THE PARADOX OF DEBT AND MINSKY'S FINANCIAL INSTABILITY HYPOTHESIS

Soon Ryoo*
Adelphi University

ABSTRACT

Some authors have claimed that the paradox of debt invalidates Minsky's theory of financial instability. Their theoretical frameworks are radically different from Minsky's in several aspects. Important Minskian elements, the role of margins of safety as a basis of financial decisions and the effects of asset prices on debt dynamics, among others, are absent in the critics' frameworks. We maintain that the thrust of the paradox of debt-based criticism to Minsky's theory has been exaggerated and key insights of Minsky's theory of financial instability can be formalized in an alternative macroeconomic framework. We provide a stock-flow consistent model of Minskian long waves.

1. INTRODUCTION

The paradox of debt refers to the phenomenon in which individual firms' attempts to reduce their indebtedness by cutting investment spending lead to increasing indebtedness as the consequent reduction in aggregate demand and profits makes firms rely more on debt finance. During an expansion phase, the same mechanism works in the opposite direction: debt–capital ratios fall as investment increases because investment boosts aggregate demand and profits.[1]

---

[1] The phenomenon of the paradox of debt is often attributed to Steindl (1952). Steindl saw such a phenomenon as a result of 'the instability due to inelastic outside saving'. Steindl himself considered his analysis of this phenomenon merely as a straightforward extension of Kalecki's analysis of the role of pure rentier saving in accumulation process. See Kalecki (1943[1991], p. 168).

The paradox-of-debt argument has been often used to criticize Minsky's financial instability hypothesis. Minsky's hypothesis suggests that firms' indebtedness (leverage) increases during expansions, but the paradox of debt, the critics argues, shows that debt ratios tend to decrease (increase) during expansions (contractions). The purpose of this paper is to evaluate such an argument and to present an alternative perspective. In so doing, we examine key assumptions and the mechanisms behind the paradox of debt in a formal framework and contrast them with Minsky's perspective.

The notion of the paradox of debt and its implications for Minsky's theory have been discussed in several studies including Lavoie (1995), Lavoie and Seccareccia (2001), Hein (2006, 2007), Toporowski (2008) and Bellofiore *et al.* (2010). It should be pointed out at the outset that the scope of each of these studies is not limited to the paradox of debt and its implications for financial instability hypothesis. Lavoie (1995) and Hein (2006, 2007), for instance, examine the effect of interest rates and debt on growth and distribution in post-Keynesian models and its implications for post-Keynesian monetary theories. Toporowski (2008) studies the evolution of Minsky's ideas by focusing on the recently published PhD thesis of Minsky. Bellofiore *et al.* (2010) try to provide a broad perspective on the current stage of capitalism from a Minskian perspective as well as their new interpretation of Minsky's financial instability hypothesis. In spite of the differences in the scopes and emphases, however, the basic logic of the paradox of debt has been an important element in shaping the critics' perspective on Minsky's theory of financial instability.[2]

Our main conclusion is that the logic behind the paradox of debt is markedly different from Minsky's perspective in several aspects. First, the paradox of debt is based on a framework where endogenous monetary expansions have a negative effect on demand and growth, leading to a downward spiral of economic activities, whereas Minsky's theory suggests that endogenous

---

[2] Based on the logic of the paradox of debt, Lavoie and Seccareccia (2001, p. 85) argue:

> Minsky's procyclical leverage ratios are also a crucial aspect of his financial fragility hypothesis because, without them, one may argue, there is little left of it beyond the obvious fact that a string of good years may lead bankers and entrepreneurs to behavior less prudently . . . Minsky nowhere specifies the dynamic endogenous processes that would make the macroeconomic financial environment more fragile when the economy is expanding overall.

Bellofiore *et al.* (2010, p. 91) suggest:

> Minsky maintains that 'the leverage ratio' . . . increases as the economy grows. Yet, there is no compelling reason why an increase in leverage should necessarily materialize. During the growth phase, total money profits made by all units increase together with debt. While units taken individually do borrow, the debt ratio for the whole economic system may not change.

monetary expansions stimulate economic activity due to their interaction with asset prices, creating upward instability. Second, the paradox of debt assumes that lending and borrowing decisions are made without any reference to margins of safety. This aspect represents a significant departure from Minsky's view of financial behavior. Third, the paradox of debt rests on the assumption of financial behavior which may apply to firms' short-term debt financing for given retention and equity financing policies, whereas Minsky's view of endogenous financial practices is better understood from a long wave perspective.

This paper suggests that the Minskian perspective can be formalized and provides a model of Minskian long waves. Endogenous changes in firm's debt structure and household portfolios are key elements of the model and their interaction produces long waves.

The paper is organized as follows. Section 2 presents a simple Kaleckian macro model to illustrate the paradox of debt and considers some variants in the literature. Section 3 discusses the main assumptions and mechanism of the paradox-of-debt argument in relation to Minsky's theory of financial instability. Section 4 presents an alternative model that highlights Minsky's financial instability hypothesis as an explanation of long waves. Section 5 offers some concluding remarks.

2. THE PARADOX OF DEBT IN A FORMAL FRAMEWORK

2.1 *Basic framework*

To illustrate the paradox of debt, we use a simple Kaleckian model with no government and foreign sector.[3] As in most Kaleckian models, we assume that labor supply is infinitely elastic and does not constrain accumulation. In addition, we assume a fixed coefficient Leontief technology. Only one kind of goods is produced and used as both consumption and investment goods. Investment is assumed to depend positively on the utilization rate, Tobin's q, and negatively on the debt ratio.

$$\frac{I}{K} = \gamma_0 + \gamma_u u - \gamma_m m + \gamma_q q \tag{1}$$

where I, K, u, m and q are real investment, real capital stock, a measure of the degree of capacity utilization ($u = Y/K$), the debt–capital ratio ($m = M/pK$) and Tobin's q ($q = (vN + M)/pK$), respectively. Y, M, N, p and v are real

---

[3] Dutt's reformulation (Dutt, 1995) of Steindl's model has similarities to the model in this section, but our model explicitly includes the effect of stock wealth on consumption and investment and new issues of equity in firms' finance constraint. Moreover, Dutt's focus in the paper is not on the implications of the analysis for Minsky's theory.

output, the level of firm debt, the number of shares, the price of real output and the price of shares. γ_0, γ_u, γ_m and γ_q are positive constants.[4] The negative impact of m on accumulation is important for the paradox-of-debt argument and we will return to its significance in section 3.

As in most Kaleckian models, pricing is based on the (constant) mark-up principle. In addition, we assume that there is no overhead cost and nominal wages are constant. These assumptions implies a constant profit share π and no inflation.

The real interest rate, r, is set by the banking system[5] which extends loans to firms (M) and collects deposits from households (M_d), with no intermediation cost. We assume that loans to firms are the only asset of banks, the loan rate of interest is equal to the deposit rate, the public does not hold cash, and banks do not hold reserves. With this assumption, bank loans create a corresponding increase in liability, i.e. deposits ($M = M_d$). Thus money is created endogenously through banks' loan-making process.

Consumption is assumed to be a function of household income and wealth.

$$pC = c_h[wL + (1 - s_f)(\Pi - rM) + rM] + c_q(vN + M) \qquad (2)$$

where C is real consumption and c_h and c_q household propensities to consume out of income and wealth; w and L are the nominal wage rate and the number of the employed; Π is gross profits, s_f firms' retention rate and thus $(1 - s_f)(\Pi - rM)$ dividend income. Equation (2) can be normalized by the value of capital stock. We then have

$$\frac{C}{K} = c_h[u - s_f(\pi u - rm)] + c_q q \qquad (3)$$

where

$$q = \frac{vN + M}{pK} = (1 + \alpha)m$$

and

$$\alpha = \frac{vN}{M}$$

α is the ratio of stocks to deposit holdings, thus capturing household portfolio decisions. The mechanism of a boom–bust cycle driven by endogenous

---

[4] Investment may depend on other variables such as profitability (the profit share or rate), interest rates and retained earnings but the basic logic of the paradox of debt can be presented in a simple specification such as equation (1).
[5] In absence of inflation, the real interest rate coincides with the nominal interest rate.

changes in α is important in Minskian story but the models that have been used to illustrate the paradox of debt have placed little emphasis on this element. Therefore, we assume that α is exogenous in our exposition of the paradox in this section. The dynamic adjustment of α, however, will become an essential element in our alternative framework in section 4.

Product market equilibrium requires

$$\frac{C}{K} + \frac{I}{K} = u \tag{4}$$

The Kaleckian literature posits that the utilization rate adjusts to establish goods market equilibrium. Plugging (1) and (3) into (4) and solving for u, we have

$$u^* = \frac{\gamma_0 + [c_h s_f r + (c_q + \gamma_q)(1+\alpha) - \gamma_m]m}{1 - c_h(1 - s_f \pi) - \gamma_u} \equiv u(m) \tag{5}$$

Kaleckian authors assume that the response of investment to variations of utilization, even in the long run, is weaker than that of savings: $1 - c_h(1 - s_f \pi) > \gamma_u$. Thus the goods market is assumed to be stable and Harrodian instability is ruled out.[6]

Plugging (5) into (1), we can derive an expression for investment as a function of m.

$$g^* = \gamma_0 + \gamma_u u(m) - \gamma_m m + \gamma_q(1+\alpha)m \equiv g(m) \tag{6}$$

The rate of profit net of interest paid is given by

$$\pi u^* - rm = \pi u(m) - rm \equiv f(m) \tag{7}$$

The effect of changes in the debt ratio on the utilization rate, the accumulation rate and the net profit rate all depends on parameter values: an increase in m may or may not increase effective demand. It will be shown that the paradox-of-debt story requires γ_m to be sufficiently large so as to ensure that $g'(m) < 0$.

The trajectory of the debt ratio remains to be determined. By definition,

$$\dot{m} = \frac{\dot{M}}{pK} - g^* m \tag{8}$$

---

[6] It is not always clear that Minsky adopted this position. Minsky often argues that the source of instability lies primarily in the financial sector and without any disturbance from the financial sector the real sector would be stable. It is less known, however, that Minsky believed the interaction between the accelerator and the multiplier in the goods market would lead to exploding trajectories under 'plausible parameters' (Minsky, 1995, p. 83). This perspective is more in line with a Harrodian perspective.

Since g^* is given by (6), we only need to specify $\dot{M}/pK$, i.e. how the stock of firms' debt grows in this economy, in order to determine the trajectory of m.

2.2 Debt dynamics and the paradox of debt

Firms' financial constraint is given by

$$\dot{M} = pI - s_f(\Pi - rM) - v\dot{N} \tag{9}$$

$$v\dot{N} = \eta pI \tag{10}$$

Equation (9) is simply an accounting identity that shows that firms' investment spending is financed by three sources, borrowing, retained earnings and new issues of equity. Assumptions regarding firms' financial behavior, however, make the interpretation of (9) rather special. Equation (10) assumes that the amount of new equity issues is a fraction of investment. Most models assume that s_f and η are structurally determined—in a simple version, they are exogenous. Given this assumption (9) tells us that firms' stock of debt adjusts to close the gap between investment expenditure and the other sources of funds. An implicit assumption behind this formulation is that banks fully accommodate firms' request for new loans at a given interest rate. We will discuss the implication of specification (9)–(10) in more detail in section 3.

Plugging (10) into (9), dividing it by pK and using (6)–(8), we have

$$\dot{m} = (1 - m - \eta)g(m) - s_f f(m) \equiv H(m) \tag{11}$$

Equation (11) determines the trajectory of firms' liability structure. Since $g(m)$ and $f(m)$ are linear in m, $H(m)$ is quadratic. Assuming that η is small, $H(m)$ has a positive constant term, i.e. $H(0) > 0$. The dynamics of debt depends critically on the behavior of accumulation in response to changes in the debt ratio.

If $g'(m) > 0$, the $H(m)$ takes an inverted U-shape and there exists a unique positive stationary point of m.[7] The stationary point is globally stable.

The paradox of debt arises if $g'(m) < 0$ and $H(m)$ is U-shaped. In this case, the negative effect of changes in the debt ratio on investment is particularly strong (γ_m is large) and, under some conditions, the dynamic equation (11) has two distinct stationary solutions for the debt ratio.[8] Let the small stationary

---

[7] The coefficient of the quadratic term of $H(m)$ is negative and the constant term is positive, $H(0) > 0$. Therefore, $H(m) = 0$ has two real roots, one positive and the other negative.
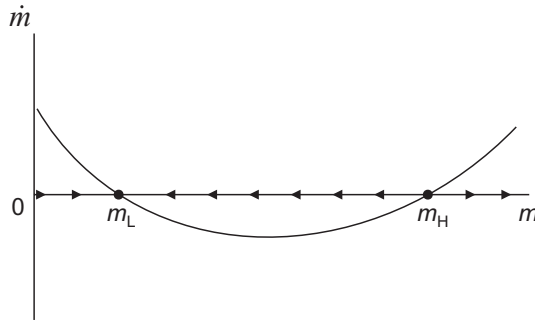[8] A proof of the existence of the solutions is available upon request.
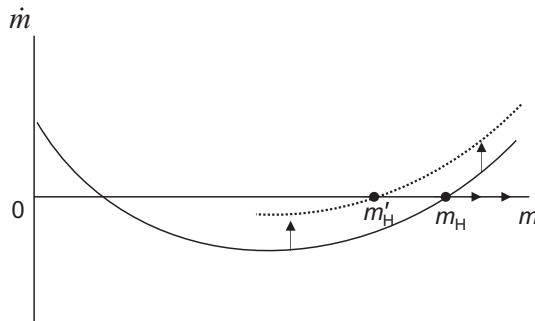
Figure 1. Debt dynamics when g′ (m) < 0.

Figure 2. The paradox of debt.

point be m_L and the large one m_H. Figure 1 illustrates the dynamics of (11). It is readily seen from figure 1 that m_L is stable but m_H is unstable. The paradox of debt is related to the dynamic behavior of m in the neighborhood of m_H.

Suppose that the economy has rested at m_H but a negative shock to accumulation—a fall in γ_0, for instance—tightens firms' budget constraint.[9] This will lead to an upward shift in the $H(m)$ curve over the relevant range of m (see figure 2).

As a result, firms' debt ratio will start to increase. Firms cut their investment in response to the resulting increase in the debt ratio ($g′(m) < 0$). Retained earnings fall due to the increase in the debt ratio. Would these induced changes tighten firms' budget constraint further? The answer will depend on whether real accumulation (investment) or internal accumulation

---

[9] Firms' budget constraint will be tightened if the initial debt ratio is sufficiently high.

(the accumulation of retained earnings) falls faster in response to rising indebtedness. If internal accumulation falls faster than real accumulation, firms' budget constraint will be tightened as m increases.[10] This is indeed the case at m_H: the rise in the debt ratio should decrease the amount of internal fund more quickly than the total required amount of finance (investment). Therefore an initial increase in the debt ratio calls for a further increase in the debt ratio. The debt ratio will be ever-increasing, while firms continue to cut investment. The whole process may be seen as a paradox because firms' attempt to reduce indebtedness by cutting investment is frustrated and instead results in ever-increasing debt ratios.

If a positive shock to investment relaxes firms' budget constraint in the neighborhood of m_H, the debt ratio will start to fall and converge to a lower debt ratio. During the transition, falling debt ratios will accompany rising investment as $g'(m) < 0$ is assumed. This is also a paradox, according to its proponents, because firms' desire to increase the debt ratio ends up falling debt ratios.

2.3 Simple versions

Lavoie (1995) assumes that pure rentiers exist who rely exclusively on interest income. Denoting renters' propensity to save as s_r, the growth of firm debt is entirely determined by rentiers' saving behavior.

$$\dot{M} = s_r r M \tag{12}$$

Putting (6), (8) and (12) together, the dynamics of firm's indebtedness is given by

$$\dot{m} = [s_r r - g(m)]m \tag{13}$$

Two steady-state solutions exist:

$$m_L = 0 \quad \text{and} \quad m_H = m_H^* \tag{14}$$

where $g(m_H^*) = s_r r$ Assuming that r is sufficiently small, m_H^* is positive and unstable and m_L is stable. It is the negative dependence of accumulation on

---

[10] Using Steindl's terminology, this is another way of saying that outside saving (debt accumulation) falls slower than real accumulation falls. Thus Steindl referred to the phenomenon now-known as the paradox of debt as 'the instability due to inelastic outside saving'. (Steindl, 1952, pp. 114–15). Steindl made great effort to show why inelasticity of outside saving might be empirically plausible (Steindl, 1952, pp. 116–18) but his empirical analysis remains highly preliminary.

the debt ratio along with the constancy of the rate of credit expansion that makes the steady state with a high debt ratio unstable.[11]

The baseline model in Hein (2007) is a special case of the model in section 2.1. Hein assumes that there is no saving from workers and there is no dividend income ($s_f = 1$). Pure rentiers save in the form of deposits, which is the only means of household savings. The growth of firms' debt is still determined by

$$\dot{M} = s_r r M \tag{15}$$

Since pure rentiers hold only deposits and there is no other saver in this case, there is no way how firms issue new equity to or buy back from households ($\eta = 0$).[12] Investment being equal to savings, we have

$$\dot{M} = pI - (\Pi - rM) \tag{16}$$

which is equivalent to (9) if $s_f = 1$ and $\eta = 0$.

In both Lavoie and Hein, the growth of firms' stock of debt—the rate of monetary growth—is constant at $s_r r$ for all debt ratios. Due to the independence of $\hat{M}$ from m, the mechanism of the paradox-of-debt scenario is particularly simple in these models: the negative effect of m on g is sufficient to generate an unstable stationary point of m. Given that $g'(m) < 0$, the condition for the paradox of debt—internal fund falls faster than investment as m increases—is always implied by the constancy of $\hat{M}$.

3. IMPLICATIONS FOR MINSKY'S FINANCIAL INSTABILITY HYPOTHESIS

The paradox of debt has been often used to criticize Minsky's financial instability hypothesis. The behavior of the debt ratio around the unstable stationary point exhibits countercyclicality: the debt ratio increases when the accumulation rate falls and decreases when the accumulation rate rises. Several features of these models are in sharp contrast to Minsky's perspectives.

---

[11] Lavoie's framework implicitly assumes that firms do issue new equities and shareholders' savings absorb those equities. Thus the amount of new equity issues is determined endogenously in the Lavoie model. This assumption along with no savings from workers ensures that (12) is equivalent to (9).

[12] Firms may issue and acquire new equities to and from each other but they cross out each other and net issues of equities to households should be zero.

3.1 Debt, monetary expansion and asset prices

The post-Keynesian literature emphasizes the endogenous nature of money supply. In the model in section 2, firms' borrowing leads to an increase in deposits (= money). The endogenous creation of money is central in Minsky's account of financial instability. In particular, Minsky argues that endogenous monetary expansion created by an increase in firms' indebtedness contributes to instability in the upward direction. The connection between asset prices and firms' indebtedness (monetary expansion) is crucial to understand this tendency towards instability: an increase in firms' indebtedness leads to monetary expansion; an increase in liquidity stimulates asset prices which in turn raises aggregate demand and firm profits; rising profitability tends to validate the initial increase in indebtedness. The effect of asset prices on aggregate demand works primarily through their effect on investment demand in Minsky's story (two-price theory of investment) but the mechanism can also work through consumption demand (wealth effect).

We will consider this interaction between debt and asset prices in a Harrodian/Kaldorian framework in section 4, but the Kaleckian model in section 2.1 also incorporates some elements of such mechanism through which an increase in the debt ratio positively affects aggregate demand: investment function (1) includes Tobin's q effect and consumption function (3) has wealth (= Tobin's q) as its determinant. Since $q = (1 + \alpha)m$, an increase in m raises q for a given α. This positive effect of m on q involves the adjustment of share prices: an increase in firms' debt will create the same amount of deposits and, if households desire to maintain a constant portfolio share, the demand for shares will increase, pushing up stock prices.[13] The increase in q will stimulate investment and consumption. In the paradox-of-debt scenario, however, such positive demand effect of credit expansion (a rise in m) is outweighed by the strong negative impact of debt on investment (high γ_m), leading to the negative net effect of monetary expansion on accumulation.[14]

One may argue that our analysis simply reveals that the macroeconomic effects of debt depend on the parameter values.[15] Our point, however, is more than a truism. At the very least, it clarifies one important aspect of the

---

[13] Increases in α, a shift in the portfolio share towards stocks, will magnify this effect.

[14] From (6), $g'(m) < 0$ requires a sufficiently high γ_m. Ryoo and Skott (2008) question the plausibility of the parameter configurations that yield such contractionary effect of financial expansion.

[15] Lavoie (1995) and Hein (2006, 2007) call the case where a rise in the real interest rate reduces accumulation 'the normal case' and the opposite case 'the puzzling case'. The paradox of debt holds in the normal case, not in the puzzling case. Their emphasis nonetheless appears to lie in the 'normal case'.

paradox-of-debt argument: the paradox-of-debt argument hinges on the framework where asset prices and portfolio choices—crucial Minskian elements—do not play a decisive role.[16]

Our discussion yields an interesting implication. In the story of the paradox of debt, high indebtedness in the firm sector is a problem because it creates a downward pressure on demand and accumulation. The paradox-of-debt argument implies that 'deleveraging' in the firm sector is nothing to worry about, since it will *stimulate* capital accumulation. This feature constitutes a starkly non-Minskian element in those models. In Minsky's analysis, firms' indebtedness is a problem because it has potential to create upward instability, which turns out to be unsustainable in the end.

3.2   Modeling debt finance and margins of safety

The assumption regarding debt financing is also important in understanding the paradox-of-debt argument. In section 2, banks are always ready to provide firms with any amount of loans that are needed to close the gap between planned investment and retained earnings plus new equity issue. Given the assumption that s_f and η are constant, firms' budget constraint (11) determines the trajectory of m.[17] In this framework, banks play only a passive role in determining firms' liability structure.

This aspect rules out one of the most important elements of Minsky's theory: lending and borrowing decisions are based on margins of safety. Minsky believes that the relationship between firms' profitability and

---

[16] Toporowski (2010), Bellofiore *et al.* (2010) and Passarella (2011) emphasize the importance of asset price inflation in understanding financial instability, while they remain critical to Minsky's view of the movement of indebtedness over the course of cycles based upon a version of the paradox-of-debt argument. We maintain that Minskian debt dynamics cannot be fully understood without reference to asset price dynamics.

[17] In his analysis of 'instability due to inelastic outside saving', Steindl tried to extend his analysis to the case where equity finance is endogenously determined (Steindl, 1952, pp. 142–7). He argued that the amount of new issues of equity depends positively on the gap between the marginal profit rate on real investment and the expected yield on shares. He concluded 'The instability due to inelastic outside saving, . . . , is therefore *reinforced* by the system of joint stock finance' (Steindl, 1952, p. 142): if firms cut investment to reduce their debt, profits will fall, which forces firms to use more debt and the lower profit rate will discourage firms from issuing new shares; firms will need more debt finance. There are two issues in this argument, however. First, Steindl's argument assumes that the effect of an induced change in the expected yield on shares on new equity issues is secondary, which may be true in the short run but not in the longer run. Next, empirically, a corporate profit boom has been usually associated with falling rate of issues of equity (increasing stock buybacks) in the US economy for several decades (see Skott and Ryoo, 2008 for evidence).

contractual payment obligations is crucial in shaping lending and borrowing processes. Minsky calls the ratio of firms' gross profits to payment commitments 'the fundamental margin of safety' (Minsky, 1982, p. 74). Minsky suggests that firms' liability structure, the debt–capital ratio (m), changes endogenously over time according to the state of the fundamental margin of safety. More specifically,

> The required margins of safety affect the acceptable financing plans of investing units. . . . If recent experience is that outstanding debts are easily serviced, then there will be a tendency to stretch debt ratios; if recent experience includes episodes in which debt-servicing has been a burden and representative units have not fulfilled debt contracts, then acceptable debt ratios will decrease. (Minsky, 1986, p. 187)

In the paradox-of-debt story, the trajectory of the debt ratio is determined with no reference to the margin of safety. To see this, consider the case with the exploding trajectory of the debt ratio: the debt ratio is ever-increasing while the growth rate of capital and the rate of profit net of interest paid are falling indefinitely. In this scenario, while firms' ability to fulfill their payment obligations based on their gross profits are deteriorating (i.e. ever-decreasing margin of safety), banks continue to extend loans and allow the debt ratio to keep rising. This is not a scenario consistent with Minsky's perspective.

The irrelevance of the margin of safety to the dynamics of debt and money creation in the paradox-of-debt scenario can be best seen in the case where debt accumulation is financed only by savings out of interest income, as in Lavoie (1995) and Hein (2007). In this case, the growth of firm debt (and money)—$\hat{M}$—is always constant at $s_r r$. The saving propensity out of interest income and the exogenous interest rate completely determines the growth rate of money and debt. Margins of safety play no role in firms/banks' financial decisions.

The argument in Toporowski (2008) and Bellofiore *et al.* (2010) is not free from our criticism in this regard. Their argument on this issue involves disaggregating the firm sector. Suppose that the firm sector consists of consume-good and capital good-producing firms, called *C*-firms and *I*-firms, respectively. If the *C*-firms raise debt to purchase capital goods from the *I*-firms, then the *I*-firms experience an increase in sales and profits, which is reflected in an increase in their deposits or cash reserves. Since the increase in indebtedness of the *C*-firms are more or less offset by the decrease in net indebtedness of the *I*-firms (the increase in deposits or cash reserves), there may be no increase in net indebtedness in the firm sector as a whole. The problem of this argument is that it does not tell us what would happen to the trajectory of firms' indebtedness in the subsequent periods. The *I*-firms

will find their profitability stronger and their net interest payment obligation lower. Given this circumstance, from a Minskian perspective, it is strange to assume the *I*-firms are content with their current balance sheet position (i.e. their current liability structure) even though their fundamental margin of safety has increased due to the increase in demand and profitability. The problem of the paradox-of-debt argument in our formal aggregative framework—the debt trajectory with no reference to margins of safety— is simply reproduced in the *I*-sector in this scenario. The Kaleckian profit equation—the IS relation—itself does not tell us anything about how bankers and firms will make decisions on their liability structure *over time*. Our discussion also points to the importance of the time span relevant to firms/bankers' decisions on the liability structure which we turn to now.

3.3 *Short business cycles or long swings?*

It is worth noting that Minsky was well aware that firms might fail to align their liability structure with the margins of safety temporarily. For instance, during a recession low realized profits may force firms to rely more on debt finance (Minsky, 1982, p. 84). But it seems that Minsky found no inconsistence between this scenario and his financial instability hypothesis. For Minsky, such a divergence of the actual debt ratio from the desired debt ratio is a prelude to a financial crisis manifest in massive scale defaults, bankruptcy and banks' increasing reluctance to provide new loans or to refinance existing loans. It is the financial crisis that makes firms' liability structure stand on a realistic basis. The time span over which Minsky's instability mechanism works itself out seems to be much longer than that of its critics. In this respect, interpreting Minsky's financial instability hypothesis as an explanation of long waves rather than short business cycles provides a useful perspective.[18]

Minsky argues that there exists a mechanism in a capitalist economy that generates a 'long swing' and the mechanism behind this long swing is endogenous changes in financial practices.

> the stable mechanism which has generated the long swings centers around the cumulative changes in financial variables that take place over the long-swing expansions and contractions. (Minsky, 1964, p. 324)

---

[18] See Minsky (1964, 1995), Ryoo (2010) and Palley (2011).

Minsky explicitly distinguishes two types of cycles, 'long waves' and 'minor cycles', and interprets his financial instability hypothesis as a mechanism of long swings.

> the more severe depressions of history occur after a period of good economic performance, with only minor cycles disturbing a generally expanding economy. (Minsky, 1995, p. 85)

During this long expansion, an initially robust financial structure is transformed to a fragile structure endogenously.

Our long waves interpretation of Minsky's instability hypothesis[19] has important implications. Issues regarding pro- or countercyclicality of firms' leverage have often been discussed without referring to the relevant periodicity of cycles. For instance, the debt dynamics (11) assumes that the debt ratio is determined by the budget constraint as a residual for given s_f and η.[20] This specification may be plausible in some short-run contexts,[21] but the specification fails to capture the idea of endogenous changes in financial practices which may take place over a long period of time. Our long wave approach also has an implication for some empirical studies that concern Minsky's financial instability hypothesis. Lavoie and Seccareccia (2001), for example, claimed that firms' leverage ratios were not procyclical for OECD countries for the period 1971–95: for some countries, firms' leverage ratios were insensitive to the behavior of output growth and for others, leverage ratios were inversely related to output growth. Their analysis mainly concerns the behavior of firms' debt/equity ratios over short business cycles. Their econometric testing says little about the validity of Minsky's financial instability hypothesis as an explanation of long waves.[22]

---

[19] Minsky's hypothesis involves cyclical dynamics but Minsky himself was not always clear about the periodicity of cycles. For most of his analysis, Minsky consider endogenous changes in financial behavior over both a short period (business cycles) and a longer period (long swings) as Palley (2011) argues.

[20] Put it differently, debt finance is seen as a 'buffer' that closes any gap between investment and other sources of finance.

[21] Even in the short run, this specification (11) is not innocuous. The variation of the rate of new equity issue, η, for example, has been substantial in the US economy.

[22] There is also a data issue. Lavoie and Seccareccia used 'debt/equity ratios' to measure firms' indebtedness but it is not clear whether the measure refers to the book ratio or the market ratio. If both debt and equity in the measure are market values, an expansion—and a stock market boom associated with it—is most likely to produce *falling debt/equity ratios* due to rapidly rising market value of equity. The (market) debt/equity ratio, in this case, fails to capture firms' indebtedness. Wolfson (1994, p. 246) also discusses this issue briefly. In a simple stock-flow

4. ALTERNATIVE APPROACH: MINSKIAN LONG WAVES

This section presents an alternative model that integrates the long wave approach into a macroeconomic framework. The model in this section is different from those in section 2 in several aspects. The model focuses on endogenous changes in financial practices that take place over a long period of time. Our model emphasizes the interaction between debt dynamics and portfolio dynamics as a source of instability and cycles, whereas the models in the previous section focus exclusively on pure debt dynamics. Firms' debt structure changes endogenously in response to changes in the profit–payment commitment relation and household portfolio decisions are driven by changes in the rate of return on equity in stock markets. In our model of long waves, we abstract from short-run fluctuations in the profit rate and the rate of return on equity. We show how this alternative framework can generate long waves which are distinguished from short business cycles. Our approach here is similar to Ryoo (2010) but the following model uses a different—more intuitively appealing—specification of portfolio dynamics.

4.1 Long-run debt and portfolio dynamics

In our framework, the dynamics of firms' debt–capital ratio and household portfolio are determined by the long-term trend of the profit–interest ratio and the rate of return on equity. More specifically, we consider the system of the following three dynamic equations:

$$\dot{m} = \tau\left(\frac{\rho^{\mathrm{T}}}{rm}\right), \quad \tau'(\cdot) > 0 \tag{17}$$

$$\dot{\alpha} = \kappa \cdot [\eta(r^{\mathrm{e}}) - \alpha], \quad \eta'(r^{\mathrm{e}}) > 0 \tag{18}$$

$$\dot{r}^{\mathrm{e}} = \lambda \cdot (r^{\mathrm{a}} - r^{\mathrm{e}}) \tag{19}$$

where ρ^{T} is the *trend* rate of profits, r^{a} is the rate of return on equity and r^{e} is the expected rate of return on equity, respectively; $\eta(r^{\mathrm{e}})$ is the desired stock–deposit ratio.

---

consistent model where firms' debts are household deposits and household assets consist of only stocks and deposits, the debt/equity ratio is simply *the inverse* of the share of stocks in household portfolio. A stock market boom will be associated with falling debt–equity ratios.

Equation (17) incorporates Minsky's assumption regarding how firms' liability structure evolves.[23] As discussed in section 3.2, the relation between firms' profits and payment obligations plays a fundamental role in Minskian debt dynamics. $\rho^T/(rm)$ in (17) represents the fundamental margin of safety. If $\rho^T/(rm)$ is high, firms are willing to raise their debt ratios and banks allow firms to do so. If $\rho^T/(rm)$ is low, 'de-leveraging' happens and thus m falls. There will be a critical level of the profit–interest ratio that makes the debt–capital ratio remain constant.

Households adjust their portfolios according to (18). Households' desired portfolio share $\eta(r^e)$ is positively related to the expected rate of return on equity (r^e): given an exogenous rate of interest on deposits (r), a higher expected rate of return on equity justifies a higher weight of stocks in households' portfolio. However, the desired portfolio may not be immediately attained. The adjustment of the actual portfolio share to the desired ratio may take time due to conventional elements or inertia.

Equation (19) assumes that households adapt their expectations on stock returns based on their observations of the realized rate of return. This adaptive specification is plausible to the extent that households' expectations are subject to some learning process under profound uncertainty in stock markets.[24]

4.2 *Long-term profitability and stock returns*

To obtain the trajectory of m, α and r^e from the dynamical system (17)–(19), ρ^T and r^a have to be determined. ρ^T and r^a represent the long-term trend of the profit rate and the rate of return on equity. The question is how to obtain tractable measures of the long-term trend of firm's profitability and the rate of return on stocks.

Let us first consider how the rate of profit is determined. The profit rate is determined in the goods market. Using the consumption function (3) and the product market equilibrium condition (4), the profit rate ρ is given by

$$\rho \equiv \pi u = \frac{g - (1-c_h)u + c_h s_f rm + c_q(1+\alpha)m}{c_h s_f} \tag{20}$$

---

u and g exhibit substantial variations during a course of short cycles and therefore the profit rate will fluctuate accordingly. These short-run variations in the profit rate, however, can be isolated if we replace u and g in (20) by their long-run average values. To simplify, let us take these long-run average values of u and g as constant and denote them as $\bar{u}$ and $\bar{g}$. We then define the trend rate of profit ρ^{T} as

$$\rho^{\mathrm{T}} \equiv \rho^{\mathrm{T}}(m, \alpha) = \frac{\bar{g} - (1 - c_{\mathrm{h}})\bar{u} + c_{\mathrm{h}}s_{\mathrm{f}}rm + c_{\mathrm{q}}(1 + \alpha)m}{c_{\mathrm{h}}s_{\mathrm{f}}} \tag{21}$$

The trend profit rate is increasing in m and α. For a given α, an increase in firms' indebtedness (m) raises household deposit holdings which in turn increase household wealth and income. For a given m, a shift in household portfolio towards stocks raises stock market wealth. Thus the increase in m or α will stimulate aggregate demand and this increase in demand will be reflected in an increase in firms' profitability.

The increase in firm's indebtedness, however, has an impact on the relation between profits and payment commitment. Minsky argues that the relation between profitability and payment commitment will deteriorate as firms get more indebted. In our framework, this means that the profit–interest ratio falls as m increases.

$$\frac{\partial \dfrac{\rho^{\mathrm{T}}(m, \alpha)}{rm}}{\partial m} < 0 \tag{22}$$

The rate of return on equity plays an important role in household portfolio decisions. The rate of return on equity is defined as

$$r^{\mathrm{a}} = \frac{Div + (\hat{v} - \hat{p})vN}{vN} \tag{23}$$

where $(\hat{v} - \hat{p})vN$ represents (real) capital gains. Nominal returns on shares consist of dividends and capital gains. They are related to firms' budget constraint (9). Adding $\dot{v}N$ to (9) and rearranging them, we have

$$Div + \dot{v}N = \frac{\mathrm{d}(vN + M)}{\mathrm{d}t} + \Pi - (pI + iM) \tag{24}$$

Equation (24) implies that the total returns on stocks (capital gains inclusive) must equal the excess of the change in the market value of firms and gross profits over the sum of investment expenditure and interest payment.

Using (23), (24) and the definition of α and m, we can rewrite the expression for the rate of return on equity (where we explicitly use the trend rate of profit and the average rate of accumulation).

$$r^a = \left[\frac{\dot{\alpha}}{\alpha} + \frac{(1+\alpha)(\dot{m}+m\bar{g})}{\alpha m} \right] + \frac{\rho^T(m,\alpha)-\bar{g}-rm}{\alpha m} \qquad (25)$$

Thus the rate of return on equity is determined by m, α, $\dot{m}$ and $\dot{\alpha}$.

$$r^a = r^a(m,\alpha,\dot{m},\dot{\alpha}), \quad r_\alpha^a > 0, r_m^a > 0 \qquad (26)$$

The positive impact of $\dot{\alpha}$ on r^a has an important dynamic implication. The positive effect of $\dot{\alpha}$ on r^a, along with portfolio and expectation dynamics (18) and (19), forms *an expectations feedback system*, a characteristic feature in a speculative asset market. For instance, households' expectations on capital gains increase their desire to hold stocks. The increase in the demand for stocks creates actual capital gains, thereby raising the actual rate of return. Initial optimistic expectations are therefore reinforced. Self-fulfilling expectations, under some conditions, can lead to a boom–bust cycle.

4.3 Minskian boom–bust cycles

Using (21) and (26), equations (17)–(19) become a recursive system. The system has a stationary solution under plausible parameter values. More interestingly, the system can produce a limit cycle around the stationary equilibrium. The limit cycle arises as the stationary point becomes locally unstable if η', κ and λ are sufficiently large.[25] Let us take a close look at this condition for instability.

High η' means that optimistic expectations of capital gains (a rise in r^e) leads to a significant increase in the desire to hold stocks. If κ is high, this increase in the desired portfolio will translate into a large shift in the actual portfolio towards stocks (equation (18)). Thus stock prices increase substantially which generates a large amount of capital gains. As a result, the rate of return on equity r^a may increase above what investors expected it to be ($r^a > r^e$) and initial optimistic beliefs will be reinforced (equation (19)). If λ is high, the tendency towards a boom will be sustained as a large increase in the

---

[25] A proof of this proposition which is available upon request is based on the Hopf bifurcation theorem.

expected rate of return (r^e) raises the desired portfolio substantially; thus the self-stabilizing portfolio adjustment mechanism built in (18) will be delayed as the desired portfolio ratio moves ahead of the actual portfolio ratio for a while (i.e. $\eta(r^e) > \alpha$).

In short, expectations on capital gains leads to increasing demand for stocks. Rising demand for stocks pushes up stock prices and generates capital gains, reinforcing initial optimism about stock markets.

Simulation results are illuminating to show the mechanism. During a boom (downturn), the desired portfolio share is higher (lower) than the actual portfolio share and therefore the share of stock holdings rises (falls) (see figure 3). The increasing share of stock holdings during a boom is supported by the rate of return on equity higher than expected (figure 4).
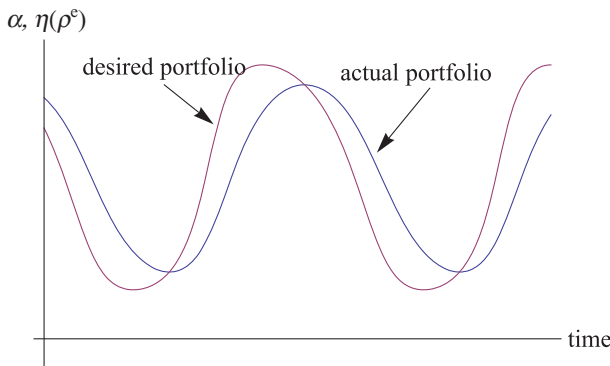

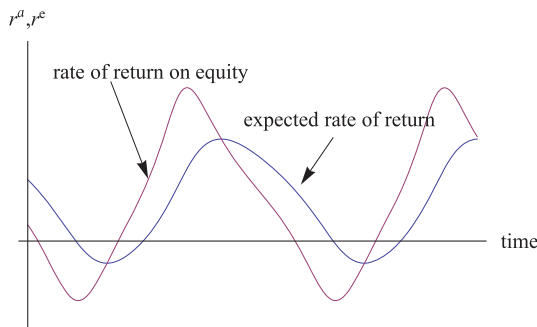Figure 3. *Actual and desired portfolio.*

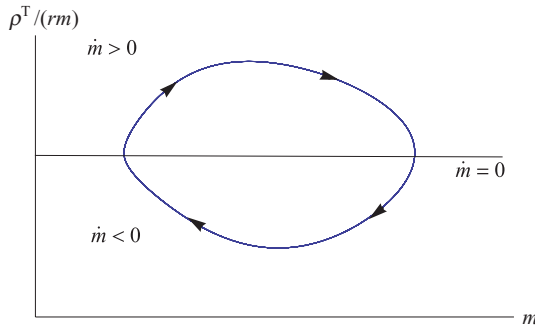Figure 4. *Actual and expected rate of return on equity.*

Figure 5. Fundamental margin of safety and the debt ratio.

A stock market boom affects firms/banks' decision on the firm liability structure. The increase in stock market wealth raises household consumption and aggregate demand. The rise in demand is absorbed by an increase in firms' profitability. High profitability justifies a high debt ratio during an expansion. As stock markets collapse, demand and profitability drops and firms/banks will find high indebtedness unwarranted. A de-leveraging process will kick in.

The importance of the effect of the portfolio dynamics on the debt dynamics is shown in some simulation results. Figure 5 shows how firms' debt structure interacts with the profit–interest ratio (the fundamental margin of safety). A stock market boom (high α) maintains the margin of safety ($\rho^T/(rm)$) at high levels. During this period, firms/banks stretch the debt ratio (m). Weak stock markets (low α) are associated with low values of $\rho^T/(rm)$, leading to falling debt ratios (m). Note that if α is fixed, the cyclical behavior as in figure 5 is impossible because the assumption (22) implies that m is always inversely related to $\rho^T/(rm)$.[26]

4.4 Long waves and short cycles

Our analysis of long waves has assumed that the long-run average rates of utilization and accumulation, $\bar{u}$ and $\bar{g}$, are constant. This assumption is not as restrictive as it seems. For instance, in an economy where growth is constrained by labor supply, Harrodian investment behavior combined with Marxian reserve army effect can generate the short-run fluctuations of the actual rates of utilization and accumulation around a structurally determined

---

[26] In other words, northeastward and southwestward movements are impossible in figure 5.

desired utilization rate (u^*) and the natural rate of growth (n), respectively.[27] $\bar{u}$ and $\bar{g}$, in this context, may well be approximated by u^* and n.[28]

Our analysis of long waves, however, does not require constant $\bar{u}$ and $\bar{g}$. The long-term averages may be formed in an adaptive manner and change over time. For instance, $\bar{u}$ and $\bar{g}$ may follow a simple averaging process:

$$\dot{\bar{u}} = v_1(u - \bar{u}) \tag{27}$$

$$\dot{\bar{g}} = v_2(g - \bar{g}) \tag{28}$$

As long as v_1 and v_2 are small, substantial short-run fluctuations in u and g generate sufficiently smooth trajectories of $\bar{u}$ and $\bar{g}$. Thus, long-term profitability and long-term rates of return on equity will be well defined based on $\bar{u}$ and $\bar{g}$.[29]

4.5 Equity finance

In section 2, firms' debt structure changes according to the budget constraint (11) for given s_f and η. In our model of Minskian long waves, firms' debt structure changes endogenously according to the margin of safety, i.e. $\rho^T/(rm)$: the debt dynamics (17) replaces the role of (11). Our model retains the exogeneity of s_f but the ratio of equity issue (η) adjusts endogenously to satisfy the budget constraint.[30] Using (9) and (10), we have

---

[27] Such a mechanism and its empirical plausibility have been advocated by Skott (1989, 2010, 2012a) and Skott and Zipperer (2010) in great detail. Ryoo (2010) showed how the Kaldorian mechanism of short business cycles can be combined with Minskian long waves in a stock-flow consistent framework. The combination of unstable goods market dynamics and stabilizing labor market dynamics is not foreign to Minsky. Minsky's early studies (Minsky, 1957, 1959, 1965) that are based on the multiplier-accelerator model *take for granted* a parameter configuration that produces an exploding trajectory—due to the strong accelerator—and the scarcity of labor supply, along with inelastic finance or capacity constraint, is considered as one of the factors constraining the exploding trajectory. This perspective reappears in his later work as well (Minsky, 1995).

[28] Both u^* and n may vary due to some endogenous forces but their variations will be moderate compared with the actual utilization and accumulation rates. Therefore, the perceived long-term average values of u and g exhibit moderate variations, thus serving as a basis of long-term financial decisions.

[29] Under these specifications, the system of long waves will be affected by the system of short cycles as u and g enters the formation of $\bar{u}$ and $\bar{g}$.

[30] Changes in both s_f and η have been part of stylized facts in the US economy. s_f can also be endogenized. Ryoo (2010, p. 167, note 12) briefly discusses an alternative specification of firms' retention policy.

$$\eta = \frac{(1-m)\overline{g} - \dot{m} - s_f(\rho^T - rm)}{\overline{g}} \tag{29}$$

The trajectory of η is determined as the variables on the right-hand side of (29) are fully determined by the system (17)–(19). Equation (29) points to the possibility that an expansionary phase in long waves is associated with falling equity issues. The logic is simple: during a boom, firms' profitability rises and debt finance increases; the relaxation of firms' budget constraint allows them to reduce new equity issues or to repurchase existing stocks (stock buy-backs).[31] This feature of our model receives empirical support: increasing stock buybacks have been a salient feature of the US economy since the early 1980s.[32]

5. CONCLUSIONS

Not surprisingly, one can derive some non-Minskian results from non-Minskian assumptions. The paradox of debt is such a theoretical exercise. We have seen that the formal framework the exercise rests on is very different from Minsky's.

There is no doubt that Minsky's financial instability hypothesis needs to be closely examined and the logic must be checked. Modeling exercises are valuable since the logic underlying Minsky's financial instability hypothesis is intricate (and not always clear): the formal analyses can clarify the assumptions and mechanisms. There can be several approaches to modeling macroeconomic dynamics. A version of Kalackian framework in section 2 is only one example. Besides the aspects we highlighted in section 3, the Kaleckian framework assumes a constant mark-up with the instantaneous adjustment of output to clear the goods market; the Kaleckian investment specification rules out the possibility of Harrodian instability; labor supply is perfectly elastic and does not constrain the growth process. Given these assumptions, the principle of effective demand comes in a particular form in the Kaleckian model. However, key insights of Minsky's theory of financial instability can be—and have been—formalized in a different macroeconomic framework. We have presented an approach that emphasizes the interaction between debt

---

[31] Firms' budget constraint in our model does not include various financial assets firms may wish to hold. In practice, firms may want to use the increasing fund during an expansion to purchase those financial assets. Increasing financial investments by non-financial corporations have been highlighted in the recent literature on financialization.

[32] See, among others, Epstein (2005), Crotty (2005), Palley (2007) and Hein and van Treeck (2010) for the issues regarding financialization.

and portfolio dynamics over a long period of time in section 4. Our alternative approach is different from the Kaleckian approach in several aspects but effective demand still plays an important role in the model of long waves. Given competing macroeconomic frameworks, the real issue is the plausibility of various specifications of behavioral/structural relations.

REFERENCES

Bellofiore, R., Halevi, J., Passarella, M. (2010): 'Minsky in the "new" capitalism. The new clothes of the financial instability hypothesis', in Papadimitriou, D., Wray, L. R. (eds): *The Elgar Companion to Hyman Minsky*, Edward Elgar, Northampton.

Crotty, J. (2005): 'The Neoliberal paradox', in Epstein, G. A. (ed.): *Financialization and the World Economy*, Elgar, Northampton, MA.

Dutt, A. K. (1995): 'Internal finance and monopoly power in capitalist economies: a reformulation of Steindl's growth model', *Metroeconomica*, 46 (1), pp. 16–34.

Epstein, G. A. (2005): 'Introduction', in Epstein, G. A. (ed.): *Financialization and the World Economy*, Edward Elgar, Northampton, MA.

Hein, E. (2006): 'Interest, debt and capital accumulation—a Kaleckian approach', *International Review of Applied Economics*, 20 (3), pp. 337–52.

Hein, E. (2007): 'Interest rate, debt, distribution and capital accumulation in a post-Kaleckian model', *Metroeconomica*, 58 (2), pp. 310–39.

Hein, E., van Treeck, T. (2010): ' "Financialisation" in post-Keynesian models of distribution and growth: a systematic review', in Setterfield, M. (ed.): *Handbook of Alternative Theories of Economic Growth*, Edward Elgar, Northampton.

Kalecki, M. (1943): *Studies in Economic Dynamics*, Allen & Unwin, London, reprinted in Osiatynsky, J. (ed.) (1991): *Collected Works of Michal Kalecki: Volume II Capitalism—Economic Dynamics*, Clarendon Press, Oxford.

Lavoie, M. (1995): 'Interest rates in post-Keynesian models of growth and distribution', *Metroeconomica*, 46, pp. 146–77.

Lavoie, M., Seccareccia, M. (2001): 'Minsky's financial fragility hypothesis: a missing macroeconomic link?', in Bellofiore, R., Ferri, P. (eds): *Financial Fragility and Investment in the Capitalist Economy: The Economic Legacy of Hyman Minsky*, vol. 2, Edward Elgar, Cheltenham.

Minsky, H. P. (1957): 'Monetary systems and accelerator models', *American Economic Review*, 47 (6), pp. 860–83, reprinted in Minsky, H. P. (1982), pp. 231–57.

Minsky, H. P. (1959): 'A linear model of cyclical growth', *Review of Economics and Statistics*, 41 (2), pp. 133–45.

Minsky, H. P. (1964): 'Longer waves in financial relations: financial factors in the more severe depressions', *American Economic Review*, 54 (3) Papers and Proceedings of the Seventy-sixth Annual Meeting of the American Economic Association, pp. 324–35.

Minsky, H. P. (1965): 'The integration of simple growth and cycle models', in Brennan, M. J. (ed.): *Patterns of Market Behavior, Essays in Honor of Philip Taft*, Brown University Press, Providence, reprinted in Minsky, H. P. (1982), pp. 258–77.

Minsky, H. P. (1982): *Can "It" Happen Again?—Essays on Instability and Finance*, M.E. Sharpe, Inc., Armonk, NY.

Minsky, H. P. (1986): *Stabilizing an Unstable Economy*, Yale University Press, New Haven, CT.

Minsky, H. P. (1995): 'Longer waves in financial relations: financial factors in the more severe depressions II', *Journal of Economic Issues*, 29 (1), pp. 83–96.

Palley, T. (2007): 'Financialization: what it is and why it matters', Levy Economics Institute Working Paper No. 525.

Palley, T. (2011): 'A theory of Minsky super-cycles and financial crises', *Contributions to Political Economy*, 30 (1), pp. 31–46.

Passarella, M. (2011): 'A simplified stock-flow consistent dynamic model of the systemic financial fragility in the "New Capitalism" ', Munich Personal RePEc Archive, Working Paper No. 28499.

Ryoo, S. (2010): 'Long waves and short cycles in a model of endogenous financial fragility', *Journal of Economic Behavior and Organization*, 74 (3), pp. 163–86.

Ryoo, S., Skott, P. (2008): 'Financialization in Kaleckian economies with and without labor constraints', *Intervention: European Journal of Economics and Economic Policies*, 5 (2), pp. 363–92.

Skott, P. (1989): *Conflict and Effective Demand in Economic Growth*, Cambridge University Press, Cambridge, UK, New York, USA, and Melbourne, Australia.

Skott, P. (1994): 'On the modelling of systemic financial fragility', in Dutt, A. K. (ed.): *New Directions in Analytic Political Economy*, Edward Elgar, Aldershot, UK and Brookfield, USA.

Skott, P. (2010): 'Growth, instability and cycles: Harrodian and Kaleckian models of accumulation and income distribution', in Setterfield, M. (ed.): *Handbook of Alternative Theories of Economic Growth*, Edward Elgar, Northampton.

Skott, P. (2012a): 'Theoretical and empirical shortcomings of the Kaleckian investment function', *Metroeconomica*, 61 (1), pp. 109–38.

Skott, P. (2012b): 'Increasing inequality and financial instability', *Review of Radical Political Economics* (forthcoming).

Skott, P., Ryoo, S. (2008): 'Macroeconomic implications of financialization', *Cambridge Journal of Economics*, 32, pp. 827–62.

Skott, P., Zipperer, B. (2010): 'An empirical evaluation of three post Keynesian models', Working Paper 2010-08, University of Massachusetts, Amherst.

Steindl, J. (1952): *Maturity and Stagnation in American Capitalism*, Monthly Review Press, New York and London.

Toporowski, J. (2008): 'Minsky's "induced investment and business cycles" ', *Cambridge Journal of Economics*, 32, pp. 725–37.

Toporowski, J. (2010): 'Excess debt and asset deflation', in Kates, S. (ed.): *Macroeconomic Theory and Its Failings: Alternative Perspectives on the World Financial Crisis*, Edward Elgar, Cheltenham.

Wolfson, M. H. (1994): *Financial Crises: Understanding the Post War U.S. Experience*, M.E. Sharpe, Armonk.

Soon Ryoo
Department of Accounting, Finance and Economics
Adelphi University
1 South Avenue
Garden City
NY 11530
USA
E-mail: sryoo@adelphi.edu