Increased Shareholder Power and Its Long-run Macroeconomic Effects in a Kaleckian Model with Debt Accumulation*

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ABSTRACT

One of the main characteristics of "financialization" is the redistribution of income in favor of shareholders. In this study, we interpret pro-shareholder redistribution as a decrease in the retention ratio and an increase in profit share. Using both the Kaleckian macroeconomic model and the Minskyan taxonomy of the financial structure of firms, we investigate the long-run effects of such parametric changes on the rate of capital accumulation, the debt–capital ratio, and the financial structures of firms. A decrease in the retention ratio leads to lower capital accumulation under a debt-burdened growth regime and makes financial structures fragile. However, an increase in profit share increases the rate of capital accumulation and improves a firm's financial position in the long run if the short-run equilibrium is debt-burdened growth.

Keywords: pro-shareholder income distribution, financial structure, Kaleckian growth model
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1 Introduction

The aim of this study is to investigate the long-run effects of a decrease in the retention ratio of firms, an increase in the profit share, and a decrease in the

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interest rate on the rate of capital accumulation, the debt–capital ratio, and the financial structures of firms, by using a Kaleckian model.

In the 1990s and 2000s, advanced capitalist countries experienced progress in terms of "financialization." Financialization entails 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 to favor shareholder value. In particular, many studies acknowledge the redistribution of income in favor of shareholders. Skott and Ryoo (2008), van Treeck (2008), and Dallery (2009) show empirically that under financialization, dividend payments to shareholders increase and firms' retention ratios decrease.[1] Under financialization, shareholders tend to have short-term relationships with firms, because their portfolios are diversified; thus, shareholder desires tend to conflict with manager desires: shareholders desire short-term profits—and hence demand higher dividend payouts—whereas managers desire long-run growth (Dallery, 2009; Hein, 2012b). Moreover, Epstein and Power (2003) and Onaran et al. (2011) each show empirically that firms increase profit share, which consequently increases shareholder income. Our concern here lies not in financialization *per se*, but in the effect of the pro-shareholder shift in income distribution on the macroeconomy under financialization.

The effects of pro-shareholder income distribution on the macroeconomy are investigated in the following studies.[2] Stockhammer (2004), Orhangazi (2008), and van Treeck (2008) empirically show that an increase in the share of shareholder income decreases the rate of capital accumulation. However, these studies really estimate the investment function, and not the long-run rate of capital accumulation, and hence they focus only on the short-run effects of financialization. Hein and van Treeck (2010) consider the case where the *rentier* rate of profit—which is the sum of dividends and interest per unit of 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. However, as in the aforementioned empirical studies, Hein and van Treeck (2010) do not analyze the long-run case where debt and capital accumulation prevail. Skott and Ryoo (2008) investigate how changes in the retention ratio and the profit share

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[1] Hein and van Treeck (2010) and Hein (2012a) investigate the effect of a parameter Ω, representing the power of shareholders on the macroeconomy. However, Ω cannot be measured in reality. In contrast, we use the retention ratio of firms, s_f, which can be measured using economic data. Some researchers believe that the retention ratio is not a policy variable determined by firms but a variable determined *ex post.* However, some studies empirically show that firms determine their dividend payout ratios—that is, their retention ratio. See DeAngelo et al. (1992), Fama and French (2001), Denis and Osobov (2008), and Brav et al. (2005).

[2] The following is the literature that theoretically considers financialization. Dutt (2006) and Palley (2010) 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. Hein's (2010) model has the same structure as Hein's (2007) model.

affect macroeconomic variables; they do so by using Harrodian and Kaleckian models. In the Kaleckian model, they show that a decrease in the retention ratio increases the long-run rates of capacity utilization and of economic growth. However, they do not derive their results analytically: Rather, they are derived largely through numerical analysis, and so those results may not be robust.

The current study analytically clarifies the long-run effects of a decrease in the retention ratio and an increase in the profit share on the rate of capital accumulation and the debt–capital ratio; it does so by using a Kaleckian model that features debt accumulation, like that used by Lavoie (1995) and Hein (2007). Lavoie (1995) presents a standard Kaleckian model that considers firm capital and debt accumulation and shows that an increase in the interest rate could increase the rates of capacity utilization and of capital accumulation. Hein (2007) considers the negative effect of interest payments on investment and investigates the properties of the long-run equilibrium. However, Hein (2007) assumes that the retention ratio of firms is equal to unity, and hence, that there are no dividend payments to shareholders. In contrast, we build a model in which the retention ratio is less than unity, and we analytically demonstrate that if the short-run equilibrium were debt-burdened—where an increase in the interest rate and the debt–capital ratio reduces the rates of capacity utilization and of capital accumulation—then a decrease in the retention ratio would lower the long-run equilibrium rate of capital accumulation.

This study also considers how changes in the retention ratio and the profit share affect the financial structure of firms, based on the taxonomy of financial regimes (i.e., hedge, speculative, and Ponzi) as defined by Minsky (1975, 1982). In line with the work of Foley (2003), Meirelles and Lima (2006) and Lima and Meirelles (2007) each investigate under what conditions the macroeconomy enters the Ponzi finance regime, where the financial structure of firms is most fragile.[3] However, both studies adopt two strong assumptions: that the saving propensities of productive and financial capitalists are equal, and that there are no dividend payments. In contrast, in relaxing these assumptions, we show that a decrease in the retention ratio worsens the financial structure of firms, irrespective of whether the economy is in a debt-burdened or debt-led regime, whenever an increase in the interest rate and the debt–capital ratio increases the rates of capacity utilization and of capital accumulation.

The remainder of this paper is organized as follows. Section 2 presents a Kaleckian model that features debt accumulation. Section 3 constructs the Minskyan taxonomy of financial structure in line with the Kaleckian model, and also examines the properties of the boundary between speculative and Ponzi finance regimes. Section 4 investigates the long-run effects of changes in the

[3]Nishi (2012) also investigates the relation between the financial structure of firms and dynamic stability by using a Kaleckian model. However, there are differences between his model and our model in formulating investment and saving functions. Furthermore, his analysis does not consider the effects of changes in the retention ratio and the profit share on the macroeconomy.

retention ratio, profit share, and interest rate on the rate of capital accumulation and the financial structures of firms. Section 5 provides concluding remarks.

2 Kaleckian model with debt accumulation

2.1 Basic settings

In the current study, the economy is assumed to be closed and without a government. There exists a single good with a constant price level, and it can be used for both production and consumption. Technological progress is not considered, and both the potential output–capital ratio and output–labor ratio are assumed to be constant.

This closed economy contains three types of agents: firms, households, and banks. Firms with excess capacity produce goods using capital stock and labor services. In the post-Keynesian "horizontalist" view (Moore, 1988; Rochon, 1999), it is assumed that firms invest by using a part of their 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 issue new shares—they issue shares only once, when they start to operate—these shares are now owned by households.[4] Thus, households earn wage income, interest, and dividends (Taylor, 2004; Skott and Ryoo, 2008). The current study additionally assumes that banks merely transfer savings from households to firms, and interest payments from firms to households.

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

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

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

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

We also make 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 household incomes. Using equations (1) and (2), the aggregate saving function is obtained:

[4] We believe that under financialization, not capitalists and rentiers but general households are likely to own shares. Accordingly, we intentionally use the terms "household" and "firm," and not the traditional terms "worker" and "capitalist."

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

where K denotes real capital stocks, u ($\equiv Y/K$) denotes the rate of capacity utilization, and λ ($\equiv L/K$) 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. Hein (2006) uses a normal Kaleckian-type investment function that relates the investment per unit of capital positively to the profit rate and the rate of capacity utilization. The current study's model assumes that real investment, I, per unit of capital responds positively to the retained profits per unit of capital and the rate of capacity utilization. This assumption is supported by many empirical studies that show that the equipment investment of firms depends positively on the current retained earnings, $s_f(\pi u - i\lambda)K$ (Hayashi and Inoue, 1991; Hoshi et al., 1991; Fazzari et al., 1988; Ndikumana, 1999).

$$\frac{I}{K} = \alpha + \beta s_f\left(\pi u - i\lambda\right) + \gamma u, \ \alpha > 0, \ \beta > 0, \ \gamma > 0. \tag{4}$$

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):

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

This equilibrium is stable if investment is sufficiently insensitive to variations in capacity utilization—that is, if $s_f\pi(1 - s_h - \beta) + s_h - \gamma > 0$—which we assume in the following discussion.[5]

[5]This paper assumes the Keynesian stability condition that ensures the stability of quantity adjustment of the goods market. However, Skott (2010, 2012) and Skott and Zipperer (2012) challenge the validity of the Keynesian stability condition in the long run. Furthermore, Hein, Lavoie and van Treeck (2011, 2012) argue against them to support the Keynesian stability condition.

The short-run equilibrium rate of capacity utilization is debt-led (DLCU) if $1 - s_h - \beta > 0$ (Hein, 2007; Taylor, 2004). This is because increases in the debt–capital ratio and the interest rate work to increase consumption demand by increasing the interest payments made to households. In contrast, if $1 - s_h - \beta < 0$, the short-run equilibrium rate of capacity utilization is debt-burdened (DBCU), because increases in the debt–capital ratio and the interest rate restrain investment demand. Note here that fulfilling the short-run stability condition in the case of DBCU always requires $s_h - \gamma > 0$—something that we assume in what follows.

We substitute equation (5) into equation (4) to obtain the rate of capital accumulation, $g(\equiv I/K)$, in the short-run equilibrium.

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

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

If investment responds weakly to the retained profits but strongly to the rate of capacity utilization, we have $\gamma\left(1 - s_h\right) - \beta s_h > 0$, which leads the short-run equilibrium to exhibit debt-led growth (DLG). If, on the other hand, investment is sufficiently sensitive to variation in the retained profits but insensitive to variation in the rate of capacity utilization, we have $\gamma\left(1 - s_h\right) - \beta s_h < 0$, which leads the short-run equilibrium to exhibit debt-burdened growth (DBG).[6]

[6]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

$$x \equiv 1 - s_h - \beta.$$

The condition for the latter is given by

$$y \equiv \gamma(1 - s_h) - \beta s_h.$$

Using these two equations obtains

$$y \equiv \gamma(x + \beta) - \beta s_h = \gamma x - \beta(s_h - \gamma).$$

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

Next, we examine, as in the standard Kaleckian models, the effect of a change in the profit share on demand and the growth rate. Differentiating u and g with respect to π yields, respectively,

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

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

Since the positive rate of capacity utilization imposes $\alpha + s_f(1 - s_h - \beta)i\lambda > 0$, the conditions of profit-led demand (PLD), $du/d\pi > 0$, and profit-led growth, $dg/d\pi > 0$, coincide with those of DBCU and DBG. In contrast, the conditions of wage-led demand (WLD), $du/d\pi < 0$, and wage-led growth, $dg/d\pi < 0$, are consistent with those of DLCU and DLG.

This property depends on the specifications of the investment and saving functions. First, from the investment function (4), we can see that the positive effect of an increase in the profit share on investment demand and the negative effect of an increase in the debt–capital ratio on investment demand share the same coefficient, βs_f. Second, from the saving function (3), we can see that the positive effect of an increase in the profit share on saving and the negative effect of an increase in the debt–capital ratio on saving share the same coefficient, $s_f(1 - s_h)$. Accordingly, the effect of an increase in the profit share is similar to the effect of an increase in the debt–capital ratio. Similarly, we can show that the effect of an increase in the profit share on capital accumulation is similar to the effect of an increase in the debt–capital ratio. If we use other specifications for saving and investment functions, WLD and DLCU do not necessarily coincide.

In the short run, we can investigate the condition of the "profits without investment" regime, by which parametric changes increase the rate of profit and reduce the rate of capital accumulation. In what follows, we show that increases in the interest rate and the profit share work to produce such a regime.

First, we consider an increase in the interest rate. If both DLCU and DBG are satisfied, an increase in the interest rate increases the rate of capacity utilization and the rate of profit, but reduces the rate of capital accumulation. Note here that the condition for DLCU is $1 - s_h - \beta > 0$, whereas the condition for DBG is $\gamma(1 - s_h) - \beta s_h < 0$. Thus, DLCU is compatible with DBG if $\beta s_h/\gamma > 1 - s_h > \beta$ is satisfied. When the household propensity to save is sufficiently small, an increase in the interest rate increases both the rate of capacity utilization and the rate of profit—which is defined by r ($\equiv \pi u$)—by increasing household consumption. Furthermore, when investment responds weakly to a

change in the rate of capacity utilization, an increase in the rate of capacity utilization does not increase the rate of capital accumulation. Thus, we have a "profits without investment" regime if the household propensity to consume exceeds the responsiveness of firm investments to internal funds, and if investment is sufficiently insensitive to changes in the rate of capacity utilization.

Next, we consider an increase in the profit share. Differentiating the profit rate with respect to π, we obtain the following equation:

$$\frac{dr}{d\pi} = \frac{(s_h - \gamma)\left[\alpha + s_f(1 - s_h - \beta)i\lambda\right]}{\left[s_f\pi(1 - s_h - \beta) + s_h - \gamma\right]^2} > 0. \tag{9}$$

By assumption, $s_h - \gamma > 0$; thus, an increase in the profit share always increases the rate of profit. Moreover, an increase in the profit share reduces the rate of capital accumulation if wage-led growth is satisfied—that is, if $\gamma(1 - s_h) - \beta s_h > 0$. Therefore, a sufficiently strong response on the part of firm investment to the rate of capacity utilization implies a "profits without investment" regime.

Hein and van Treeck (2010) and Hein (2010) also investigate the conditions inherent in a "profits without investment" regime. Their conditions differ from ours, not only because we use a different specification of investment and different class settings, but also because we explicitly distinguish interest and dividends.

2.3 Long-run equilibrium

In the long run, the short-run equilibrium is always attained and the debt–capital ratio is adjusted. Therefore, planned investment and saving are always equalized—that is, the goods market always clears. The growth rate of the debt–capital ratio is given by

$$\dot{\lambda} = \left(\frac{\dot{L}}{L} - g\right)\lambda = \frac{\dot{L}}{K} - g\lambda, \tag{10}$$

where the dots over the variables denote time derivatives.

In terms of the firms' cash-flow identity, an operating fund comprising new borrowings and profit is equal to total expenditures, including investment, interest, and dividends.

$$\frac{\dot{L}}{K} + \pi u \equiv g + i\lambda + \left(1 - s_f\right)\left(\pi u - i\lambda\right). \tag{11}$$

Equation (11) implies that an increment of debt is the difference between investment and retained profits.

$$\frac{\dot{L}}{K} = g - s_f\left(\pi u - i\lambda\right). \tag{12}$$

Substituting equation (12) into equation (10) yields the dynamic equation of the debt–capital ratio:[7]

$$\begin{aligned}\dot{\lambda} \equiv F(\lambda) &= \left[1 - \lambda - \frac{s_f \pi}{s_f \pi(1-s_h)+s_h}\right] g + \frac{s_f s_h}{s_f \pi(1-s_h)+s_h} i\lambda \\ &= -B\lambda^2 + \left[\frac{s_h(1-s_f\pi)B + s_f s_h i}{s_f \pi(1-s_h)+s_h} - A\right]\lambda + \frac{s_h(1-s_f\pi)A}{s_f\pi\left(1-s_h\right)+s_h}\ .\end{aligned} \tag{13}$$

The long-run equilibrium is defined by $\dot{\lambda} = 0$. 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 run can be easily verified.

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

$$\bar{\lambda} = \frac{s_h(1-s_f\pi)B + s_f s_h i - \left[s_f\pi\left(1-s_h\right)+s_h\right]A}{2B\left[s_f\pi\left(1-s_h\right)+s_h\right]}. \tag{14}$$

Figure 1 shows that $F(\lambda)$ always intersects the horizontal axis once within $\lambda > 0$ because its intercept is positive, regardless of the sign of the inflexion axis. 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

[7]Function $F(\lambda)$ is derived as follows. Let the left-hand side of equation (3) be g. From this, we obtain the rate of capacity utilization as a function of the rate of capital accumulation—that is, $u = u(g)$. Substituting $u = u(g)$ into equation (12), and substituting the resultant expression $\dot{L}/K$ into equation (9), we obtain the first line of equation (13). Then, substituting equation (6) into the first line of equation (13), we obtain the second line of equation (13).

Figure 1. DLG case.

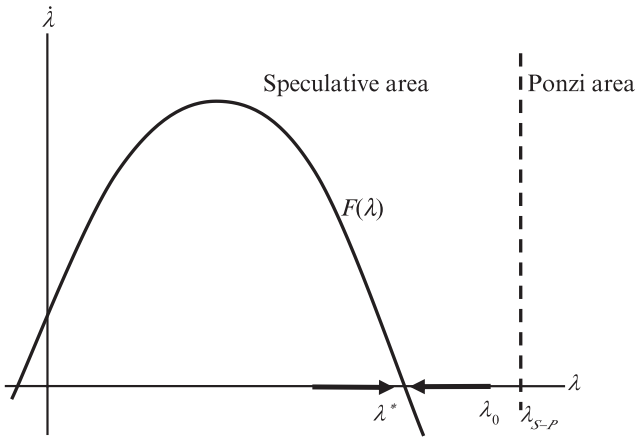
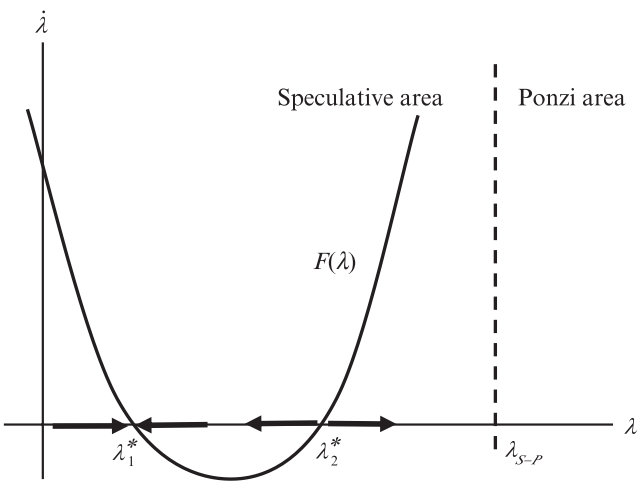


Figure 2. DBG case.



equilibrium, it continues to increase because of $\dot{\lambda} > 0$ and eventually converges to the equilibrium.

Next, we consider the case where $B < 0$, in which the short-run equilibrium exhibits DBG. In this case, $F(\lambda)$ shows a parabola with a downwardly oriented vertex 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 $s_h(1-s_f\pi)B + s_f s_h i - [s_f\pi(1-s_h)+s_h]A < 0$ under $B < 0$, is satisfied if the parameter α is 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.[8]

Figure 2 shows that the DBG case has multiple equilibria $\left(\lambda_1^*, \lambda_2^*\right)$. The low equilibrium, λ_1^*, is locally stable, while the high one, λ_2^*, is locally unstable. If a negative shock drives the debt–capital ratio over λ_2^*, the economy diverges to infinity and, as the next section shows, the financial structure of firms changes from a speculative finance regime to a Ponzi finance regime.

Additionally, note that the following condition is always satisfied in the aforementioned stable long-run positive equilibrium, regardless of whether we have DLG or DBG:

$$\left.\frac{d\dot{\lambda}}{d\lambda}\right|_{\lambda=\lambda^*} = \left.\frac{\partial F(\lambda)}{\partial \lambda}\right|_{\lambda=\lambda^*} = -2B\lambda^* + \left[\frac{s_h(1-s_f\pi)B + s_f s_h i}{s_f\pi\left(1-s_h\right)+s_h} - A\right] < 0. \tag{15}$$

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

$$g^* = \frac{s_f s_h i \lambda^*}{s_f\pi - \left[s_f\pi\left(1-s_h\right)+s_h\right]\left(1-\lambda^*\right)}. \tag{16}$$

Here, we consider only the case where $0 \le \lambda^* \le 1$ because, in reality, the debt–capital ratio remains between 0 and 1 (Taylor and Arnim, 2008; Hein and Schoder, 2011). Moreover, it is appropriate to expect the capital accumulation rate to have a positive value. 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, $\lambda^* > s_h\left(1-s_f\pi\right)/\left[s_f\pi\left(1-s_h\right)+s_h\right]$, for $g^* > 0$.[9] It is assumed that this condition is always satisfied; the long-run equilibrium value of the capital accumulation rate has a positive value.

[8] We can present plausible numerical examples that satisfy the assumption.

[9] This lower limit is positive and smaller than 1. Thus, the assumption that λ^* is larger than the lower limit does not contradict the case $0 \le \lambda^* \le 1$. As long as $\lambda^* > s_h(1-s_f\pi)/[s_f\pi(1-s_h)+s_h]$ is not satisfied, we obtain $\pi u^* - i\lambda^* < 0$ from equations (21) and (22). This implies that the retained profits of firms become negative, and accordingly, the rate of capital accumulation is likely to become negative. Thus, the debt–capital ratio must exceed the lower limit.

3 Minskyan taxonomy of the financial structure

3.1 Financial regime and position of the long-run equilibrium

Minsky (1975, 1982) classifies the financial structures of firms into three categories, according to cash-flow accounting: hedge finance, speculative finance, and Ponzi finance. Studies 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 (2008b, 2008c).[10]

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

$$g^* - s_f\left(\pi u^* - i\lambda^*\right) \leq 0, \tag{17}$$

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

Next, speculative finance is defined as a situation in which 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 conditions for speculative finance obtains the following relations:

$$g^* - s_f\left(\pi u^* - i\lambda^*\right) > 0 \quad \text{and} \quad \pi u^* > i\lambda^*. \tag{18}$$

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

[10]These earlier studies consider only investment and interest payments; they do not consider dividends. Studies that specify the taxonomy of financial structure by using Kaleckian models include Foley (2003: 158–160), Meirelles and Lima (2006: 102–104), Lima and Meirelles (2007: 570–572), Charles (2008a: 320–321), and Nishi (2012: 12–14). These studies include only investment and interest payments in firm expenditures; they do not consider dividends. However, we should not exclude dividends, because it is one of the most important expenditure items vis-à-vis pro-shareholder income distribution. In addition, Minsky (1982) himself explicitly states that dividends constitute a component of firm expenditures: "The cash payments made by a unit over a relevant time period equal the spending on current labor and purchased inputs, tax payments, the remittance due to debts that fall due, and dividends" (24).

Table 1. Taxonomy of the financial structures of firms.

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

sum of interest payments and dividends. Rearranging the condition for Ponzi finance yields the following relation:

$$\pi u^* \leq i\lambda^*. \tag{19}$$

In which financial regime is the long-run equilibrium located? First, from equation (12), it is known that under hedge finance, $\dot{L}/K \leq 0$. Because the goods market clears in the long-run equilibrium, from equations (3) and (12), the borrowing of firms is equal to the savings of households.

$$\frac{\dot{L}}{K} = s_h\left[\left(1 - s_f\pi\right)u^* + s_f i\lambda^*\right]. \tag{20}$$

The right-hand side of equation (20) is clearly positive, which contradicts $\dot{L}/K \leq 0$. Therefore, the long-run equilibrium is not hedge finance.[11] In addition, this means that the former condition of equation (18) necessarily holds.

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

[11] 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 $u^* = [g^* + s_f(1 - s_h)i\lambda^*]/[s_f\pi(1 - s_h) + s_h]$. Substituting this equation into equation (17) and rearranging the resultant expression yields

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

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

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

The condition for speculative finance is identical to $g^* - s_h u^* > 0$. By using equation (16), we can rewrite the latter as follows:

$$g^* - s_h u^* = \frac{s_f s_h\left(1 - s_h\right)\left(1 - \lambda^*\right) i\lambda^*}{s_f \pi - \left[s_f \pi\left(1 - s_h\right) + s_h\right]\left(1 - \lambda^*\right)}. \tag{22}$$

The assumption, made in the previous section, is that the denominator of the right-hand side of equation (22) is positive; consequently, we obtain $g^* - s_h u^* > 0$. Therefore, the long-run equilibrium is in the speculative finance regime. The long-run equilibrium is never in the Ponzi finance regime.

The long-run equilibrium is necessarily located in the speculative finance regime, for the following reason. In the long-run equilibrium, the debt–capital ratio is constant, which means that debt stock increases at the same rate as capital stock. In the hedge finance regime, since the profits of firms are larger than the sum of expenditures, firms necessarily reduce their debt ($\dot{L}/K \leq 0$ from equation (12)). In the Ponzi finance regime, since firms require new borrowings to pay interest on past debts, debt stock increases at a rate higher than that of capital stock. Therefore, the economy is necessarily located in the speculative finance regime, and so debt stock and capital stock grow at the same rate.

3.2 Comparative static analysis of financial regimes

However, depending on whether the long-run equilibrium is near the hedge finance or Ponzi finance regime, firm sustainability can differ greatly. If the equilibrium is near the Ponzi finance regime, a negative shock to the economy will drive firm financial positions into that regime. Thus, we need to investigate under what conditions the long-run equilibrium approaches the Ponzi finance regime. As a preliminary step, we pinpoint the boundary between the speculative and Ponzi finance regimes.

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:

$$\lambda_{S-P} = \frac{\alpha\pi}{\left(s_h - \gamma\right) i}. \tag{23}$$

The boundary value is positive under $s_h - \gamma > 0$. Because the long-run equilibrium is located in the speculative finance regime, $\lambda^* < \lambda_{S-P}$ always occurs, as Figures 1 and 2 show.

To assess whether 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 an increase in a parameter increases the long-run equilibrium value of the debt–capital ratio, and how an increase in the parameter shifts the boundary. In this section, the latter issue is 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, respectively:

$$\frac{d\lambda_{S-P}}{ds_f} = 0, \tag{24}$$

$$\frac{d\lambda_{S-P}}{d\pi} = \frac{\alpha}{(s_h - \gamma)i} > 0, \tag{25}$$

$$\frac{d\lambda_{S-P}}{di} = -\frac{\alpha\pi}{(s_h - \gamma)i^2} < 0. \tag{26}$$

First, the boundary is independent of the retention ratio of firms. Second, the effect of an increase in the profit share on the boundary is positive. Third, an increase in the interest rate shifts the boundary in the negative direction.

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

In this section, we investigate the effect of changes in the retention ratio, profit share, and interest rate on the long-run equilibrium values of the debt–capital ratio, rate of capital accumulation, and financial structure of firms. Table 2 shows the results referenced in subsection 3.2 and of the comparative static analysis.[12]

As stated in the Introduction, one of the important features of financialization is a decrease in the retention ratio. A decrease in the retention ratio leads to an increase in the equilibrium value of the debt–capital ratio under both DBG and DLG; however, as equation (24) shows, it never affects the boundary value λ_{S-P} between speculative finance and Ponzi finance. Therefore, a decrease in the retention ratio moves the financial structure of firms closer to the Ponzi finance

[12] For details of the comparative static analysis, see the Appendix.

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

	s_f	π	i
λ^*	−	−	+
g^*	+ under DBG − under DLG	+ under DBG − under DLG	− under DBG + under DLG
λ_{S-P}	0	+	−

regime. In addition, a decrease in the retention ratio has a negative impact on the long-run equilibrium value of the rate of capital accumulation under DBG, but has a positive impact under DLG.

However, the financial structure of firms can be improved by increasing the profit share. This is because an increase in the profit share reduces the equilibrium value of the debt–capital ratio and increases the boundary value. Another way of improving financial structure is to reduce the interest rate. A decrease in the interest rate reduces the equilibrium value of the debt–capital ratio, irrespective of DBG or DLG, and shifts the boundary value upwards. 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 is contingent on the monetary policy of the central bank, the lending rate moves with the base rate as long as the mark-up remains constant. Thus, the central bank can decisively affect the financial structure of firms by controlling the base rate.

To summarize the above results, we set forth the following propositions.

Proposition 1. *In the long-run equilibrium, a decrease in the retention ratio worsens the financial structure of firms. Moreover, a decrease in the retention ratio reduces (increases) the rate of capital accumulation under DBG (DLG).*

Proposition 2. *In the long-run equilibrium, an increase in the profit share improves the financial structure of firms. Moreover, an increase in the profit share increases (reduces) the rate of capital accumulation under DBG (DLG).*

Proposition 3. *In the long-run equilibrium, a decrease in the interest rate improves the financial structure of firms. Moreover, a decrease in the interest rate increases (reduces) the rate of capital accumulation under DBG (DLG).*

As stated in the Introduction, it is possible that the progress of financialization leads to an increase in profit share. Even if firm profit shares reach their highest levels—such that firms cannot increase their profit shares any further—policy-makers can lower interest rates in order to improve the financial structure of firms.

5 Conclusions

Many studies have observed pro-shareholder income redistribution that results from a decrease in the retention ratio and an increase in the profit share, in advanced capitalist countries under financialization. This study investigated the long-run effect of such redistribution on the rate of capital accumulation, the debt–capital ratio, and firms' financial position; it did so by using a Kaleckian model with debt accumulation and a Minskyan taxonomy vis-à-vis the financial structures of firms. The main results of the current study are summarized as follows.

If investment is sufficiently insensitive to changes in retained profits but sensitive to changes in the rate of capacity utilization, then the short-run equilibrium exhibits debt-led growth. In this case, a decrease in the retention ratio raises the long-run equilibrium value of the rate of capital accumulation. Furthermore, under this regime, the long-run equilibrium is always stable.

However, we have a more realistic debt-burdened growth case, where investment responds strongly to retained profits but weakly to the rate of capacity utilization. Under this regime, a decrease in the retention ratio reduces the long-run rate of capital accumulation. In addition, if a negative shock leads to a high debt–capital ratio, then the economy becomes unstable and the financial structure falls into a Ponzi finance scheme.

Even if the economy never diverges to infinity, a decrease in the retention ratio worsens the financial structure of firms, irrespective of whether growth is debt-led or debt-burdened. Ultimately, we showed that there are two alternative ways of improving the financial structure of firms—namely, increasing the profit share or reducing the interest rate.

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Appendix: Comparative static analysis

A.1 The retention ratio

Totally differentiating $F(\lambda^*; s_f) = 0$ yields

$$\frac{d\lambda^*}{ds_f} = -\left(\frac{\partial F}{\partial s_f}\right) / \left(\frac{\partial F}{\partial \lambda^*}\right). \tag{A1}$$

Because the long-run equilibrium is stable, $\partial F/\partial \lambda^* < 0$ is obtained from equation (15). Next, $\partial F/\partial s_f$ is derived as follows:

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

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

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

Using equation (5), equation (A3) can be rewritten as follows:

$$\begin{aligned}\frac{\partial g^*}{\partial s_f} &= -\frac{\left[\gamma\left(1-s_h\right)-\beta s_h\right]\left\{\alpha\pi - s_f\left[\pi\left(1-s_h-\beta\right)+s_h-\gamma-\pi\left(1-s_h-\beta\right)\right]i\lambda^*\right\}}{\left[s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma\right]^2} \\ &= -\frac{\left[\gamma\left(1-s_h\right)-\beta s_h\right]\left(\pi u^* - i\lambda^*\right)}{s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma} \\ &= -\frac{\left[\gamma\left(1-s_h\right)-\beta s_h\right]\left(\pi g^* - s_h i\lambda^*\right)}{\left[s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma\right]\left[s_f\pi\left(1-s_h\right)+s_h\right]}.\end{aligned} \tag{A4}$$

Substituting equation (A4) into equation (A2) yields

$$\frac{\partial F}{\partial s_f} = -\Delta\left\{s_h - \frac{\left[\gamma\left(1-s_h\right)-\beta s_h\right]\left\{s_f\pi - \left[s_f\pi\left(1-s_h\right)+s_h\right]\left(1-\lambda^*\right)\right\}}{s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma}\right\}, \tag{A5}$$

where $\Delta \equiv (\pi g^* - s_h i\lambda^*)/[s_f\pi(1 - s_h) + s_h]^2$. Here, we can easily prove $\Delta > 0$, because $\pi g^* - s_h i\lambda^*$ can be transformed into

$$\pi g^* - s_h i\lambda^* = \frac{s_h\left[s_f\pi\left(1-s_h\right)+s_h\right]\left(1-\lambda^*\right)i\lambda^*}{s_f\pi-\left[s_f\pi\left(1-s_h\right)+s_h\right]\left(1-\lambda^*\right)} > 0. \tag{A6}$$

Based on the assumption $s_f\pi - [s_f(1-s_c)+s_c](1-\lambda^*) > 0$, $\partial F/\partial s_f < 0$ is obtained if the short-run equilibrium exhibits DBG—that is, $\gamma(1 - s_h) - \beta s_h < 0$. Moreover, equation (A5) can be rewritten as follows:

$$\frac{\partial F}{\partial s_f} = -\frac{\Delta\left[s_f\pi\left(1-s_h\right)+s_h\right]\left\{s_h-\gamma+\left[\gamma\left(1-s_h\right)-\beta s_h\right]\left(1-\lambda^*\right)\right\}}{s_f\pi\left(1-s_c-\beta\right)+s_h-\gamma}. \tag{A7}$$

By assuming $s_h - \gamma > 0$, $\partial F/\partial s_f < 0$ is obtained, even if the short-run equilibrium exhibits DLG—that is, $\gamma(1 - s_h) - \beta s_h > 0$. Accordingly, $d\lambda^*/ds_f < 0$ is obtained both under DBG and DLG.

The effect of a decrease in the retention ratio on the long-run equilibrium value of the rate of capital accumulation is investigated as follows. Considering that the long-run equilibrium value of the debt–capital ratio is a decreasing function of the retention ratio, one can differentiate equation (6) with respect to s_f, and hence yield

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

As shown in subsection 3.1, the long-run equilibrium is in the speculative finance area, which implies $\pi u^* - i\lambda^* > 0$. Substituting equation (5) into this inequality leads to $\alpha\pi - (s_h - \gamma)i\lambda^* > 0$. Thus, $dg^*/ds_f > 0$ ($dg^*/ds_f < 0$) is obtained if the short-run equilibrium exhibits DBG (DLG).

A.2 Profit share

Completely differentiating $F(\lambda^*; \pi) = 0$ yields the following relation:

$$\frac{d\lambda^*}{d\pi} = -\left(\frac{\partial F}{\partial \pi}\right) \Big/ \left(\frac{\partial F}{\partial \lambda^*}\right), \tag{A9}$$

where the denominator is negative and the numerator is given by

$$\begin{aligned}\frac{\partial F}{\partial \pi} = &-\frac{s_f s_h}{\left[s_f \pi (1-s_h)+s_h\right]^2}\left[g^* + s_f (1-s_h) i\lambda^*\right] \\ &-\frac{s_f \pi - \left[s_f \pi (1-s_h)+s_h\right](1-\lambda^*)}{s_f \pi (1-s_h)+s_h}\frac{\partial g^*}{\partial \pi}.\end{aligned} \tag{A10}$$

The first term on the right-hand side of equation (A10) is negative. The sign of the second term on the right-hand side depends on the sign of $\partial g^*/\partial \pi$. From equation (8), if the short-run equilibrium exhibits DBG, then $\partial g^*/\partial \pi > 0$, which implies that the second term on the right-hand side of equation (A10) is negative. Hence, we obtain $\partial F/\partial \pi < 0$—and, consequently, $d\lambda^*/d\pi < 0$ in the DBG case. Moreover, we can rewrite equation (8) as follows:

$$\begin{aligned}\frac{\partial g^*}{\partial \pi} &= -\frac{s_f\left[\gamma(1-s_h)-\beta s_h\right]u^*}{s_f \pi (1-s_h-\beta)+s_h-\gamma} \\ &= -\frac{s_f\left[\gamma(1-s_h)-\beta s_h\right]\left[g^* + s_f(1-s_h) i\lambda^*\right]}{\left[s_f \pi (1-s_h-\beta)+s_h-\gamma\right]\left[s_f \pi (1-s_h)+s_h\right]}.\end{aligned} \tag{A11}$$

Substituting equation (A11) into equation (A10) yields

$$\frac{\partial F}{\partial \pi} = -\frac{s_f\left[g^* + s_f(1-s_h) i\lambda^*\right]\left\{s_h-\gamma+\left[\gamma(1-s_f)-\beta s_h\right](1-\lambda^*)\right\}}{\left[s_f \pi (1-s_h)+s_h\right]\left[s_f \pi (1-s_h-\beta)+s_h-\gamma\right]}. \tag{A12}$$

Equation (A12) shows that even if the short-run equilibrium were to exhibit DLG, we obtain $\partial F/\partial \pi < 0$, and hence, $d\lambda^*/d\pi < 0$.

By considering that the long-run equilibrium value of the debt–capital ratio can be a decreasing 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:

$$\frac{dg^*}{d\pi} = -\frac{s_f\left[\gamma\left(1-s_h\right)-\beta s_h\right]\left\{\alpha + s_f\left(1-s_h-\beta\right)i\lambda^* - \left[s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma\right]i\frac{d\lambda^*}{d\pi}\right\}}{\left[s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma\right]^2}. \tag{A13}$$

Thus, we obtain $dg^*/d\pi > 0$ ($dg^*/d\pi < 0$) if the short-run equilibrium exhibits DBG (DLG).

A.3 Interest rate

Completely differentiating $F(\lambda^*; i) = 0$ yields

$$\frac{d\lambda^*}{di} = -\left(\frac{\partial F}{\partial i}\right)\Big/\left(\frac{\partial F}{\partial \lambda^*}\right). \tag{A14}$$

Here, the numerator is

$$\frac{\partial F}{\partial i} = -\left\{\frac{s_f\pi - \left[s_f\pi\left(1-s_h\right)+s_h\right]\left(1-\lambda^*\right)}{s_f\pi\left(1-s_h\right)+s_h}\right\}\frac{dg^*}{di} + \frac{s_f s_h}{s_f\pi\left(1-s_h\right)+s_h}\lambda^*. \tag{A15}$$

If the short-run equilibrium exhibits DBG, both terms on the right-hand side of equation (A15) are positive—that is, $\partial F/\partial i > 0$—which finally implies $d\lambda^*/di > 0$. Moreover, from equation (6), we obtain

$$\frac{dg}{di} = \frac{s_f\left[\gamma\left(1-s_h\right)-\beta s_h\right]\lambda}{s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma}. \tag{A16}$$

Substituting equation (A16) into equation (A15) yields

$$\frac{\partial F}{\partial i} = \frac{s_f\lambda^*\left\{s_h-\gamma+\left[\gamma\left(1-s_f\right)-\beta s_h\right]\left(1-\lambda^*\right)\right\}}{\left[s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma\right]}. \tag{A17}$$

Even if the short-run equilibrium exhibits DLG, we obtain $dF/di > 0$, and hence, $d\lambda^*/di > 0$.

Finally, differentiating the long-run equilibrium value of the rate of capital accumulation with respect to the interest rate yields

$$\frac{dg^*}{di} = \frac{s_f\left[\gamma\left(1-s_h\right)-\beta s_h\right]}{s_f\pi\left(1-s_h-\beta\right)+s_h-\gamma}\left(\lambda^* + i\frac{d\lambda^*}{di}\right). \tag{A18}$$

Note here that $\lambda^* + i(d\lambda^*/di) > 0$. Thus, we obtain $dg^*/di < 0$ ($dg^*/di > 0$) in the case of DBG (DLG).