A Minskian extension to Kaleckian dynamics

Kemp-Benedict, Eric

Stockholm Environment Institute

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Eric Kemp-Benedict

Stockholm Environment Institute, Bangkok, Thailand
eric.kemp-benedict@sei-international.org

Abstract

Minsky's financial instability hypothesis (FIH) has been criticized as suffering from a fallacy of composition that violates a central thesis of Kalecki. Nevertheless, Minsky's description of borrowing and lending behavior is sufficiently compelling that it continues to drive new research. In this paper we propose a modified Kaleckian model in which a behavioral rule captures Minsky's microeconomic argument that firms and banks increase the leverage of new loans during booms, but which translates through Kaleckian dynamics into a falling debt-to-capital ratio at a macroeconomic level. The expanding loan-to-capital ratio drives a potential instability, but in utilization, rather than debt.

Keywords: financial instability hypothesis; Kalecki; Minsky; debt dynamics

1. Introduction

Hyman Minsky's influence on post-Keynesian theory is undeniable, yet his most far-reaching idea, the financial instability hypothesis (FIH) (Minsky 1977; 1980; 2008) has been criticized on both theoretical and empirical grounds. The FIH states that, in the boom phase of a financial cycle, firms steadily increase their leverage, thereby moving the entire financial system from a "hedge" position in which profits cover payments on both principle and interest to a "Ponzi" position in which profits cover neither, so business loans require periodic refinancing. The theoretical critique of the FIH is that it commits a fallacy of composition (Lavoie and Seccareccia 2001; Toporowski 2008), in that it ignores Kalecki's (1969) observation that investment decisions taken by firms individually lead to a collective increase in income, an essential insight sometimes summarized as "capitalists earn what they spend". Empirically, Lavoie and Seccareccia (2001) display trends in GDP growth and debt-to-equity ratios for six OECD countries and argue there is no obvious, stable, relationship between the two. Moreover, in an econometric analysis of annual data for Canada they show that, if anything, debt-to-equity ratios tend to fall during booms, rather than rise, as the FIH proposes.

The position of this paper is that the empirical evidence cannot be denied: debt-to-equity ratios tend to, but do not always, fall during booms. However, we also consider Minsky to have proposed a compelling microeconomic argument for firm and bank behavior during booms. The argument (Minsky 1980, pp.516–517) is that, to the extent that profit income validates past debt, firms and banks feel confident in increasing the leverage of new loans. This is possible as long as banks are willing to lend and, crucially, that they are willing to refinance existing loans. If banks curtail lending and refinancing operations, then firms that have taken "Ponzi" positions cannot repay their debts. Minsky's presentation of this argument explicitly takes Kalecki's theory into account, but still commits the fallacy of composition noted above. The fallacy is introduced at the end of the argument, in which it is assumed, but not demonstrated, that increasing leverage of loans (a flow) leads necessarily to increasing leverage of debt (a stock).

In this paper we begin with an essentially Kaleckian model and then introduce a behavioral relationship consistent with Minsky's microeconomic argument. We are not the first to attempt a union between Kalecki and Minsky. Aside from Minsky himself, Lavoie (1995) introduced a "Minsky-Steindl" model that was later taken up and expanded upon by Hein (2006; 2007). In these papers, the debt-to-capital ratio is held fixed in the short run, and then either the effect of the debt-to-capital ratio on utilization is studied in a comparative static analysis or the debt-to-capital ratio is endogenized in a long-run analysis. A distinct analysis was carried out by Ryoo (2013), who argued in favor of the FIH, particularly in the long run. Ryoo makes two departures from a standard analysis, first by considering equity rather than bank finance and second by closing the model by adjusting the debt level rather than utilization. As we follow Minsky by focusing on bank lending and Kalecki by focusing on changes in capacity utilization, the model presented in this paper is not directly comparable to Ryoo's.

While remaining close to Kalecki's formulation of economic dynamics, we depart from the conventional Kaleckian analysis. We introduce an investment function through an accounting balance that includes loans, and then, following Minsky's arguments, propose a dynamic adjustment mechanism for the loan-to-capital ratio that leads it to expand during booms. For a plausible range of parameter values this destabilizes utilization, while the debt-to-capital ratio has stable dynamics, and tends to decline during the boom. The behavior of the debt-to-capital ratio is consistent with the empirical evidence presented by Lavoie and Seccareccia (2001), while the instability is consistent with Minsky (1977; 1980).

2. A Kaleckian model with Minskian behavior

As noted in the Introduction, in the model we aim to capture two concepts: Kalecki's macroeconomic argument that the contribution of investment to effective demand leads to rising profits and Minsky's microeconomic argument that firms and banks agree to increase the leverage of new loans in the course of a boom. Everything else in the model is kept as simple as possible. In particular, we assume a closed economy with no government sector, and keep fixed some parameters that are normally assumed to vary in Kaleckian models.

Kaleckian dynamics

Following Kalecki, future physical investment (the "next period" in the model this paper) is financed through current-period loans and retained profits, net of debt payments. Mathematically, investment is given by

$$I_{t+1} = \rho\Pi_t + L_t - iD_t, \tag{1}$$

where I_{t+1} is next period-investment, financed by the retained fraction ρ of total profits Π_t from the current period, as well as bank loans L_t, net of debt payments at a rate i on the total debt D_t.

Debt stock in the next period is given by current period debt, less current debt payments, plus current-period loans. Thus, in this model loans are viewed as being negotiated through the current period and are recorded against firms' accounts in the next period,

$$D_{t+1} = (1-i)D_t + L_t. \tag{2}$$

GDP, Y_t, is proportional to the capital stock K_t,

$$Y_t = u_t \kappa K_t, \tag{3}$$

where u_t is utilization, defined so that it is equal to one at a "normal" utilization level and κ is capital productivity at normal utilization. The debt stock follows standard "perpetual inventory" dynamics with a fixed depreciation rate,

$$K_{t+1} = (1-\delta)K_t + I_{t+1}. \tag{4}$$

Dividing equation (1) by K_t gives the following equation in intensive variables,

$$g = \rho\pi\kappa u_t + \lambda_t - iz_t, \tag{5}$$

where g is gross increase in the capital stock due to investment, π is the profit share, λ_t the loan-to-capital ratio, and z_t the debt-to-capital ratio. Dividing equation (2) through by K_t and combining with equation (4) gives

$$(1+g-\delta)z_{t+1} = (1-i)z_t + \lambda_t. \tag{6}$$

We close the model by equating savings and investment. Because our focus is on the investment function, the savings equation is particularly simple,

$$S_t = sY_t = s\kappa u_t K_t. \tag{7}$$

As the notation indicates, in this paper we hold the savings rate s fixed, as well as variables that affect savings, including the interest rate i, profit share π, and the retention ratio ρ. These are clearly extreme assumptions, as they preclude analysis of changing savings behavior through a changing income distribution; that is, they preclude a treatment of an essential feature of Kalecki's theory. As discussed above, this is a deliberate choice that we make in order to focus attention on a peculiarly Minskian behavioral relationship. As we shall show, the Minskian dynamics alone lead to endogenous changes in utilization. A full analysis would include cyclical or trend changes in distributional parameters, which would enrich the dynamics, but complicate the presentation.

Equating savings and investment means that we can substitute $s\kappa u_t$ for g in the equations above, so they become

$$\kappa\left(s-\rho\pi\right)u_t=\lambda_t-iz_t, \tag{8}$$

$$\left(1+s\kappa u_t-\delta\right)z_{t+1}=\left(1-i\right)z_t+\lambda_t. \tag{9}$$

The profit retention ratio

Before continuing, we pause to discuss the profit retention ratio ρ, because it has not been given the same attention in post-Keynesian literature as have the other distributional parameters. Sasaki and Fujita (2012) explicitly treat the retention ratio in a Kaleckian model with debt dynamics and argue that it must be less than one to obtain sensible results. Lavoie (1995, pp.165–166) explicitly includes the retention ratio in the savings function in his Minsky-Steindl model, while allowing it to change implicitly in the investment function.

The retention ratio is one less than the payout ratio, and payout policies have been extensively studied and discussed both empirically and theoretically in the finance literature. In common with much of financial theory since the 1960s, this large literature has been driven by a "puzzle" (that is, empirical contradiction of theoretical expectations), in this instance why companies pay dividends at all. Miller and Modigliani (MM) (1961) argue that a rational investor should be indifferent as to whether they receive dividends or capital gains. Others, noting that the theory is inconsistent with the facts, introduce market imperfections and other adjustments to the MM model. These theories are incompatible with the post-Keynesian assumption of fundamental uncertainty, but a similar criticism of MM has been raised in a post-Keynesian context as well (Gordon 1992). While it is not the topic of this paper, we would agree with the argument that fundamental uncertainty explains in a natural way why investors value cash distributions differently than capital gains. One argument is that, in a fundamentally uncertain world (and not merely a risky one, as in Bhattacharya 1979), a "bird in the hand" is valuable (Findlay and Williams 2000, p.192; Baker and Weigand 2015, p.134). Another is that the past stream of dividends is the main source of information on future dividends (Gordon 1989, p.24).

The classic empirical paper on payout policies is Lintner (1956), who found that most of the firms he studied set target dividend payout rates. Actual payout rates tracked the target slowly over time, with full adjustment taking multiple years. In the decades since that paper was published, there has been a steady erosion of dividends. This has been partly offset by a rise in stock repurchases, but in a recent review, Baker and Weigand (2015, p.131) note that total payouts have declined. Among the "stylized facts" compiled by Baker and Weigand (p. 138), dividend payments remain large in absolute terms and are important to investors, analysts, and firms; a rise in payouts is normally met with an increase in share price; and there is no single theory that explains dividend policies.

In the present paper, as noted earlier, we assume an unchanging retention ratio in the short run. To the extent that Lintner's (1956) observations remain true today, a more realistic assumption might be a constant payout in the short run, with a gradual adjustment toward a target rate. In order to focus on Minksian loan dynamics, we defer that analysis to a future paper.

Minskian behavior

In Minsky's theory, profits validate past investment and current debt payments. If an economy is starting to do well, but it recently had not, it will have liability structures that reflect the recent past, with margins of safety that ensure continued operation despite poor performance. As the economy begins to do well, in Minsky's (1977, p.24) words,

> Existing debts are easily validated and units that were heavily in debt prospered; it paid to lever. After the event, it becomes apparent that the margins of safety built into debt structures were too great. As a result, over a period in which the economy does well, views about acceptable debt structure change. In the deal-making that goes on between banks, investment bankers, and businessmen, the acceptable amount of debt to use in financing various types of activity and positions increases.

We capture this behavior in the model by proposing that firms and the banks that lend to them expect the economy to be at a particular utilization level u_t^*, and they make borrowing and lending agreements– as expressed by the loan-to-capital ratio λ_t – on that basis. Because firms set prices based on a fixed markup, the difference between anticipated and realized profits is proportional to the difference between anticipated and realized utilization, which gives a windfall (retained) profit rate w_t per unit of capital,

$$w_t = \rho\pi\kappa\left(u_t - u_t^*\right). \tag{10}$$

At the start of a recovery, the windfall is positive, so that profits "easily" validate past debt. This encourages both borrowing firms and lending banks to revise their assessments of risk, and in the next period they increase the loan-to-capital ratio by a multiple of the windfall profit rate,

$$\lambda_{t+1} = \lambda_t + \alpha w_t. \tag{11}$$

In this paper we assume simple adaptive expectations, in which expected utilization equals previous period utilization,

$$u_t^* = u_{t-1}. \tag{12}$$

From equations (10) and (11), the loan-to-capital ratio then obeys

$$\Delta\lambda_{t+1} = \alpha\rho\pi\kappa\Delta u_t. \tag{13}$$

To make use of this equation, we take first differences of equation (8) and combine with equation (13) to find a second-order difference equation

$$\Delta^2 u_t \equiv \Delta u_t - \Delta u_{t-1} = \frac{(1+\alpha)\rho\pi - s}{s - \rho\pi}\Delta u_{t-1} - \frac{i}{\kappa(s-\rho\pi)}\Delta z_t. \tag{14}$$

If there is no Minskian adjustment mechanism, so that α is zero, then this reduces to a simple statement that the debt-to-capital ratio rises or falls in step with the profit rate when the loan-to-capital ratio is fixed. For an arbitrary value of α this equation gives rise to autonomous changes in utilization.

Later, it will be convenient to express all variables in terms of small deviations from conditions at normal utilization, $u = 1$. We write

$$u_t = 1 + \varepsilon_t, \quad z_t = z_0 + \varsigma_t, \tag{15}$$

where z_0 is the debt ratio at normal utilization. In terms of these variables, equation (14) becomes

$$\Delta^2 \varepsilon_t = \frac{(1+\alpha)\rho\pi - s}{s - \rho\pi}\Delta \varepsilon_{t-1} - \frac{i}{\kappa(s-\rho\pi)}\Delta \varsigma_t. \tag{16}$$

This is a dynamical equation in two variables. For a complete system we need a further equation that gives the change in the debt-to-capital ratio.

Debt dynamics

A dynamical equation for the debt-to-capital ratio emerges when we combine equations (8) and (9) to eliminate λ_t:

$$(1 + s\kappa u_t - \delta) z_{t+1} = z_t + \kappa(s - \rho\pi)u_t. \tag{17}$$

The change in the debt ratio is then given by

$$\Delta z_t = -\frac{s\kappa u_t - \delta}{1 + s\kappa u_t - \delta} z_t + \frac{\kappa(s-\rho\pi)}{1 + s\kappa u_t - \delta} u_t. \tag{18}$$

The sign of the coefficient on z_t is negative during a recovery and subsequent boom, in which accumulation exceeds depreciation. This means that its dynamics are stable, so the debt-to-capital ratio chases an asymptotic value z^* that can be found by setting equation (18) equal to zero,

$$z^* = \frac{\kappa u_t (s - \rho\pi)}{s\kappa u_t - \delta} = \frac{s - \rho\pi}{s - \delta/\kappa u_t}. \tag{19}$$

From this equation it can be seen that when utilization goes up, z^* goes down, meaning that in a boom, the debt ratio will tend to go down, other factors remaining the same. This is consistent with Lavoie and Seccareccia's (2001) findings. Also consistent with their findings is that utilization and the debt-to-capital ratio do not have to move in opposite directions if other factors – the profit share, depreciation rate, and fraction of retained earnings – are changing at the same time, or if the debt-to-capital ratio is not already near its steady-state value.

In terms of the small parameters ε_t and ς_t we introduced above, and keeping only first-order terms, we find

$$\Delta \varsigma_t \cong -\frac{s\kappa - \delta}{1 + s\kappa - \delta}\left(z_0 + \varsigma_t\right) + \frac{\kappa\left(s - \rho\pi\right)}{1 + s\kappa - \delta} + \frac{\kappa\left(s - \rho\pi\right)\left(1 - \delta\right)}{\left(1 + s\kappa - \delta\right)^2}\varepsilon_t. \tag{20}$$

With equation (16), this is the second of two linear difference equations that together make up a discrete dynamic system. The essential question in Minsky's theory is whether the system is stable or not. We therefore turn to a stability analysis.

3. Stability analysis

For the stability analysis, it is convenient to work in continuous time. Equation (16) is second-order in time, and in continuous time it becomes

$$\ddot{\varepsilon} = \frac{\left(1+\alpha\right)\rho\pi - s}{s - \rho\pi}\dot{\varepsilon} - \frac{i}{\kappa\left(s - \rho\pi\right)}\dot{\varsigma}. \tag{21}$$

While this is second-order, it is straightforward to integrate it to find a first-order equation,

$$\dot{\varepsilon} = v_0 + \frac{\left(1+\alpha\right)\rho\pi - s}{s - \rho\pi}\varepsilon - \frac{i}{\kappa\left(s - \rho\pi\right)}\varsigma. \tag{22}$$

In this equation, v_0 is the "velocity" of utilization at normal utilization – that is, it is the value of $\dot{\varepsilon}$ when ε and ς are both zero. During a boom phase this velocity is expected to be positive.

In continuous time, equation (20) for the change in the debt-to-capital ratio becomes

$$\dot{\varsigma} = -\frac{n_0}{1 + n_0}\left(z_0 + \varsigma\right) + \frac{\kappa\left(s - \rho\pi\right)}{1 + n_0} + \frac{\kappa\left(s - \rho\pi\right)\left(1 - \delta\right)}{\left(1 + n_0\right)^2}\varepsilon, \tag{23}$$

where n_0 is the net rate of growth of the capital stock at normal utilization,

$$n_0 = s\kappa - \delta. \tag{24}$$

The stability of the system can be determined by the eigenvalues of the coefficient matrix in the pair of dynamical equations (22) and (23),

$$\mathbf{M} = \begin{pmatrix} \dfrac{\left(1+\alpha\right)\rho\pi - s}{s - \rho\pi} & -\dfrac{i}{\kappa\left(s - \rho\pi\right)} \\ \dfrac{\kappa\left(s - \rho\pi\right)\left(1 - \delta\right)}{\left(1 + n_0\right)^2} & -\dfrac{n_0}{1 + n_0} \end{pmatrix}. \tag{25}$$

The signs of the eigenvalues, in turn, can be determined by the trace and determinant of this matrix. The trace is given by

$$\mathrm{Tr}\,\mathbf{M} = \frac{\left(1+\alpha\right)\rho\pi - s}{s - \rho\pi} - \frac{n_0}{1 + n_0}, \tag{26}$$

while the determinant is

$$\operatorname{Det}\mathbf{M} = \frac{1-\delta}{(1+n_0)^2}i - \frac{n_0}{1+n_0}\frac{(1+\alpha)\rho\pi - s}{s-\rho\pi}. \tag{27}$$

It is convenient to re-write these expressions in terms of a convenient parameter – the fraction f_{RE} of gross investment that is funded by retained earnings. In this model, the parameter is given by

$$f_{\text{RE}} = 1 - \frac{\rho\pi}{s}. \tag{28}$$

Each of the parameters on the right-hand-side is held constant in this paper, so the left-hand side is constant as well. The parameter f_{RE} is a measure of leverage, so it may appear odd to for it to be fixed in this way, when leverage clearly increases over time through the loan dynamics given by equation (11). The resolution to the apparent paradox can be found from equation (8), where f_{RE} is seen to be proportional to the ratio of new loans net of debt payments relative to the capital stock, while λ_t is the ratio of total new loans to the capital stock, without subtracting debt payments. As the debt payment is fixed in any particular period, an increase in total lending increases utilization at a fixed value of f_{RE}. To reiterate an earlier point, this is a consequence of the particularly simple assumptions we have made in this paper in the interest of focusing on the Minskian loan dynamics.

In terms of f_{RE}, the trace and determinant are given by

$$\operatorname{Tr}\mathbf{M} = \frac{(1+\alpha)f_{\text{RE}} - 1}{1-f_{\text{RE}}} - \frac{n_0}{1+n_0}, \tag{29}$$

$$\operatorname{Det}\mathbf{M} = \frac{1-\delta}{(1+n_0)^2}i - \frac{n_0}{1+n_0}\frac{(1+\alpha)f_{\text{RE}} - 1}{1-f_{\text{RE}}}. \tag{30}$$

An essential requirement for stability in this system is that the trace be negative (in which case the determinant can be shown to almost certainly be positive). This condition can be expressed as a constraint on the parameter α, which must lie below a critical level,

$$\alpha \le \frac{1}{f_{\text{RE}}}\left[\frac{n_0}{1+n_0}(1-f_{\text{RE}}) + 1\right] - 1. \tag{31}$$

In order to provide an estimate for f_{RE}, we examined annual data on nonfinancial businesses in the US from 1946 through 2014 from the Federal Reserve. We calculated a raw series as one plus net lending divided by capital expenditure, and then smoothed the series over business cycles by applying a Hodrick-Prescott filter with a parameter $\lambda_{\text{HP}} = 6.25$, as suggested by Ravn and Uhlig (2002) for annual data. The smoothed series shows significant variation over time, with a mean value of 0.83 between 1950 and 1960, of 0.73 between 1970 and 1980, and 0.98 between 1990 and 2000.

With these historical values, we propose as an example, that retained earnings are 80% of total investment, while the net capital stock growth is 2.0%/year. In that case, the critical value for α is 0.25. So, if banks and firms increase the lending-to-capital ratio by less than one-quarter of the previous period windfall profit rate, then the dynamics are stable; otherwise, they are unstable.

Implications

The propensity to increase loan leverage with higher than expected profits, which is represented by α in the model, is not a conventional parameter, so estimates of it do not exist. However, a threshold value of 0.25 does not seem particularly restrictive, and it is plausible to imagine that firms and banks might adjust loan-to-debt ratios upwards by more than a quarter of the previous-period windfall profit rate.

The critical value of α falls if the fraction of new investment from retained profits, f_{RE}, rises, and the dependence is quite sensitive. In this model, when $f_{RE} = 1$, the critical value of α is zero, and any degree of lending is destabilizing, while at $f_{RE} = 0.60$ and $n_0 = 2.0\%$/year, the critical value for α is 0.68. The critical value also depends on the net growth rate of the capital stock at normal utilization, n_0, but not sensitively: if $f_{RE} = 0.80$, then the critical value for α varies only from 0.25 and 0.27 as n_0 varies widely, from 0%/year to 10%/year. Given the relative insensitivity to n_0, a reasonable approximation to the threshold value of α is

$$\alpha \le \frac{1}{f_{RE}} - 1. \tag{32}$$

Returning to the US data, the critical value corresponding to the mean f_{RE} between 1950 and 1960 is 0.21, between 1970 and 1980 it is 0.38, and between 1990 and 2000 it is 0.02. It is plausible that the response of loan leverage to rising profits could be stronger than these levels, which would lead to instability.

The fraction of new investment from retained profits is affected both by savings behavior and the retention ratio. The model developed above suggests that the combination of these variables, captured by f_{RE}, with the response of firms and banks to rising profits, captured by α, is important determinant of economic stability.

4. Discussion

The model presented in this paper addresses a weakness of Minsky's financial instability hypothesis (FIH), a fallacy of composition that conflicts directly with Kalecki's theory of economic dynamics. The resolution of the problem leads to an empirically more acceptable outcome – in the model, the debt-to-capital ratio falls during a boom – as well as to an instability arising directly from a Minskian behavioral relationship. The behavioral relationship captures Minsky's narrative of how firms and banks gradually adjust liability structures during a boom to allow for loans with higher leverage. However, in contrast to Minsky's claim, higher loan leverage does not translate into higher debt leverage, due to Kaleckian macrodynamics. To focus specifically on these issues we set aside another important aspect of Kalecki's theory, the influence of the functional income distribution on the aggregate saving rate. This is not an essential limitation of the model presented in this paper, which could be extended to a full Kaleckian analysis. Such an analysis should also include behavioral responses to changing interest rates.

The instability in the model is in capacity utilization, rather than the debt ratio. In the model, and in contrast to a conventional Kaleckian treatment, utilization has endogenous dynamics that can be either stable or unstable. The potential instability arises from the Minskian behavioral relationship, and occurs at plausible parameter values. This suggests that instability could be a frequent, if not inevitable, consequence of Minskian microeconomics, which is a weaker statement than the FIH, but consistent with Minsky's contention that capitalism has inherent instabilities. Missing from the paper is an exploration of fragility – that is, the patterns of behavior that drive the system from one of rising utilization to one of falling utilization. In the model presented in this paper the most likely source of fragility is that the economy hits a capacity constraint. In the run-up to the boom, the system as a whole has seen a fall in the debt-to-capital ratio, but as firms are taking on more leverage with each loan, it is likely that many individual firms will follow Minsky's path from hedge to Ponzi positions, and will begin to fail when tight capacity margins lead to price fluctuations and delayed delivery of intermediate inputs.

The expression for the threshold value of α – that is, for the propensity of firms and banks to increase loan leverage when profits are higher than expected – is surprisingly simple. As shown in equation (32), to a good approximation it is simply one over the fraction of gross investment funded by retained profits, minus one. According to the model, the more firms rely on their own cash flows to finance new investment, the lower the threshold between the stable and unstable regimes. The simple expression would doubtless be replaced by a more complex one in a more complete model, but it suggests a possible avenue for empirical study. The fraction of gross investment funded by retained profits depends on the retention ratio, both directly and through its influence on saving behavior, and this parameter has not been examined in detail in the post-Keynesian literature. Both the model proposed in this paper and post-Keynesian modeling in general could benefit from a more realistic representation of payout policies.

5. Conclusion

Minsky's theories have been productive, generating considerable new research. However, his most sweeping idea – that modern capitalist economies are inherently unstable and subject to financial fragility – has been critiqued on both empirical and theoretical grounds. We accept the critique, but take Minsky's argument as a microeconomic basis for specifying a behavioral relationship in a Kaleckian model. The model features stable dynamics for the debt-to-capital ratio, consistent with observation, but potentially unstable endogenous dynamics for capacity utilization. The instability arises directly from the Minskian behavioral relationship.

While other authors (including Minsky) have sought to combine Kalecki's and Minsky's ideas, the model in this paper is novel in two ways: first, because it uses Minsky's microeconomic arguments, rather than his macroeconomic ones, to motivate a model; second, because it yields endogenous dynamics for utilization and debt. Aside from the Minskian parameter in the model – the propensity of firms and banks to increase loan leverage when profits are higher than expected – the crucial parameter determining stability is the fraction of gross investment funded by retained profits.

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