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Financialization and its long-run macroeconomic effects in a Kalecki-Minsky model*

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Abstract
One of the main characteristics of "financialization" is the redistribution of income in favor of shareholders, at the expense of workers. In this paper, we interpret pro-shareholder redistribution as a decrease in both retention ratio and wage share. Using both the Kaleckian macroeconomic model and the Minskyan taxonomy of finance regime, we investigate the long-run effects of such parametric changes on the rate of capital accumulation and the debt-capital ratio, on the one hand, and on the financial structures of firms, on the other. A decrease in the retention ratio leads to higher capital accumulation, but makes financial structures fragile. Moreover, a rise in profit share improves the financial position in the long run if the short-run equilibrium is profit-led growth regime; this is not necessarily so with wage-led growth.

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1 Introduction

An extensive body of literature describes examinations of "financialization," which has been in progress over the last two decades in advanced capitalist countries. Financialization, in fact, has broad and various senses: the appearance of new financial commodities, along with deregulation of the financial market; an increase in financial transactions, including financial investment by firms and credit-financed consumption by households; and the restructuring of corporate governance so as to favor shareholder value. This paper focuses on the redistribution of income in favor of shareholders and at the expense of workers; it also investigates the long-run effect of such redistribution on the rate of capital accumulation and the debt-capital ratio, on the one hand, and on the financial structures of firms, on the other.

Many empirical studies have investigated the short-run effect of pro-rentier (i.e., shareholder) income redistribution on effective demand. Stockhammer (2004) shows that the negative effect of a rise in rentier income (dividends and interest) per GDP on capital accumulation is statistically significant in the United States, the United Kingdom, and France, but not in Germany.[1] Onaran, Stockhammer, and Grafl (2011), in surveying how the U.S. rentier income share started to increase in the 1980s at the expense of both non-rentier income share and wage share, indicates that the overall effect of such redistribution on aggregate demand was neutral: the positive effect of a rise in rentier income with the higher wealth effects on consumption is canceled out by its negative effect on investment and declining consumption, caused by a fall in the wage share.

It is worth noting that with financialization, a decrease in the wage share—caused by firms looking to compensate for a loss of retained earnings—has been observed not only in the United States, but also in other advanced countries. Epstein and Power (2003) shows that some OECD countries after 1980s experienced a modest increase in non-financial corporate profit share with a drastic increase in the rentier income share, both of which worked to reduce the wage share.

Some studies have presented theoretical analyses concerning pro-rentier redistribution and its influences.[2] Skott and Ryoo (2008) investigate how a fall in the retention ratio—which the current study regards as one of the features of financialization in the United States—affects macroeconomic variables; they do so by using Harrodian and Kaleckian models. They show that a decrease in the retention ratio raises the long-run rates of capacity utilization and of economic growth in a Kaleckian model. Hein and van Treeck (2010a) consider the case where the rentiers' rate of profit, which is the sum of dividends and interest per capital, and the mark-up rate on pricing are increasing functions of shareholder power. They demonstrate that there exist diverse growth regimes, because shareholder power influences short-run aggregate demand through many channels.

Following Skott and Ryoo (2008), this paper expresses income redistribution in favor of shareholders as decreases in both retention ratio and wage share. It is appropriate to consider that shareholder value orientation is proxied not by the sum of dividends and interest, but by dividends alone (or the retention ratio, which determines the share of the dividend) (van Treeck 2008, p. 380). Using the Kaleckian model—which takes into account monetary factors (Lavoie 1995; Taylor 2004; Hein 2006, 2007)—this paper pays special attention to the effects of a decrease in the retention ratio and a increase in the profit share on both the rate of capital accumulation and the debt-capital ratio in the long-run period when capital and debt are accumulated.

Another contribution of this paper is that it considers the effect of changes in the retention ratio and the profit share on the financial structure of firms, based on the taxonomy of the financial regime (i.e., hedge, speculative, and Ponzi), as defined by Minsky (1975, 1982). We expect that there might exist a situation theoretically and actually where firms confront a more fragile financial structure in spite of higher capital accumulation.

A pioneering study by Foley (2003)—which specifies Minskyan financial taxonomy in line with the Kaleckian model—indicates that, in an open economy framework, the long-run dynamics of the macro economy could temporarily enter the Ponzi finance regime throughout the convergence to the equilibrium.[3] Meirelles and Lima (2006) study the relationship between parameters in both saving and investment and the areas of each finance regime under a constant interest rate and debt-capital ratio. They derive an interesting proposition: the financial structure of firms worsens, despite a higher capital accumulation, if investment does not responds sensitively enough to the rate of interest. However, Meirelles and Lima (2006) adopt two strong assumptions—namely, that the saving propensities of productive and financial capitalists are equal, and there do not exist in the dividend. In contrast, in relaxing those assumptions, the current study shows that a decrease in the retention ratio will promote capital accumulation, even as it creates a more risky financial position in the long run.

The remainder of this paper is organized as follows. Section 2 presents a Kaleckian model with debt accumulation; section 3 constructs the Minskyan taxonomy of financial structure in line with that Kaleckian model, and examines the properties of a boundary between speculative and Ponzi finance regimes. Section 4 investigates the long-run effect of changes in retention ratio, profit share, and rate of interest on the debt-capital ratio, rate of capital accumulation, and financial structures of firms. Section 5 concludes the paper.

2. Kaleckian model

2.1 Basic settings

A closed economy without a government is assumed. There exists a single good with a constant price level, which can be used for both production and consumption. Technological progress is not explicitly considered: both the potential output-capital ratio and the output-labor ratio are assumed to be constant.

This closed economy contains three agents: firms, households, and banks. Firms with excess capacity produce goods by means of capital stock and labor services. According to the post-Keynesian "horizontalist" view (Moore 1988 ; Rochon 1999), it is assumed that firms invest by using a part of the profits and external funds that are financed by households via banks; this in turn sets the constant nominal loan rate (i.e., interest rate). Although firms do not issues new shares—but they issue shares only once, when they start to operate—these shares are now owned by households. Thus, households acquire wage income, interest, and dividends (Taylor 2004; Kurose 2004; Skott and Ryoo 2008). The current study, additionally, assumes that banks merely transfer deposits from households to firms and interest payments from firms to households.

Based on the aforementioned assumptions, firms' real retained earnings (Π_f) and households' real income (Π_h) are given as

$$\Pi_f = s_f(\pi Y - iL), \quad s_f \in (0,1), \quad \pi \in (0,1), \quad i(>0), \tag{1}$$

$$\Pi_h = (1-\pi)Y + iL + (1-s_f)(\pi Y - iL), \tag{2}$$

where Y denotes aggregate income in real terms, L denotes the real stock of debt held by firms, s_f denotes the retention ratio, π denotes the profit share, and i denotes the interest rate. The last three variables are assumed to be constant.

There is also the assumption that households save a constant fraction, s_h, of their income. Total savings, S, in real terms, comprises retained profits and savings from households' incomes. Using equations (1) and (2), the aggregate saving function is obtained.

$$\frac{S}{K} = s_f(\pi u - i\lambda) + s_h[(1 - s_f\pi)u + s_f i\lambda], \quad s_h \in (0,1), \tag{3}$$

where K denotes real capital stocks, $u(\equiv Y/K)$ denotes the rate of capacity utilization, and $\lambda(\equiv L/K)$ denotes the debt-capital ratio.

Kaleckian models feature many variants of the desired investment function. Charles (2008a, 2008b, 2008c) assumes that investment is an increasing function of retained profits. Meirelles and Lima (2006) and Lima and Meirelles (2007) assume that investment is related positively to profits and negatively to the interest rate. Dutt (1992) uses a similar equation, but adds the rate of capital utilization to the explanatory variable. The current study's model assumes that real investment, I, per capital is an increasing function of the profit rate and the rate of capacity utilization (Marglin and Bhaduri 1990) and a decreasing function of the interest payment per capital (Hein 2007; Taylor and Arnim 2008; Hein and van Treeck 2010b).[4]

$$\frac{I}{K} = \alpha + \beta\pi + \gamma u - \theta i\lambda, \quad \alpha > 0, \quad \beta > 0, \quad \gamma > 0, \quad \theta > 0. \tag{4}$$

The estimated result of the investment function by each of Stockhammer (2004), Orhangazi (2008), and van Treeck (2008) supports our behavioral equation.

2.2 Short-run equilibrium

In the short run, disequilibrium between investment and savings is adjusted through changes in capacity utilization, under given capital and debt stocks.

The short-run equilibrium rate of capacity utilization is obtained from equations (3) and (4).

$$u = \frac{\alpha + \beta\pi + \left[s_f(1-s_h)-\theta\right]i\lambda}{s_f\pi(1-s_h)+s_h-\gamma}. \tag{5}$$

This equilibrium will be stable if investment is sufficiently insensitive to variations in capacity utilization—that is, if $s_f\pi(1-s_h)+s_h-\gamma>0$, which we assume in the following discussion.

The short-run equilibrium rate of capacity utilization is called debt-led (DLCU, hereafter) if $s_f(1-s_h)-\theta>0$ (Hein 2007; Taylor 2004; Lavoie and Godley 2001–2). This is because increases in the debt-capital ratio and the interest rate raise consumption demand by raising interest payments to households. In contrast, if $s_f(1-s_h)-\theta<0$, the short-run equilibrium rate of capacity utilization is called the debt-burdened (DBCU, hereafter), because increases in the debt-capital ratio and the interest rate restrain investment demand.

Substituting equation (5) in equation (4) obtains the rate of capital accumulation, $g(\equiv I/K)$, in the short-run equilibrium.

$$g = A + B\lambda,$$

$$A = \frac{(\alpha+\beta\pi)\left[s_f\pi(1-s_h)+s_h\right]}{s_f\pi(1-s_h)+s_h-\gamma},\quad B = \frac{\left\{\gamma s_f(1-s_h)-\theta\left[s_f\pi(1-s_h)+s_h\right]\right\}i}{s_f\pi(1-s_h)+s_h-\gamma}. \tag{6}$$

If $\gamma s_f(1-s_h)-\theta\left[s_f\pi(1-s_h)+s_h\right]>0$, then the short-run equilibrium is debt-led growth (DLG, hereafter). If, on the other hand, $\gamma s_f(1-s_h)-\theta\left[s_f\pi(1-s_h)+s_h\right]<0$, then the short-run equilibrium is debt-burdened growth (DBG, hereafter).[5]

Next examined, as in the standard Kaleckian models, is the effect of a change in the profit share on the demand level and the growth rate. Differentiating u and g

with respect to π yields

$$\frac{du}{d\pi}=\frac{-s_f(1-s_h)\{\alpha+[s_f(1-s_h)-\theta]i\lambda\}+\beta(s_h-\gamma)}{[s_f\pi(1-s_h)+s_h-\gamma]^2},\tag{7}$$

$$\frac{dg}{d\pi}=\frac{-[s_f(1-s_h)\alpha-\beta(s_h-\gamma)][s_f\pi(1-s_h)+s_h]-s_f\gamma(1-s_h)[s_f(1-s_h)-\theta]i\lambda}{[s_f\pi(1-s_h)+s_h-\gamma]^2}.\tag{8}$$

Here, the terms concerning the distributive regimes in Blecker (2002) are accepted. An exhilarationist and profit-led growth regime (PLG, hereafter) will be established if the following conditions are met: α is sufficiently small, θ is sufficiently large, and β is sufficiently large under $s_h-\gamma>0$. If these conditions are not satisfied, then a stagnationist and wage-led growth regime (WLG, hereafter) will appear. Moreover, since there exists the term $s_f(1-s_h)-\theta$ in the numerators of the right-hand side of equations (7) and (8), a stagnationist and WLG (exhilarationist and PLG) will tend to appear if the short-run equilibrium is DLCU (DBCU).

2.3 Long-run equilibrium

In the long run, the debt-capital ratio becomes an endogenous variable, while the goods market always clears. The growth rate of the debt-capital ratio is given by

$$\dot{\lambda}=\left(\frac{\dot{L}}{L}-g\right)\lambda=\frac{\dot{L}}{K}-g\lambda,\tag{9}$$

where the dot over the variable denotes its time derivative.

In the firms' cash flow identity, an operating fund comprising new borrowing and profit is equal to total expenditure, including investment, interest, and dividends.

$$\frac{\dot{L}}{K}+\pi u\equiv g+i\lambda+(1-s_f)(\pi u-i\lambda)\tag{10}$$

Equation (10) implies that an increment of the debt is the difference between investment and retained earnings.

$$\frac{\dot{L}}{K}=g-s_f(\pi u-i\lambda)\tag{11}$$

Substituting equation (11) into equation (9) yields the dynamical equation of the debt-capital ratio.

$$\dot{\lambda} \equiv F(\lambda) = \left[1 - \lambda - \frac{s_f \pi}{s_f \pi(1 - s_h) + s_h}\right] g + \frac{s_f s_h}{s_f \pi(1 - s_h) + s_h} i\lambda$$
$$= \frac{s_h (1 - s_f \pi) A}{s_f \pi(1 - s_h) + s_h} + \left[\frac{s_h (1 - s_f \pi) B + s_f s_h i}{s_f \pi(1 - s_h) + s_h} - A\right] \lambda - B\lambda^2 . \quad (12)$$

The long-run equilibrium is defined by $\dot{\lambda} = 0$. Then, the equilibrium value of the debt-capital ratio, λ^*, is obtained by solving $F(\lambda^*) = 0$. Using the $(\lambda, \dot{\lambda})$ plane, the existence of the positive equilibrium value and its local stability in the long run can be easily verified.

Now, assume that the short-run equilibrium is DLG—that is, $B > 0$. Then, $F(\lambda)$ shows a parabola with its vertex oriented upwards in the $(\lambda, \dot{\lambda})$ plane. The inflexion axis of the curve is given by

$$\bar{\lambda} = \frac{s_h (1 - s_f \pi) B + s_f s_h i - \lfloor s_f \pi(1 - s_h) + s_h \rfloor A}{2B\lfloor s_f \pi(1 - s_h) + s_h \rfloor} . \quad (13)$$

Figure 1 shows that $F(\lambda)$ always intersects the horizontal axis once within $\lambda > 0$, regardless of the sign of the inflexion axis. It is obvious that this intersection is the long-run equilibrium.

The long-run equilibrium is always locally stable in the DLG case. Even if an external shock moves the debt-capital ratio to the point λ_0 on the horizontal axis, this ratio continues to decrease in the range of $\dot{\lambda} < 0$ until it converges to the equilibrium. In contrast, even if the debt-capital ratio happens to be below its equilibrium, this ratio continues to increase because of $\dot{\lambda} > 0$, and it finally converges to the equilibrium.

(Figures 1 and 2 around here)

Next considered is the case where $B < 0$, which means that the short-run equilibrium is DBG. In this case, $F(\lambda)$ depicts a parabola with its vertex oriented downwards in the $(\lambda, \dot{\lambda})$ plane, as shown in Figure 2. The necessary and sufficient conditions for the existence of the positive equilibrium value are that the discriminant of $F(\lambda) = 0$ is positive and $\bar{\lambda} > 0$. The latter condition, which implies $s_h (1 - s_f \pi) B + s_f s_h i - \lfloor s_f \pi(1 - s_h) + s_h \rfloor A < 0$ under $B < 0$, is satisfied if the parameters α and β are sufficiently large. However, it is difficult to specify the former condition, given the complexity of the calculations. Here, we assume that the discriminant is positive.

Figure 2 shows that the DBG case has multiple equilibria $(\lambda_1^*, \lambda_2^*)$. The smaller equilibrium, λ_1^*, is locally stable, while the larger one, λ_2^*, is locally instable.

Additionally, note that the following condition is always satisfied, regardless of the DLG or DGB, in the aforementioned long-run positive equilibrium.

$$\left.\frac{\partial F(\lambda)}{\partial \lambda}\right|_{\lambda=\lambda^*} = \left[\frac{s_h(1-s_f\pi)B + s_f s_h i}{s_f\pi(1-s_h)+s_h} - A\right] - 2B\lambda^* < 0. \tag{14}$$

From $F(\lambda^*)=0$, we obtain the relation between the equilibrium value of the debt-capital ratio and that of the capital accumulation rate, g^*, in the long run.

$$g^* = \frac{s_f s_h i \lambda^*}{s_f\pi - [s_f\pi(1-s_h)+s_h](1-\lambda^*)} \tag{15}$$

Here, only the case where $0 \le \lambda^* \le 1$ is considered because, in reality, the debt-capital ratio remains between 0 and 1 (Taylor and Arnim 2008; Hein and Schoder 2009). Moreover, it is appropriate to expect that the capital accumulation rate would have a positive value. Then, the positive value of g^* under $\lambda^* > 0$ requires that there be a positive denominator on the right-hand side of equation (15). Therefore, there is a lower limit of λ^*—that is, $\lambda^* > s_h(1-s_f\pi)/[s_f\pi(1-s_h)+s_h]$, for $g^* > 0$.[6] It is assumed that this condition is always satisfied; the long-run equilibrium value of the capital accumulation rate has a positive value.

3 Minskyan taxonomy of the financial structure

3.1 Financial regime and position of the long-run equilibrium

Minsky classifies the financial structures of firms into three categories, according to cash-flow accounting: hedge finance, speculative finance, and Ponzi finance (Minsky, 1975, 1982). Earlier examples that specify the taxonomy of the financial structure of firms by using Kaleckian models include Foley (2003), Meirelles and Lima (2006), Lima and Meirelles (2007), and Charles (2008a, 2008b).[7]

Table 1 shows the condition for each financial regime, based on the present notation. Hedge finance is a situation where the financial structure is the most sound, and it is defined as a situation where the profits of firms are larger than or equal to the sum of investment, interest payments, and dividends. Rearranging the condition for hedge finance obtains the following relation:

$$g^* - s_f\left(\pi u^* - i\lambda^*\right) \le 0, \tag{16}$$

where u^* denotes the long-run equilibrium value of the rate of capacity utilization.

Next, speculative finance is defined as a situation where the profits of firms are less than the sum of investment, interest payments, and dividends, but larger than the sum of interest payments and dividends. Rearranging the condition for speculative finance obtains the following relation:

$$g^* - s_f\left(\pi u^* - i\lambda^*\right) > 0 \ \text{ and } \ \pi u^* > i\lambda^*. \tag{17}$$

Finally, Ponzi finance is a situation where the finance structure is the most fragile, and it is defined as a situation where the profits of firms are less than the sum of interest payments and dividends. Rearranging the condition for Ponzi finance obtains the following relation:

$$\pi u^* \le i\lambda^*. \tag{18}$$

(Table 1 around here)

In which financial regime is the long-run equilibrium located? First, from equation (11), it is known that $\dot{L}/K < 0$ under hedge finance. Because the goods market clears in the long-run equilibrium, from equations (3) and (11), the borrowing of firms is consequently equal to the savings of households.

$$\frac{\dot{L}}{K} = s_h\left[\left(1 - s_f\pi\right)u^* + s_f i\lambda^*\right]. \tag{19}$$

The right-hand side of equation (19) is clearly positive, which contradicts $\dot{L}/K < 0$. Therefore, the long-run equilibrium is not hedge finance.[8] In addition, this fact means that the former condition of equation (17) necessarily holds.

Moreover, when the goods market clears, equation (3) can be rearranged as follows:

$$\frac{g^* - s_h u^*}{s_f\left(1 - s_h\right)} = \pi u^* - i\lambda^*. \tag{20}$$

The condition for speculative finance is identical to $g^* - s_h u^* > 0$. By using equation (15), we can rewrite the left-hand side of this inequality as follows:

$$g^* - s_h u^* = \frac{s_h\left[s_f\pi(1-s_h)+s_h\right](1-\lambda^*)i\lambda^*}{s_f\pi - \left[s_f\pi(1-s_h)+s_h\right](1-\lambda^*)}. \tag{21}$$

The assumption in the previous section was that the denominator of the right-hand side of equation (21) is positive; consequently, $g^* - s_h u^* > 0$ is obtained. Therefore, the long-run equilibrium is located in the speculative finance regime. In other words, the long-run equilibrium is never located in the Ponzi finance regime.

3.2 A comparative static analysis of financial regime

As the previous subsection showed, the long-run equilibrium is located in the speculative finance regime. However, depending on whether the equilibrium is near the hedge finance regime or the Ponzi finance regime, the sustainability of firms can differ greatly. If the equilibrium is near the Ponzi finance regime, a negative shock to an economy temporally drives firms into the Ponzi finance regime—for example, as shown as λ_0 in Figure 3. Firms eventually converge to the equilibrium λ^*, but it is not certain whether firms can precisely predict the convergence. Unless firms can predict the convergence toward the equilibrium, they will stop production; if the worst happens, they must go bankrupt due to default.

(Figure 3 around here)

Based on the above observation, the next task is to investigate under what condition the long-run equilibrium approaches the Ponzi finance regime. As a preliminary step, the boundary between the speculative finance and Ponzi finance regimes are derived.

At the boundary between speculative finance and Ponzi finance is a situation where the profits of firms are equal to the sum of interest payments and dividends. From this, by using equation (5), the boundary value, λ_{S-P}, is derived, as follows:

$$\lambda_{S-P} = \frac{(\alpha + \beta\pi)\pi}{(s_h + \theta\pi - \gamma)i}. \tag{22}$$

Here, the assumption is that the coefficient of the investment function γ is small enough for the denominator of the right-hand side of equation (22) to be positive: the boundary λ_{S-P} is positive. Note that because the long-run equilibrium λ^* is located in the speculative finance regime, $\lambda^* < \lambda_{S-P}$ always occurs.

To judge whether, after financialization, the long-run equilibrium is near the hedge finance regime or the Ponzi finance regime, the following two things need to be investigated: whether or not a rise in a parameter increases the long-run equilibrium value of the debt-capital ratio (i.e., a change in λ^*), and how the rise in the parameter shifts the boundary (i.e., a change in λ_{S-P}). In this section, the latter issue was considered; the former issue will be considered in the next section.

The effects of increases in the retention ratio, profit share, and interest rate are as follows:

$$\frac{d\lambda_{S-P}}{ds_f} = 0, \tag{23}$$

$$\frac{d\lambda_{S-P}}{d\pi} = \frac{(\alpha + 2\beta\pi)(s_h - \gamma) + \beta\theta\pi^2}{(s_h + \theta\pi - \gamma)^2 i}, \tag{24}$$

$$\frac{d\lambda_{S-P}}{di} = -\frac{(\alpha + \beta\pi)\pi}{(s_h + \theta\pi - \gamma)i^2} < 0. \tag{25}$$

First, as equation (23) shows, the boundary is independent of the retention ratio of firms. Accordingly, to know the effect of a fall in the retention ratio on the financial structure of firms, one need only know the effect of the fall in the retention ratio on the long-run equilibrium value of the debt-capital ratio. Second, as equation (24) shows, the effect of a rise in the profit share on the boundary is ambiguous; however, if the coefficient γ is small enough, $d\lambda_{S-P} / d\pi > 0$ is obtained—that is, the rise in the profit share shifts the boundary in the positive direction. Third, a rise in the interest rate shifts the boundary in the negative direction.

4 Long-run effect of the retention ratio, profit share, and interest rate

4.1 Retention ratio

This subsection investigates the effect of a rise in a parameter on the long-run equilibrium values of the debt-capital ratio and the rate of capital accumulation.

As stated in the Introduction, one of the important features of financialization is a fall in the retention ratio. Totally differentiating $F(\lambda^*; s_f) = 0$ obtains

$$\frac{d\lambda^*}{ds_f} = -\left(\frac{\partial F}{\partial s_f}\right) / \left(\frac{\partial F}{\partial \lambda^*}\right). \tag{26}$$

Because the long-run equilibrium is stable, $\partial F / \partial \lambda^* < 0$ is obtained from equation (14). The term $\partial F / \partial s_f$ can be calculated as follows:[9]

$$\frac{\partial F}{\partial s_f} = \frac{s_h(1-\lambda^*)\Delta i \lambda^*}{[s_f \pi(1-s_h) + s_h - \gamma]\{s_f \pi - [s_f \pi(1-s_h) + s_h](1-\lambda^*)\}}. \tag{27}$$

Here, $\Delta = -s_h + \gamma[s_h + (1-s_h)\lambda^*]$ and the sign of the right-hand side of equation (27) depends on the sign of Δ. If one were to consider a realistic case where the debt of firms does not exceed the total capital—that is, $\lambda^* \leq 1$—then $s_h + (1-s_h)\lambda^*$ is less than or equal to unity. Accordingly, unless the coefficient γ takes an extremely large value, then $\Delta < 0$, which yields $\partial F / \partial s_f < 0$, and hence $d\lambda^* / ds_f < 0$. Moreover, as shown in the preceding section, a fall in the retention ratio never affects the boundary. In summary, unless γ takes an extremely large value, a fall in the retention ratio will move the financial structure of firms closer to the Ponzi finance regime.

Next investigated is the effect of a fall in the retention ratio on the long-run equilibrium value of the rate of capital accumulation. Considering that the long-run equilibrium value of the debt-capital ratio is a function of the retention ratio, one can differentiate equation (15) with respect to s_f, which yields

$$\frac{dg^*}{ds_f} = \frac{-s_h^2(1-\lambda^*)i\lambda^* + s_f s_h^2 i(1-s_f \pi)\dfrac{d\lambda^*}{ds_f}}{\{s_f \pi - [s_f \pi(1-s_h) + s_h](1-\lambda^*)\}^2}. \tag{28}$$

Because $d\lambda^* / ds_f < 0$, the right-hand side of equation (28) is negative. Hence, a fall in the retention ratio increases the long-run equilibrium value of the rate of capital accumulation. This means that a kind of paradox of thrift—where an increase in the propensity to save (i.e., the retention ratio of firms) lowers the economic growth—holds in the long run.

In summarizing the above analysis, the following proposition is obtained.

Proposition 1. *In the long-run equilibrium, a fall in the retention ratio increases the rate of capital accumulation but worsens the financial structure of firms.*

4.2 Profit share

Firms facing a decrease in retained earnings as a result of financialization tend to offset the loss by increasing profit share. Therefore, we must investigate the effect of an increase in profit share on the long-run equilibrium.

Proposition 2. *Suppose that the short-run equilibrium is PLG. Then, an increase in the profit share decreases the long-run equilibrium value of the debt-capital ratio.*
Proof. See Appendix 2, which is available on request.

Recall that as long as the coefficient γ is sufficiently small, an increase in the profit share shifts the boundary λ_{S-P} in the positive direction. Accordingly, if the short-run equilibrium is PLG and if γ takes a small value, then an increase in the profit share improves the financial structure of firms. On the other hand, if these two conditions are not satisfied—if, for example, the short-run equilibrium is WLG—then the effect of an increase in the profit share on the long-run equilibrium value of the debt-capital ratio is ambiguous. In other words, an increase in the profit share does not always improve the financial structure of firms. In addition, the effect of an increase in the profit share on the long-run equilibrium value of the rate of capital accumulation is also ambiguous.

4.3 Interest rate

Next, let us investigate under what condition the monetary policy of the central bank that controls the interest rate improves the financial structure of firms.

In the current model, the interest rate is a nominal lending rate, which is usually specified as a base rate multiplied by a mark-up. Because the base rate depends on the monetary policy of the central bank, the lending rate moves with the base rate, as long as the mark-up remains constant. In summary, the central bank can decisively affect the financial structure of firms by controlling the base rate.

Proposition 3. *Suppose that the short-run equilibrium is DBG; then, a decrease in the interest rate lowers the long-run equilibrium value of the debt-capital ratio.*
Proof. See Appendix 3, which is available on request.

Recall that a decrease in the interest rate shifts the boundary λ_{S-P} in the positive direction. Therefore, when the short-run equilibrium is DBG, a decrease in the interest rate by the central bank will improve the financial structure of firms.

Note that when an investment largely reacts to the interest payments $i\lambda$—that is, when θ is sufficiently large—the short-run equilibrium tends to be both DBG and PLG, as shown in subsection 2.2. When these two regimes are attained, a decrease in the base rate by the central bank and an increase in the profit share by firms are complementary. However, if θ is sufficiently small and, consequently, the short-run equilibrium is both WLG and DLG, then it is possible that neither an increase in the profit share nor the monetary policy (i.e., the decrease in interest rate) can improve the financial structure of firms.

(Table 2 around here)

Table 2 shows the results of sections 3 and 4, and adds the results with regard to the effects of changes in the parameters of the investment function on the debt-capital ratio, the rate of capital accumulation, and the financial structure of firms.[10]

5 Conclusion

Many studies have investigated both the advantages and disadvantages of "financialization," a situation that has been taking place over the last two decades in advanced capitalist economies. This paper confines itself to a redistribution of income that favors shareholders, at the expense of workers; this is a main characteristic of financialization. This paper also sought to identify certain redistribution patterns—including decreases in the retention ratio and wage share—and analyze the long-run effect of a decrease in the retention ratio and an increase in the profit share on the rate of capital accumulation rate, the debt-capital ratio, and firms' financial position. It did so through the use of the Kaleckian model with debt accumulation and a

Minskyan taxonomy vis-à-vis the financial structures of firms.

The main results of the present study are summarized as follows. First, a fall in the retention ratio has an important role in the occurrence of the ambivalent situation where the financial structure becomes more fragile, in spite of higher economic growth. Because of the paradox of thrift, a decrease in the retention ratio raises the equilibrium rate of capital accumulation in the long run, irrespective of the debt-led or debt-burdened growth regime. However, since it increases the long-run equilibrium debt-capital ratio and has no effect on the boundary value between speculative and Ponzi finance regimes, a pro-shareholders dividend policy will cause financial fragility; this implies that a negative shock easily moves the financial positions of firms into a Ponzi finance regime. Second, firms facing a decrease in the retention ratio will increase the profit share by lowering wage income. This action improves the financial structure if the short-run equilibrium is in a profit-led growth regime, largely by reducing the long-run equilibrium debt-capital ratio and raising the boundary value. However, the effect of increasing profit share is ambiguous (or, in some cases, may worsen the financial structure) when the short-run equilibrium is in a wage-led growth regime. Thus, a pro-shareholder redistribution of income in the financialization era appears to bear higher risk, in the sense that it brings about financial fragility. Finally, the monetary policy—such as when the central bank reduces the base rate—will be effective if the equilibrium is debt-burdened growth regime in the short run, but this is not necessarily so with debt-led growth.

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Endnotes

[1] See also similar studies by Orhangazi (2008) and van Treeck (2008). Using firm-level data, Orhangazi (2008) demonstrates that financial payments (i.e., dividends and stock buybacks) depress real investment, especially large-sized manufacturing industry in the United States. van Treeck (2008) explicitly distinguishes dividends and interest, and shows that both terms negatively affect investment in the United States, the United Kingdom, France, and Germany.

[2] The following is the literature that considers financialization. Dutt (2006) and Palley (2010) each investigate the relationship between the debt accumulation of households and economic growth. Hein (2010) presents a model in which the outside finance-capital ratio is an endogenous variable in the long run.

[3] Other literatures that take into account the Minskyan taxonomy of financial structure are as follows. Charles (2008a) explains the instable process of the macro economy by constructing a model in which the interest-profit ratio, which implies the state of the financial structure, evolves over time. Lima and Meirelles (2007) show that macro

economic instability always appears when the long-run equilibrium of the debt-capital ratio is located in the Ponzi finance area, regardless of adjustments to the rate of interest.

4 We can add dividends to the explanatory variables of the investment function. Because a rise in the dividend is identified as a signal of firms' good performance, it might reduce the capital cost and raise investment. In contrast, an increase in the dividend—which would imply a decrease in retained earnings—might have a negative impact on investment. van Treeck (2008) shows that the latter effect is statistically significant.

5 As previously seen, the condition for DLCU (DBCU) differs from the condition for DLG (DBG). Note that DBCU is not compatible with DLG. The condition for the former is given by

$$x \equiv s_f(1-s_h)-\theta < 0.$$

The condition for the latter is given by

$$y \equiv \gamma s_f(1-s_h)-\theta\left[s_f\pi(1-s_h)+s_h\right] > 0.$$

Using these two equations obtains

$$y \equiv \gamma(x+\theta)-\theta\left[s_f\pi(1-s_h)+s_h\right] = \gamma x-\theta\left[s_f\pi(1-s_h)+s_h-\gamma\right].$$

Here, $x<0$ and $s_f\pi(1-s_h)+s_h-\gamma>0$ imply $y<0$. The DBCU necessarily leads to DBG. Therefore, there exist the following three cases: Case (a): DLCU and DLG; (b) DLCU and DBG; and (c) DBCU and DBG.

6 This lower limit is positive and smaller than 1. Thus, assuming that λ^* is larger than the lower limit does not contradict the case $0 \le \lambda^* \le 1$.

7 These earlier studies consider only investment and interest payments; they do not consider dividends.

8 The long-run equilibrium value of the debt-capital ratio under the hedge finance regime is negative. When the goods market clears, from equation (3), we obtain $u^* = \left[g^* + s_f(1-s_h)i\lambda^*\right] / \left[s_f\pi(1-s_h)+s_h\right]$. Substituting this equation in equation (16) and rearranging the resultant expression obtains

$$\lambda^* \le -\frac{(1-s_f\pi)g^*}{s_h(1+s_f\pi)i}.$$

This means that λ^* is negative, as long as g^* is positive.

[9] For the derivation, see Appendix 1, which is available on request.

[10] For proofs, see Appendix 4, which is available on request.

Figure 1: DLG case

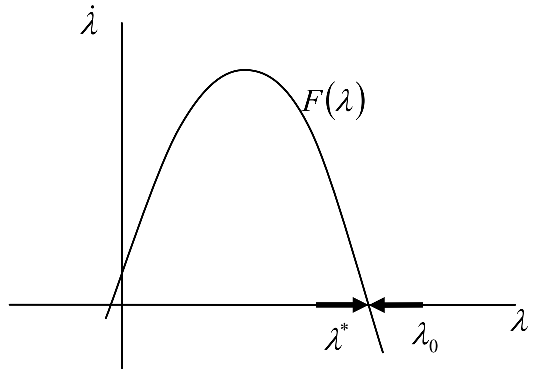

Figure 2: DBG case

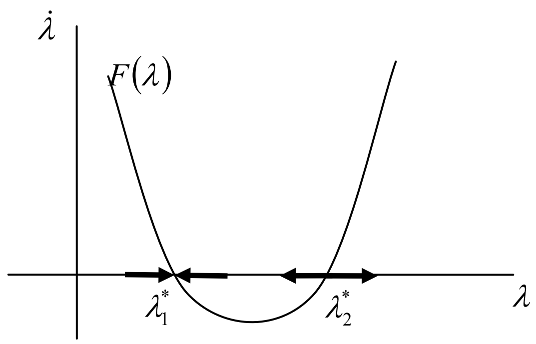

Figure 3: Convergence process from the Ponzi to the speculative area

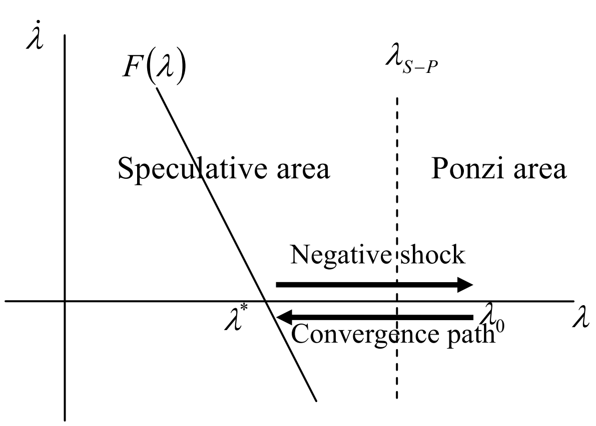

Table 1: Taxonomy of the financial structures of firms

Finance regime	Definition of each financial regime	Existence of the long-run equilibrium
Hedge	$\pi u^* \geq g^* + i\lambda^* + (1 - s_f)(\pi u^* - i\lambda^*)$ eq. (16)	No
Speculative	$\pi u^* < g^* + i\lambda^* + (1 - s_f)(\pi u^* - i\lambda^*)$ and $\pi u^* > i\lambda^* + (1 - s_f)(\pi u^* - i\lambda^*)$ eq. (17)	Yes
Ponzi	$\pi u^* \leq i\lambda^* + (1 - s_f)(\pi u^* - i\lambda^*)$ eq. (18)	No

Table 2: Results of comparative static analysis in the long-run equilibrium

	s_f	π	i	α, β, γ	θ
λ^*	−	− under PLG	+ under DBG	−	+
g^*	−	Ambiguous	− under DBG	+	−
λ_{S-P}	0	+	−	+	−
Financial structure	+	+ under PLG	+under DBG	+	−

Note: Several results assume that γ is sufficiently small. DBG: debt-burdened growth; PLG: profit-led growth.

Appendix (not for publication)

A-1 Derivation of equation (27)

First, $\partial F / \partial s_f$ is derived.

$$\frac{\partial F}{\partial s_f} = -\frac{s_h\left(\pi g^* - s_h i\lambda^*\right)}{\left[s_f\pi(1-s_h)+s_h\right]^2} - \frac{s_f\pi - \left[s_f\pi(1-s_h)+s_h\right]\left(1-\lambda^*\right)}{\left[s_f\pi(1-s_h)+s_h\right]}\frac{\partial g^*}{\partial s_f}. \tag{A1}$$

Using equation (6), $\partial g^* / \partial s_f$ is obtained as follows:

$$\frac{\partial g^*}{\partial s_f} = -\gamma(1-s_h)\frac{(\alpha+\beta\pi)\pi - (s_h + \theta\pi - \gamma)i\lambda^*}{\left[s_f\pi(1-s_h)+s_h-\gamma\right]^2}. \tag{A2}$$

Using equation (5), equation (A2) can be rewritten as follows:

$$\begin{aligned}\frac{\partial g^*}{\partial s_f} &= -\gamma(1-s_h)\frac{(\alpha+\beta\pi)\pi - \left\{\left[s_f\pi(1-s_h)+s_h-\gamma\right] - \pi\left[s_f(1-s_h)-\theta\right]\right\}i\lambda^*}{\left[s_f\pi(1-s_h)+s_h-\gamma\right]^2} \\ &= -\frac{\gamma(1-s_h)\left(\pi u^* - i\lambda^*\right)}{s_f\pi(1-s_h)+s_h-\gamma} \\ &= -\frac{\gamma(1-s_h)\left(\pi g^* - s_h i\lambda^*\right)}{\left[s_f\pi(1-s_h)+s_h-\gamma\right]\left[s_f\pi(1-s_h)+s_h\right]}\end{aligned}. \tag{A3}$$

Substituting equation (A3) in equation (A1) obtains:

$$\frac{\partial F}{\partial s_f} = \frac{\Delta\left(\pi g^* - s_h i\lambda^*\right)}{\left[s_f\pi(1-s_h)+s_h\right]\left[s_f\pi(1-s_h)+s_h-\gamma\right]}. \tag{A4}$$

Using equation (15), $\pi g^* - s_h i\lambda^*$ can be transformed into

$$\pi g^* - s_h i\lambda^* = \frac{s_h\left[s_f\pi(1-s_h)+s_h\right]\left(1-\lambda^*\right)i\lambda^*}{s_f\pi - \left[s_f\pi(1-s_h)+s_h\right]\left(1-\lambda^*\right)}. \tag{A5}$$

Substituting equation (A5) in equation (A4), equation (27) of the text is obtained.

A-2 Proof of Proposition 2

This study investigated the effect of a change in the profit share on the long-run equilibrium value of the debt-capital ratio. Totally differentiating $F\left(\lambda^*;\pi\right)=0$ obtains the following relation:

$$\frac{d\lambda^*}{d\pi} = -\left(\frac{\partial F}{\partial \pi}\right) / \left(\frac{\partial F}{\partial \lambda^*}\right). \tag{A6}$$

The term $\partial F / \partial \pi$ leads to

$$\frac{\partial F}{\partial \pi} = -\frac{s_f s_h}{\sigma^2}\left[g^* + s_f(1-s_h)i\lambda^*\right] - \frac{s_f \pi - [s_f \pi(1-s_h)+s_h](1-\lambda^*)}{s_f \pi(1-s_h)+s_h}\frac{\partial g^*}{\partial \pi}. \tag{A7}$$

The first term on the right-hand side of equation (A7) is negative. The sign of the second term on the right-hand side depends on the sign of $\partial g^* / \partial \pi$. Because the short-run equilibrium is also attained in the long run, equation (8) holds even in the long run. From this, if the short-run equilibrium is PLG, then $\partial g^* / \partial \pi > 0$, which implies that the second term on the right-hand side of equation (A7) is negative. Hence, both $\partial F / \partial \pi < 0$ and $\partial F / \partial \lambda^* < 0$, and consequently, $d\lambda^* / d\pi < 0$—that is, an increase in the profit share decreases the long-run equilibrium value of the debt-capital ratio if the short-run equilibrium is PLG.

By considering that the long-run equilibrium value of the debt-capital ratio can be a function of the profit share, one can differentiate the long-run equilibrium value of the rate of capital accumulation with respect to π as follows:

$$\frac{dg^*}{d\pi} = -s_f s_h i \frac{s_h(1-s_f\pi)\frac{d\lambda^*}{d\pi} + s_f \lambda^*\left[\lambda^* + s_h(1-\lambda^*)\right]}{\left\{s_f \pi - [s_f \pi(1-s_h)+s_h](1-\lambda^*)\right\}^2}. \tag{A8}$$

When the short-run equilibrium is PLG, then $d\lambda^* / d\pi < 0$. However, the sign of equation (A8) is ambiguous.

A-3 Proof of Proposition 3

Totally differentiating $F(\lambda^*; i) = 0$ obtains the following relation:

$$\frac{d\lambda^*}{di} = -\left(\frac{\partial F}{\partial i}\right) / \left(\frac{\partial F}{\partial \lambda^*}\right). \tag{A9}$$

Here, $\partial F / \partial i$ leads to

$$\frac{\partial F}{\partial i} = \left(\frac{\{s_h(1-s_f\pi) - [s_f\pi(1-s_h)+s_h]\lambda^*\}\{\gamma s_f(1-s_h) - \theta[s_f\pi(1-s_h)+s_h]\}}{[s_f\pi(1-s_h)+s_h][s_f\pi(1-s_h)+s_h-\gamma]}\right)\lambda^* + \frac{s_f s_h}{s_f\pi(1-s_h)+s_h}\lambda^* . \tag{A10}$$

For both the positive long-run equilibrium value of the debt-capital ratio and the positive long-run equilibrium value of the rate of capital accumulation, one needs

$s_f\pi - [s_f\pi(1-s_h)+s_h](1-\lambda^*) > 0$, which has already been assumed. This inequality can be rewritten as $s_h(1-s_f\pi) - [s_f\pi(1-s_h)+s_h]\lambda^* < 0$. If the short-run equilibrium is DBG, then $\gamma s_f(1-s_h) - \theta[s_f\pi(1-s_h)+s_h] < 0$, which yields $\partial F/\partial i > 0$. Moreover, from the stability condition of the long-run equilibrium, there is $\partial F/\partial\lambda^* < 0$, which finally yields $d\lambda^*/di > 0$. On the other hand, if the short-run equilibrium is DLG, the sign of equation (A9) cannot be determined.

Furthermore, differentiating the long-run equilibrium rate of capital accumulation, $g^* = A + B\lambda^*$, with respect to the interest rate yields

$$\frac{\partial\lambda^*}{\partial i} = \frac{\{\gamma s_f(1-s_h) - \theta[s_f\pi(1-s_h)+s_h]\}}{s_f\pi(1-s_h)+s_h-\gamma}\left(\lambda^* + i\frac{d\lambda^*}{di}\right). \quad \text{(A11)}$$

In the case of DBG, $dg^*/di < 0$ is obtained because $\gamma s_f(1-s_h) - \theta[s_f\pi(1-s_h)+s_h] < 0$ and $d\lambda^*/di > 0$. However, in the case of DLG, the effect is not clear.

A-4 Comparative static analysis of other parameters

This study investigated the effect of a change in a parameter of the investment function on the boundary from the speculative finance to the Ponzi finance regime, and on the long-run equilibrium value of the debt-capital ratio.

To start, the effect of α on the boundary is given by

$$\frac{d\lambda_{S-P}}{d\alpha} = \frac{\pi}{(s_h+\theta\pi-\gamma)i} > 0. \quad \text{(A12)}$$

Hence, an increase in α shifts the boundary in the positive direction.

Next, this study examined the effect of α on the long-run equilibrium value of the debt-capital ratio. Totally differentiating $F(\lambda^*;\alpha) = 0$ obtains the following relation:

$$\frac{d\lambda^*}{d\alpha} = -\left(\frac{\partial F}{\partial\alpha}\right)/\left(\frac{\partial F}{\partial\lambda^*}\right). \quad \text{(A13)}$$

From the stability condition of the long-run equilibrium, it is known that $\partial F/\partial\lambda^* < 0$. On the other hand, $\partial F/\partial\alpha$ leads to

$$\frac{\partial F}{\partial\alpha} = -\frac{s_f\pi - [s_f\pi(1-s_h)+s_h](1-\lambda^*)}{s_f\pi(1-s_h)+s_h}\frac{\partial g^*}{\partial\alpha}. \quad \text{(A14)}$$

With the aid of equation (6), the term $\partial g^*/\partial\alpha$ can be calculated as follows:

$$\frac{\partial g^*}{\partial \alpha} = \frac{s_f \pi (1 - s_h) + s_h}{s_f \pi (1 - s_h) + s_h - \gamma} > 0 . \tag{A15}$$

With equation (A15) and the inequality $s_f \pi - [s_f \pi (1 - s_h) + s_h](1 - \lambda^*) > 0$, $\partial F / \partial \alpha < 0$ is obtained, which in turn yields $d\lambda^* / d\alpha < 0$. Therefore, an increase in α shifts the boundary in the positive direction and lowers the long-run value of the debt-capital ratio, thus improving the financial structure of firms.

Moreover, from equation (15), the relationship between the rate of capital accumulation and the debt-capital ratio in the long-run equilibrium leads to

$$\frac{dg^*}{d\lambda^*} = -\frac{s_f s_h^2 i \lambda^* (1 - s_f \pi)}{\{s_f \pi - [s_f \pi (1 - s_h) + s_h](1 - \lambda^*)\}^2} < 0 . \tag{A16}$$

Hence, $dg^* / d\alpha = (dg^* / d\lambda^*)(d\lambda^* / d\alpha) > 0$.

A similar procedure applies to the effects of other parameters on the long-run equilibrium.