Inequality, Debt Servicing, and the Sustainability of Steady State Growth

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ABSTRACT

We investigate the claim that the way in which debtor households service their debts matters for macroeconomic performance. A Kaleckian growth model is modified to incorporate working households who borrow to finance consumption that is determined, in part, by the desire to emulate the consumption patterns of more affluent households. The impact of this behavior on the sustainability of the growth process is then studied by means of a numerical analysis that captures various dimensions of income inequality. When compared to previous contributions to the literature, our results show that the way in which debtor households service their debt has both quantitative and qualitative effects on the economy's macrodynamics.

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1 Introduction

A substantial literature connects the relatively rapid growth of the US economy during the Great Moderation to aggressive increases in household indebtedness that offset the otherwise negative impact on consumption spending of increased income inequality (Palley, 2002; Cynamon and Fazzari, 2008; Brown, 2008; Barba and Pivetti, 2009; Wisman, 2013; Setterfield, 2013). According to Setterfield and Kim (2013), in the presence of emulation effects in consumption behavior and fundamental uncertainty about the long-term consequences of debt accumulation, rising income inequality of the sort witnessed in the US since 1980 can boost growth but simultaneously undermine the sustainability of the growth process. The authors also show that not only increased borrowing *per se* but also the increased *debt servicing* that inevitably accompanies debt accumulation tend to raise the rate of growth. This last result runs counter to conventional Keynesian logic, according to which debt servicing redistributes income toward low spending (at the margin), affluent households and therefore exerts a drag on aggregate demand formation. The results of Setterfield and Kim (2013) are, however, based on a particular characterization of household debt servicing behavior, according to which households treat debt servicing as a cash outlay or expense rather than as a deduction from income (Cynamon and Fazzari, 2014).[1] In so doing, they first consume from their income, then service their debts, and then save what remains as a residual. The purpose of this paper is to investigate whether or not the results of Setterfield and Kim (2013) survive if households service their debts "conventionally", by treating debt servicing as a deduction from income and then consuming some fraction of what remains. This enables us to explore further a key hypothesis of Setterfield and Kim (2013), that not only debt servicing *per se* but the precise manner in which debtor households service their debts affects macroeconomic performance.

The remainder of the paper is organized as follows. In section 2, we describe features of our basic model, including its stock-flow consistency. Key attributes of firm and, in particular, household behavior are outlined, and short-run equilibrium outcomes and the comparative statics

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[1] See also Kim et al. (2014), who discuss the implications of different debt servicing behaviors for consumption in a static (non-growth) context.

associated with these outcomes are derived. Section 3 then explores the impact of debt servicing behavior on the sustainability of the growth process by means of a numerical analysis. The fourth section offers some conclusions, chief among which is that the way in which debtor households service their debts has both qualitative and quantitative effects on the economy's macrodynamics.

2 Model Structure

2.1 Stock-Flow Consistency

Following Setterfield and Kim (2013), our model consists of banks, firms, and two types of house-holds – working households who borrow to finance some part of their current consumption and rentier households who do not. The balance sheet and transaction flow relationships between these agents are described in the social accounting matrices (SAMs) in Tables 1 and 2. Note that because our focus is on household behavior, both firms and banks are highly simplified. Firms produce, set prices, and invest, their investment expenditure funded entirely by rentiers who purchase equities.[2] Banks, meanwhile, act as passive intermediaries between households. They earn no income from the intermediation services they provide and accumulate no net worth.

Table 1: Balance Sheet Matrix

	Workers	Rentiers	Firms	Banks	Sum
Capital			K		K
Deposits	D_W	D_R		$-(D_W + D_R)$	0
Loans	$-D$			D	0
Equity		E	$-E$		0
Net worth	$D_W - D$	$D_R + E$	$K - E$	$D - (D_W + D_R)$	K

Total income in the economy can be described as:

$$Y = W_W N + W_R \alpha N + \Pi \tag{1}$$

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[2]For simplicity, the price of equity is fixed and normalized to one.

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	Workers	Rentiers	Firms Current	Firms Capital	Banks Current	Banks Capital	Sum
Consumption by wage	$-C_W$	$-C_R$	$C_W + C_R$				0
Consumption by debt	$-\dot{D}$		$\dot{D}$				0
Investment			I	$-I$			0
Wages	$W_W N$	$W_R \alpha N$	$-W$				0
Firms' profits		Π	$-\Pi$				0
Deposit interest	iD_W	iD_R			$-i(D_W + D_R)$		0
Loan interest	$-iD$				iD		0
Deposit flows	$-\dot{D_W}$	$-\dot{D_R}$				$(\dot{D_W} + \dot{D_R})$	0
Loan flows	$\dot{D}$					$-\dot{D}$	0
Issues of equities		$-\dot{E}$		$\dot{E}$			0
Sum	0	0	0	0	0	0	0

where Y denotes real income, Π denotes total real profits, W_W is the real wage of production workers, W_R is the real wage of supervisory workers, N is the number of production workers employed, and $\alpha < 1$ denotes the necessary ratio of managers to production workers (given by technology and the organizational structure of the production process). In equation (1), $W_W N$ is the income of working (net debtor) households and $W_R \alpha N + \Pi$ is the income of rentier (net creditor) households, the latter made up of capitalists and supervisory workers. Following Palley (2013b), this distinction follows from the observation that there are marked differences, in terms of income and wealth shares, between the bottom 80 per cent and the top 20 per cent of the US income distribution, with the bottom 80 per cent corresponding to the working class,[3] and the top 20 per cent corresponding to the middle class (including the upper middle class of capitalists and the "working rich" who make up the top one per cent of the income distribution).[4]

Note from Tables 1 and 2 that rentier households fund only part of the debt accumulated by working households: the remainder is funded by other working households, as a result of the assumption that workers save even as they borrow.[5] This assumption can be justified as follows.

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[3]Production and non-supervisory workers account for 80 per cent of all employees in the US economy.

[4]The "working rich" refers to upper-level salaried employees who have, in increasing numbers, joined capitalist households at the very top of the income distribution over the last thirty years. See Piketty and Saez (2003), Wolff and Zacharias (2009) and Atkinson et al. (2011) on the evolution of "top incomes" in the US. See also Mohun (2006) on the correct accounting treatment of the "wage" income earned by the "working rich", and Wolff and Zacharias (2013) on the relationship between social class and the size distribution of income.

[5]Notice that, following Skott (1989, 2014), working households accumulate wealth only in the form of interest-earning bank deposits: all corporate equity is owned by rentiers. This differs from the approach taken by Pasinetti

First, working households are heterogeneous: some fully fund consumption from current income and save, while others save nothing and simultaneously consume more than they earn by borrowing. Second, in an environment of fundamental uncertainty and imperfect credit markets, it is rational for any individual household that wishes to consume in excess of current income to simultaneously save and borrow (Setterfield and Kim, 2013). This is because uncertainty implies a precautionary demand for liquidity to meet unforeseen contingencies, while imperfect credit markets mean that dis-saving and borrowing are not perfect substitutes: a household is always legally entitled to draw down previously accumulated wealth, but has no right to borrow.

2.2 Production, Pricing and Investment

As noted above, banks are passive intermediaries and their behavior requires no further exploration. Firms, however, engage in production, pricing and investment behavior that contributes to the structure of our model and demands investigation.

Production results from a fixed coefficient production function of the following form:

$$Y = min\{\kappa K, \varepsilon Min[N, M/\alpha]\} \tag{2}$$

where M denotes the number of managers.[6] The fixed real wage earned by workers is assumed to be a fraction of the real wage of managers, or:

$$W_R = \phi W_W \tag{3}$$

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(1962) and Palley (2012), in which physical capital is the only asset that households can own, so that workers who save own equity (and therefore receive some share of profit income). Clearly, the two approaches are not mutually exclusive, and the consequences of equity ownership by working households are worthy of further investigation in future research.

[6]See also Palley (2013a).

where $\phi > 1$. Total real wage income is then:

$$W = W_W N + W_R M \tag{4}$$

$$\Rightarrow W = W_W N + \phi W_W \alpha N = (1 + \phi \alpha) W_W N$$

Denoting workers' wage share of total income as ω_W and managers' wage share as ω_R, it follows that:

$$\omega_R = \phi \alpha \omega_W \tag{5}$$

Note, then, that on the basis of equations (1) and (5):

$$1 - \pi = (1 + \phi \alpha) \omega_W \tag{6}$$

$$\Rightarrow \omega_W = \frac{1 - \pi}{1 + \phi \alpha}$$

Firms set prices in standard neo-Kaleckian fashion, by marking up unit labor costs, (Harris, 1974; Asimakopulos, 1975). The gross profit share ($\pi = \Pi/Y$) is then:

$$\pi = \frac{\tau}{1 + \tau} \tag{7}$$

where τ is the (fixed) mark up applied to unit labor costs to determine prices.

Finally, following Stockhammer (1999), firms' desired investment rate ($g_K = I/K$) is described as:

$$g_K = \kappa_0 + \kappa_r r \tag{8}$$

where $r = \Pi/K$ is the rate of profit. The parameters in this investment function are positive: κ_0 captures the state of business confidence or "animal spirits"; and κ_r captures the sensitivity of desired investment to the profit rate. The current profit rate approximates the expected rate of return, and hence changes in r induce variations in planned investment spending (Blecker, 2002; Stockhammer, 1999). Since the profit rate is just the product of the profit share and the capacity

utilization rate ($u = Y/K$), the rate of accumulation in equation (8) can be expressed as:[7]

$$g_K = \kappa_0 + \kappa_r \pi u \tag{9}$$

2.3   Consumption Behavior

From Table 2, aggregate consumption, C, can be written as:

$$C = C_W + C_R + \dot{D} \tag{10}$$

Note that borrowing by working households, $\dot{D}$, results in the accumulation of debt by these house-holds and hence the accumulation of an equivalent stock of financial wealth by other households. The influence of debt on consumption is discussed in detail below. We abstract from the influence of financial assets (and wealth in general) on consumption spending, however, for the sake of simplicity. Stylized facts (an extremely unequal distribution of wealth – and particularly financial assets – coupled with small marginal propensities to spend on the part of the most affluent members of society) suggest that the marginal impact of wealth on aggregate consumption is modest.[8]

The individual components of equation (10) are modeled as follows. First, we describe consumption by rentiers as a fixed proportion of their total wage, profit, and interest income:

$$C_R = c_\pi [W_R \alpha N + \Pi + i D_R)] \tag{11}$$

Consumption spending by workers, meanwhile, is made up of two components. First, consumption financed by borrowing is characterized as:

$$\dot{D} = \beta(C^T - C_W), \beta > 0 \tag{12}$$

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[7]The investment function in equation (8) does not include a separate accelerator term through which u can influence g_K independently of $r = \pi u$, but it nevertheless generates an "orthodox" Kaleckian stagnationist result under conventional neo-Kaleckian conditions, as demonstrated in equation (20) below. However, as discussed in section 2.4, this stagnationist result does not *necessarily* carry over to the model as specified in this paper.

[8]For empirical evidence supporting these claims, see Wolff (2010) and Onaran et al. (2011).

where C^T denotes a target level of consumption to which working households aspire, specified as:

$$C^T = \eta C_R \tag{13}$$

The adjustment parameter β in equation (12) depends on household borrowing norms and financial market lending norms, and is taken as given. Note that borrowing only partially closes the gap between C^T and C_W at any point in time. In other words, working households generally consume at levels below those to which they aspire. In equation (13), workers attempt to emulate rentier consumption.[9] The influence of rentier consumption on that of working households may be direct, working through representations of rentier lifestyles in the mass media (Cynamon and Fazzari, 2008; Bartolini et al., 2014).[10] Alternatively it may be an indirect consequence of the "expenditure cascades" outlined by Frank et al. (2014), according to whom the consumption patterns of the most affluent households influence the consumption patterns of their (geographically and economically) near neighbors, who influence the consumption patterns of their near neighbors, and so on. The larger the emulation parameter η, the higher the target level of consumption C^T in equation (13) and the more debt financed consumption is undertaken by workers in equation (12).

The second component of workers' consumption is consumption spending funded by current

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[9]Equation (13) can be thought of as a simplification of the more general expression:

$$C^T = \eta_n C_n + \eta_R C_R + \eta_E E(W_W N \mid \Omega)$$

where C_n denotes a "normal" level of consumption established in the past and Ω is the incomplete information set that provides the basis for expectations formation in an environment of uncertainty. This expression is consistent with the claim of Kahneman et al. (1986), that aspirations (such as C^T) are based largely on objective observations of past outcomes and outcomes experienced by others. Note that increases in C^T may involve distinctly defensive or restorative behaviors by households. For example, as an expression of *private* consumption norms, C_n may increase because the erosion of public services such as health care requires private provision of these services if household welfare is to remain unchanged, or because acquisition of market goods (such as alarm systems) is required to redress the erosion of social capital such as trust (Barbosa-Filho et al., 2008; Bartolini et al., 2014). Increases in C^T and the household borrowing and indebtedness to which they give rise may, therefore, reflect efforts by households to merely *maintain* (rather than increase) overall consumption and/or welfare. The simplification in equation (13), however, focuses attention exclusively on outcomes experienced by others as a "driver" of C^T, and hence on the process of emulation in consumption behavior that is central to this paper.

[10]Bartolini et al. (2014, pp.1030-1031) argue that "powerful industries (advertising, media culture, etc.) present in contemporary market economies have successfully pushed people into substituting short-term materialistic wants, which can be satisfied on the marketplace, for long-term happiness, which can be pursued by investing time and effort to develop deep interpersonal relations." This suggests that the locus of responsibility for the propensity to emulate (and any increases therein) is contestable: it may reside with the individual or society (or both).

income. In Setterfield and Kim (2013):

$$C_W = c_W W_W N$$

and:

$$S_W = (1 - c_W)W_W N - iD_R$$

In other words, workers' behavior conforms to a distinct hierarchy or "pecking order", according to which they first consume from current income, then service their debts, and finally treat saving as a residual determined by prior consumption and debt servicing outlays. In this paper, we write:

$$C_W = c_W(W_W N - iD_R) \tag{14}$$

so that:

$$S_W = (1 - c_W)(W_W N - iD_R) \tag{15}$$

This involves a more conventional treatment of debt servicing as an initial deduction from income, the remainder of which is then *either* consumed *or* saved. The key question addressed in what follows is whether, and if so how, this affects the macrodynamics of the economy.

2.4 Temporary Equilibrium and Comparative Statics

Commodity market equilibrium can be stated as:

$$Y = C_W + C_R + \dot{D} + I \tag{16}$$

By substituting equations (11), (12), and (14) into this equilibrium condition, normalizing all variables by the capital stock, and utilizing equation (9), equation (16) can be rewritten in terms of the rate of capacity utilization as:[11]

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[11]The term d_R in equation (17) is workers' net debt (i.e., debt owed to rentiers) to capital stock ratio. This bears a straightforward relationship to the more intuitive debt to income ratio, which is given by $D_R/W_W N = d_R/\omega_W u$.

$$u = c_W(1-\beta)(\omega_W u - id_R) + c_\pi(1+\beta\eta)(\phi\alpha\omega_W u + \pi u + id_R) + \kappa_0 + \kappa_r \pi u \qquad (17)$$

Recalling that, on the basis of equation (6), ω_W can be replaced with $(1-\pi)/(1+\alpha\phi)$, and utilizing equation (9), we can then derive the following expressions for the rates of capacity utilization, profit, and accumulation:[12]

$$u = \frac{\kappa_0 + id_R[c_\pi(1+\beta\eta) - c_W(1-\beta)]}{\left\{1 - [c_\pi(1+\beta\eta) + \kappa_r]\pi - \frac{[1-\pi][c_W(1-\beta)+c_\pi(1+\beta\eta)\phi\alpha]}{1+\phi\alpha}\right\}} \qquad (18)$$

$$r = \pi u = \frac{\pi[\kappa_0 + id_R(c_\pi[1+\beta\eta] - c_W[1-\beta])]}{\left\{1 - [c_\pi(1+\beta\eta) + \kappa_r]\pi - \frac{[1-\pi][c_W(1-\beta)+c_\pi(1+\beta\eta)\phi\alpha]}{1+\phi\alpha}\right\}} \qquad (19)$$

$$g_K = \kappa_0 + \frac{\kappa_r\pi[\kappa_0 + id_R(c_\pi[1+\beta\eta] - c_W[1-\beta])]}{\left\{1 - [c_\pi(1+\beta\eta) + \kappa_r]\pi - \frac{[1-\pi][c_W(1-\beta)+c_\pi(1+\beta\eta)\phi\alpha]}{1+\phi\alpha}\right\}} \qquad (20)$$

The comparative static results for u, r and g_K derived from the temporary equilibria in equations (18)–(20) are reported in Table 3.[13] They reveal several interesting features of the growth process modeled in this paper. Because the responses of u, r and g_K with respect to small variations in κ_0, π, i, d_R, and η are always of the same sign, we focus in what follows on comparative static results involving the temporary equilibrium growth rate.

Table 3: Short-Run Comparative Statics

	κ_0	π	i	d_R	η
u	+	?	?	?	+
r	+	?	?	?	+
g_K	+	?	?	?	+

Positive d_R is assumed.

[12]The capacity utilization rate is an adjusting variable in our model in the both short run and long run. We acknowledge, however, that there has been an active debate about the validity of variable capacity utilization in the long run. See for example, Hein et al. (2011, 2012); Skott (2012).

[13]The results reported in Table 3 assume $d_R > 0$ and that the Keynesian stability condition holds (i.e., the denominator in equations (18)–(20) is positive.

First, and as expected, $\partial g_K/\partial \eta, \partial g_K/\partial \kappa_0 > 0$. Since η is the propensity to emulate in equation (13) which (given $\beta > 0$) drives workers' borrowing in equation (12), the first of these derivatives confirms that increased borrowing fuels demand formation and hence growth. This is in keeping with ordinary Keynesian logic. So, too, is the sign of $\partial g_K/\partial \kappa_0$, which suggests that an improvement in the "animal spirits" of firms boosts growth.

The ambiguous signs of the derivatives reported in the third, fourth, and fifth columns of Table 3 demand more extensive discussion. Consider first the results in columns four and five. The servicing of debts sets up a flow of transfer payments from debtors to creditors that (*ceteris paribus*) is conventionally thought to create a deflationary drag in demand-led growth models.[14] This is because of the higher marginal propensity to consume of debtor households. But according to Table 3, $\partial g_K/\partial i, \partial g_K/\partial d_R \gtreqless 0$. The basis of this result is immediately obvious from inspection of the numerator of equation (20), from which it can be seen that:

$$\frac{dg_K}{di}, \frac{dg_K}{dd_R} \gtreqless 0 \iff c_\pi(1+\beta\eta) - c_W(1-\beta) \gtreqless 0 \tag{21}$$

The intuition for this result is that the redistribution of income from workers to rentiers brought about by increased debt servicing commitments has *two* effects on consumption spending, which are clearly revealed by writing:

$$c_\pi(1+\beta\eta) - c_W(1-\beta) = (c_\pi - c_W) + \beta(c_\pi\eta + c_W)$$

The first term on the right hand side of this expression ($c_\pi - c_W < 0$) captures the conventional (direct) effect of debt servicing: a redistribution of income from high to low marginal propensity to consume households that depresses total consumption spending (*ceteris paribus*). The second term on the right hand side ($\beta[c_\pi\eta + c_W] > 0$) is an unconventional indirect effect of debt servicing on consumption. It captures the fact that as income is redistributed towards rentiers as a result of debt servicing, this both: a) increases rentier income and hence rentier consumption spending and

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[14]See, for example, Dutt (2005, 2006) and Hein (2012, chpt.5).

hence (because of emulation effects) C^T and hence worker borrowing; and b) decreases worker income and hence workers' consumption from income, thus widening the gap between C^T and C_W and so increasing worker borrowing (see equation (12)). In short, income redistribution due to increased debt servicing commitments lowers consumption spending from current income but increases consumption spending financed by workers' borrowing, with the result that its total impact on consumption expenditures (and hence g_K) is ambiguous.

Note also from the expression in (21) that as $\beta \to 0$ (i.e., borrowing and/or lending norms restrict workers' ability to pursue their consumption target, C^T), the right hand side of (21) tends towards $c_\pi - c_W < 0$. In other words, the more aggressively working households accumulate debt to finance consumption spending, the greater the likelihood that the derivatives in (21) will turn positive. Note also, however, that $\eta > 0$ impacts positively on the right hand side of (21). In other words, consumption emulation by working households increases the likelihood that the derivatives in (21) will turn positive. Taken together, these comments demonstrate that it is the *combination* of borrowing and consumption emulation behavior that determines the possibility that higher debt servicing payments will stimulate the economy.

The ambiguity of the signs of the derivatives in (21) means that one of the central results reported by Setterfield and Kim (2013) – that increased debt servicing commitments provide a source of demand-side stimulus to the economy – remains a possibility even when debtor households adhere to a more conventional pattern of debt servicing behavior (as in this paper). In other words, this result does not altogether depend on the "pecking order" behavior hypothesized by Setterfield and Kim (2013).[15] This observation poses an obvious question: why has the result in (21) not been observed previously in the literature that considers household debt accumulation as part of the dynamics of a Kaleckian growth process? Inspection of the literature reveals that the answer

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[15]It should be noted that the result is, however, made more likely by this behavior, since what Setterfield and Kim (2013) show is that increased debt servicing obligations *always* provide a stimulus to the economy. The intuition for this result is straightforward: with the "pecking order" behavior hypothesized by Setterfield and Kim (2013), workers sacrifice only *savings* to meet increased debt servicing obligations, while rentiers *spend* some part of the additional income they receive as a result of the transfer payments created by debt servicing. In this way, a leakage from the circular flow of income (workers' saving) is partially transformed into an injection (rentier spending), boosting aggregate demand formation.

varies with the contribution at hand. In Dutt (2005, 2006), for example, there is no emulation effect through which an increase in rentier consumption can stimulate increased borrowing and consumption spending by workers. At the same time, a decline in workers' income (and hence workers' consumption from income) due to increased debt servicing commitments reduces the desired debt level of working households which depresses borrowing and hence consumption spending.[16] In conjunction with the conventional, direct effect of debt servicing on consumption (as outlined above), this means that the net effect of increased debt servicing commitments on consumption spending (and hence growth) is unambiguously negative.

Kim (2012), meanwhile, features an emulation effect through which increased capitalist consumption will stimulate borrowing and spending by workers, but no accompanying mechanism whereby a fall in workers' income (and hence their consumption from income) also stimulates worker borrowing and spending. From the short run equilibrium solution to this model, it appears to be the case that:

$$\frac{du}{d(id_w)}, \frac{dg_K}{d(id_w)} \gtreqqless 0 \iff (1+\beta)s_R - \beta \lesseqqgtr 0$$

where id_w is the total debt servicing commitments (per unit of capital) of workers, β is the propensity of workers to emulate capitalist consumption, and s_R is capitalists' propensity to save.[17] However, the Keynesian stability condition in this model requires that $(1+\beta)s_R > \kappa_r + \beta$, from which it follows that $(1+\beta)s_R > \beta$ (since $\kappa_r > 0$, where κ_r is the responsiveness of the rate of accumulation to the rate of profit). It must therefore be the case that $du/d(id_w), dg_k/d(id_w) < 0$ in the expression above – in other words, that an increase in the debt servicing commitments of workers has an unambiguously negative effect on capacity utilization and growth.

Finally, the model developed by Dutt (2008) admits a short run equilibrium solution from which it follows that:

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[16]See Dutt (2005, p.167) equations (14) and (15) and Dutt (2006, p.347) equations (6) and (7), respectively.
[17]See Kim (2012, p.8), equations (13)–(15).

$$\frac{du}{d(ik_w)} \gtreqqless 0 \iff c_w - (1+\gamma)c_c \gtreqqless 0$$

where $k_w < 0$ is the debt to capital stock ratio of workers, γ is the propensity of working house-holds to emulate capitalists' consumption, and c_c is capitalists' propensity to consume.[18] Noting that $c_w - (1+\gamma)c_c = (c_w - c_c) - \gamma c_c$, we can see that a decrease in $ik_w < 0$ (that is, an increase in workers' debt servicing commitments), will simultaneously: a) reduce aggregate consumption through the conventional direct channel ($c_w - c_c > 0$); and b) increase aggregate consumption through the unconventional indirect channel $-\gamma c_c < 0$, as redistribution of income towards cap-italist households increases capitalist consumption which then increases workers' consumption financed by borrowing as a result of emulation effects. This demonstrates that the possibility that increased debt servicing commitments will boost demand-led growth through a combination of emulation and borrowing effects, even when debt servicing behavior is conventional, has been dis-covered before – even if it has not been explicitly remarked upon.[19] Taken together, the various elements of the discussion of the result in (21) suggest that not only the precise way in which net-debtor households service their debts, but also the precise way in which these households borrow and seek to emulate the consumption patterns of more affluent households matter for the economy's macrodynamics.

Finally, consider the comparative static results in the third column of Table 3, where the am-biguous sign of $\partial g_K / \partial \pi$ suggests that the growth regime can be either wage- or profit-led. First, it follows from the investment function in equation (20) that:

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[18]See Dutt (2008, p.543), equation (11).

[19]Note that the result described above is not constrained by the Keynesian stability condition, which in Dutt (2008) requires that:
$$1 - (1+\gamma)c_c\sigma - c_w(1-\sigma) > 0$$

or:
$$c_w - (1+\gamma)c_c > \frac{c_w - 1}{\sigma}$$

where σ is the profit share of income. The term on the right hand side of this last expression is unambiguously negative, so the term on the right hand side can be either positive *or* (within bounds) negative.

$$\frac{dg_K}{d\pi} = \frac{\partial g_k}{\partial \pi} + \frac{\partial g_k}{\partial u}\frac{du}{d\pi} = \kappa_r u + \kappa_r \pi \frac{du}{d\pi} \tag{22}$$

Given that $\kappa_r u, \kappa_r \pi \gg 0$, the sign of the derivative in equation (22) depends on the sign of $du/d\pi$.

Using equation (18), it can be shown that:

$$\frac{du}{d\pi} \gtreqless 0 \iff [\kappa_0 + id_R(c_\pi[1+\beta\eta] - c_W[1-\beta])][\kappa_r(1+\alpha\phi) + c_\pi(1+\beta\eta) - c_W(1-\beta)] \gtreqless 0 \tag{23}$$

If we were to assume that there is no managerial class ($\alpha = 0$), and no saving, no borrowing and (hence) no net debt accumulation by working households ($c_W = 1$ and $\beta, d_R = 0$), the expression in (23) would become:[20]

$$\frac{du}{d\pi} < 0 \iff -\kappa_0[1 - c_\pi - \kappa_r] < 0 \tag{24}$$

Comparison of the expressions in (23) and (20) reveals that as in the earlier model of Setterfield and Kim (2013), the introduction of a managerial class coupled with borrowing and debt accumulation by working households seeking to emulate rentiers' consumption patterns has both quantitative and qualitative effect on the sign of $\partial g_K/\partial \pi$. There is a qualitative effect because in (23), unlike in (20), the sign of $\partial u/\partial \pi$ is indeterminate: the "paradox of costs" may or may not be observed. There is also a quantitative effect because $(1 + \alpha\phi), (1 + \beta\eta) > 1$, and $1 - \beta < 1$ all affect the *size* of $du/d\pi$ (and hence $dg_K/d\pi$) in (23) relative to that of $du/d\pi$ (and hence $dg_K/d\pi$) in (20). In the first instance, $\kappa_r(1+\alpha\phi) + c_\pi(1+\beta\eta) - c_W(1-\beta) > \kappa_r + c_\pi - 1$. *Ceteris paribus*, this makes the expression in (23) larger than that in (20), which increases the likelihood that growth will

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[20]Under these conditions, we have:
$$u = \frac{\kappa_0}{(1 - c_\pi - \kappa_r)\pi}$$
and:
$$\frac{du}{d\pi} = -\frac{\kappa_0(1 - c_\pi - \kappa_r)}{[(1 - c_\pi - \kappa_r)\pi]^2} < 0$$
where the Keynesian stability condition ensures that $(1 - c_\pi - \kappa_r) > 0$.

be profit-led. A similar result is obtained in Setterfield and Kim (2013).[21] But in contrast to this earlier contribution, the sign of the derivative in (23) depends *also* on $c_\pi(1 + \beta\eta) - c_W(1 - \beta) \gtrless 0$ in the first bracketed term of the expression. What this means is that in the model developed in this paper, the effect of introducing a managerial class coupled with saving, borrowing, and debt accumulation by working households on the prospects for wage- rather than profit-led growth is ambiguous. This result provides further evidence that the precise nature of debt servicing behavior matters for the economy's macrodynamics.

3 Debt Dynamics and the Sustainability of Steady State Growth

The question addressed in this section is whether or not steady-state growth is financially sustainable, given the assumptions made about workers' debt servicing behavior. Note that from the definition of d_R, it follows that:

$$
\begin{aligned}
\dot{d_R} &= \frac{\beta(C^T - C_W) - \dot{D_W}}{K} - g_K d_R \\
&= \frac{\beta(\eta C_R - C_W) - \dot{D_W}}{K} - g_K d_R \\
&= \beta\eta c_\pi(\omega_R u + \pi u + i d_R) - (1 - [1 - \beta]c_W)(\omega_W u - i d_R) - g_K d_R
\end{aligned}
\tag{25}
$$

Solving for and identifying the stability properties of the steady state values of d_R requires that we substitute equations (18) and (20) into equation (25) and set $\dot{d_R} = 0$. But without undertaking these operations, inspection of equation (25) reveals at a glance two things about the stability properties of the economy's debt dynamics. First, because g_K is a function of d_R (see equation (20)), equation (25) will take the usual quadratic form. Second, as revealed in Table 3, $\partial g_K / \partial d_R \gtrless 0$. This implies that, in equation (25), the $g_K d_R$ term can be either increasing or decreasing in d_R. On one hand, if $\partial g_K / \partial d_R < 0$, a higher value of d_R may generate a destabilizing force, increasing

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[21]In Setterfield and Kim (2013), $du/d\pi > 0$ and hence $dg_K/d\pi > 0$ (profit-led growth) is unambiguously more likely than in the two-class model with no net borrowing by workers from the capitalist class.

the likelihood that $\partial \dot{d}_R / \partial d_R > 0$ at higher values of d_R. The resulting u-shape of the $\dot{d}_R$ function implied by this observation (and depicted in Figure 1) conforms to the conventional u-shaped relationship found in the literature (see, for example, Hein (2012, pp.94-98)). In this case, the smaller of the two roots of equation (25), denoted by d_{R2} in Figure 1, will correspond to the stable steady state solution of equation (25). On the other hand, if $\partial g_K / \partial d_R > 0$, a higher value of d_R may generate a stronger stabilizing force, increasing the likelihood that $\partial \dot{d}_R / \partial d_R < 0$ at higher values of d_R. The inverse u-shape of the $\dot{d}_R$ function implied by this observation (and depicted in Figure 2) differs from the conventional u-shaped relationship in Figure 1, and implies that the larger of the two roots of equation (25), denoted by d_{R1} in Figure 2, will now correspond to the stable steady state solution of equation (25).
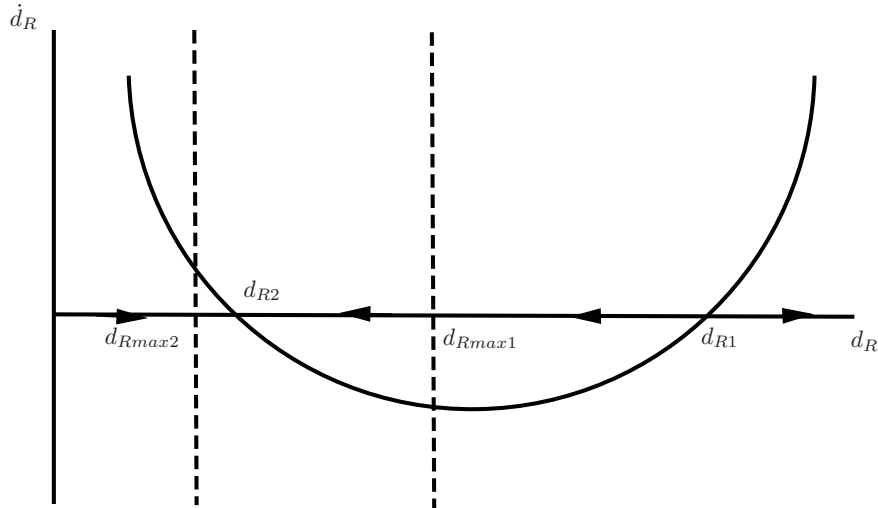

Figure 1: Debt dynamics: the "conventional" case

We can also consider the proximity of the stable steady state value of d_R to the maximum feasible net debt to capital ratio of working households, d_{Rmax}. This allows us to reflect on the sustainability of the growth process. First note that from our previous description of workers' consumption and debt servicing behavior in equation (14), we can define a feasibility coefficient:

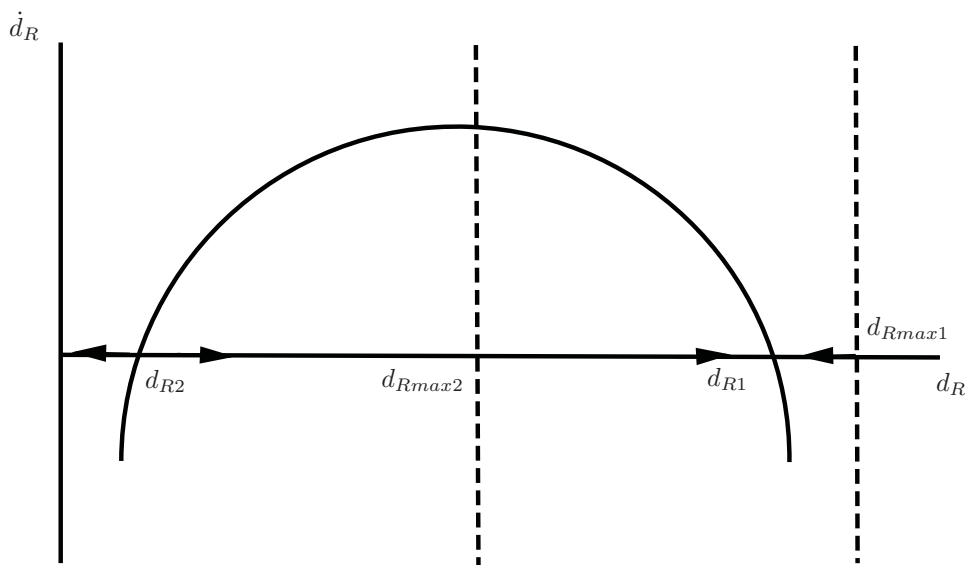$$c = \omega_W u - i d_R \tag{26}$$

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Figure 2: Debt dynamics: the "unconventional" case

that must satisfy $c \geq 0$ in order for working households to continue servicing their debts. By
setting $c = 0$ we can identify the maximum net debt to capital ratio that workers can sustain as:

$$
\begin{aligned}
d_{Rmax} &= \omega_W u / i \\
&= \frac{\kappa_0(\pi - 1)}{i[c_\pi(1 + \beta\eta) + \kappa_r\pi - 1](1 + \phi\alpha)}
\end{aligned}
\tag{27}
$$

If our debt dynamics are conventional as in Figure 1 (where d_{R2} is the stable, steady-state
debt to capital ratio), then with $d_{Rmax} = d_{Rmax1}$, $d_R \leq d_{Rmax1}$ initially suffices to ensure that
convergence to d_{R2} is feasible. The accompanying steady-state growth rate will then be sustainable
indefinitely (*ceteris paribus*). Only if d_{Rmax} is very low–as exemplified by d_{Rmax2}, for instance–
will the growth process be unsustainable. In this case, even if $d_R \leq d_{Rmax2}$ initially, convergence
towards d_{R2} will eventually violate the feasibility condition $c \geq 0$ and the growth regime will
experience a crisis.[22]

Now consider Figure 2, where d_{R1} is the stable equilibrium. If $d_{Rmax} = d_{Rmax1}$, then $d_R \leq$

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[22]In this context a "crisis" refers only to a breakdown in the dynamics of the model as specified. Exactly how the
economy reacts to these circumstances is beyond the scope of the current paper.

d_{Rmax1} initially will ensure convergence to the stable, steady-state debt to capital ratio d_{R1}. Once again, the accompanying steady-state growth rate will be sustainable indefinitely (*ceteris paribus*). If, however, $d_{Rmax} = d_{Rmax2}$, then even if $d_R \leq d_{Rmax2}$ initially, the stability of d_{R1} will eventually pull the debt to capital ratio above its maximum sustainable value.[23] The borrowing behavior of workers is unsustainable and the economy will eventually experience a crisis.

3.1 Numerical Analysis

We now examine the effects of workers' debt servicing behavior on the sustainability of the growth process by means of a numerical analysis based on empirically plausible parameter values designed to represent conditions prevalent during the Neoliberal growth regime (1980-2007) in the US. These parameter values are reported in Table 4, and are identical to the values used by Setterfield and Kim (2013) with the exception of κ_0. Following Setterfield and Kim (2013), κ_0 is set so that, in conjunction with the other parameters in Table 4, equation (18) produces a capacity utilization rate of approximately 80 percent when evaluated at the steady-state value of d_R. Again following Setterfield and Kim (2013), the propensity of working households to emulate rentier consumption, η, is calculated as:

$$\eta = \lambda \delta \tag{28}$$

where λ is the emulation parameter calculated by Ravina (2007) and δ is a "scaling parameter" that captures the ratio of consumption by the upper-middle class (capitalists and the working rich) to consumption by the median rentier family, proxied by the ratio of CEO pay to median rentier household income. Variation in the size of δ over time captures changes in income inequality within the top decile of the income distribution. Equation (28) posits that this will affect the size of the emulation parameter η for any given propensity to emulate, λ.

Using the parameter values in Table 4, the debt dynamics of the Neoliberal growth regime are revealed as "conventional" (i.e., similar to those discussed in Figure 1 above). This is made

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[23]The exception is if $d_R < d_{R2}$ initially. In this case, workers will eventually cease to be net debtors.

Table 4: Parameter values

Parameter	Value	Source
c_W	0.94	Authors' calculations based on Bunting (1998)
c_π	0.20	Setterfield and Budd (2011)
β	0.10	Authors' calculations[1]
λ	0.29	Ravina (2007)
δ	74.89	Authors' calculations based on Mishel and Sabadish (2012) and ϕ
ϕ	2.27	Authors' calculations based on Mishel et al. (2007)
α	0.25	Authors' calculations[2]
ω_W	0.42	Authors' calculations based on Mohun (2006), Figure 7
π	0.34	Authors' calculations[3]
κ_0	0.095	Authors' calculations[4]
κ_r	0.5	Lavoie and Godley (2001-02), Skott and Ryoo (2008)
i	0.0481	Authors' calculations based on World Bank Data[5]

1. Set in accordance with other parameters to satisfy the Keynesian stability condition.
2. Based on production workers accounting for 80 per cent of total employment. See (Mishel et al., 2007, p.118).
3. Set in accordance with $\pi = 1 - (1 + \alpha\phi)\omega_W$.
4. Set in accordance with other parameters to yield capacity utilization rate of approximately 80 per cent.
5. See data.worldbank.org.

Table 5: Sustainability of Growth in Two Growth Regimes

	d_{R1}	d_{R2}	$d_R max$	c
Neoliberal	13.845	0.740	4.251	0.305
Golden Age	9.685	-0.104	1.589	0.154

clear in Figure 3. Under the assumptions they make about workers' debt servicing behavior, Setterfield and Kim (2013) show that the debt dynamics of the Neoliberal regime are unequivocally unconventional (as in Figure 2). The result in Figure 3 therefore demonstrates that, under plausible conditions (as represented by the parameter values in Table 4), the way in which debtor households service their debts has an important qualitative effect on the economy's debt dynamics. Specifically, when debts are serviced conventionally (i.e., when debt servicing is treated as an initial deduction from income), the debt dynamics of the Neoliberal growth regime are transformed from unconventional (Figure 2) to conventional (Figure 1).
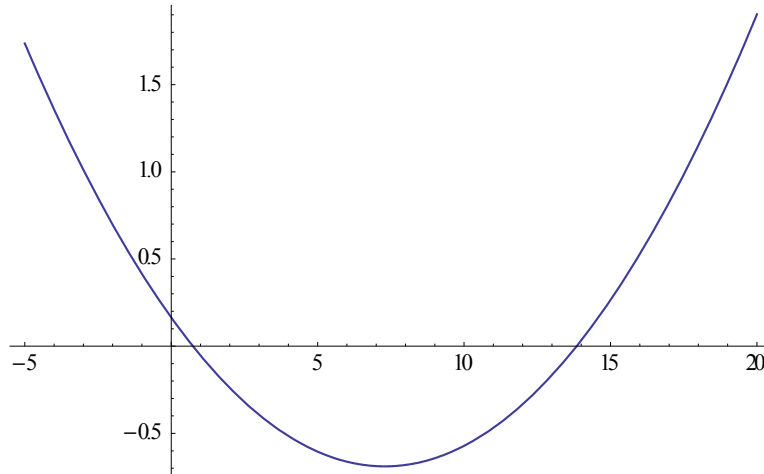

Figure 3: Simulated debt dynamics of the Neoliberal growth regime

The sustainability of the growth process is explored in Table 5, which reports the values of the larger (unstable) and smaller (stable) roots of equation (25), d_{R1} and d_{R2}, the maximum debt to capital ratio that can be sustained by working households (d_{Rmax}), and the feasibility coefficient,

c, evaluated at the stable steady state d_{R2}:

$$c = \omega_W u - i d_{R2} \qquad (29)$$

Table 5 reveals that the Neoliberal growth regime is sustainable for a large range of initial values of d_R (given by $d_R \leq 4.251$). The stable steady-state value of d_R ($d_{R2} = 0.740$) is positive but well below $d_{Rmax} = 4.251$. The feasibility coefficient $c = 0.305$ indicates that at d_{R2}, the steady-state debt to capital ratio of working households lies well within the feasible set of workers' debt servicing capabilities. Table 5 also shows that the Golden Age growth regime – which in this exercise differs numerically from the Neoliberal regime only in terms of the key distributional parameters ω_W, ω_R, π, and η – has qualitatively similar characteristics of sustainability, with $d_{R2} = -0.104 < 1.589 = d_{Rmax}$ and $c = 0.154$.[24] The obvious contrast here is with the results reported in Setterfield and Kim (2013), where the Neoliberal regime is shown to be unsustainable because of its distributional characteristics. Table 5 demonstrates that with conventional debt servicing behavior, this result no longer holds. In other words, even with the distributional changes associated with the transition from the Golden Age to the Neoliberal regime, the growth process remains sustainable as long as debtor households treat debt servicing obligations as a deduction from income.[25]

The results of this analysis suggest that in addition to changing qualitative characteristics of the economy's debt dynamics (as illustrated in Figure 3), the treatment of debt servicing as a deduction from income (as opposed to a household expense that is accommodated by sacrificing savings) has a decisive effect on the sustainability of the Neoliberal growth regime. Specifically, the susceptibility of the latter to its distributional regime (as demonstrated by Setterfield and Kim

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[24]The exact values of the Golden Age distributional parameters used in the calculations reported in the second row of Table 5 are $\omega_W = 0.48$, $\omega_R = 0.2304$, $\pi = 0.2896$, and $\eta = 2.92$. These values are derived from the sources used to evaluate ω_W, ω_R, π, and η during the Neoliberal era, as previously reported in Table 4.

[25]In Setterfield and Kim (2013), the feasibility coefficient is given by:

$$c = (1 - c_W)\omega_W u - i d_R$$

Comparing this expression with the feasibility coefficient in equation (26), it is immediately clear why the modification of workers' debt servicing behavior considered in this paper can make even the Neoliberal growth regime sustainable. In short, debtor households' treatment of debt service payments as a deduction from saving (as in Setterfield and Kim (2013)) generates a tighter budget constraint for debt service payments, *ceteris paribus*.

(2013)) would appear to depend on the precise debt servicing behavior of working households.[26]

What our results also demonstrate, therefore, is that even historically high levels of household debt (as witnessed in countries such as the US, UK and Ireland prior to the 2007/08 crisis) are not *necessarily* a problem in and of themselves. The threat posed to the sustainability of growth instead depends not just on the absolute level of indebtedness, but is also deeply rooted in behavioral issues.

4   Conclusion

Following Dutt (2005, 2006, 2008), Hein (2012), and Kim (2012), this paper extends a conventional Kaleckian growth model to incorporate consumption emulation and borrowing behavior by working households. Particular attention is paid to the precise manner in which debtor households service their debts and its impact on macroeconomic performance, the purpose being to investigate whether or not the results of Setterfield and Kim (2013) survive if households service their debts "conventionally" – that is, by treating debt servicing commitments as an initial deduction from income and then consuming some fraction of what remains. To this end, short-run equilibrium outcomes and the comparative statics associated with them are derived. The effects of debt servicing behavior on the sustainability of the growth process is then explored by means of a numerical analysis, in which attention is focused on the impact of changes in the distributional regime.

Using the results reported in Setterfield and Kim (2013) as a foil, the results in this paper suggest that debt servicing behavior can have important quantitative and qualitative effects on the economy's macrodynamics, affecting its comparative statics (the response of growth to debt servicing commitments and the profit share), its debt dynamics (as captured by the "conventional" versus "unconventional" functional form of the expression for the rate of change of the debt to capital ratio), and sustainability of the growth regime in response to the imposition of a particular (Neoliberal) distributional configuration. These findings confirm the hypothesis that the precise

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[26]Ours is, of course, a closed-economy model that assumes no public sector. Both the public and external sectors may be relevant for the dynamics of household debt accumulation, so that extending our model to include these sectors would be a useful avenue for future research.

manner in which debtor households service their debts is important for macroeconomic performance. This, in turn, suggests that as a microcosm of "financialized" capitalism, household debt servicing behavior warrants more extensive empirical study.

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