eq.(2.3), the growth rate is as follows:

$$g^*=\dot{K}/K=g_0+g_1(1-\sigma)u^*(\sigma)-g_2 i.$$

The rise in wage share stimulates the growth rate as long as the following condition is satisfied:

$$\frac{\partial g^*}{\partial \sigma}>0, \quad \text{iff.} \quad \frac{\partial u}{\partial \sigma}>\frac{u}{1-\sigma}>0. \tag{3.17}$$

In the wage-led demand case, the sign of the first term in the condition is not determined clearly (see Appendix). An increase in wage stimulates effective demand in this demand creation pattern. However, it also stimulates households' borrowing, which restrains disposable income of the households via rise in debt-capital ratio. Therefore, the wage-led growth may be restrained.

On the other hand, the condition for the profit-led growth is as follows:

$$\frac{\partial g^*}{\partial \sigma}<0, \quad \text{iff.} \quad \frac{\partial u}{\partial \sigma}<0<\frac{u}{1-\sigma}. \tag{3.18}$$

In the profit-led demand case, this inequality is always satisfied (see Appendix). An increase in profit share stimulates effective demand in this demand creation pattern. In addition, it also restrains households' borrowing, which increases disposable income of the households via fall in debt-capital ratio. This effect also contributes to an increase in effective demand. Thus, the profit-led growth is enhanced by way of households' borrowing, compared to the wage-led demand case.

4 Conclusion

In this paper, we examined the dynamics of macroeconomy in which the households' borrowing is active. We summarize the main implications of each section in order to conclude this paper.

Sections 2 and 3 have presented a post-Keynesian model and examined the demand and debt creation patterns and economic stability. In the American loanable fund market, the households can borrow relatively easily thanks to the development of the capital market. This is one of the institutional features of the American economy. In addition, as an ideal function of this institu-

4) By wage- or profit-led 'demand', we think of the relationship between effective demand u and income distribution. By wage- or profit-led 'growth', we think of the relationship between growth rate g and income distribution.

tional foundation, we introduced that the funds are allocated according to the macroeconomic signals into our model. The economic stability depends on the lending attitude of financial institutions. In case of the structuralist regime, their excessive lending attitude to the profit signal would be one of the causes of the economic instability. There fore for the stability of economy, it is more favorable to control the interest rate rather than to leave it determined by the demand and supply oriented market adjustment.

Section 3 also examined the impact of distribution to the effective demand and economic growth. We can show the conventional wage-led and profit-led demand regimes, according to the relative strength of demand creation from wage and profit. However, in this case, the impact of income distribution does not conclude in the real side of economy only. It has also an impact on the macroeconomy by way of the financial side. Therefore, the compatibility of income distribution, demand creation, and borrowing patterns matters. In the economy with increasing households' debt, even if the demand regime is the wage-led one, a rise in wage share may not necessarily stimulate the economic growth. This is crucially due to the fact that wage share also increases borrowing and the debt-capital ratio. Therefore, even under the wage-led case, an increase in the wage share might lead to a low growth rate. On the other hand, the profit-led growth is enhanced by restraining an excessive borrowing of households and sustaining their disposable wage income.

Lastly, let us state some remaining issues for further research. While we examined effects of the households' debt on the demand creation pattern and stability as a case of the American economy, the economy should be carefully examined. For example, the wealth effects shouldnot be dropped, since they might also play an important role in the active consumption and borrowing. As the households keep a relatively high share of the stock in the American economy, this issue would be of importance. Besides, we had to leave the firms' borrowing implicit in order to simplify the analysis. In reality, of course, they also borrow the funds from financial institutions. It might be interesting to introduce this issue into our model and reexamine the demand creation and the stability.

Appendix

Proof of proposition 2. In case of the structuralist regime, the response of supply side for the change of the interest rate is finite. Then, feedback effect from the change of interest rate occurs depending on the variation of capacity utilization and debt-capital ratio. However, as long as the financial institutions keep the moderate attitude, the response of funds lending for the profit rate and debt-capital ratio is as much as that of borrowing demand of households. Consequently, this type results in $|\partial i/\partial u| \simeq 0$ and $|\partial i/\partial \lambda_h| \simeq 0$. Therefore, the signs in the Jacobian

are similar to the result of eq.(3.13).Then, it is trivial that the necessary and sufficient condition for the local stability are satisfied.

Proof of proposition 3. In the structuralist regime, change in the lending volume for the variation in interest rate is finite. Therefore, feedback effects of the interest rate occur depending on the profit rate and the debt-capital ratio. Taking these effects into consideration, the elements of the Jacobian are summarized as follows: $\boldsymbol{J}^*_2$ as follows:

$$j_{11}=\frac{\partial \dot{u}}{\partial u}=-\phi[(1-\Delta\sigma)+g_1(\sigma-1)]-\phi(g_2+\Delta\lambda_h^*)\frac{\partial i}{\partial u}, \tag{4.1}$$

$$j_{12}=\frac{\partial \dot{u}}{\partial \lambda_h}=-\phi\Delta i-\phi(g_2+\Delta\lambda_h^*)\frac{\partial i}{\partial \lambda_h}, \tag{4.2}$$

$$j_{21}=\frac{\partial \dot{\lambda}_h}{\partial u}=\gamma\sigma-g_1\lambda_h^*(1-\sigma)-(\gamma-g_2)\lambda_h^*\frac{\partial i}{\partial u}, \tag{4.3}$$

$$j_{22}=\frac{\partial \dot{\lambda}_h}{\partial \lambda_h}=-[g_0+g_1(1-\sigma)u^*+(\gamma-g_2)i]-(\gamma-g_2)\lambda_h^*\frac{\partial i}{\partial \lambda_h}. \tag{4.4}$$

Suppose that financial institutions keep a moderate attitude for the debt-capital ratio, then we can ignore the second term in eq.(4.2) and eq.(4.3), respectively. Therefore, the sign of j_{12} and j_{22} is negative. On the other hand, suppose that the financial institutions show an excessive attitude for the profit rate, then we can obtain $\partial i/\partial u \ll 0$.

In this case, there is a possibility that in eq.(4.1) the second term offsets the first term, due to the strong negative feedback effect of the interest rate. In this case, the signs of the elements in the matrix are:

$$\boldsymbol{J}^*_2=\begin{bmatrix}+ & - \\ + & -\end{bmatrix}. \tag{4.5}$$

Consequently, the sign of Det $\boldsymbol{J}^*_2$ and Trace $\boldsymbol{J}^*_2$ are not clear. Therefore, the necessary and sufficient conditions for the local stability of the system may not be satisfied. In this case, the steady state locus of both variables is upward-sloping. Some types of local instability occur according to the combination of the relationship of both loci. Suppose the slope of $\dot{u}=0$ locus is larger than $\dot{\lambda}_h=0$ locus, then, even if the dynamics of debt-capital has negative feedback on itself, the possibility of saddle-path remains. Thus, in this excessive case, the economy with households' debt involves local instability.

In this case, the slope of both $\dot{u}=0$ and $\dot{\lambda}_h=0$ loci is positive. Note that the sign of elements in the Jacobian, we can depict arrows in Fig 3.

The impact of change in income distribution. Total differentiation of the dynamic system with regard to λ, σ and u given by eqs.(3.2) and (3.3) is summarized as follows:

$$\boldsymbol{J}^*_1\begin{bmatrix}du \\ d\lambda_h\end{bmatrix}+\begin{bmatrix}\phi u(\Delta-g_1) \\ u(\gamma+\lambda_h g_1)\end{bmatrix}d\sigma=\begin{bmatrix}0 \\ 0\end{bmatrix}. \tag{4.6}$$

where $\boldsymbol{J}^*_1$ is given by eq.(3.13). By Cramer's rule, we obtain the following equation:

$$\frac{du}{d\sigma}=\frac{1}{\mathrm{Det}\boldsymbol{J}^*_1}\begin{bmatrix}\phi u(g_1-\Delta) & j_{12}\\ -u(\gamma+\lambda_h) & j_{22}\end{bmatrix}. \tag{4.7}$$

where j_{12} and j_{22} are the elements defined in $\boldsymbol{J}^*_1$. In case of the wage-led demand creation, the sign of $g_1-\Delta$ is negative, while it is positive in case of the profit-led. Note that the determinant of $\boldsymbol{J}^*_1$ is positive since we focus on the stable case, then the sign of the elements in eq.(4.7) is as follows:

$$\frac{du}{d\sigma}=\frac{1}{\mathrm{Det}\boldsymbol{J}^*_1}\begin{bmatrix}\pm & -\\ - & -\end{bmatrix}. \tag{4.8}$$

The sign of wage-led case is not determined clearly, whereas the profit-led case always satisfies $du/d\sigma<0$.

References

Dutt, A.K. and J. Ros eds. [2003] *Development Economics and Structuralist Macroeconomics*: Edward Elgar.

Dutt, A.K. [2005] "Conspicuous Consuption, Consumer Debt and Economic Growth". in Setterfield [2005].

—— [2006] "Maturity, Stagnation and Consumer Debt: A Steindlian Approach", *Metroeconomica*, Vol.57, 3.

Dymski, G. and R. Pollin eds. [1994] *New Perspectives in Monetary Macroeconomics: Explorations in the Tradition of Hyman P. Minsky*: The University of Michigan Press.

Epstein, G [1994] "A Political Model of Comparative Central Banking". Dymski and Pollin [1994].

Foley, D. [2003] "Financial Fragility in Developing Economies". in Dutt and Ros [2003].

Fujita, S. [2006] "An Institutional Approach to post-Keynesian Financial Instability Analysis", *Political Economy Quarterly*, Vol.42, No.4 (in Japanese)「ポスト・ケインズ派金融不安定化モデルに対する制度論的アプローチ」.

Ikeo, K. [2006] *Kaihatsushugi no boso to hoshin*: NTT.(in Japanese)『開発主義の暴走と保身：金融システムと平成経済』.

Lavoie, M. [1992] *Foundations of Post-Keynesian Economic Analysis*: Edward Elgar.

Lima, G.T. and J.A. Meirelles [2007] "Macrodynamics of Debt Regimes, Financial Instability and Growth", *Cambridge Journal of Economics*, Vol.31.

Moore, B.J. [2001] "Some reflections on endogenous money", in Rochon L, P.(ed), *Credit, Interest Rate and the Open Economy: Essays on Horizontalism*, Edward Elgar.

Nishi, H. [2007] "Households Debt, Demand Creation Pattern and Macroeconomic Stability", *Papers and Proceedings of the 55th Annual Conference of the JSPE*. (in Japanese)「家計の負債化とマクロ経済の需要形成パターン・安定性」.

Noshita, Y. [2001] *Development of Menetary Economic Analysis: Towards non-Keynesian Type of Managed Currency System*: Nihon-Keizai-Hyoron sha. (in Japanese)『貨幣的経済分析の現代的展開：非ケインズ型管理通貨制度を求めて』.

Schaberg, M. [1999] *Globalization and the Erosion of National Financial Systems: Is Declining Autonomy Inevitable*: Edward Elgar.

Setterfield. M. ed. [2005] *Interactions in Analytical Political Economy*: M.E.Sharpe.

Uhi, H. [2004] "Complementarity between Employment System and Financial System and Macroeconomic Stability", *Economic Studies of Institutional Complementarity and Mode of Regulation*. (in Japanese)「雇用制度と金融制度の補完性とマクロ経済的安定性」.