Forum for Macroeconomics and Macroeconomic Policies

IMK Macroeconomic Policy Institute

The IMK is an institute of the Hans-Böckler-Stiftung

FMM WORKING PAPER

No. 78 • April 2022 • Hans-Böckler-Stiftung

AN EVALUATION OF NEO-KALECKIAN SUPERMULTIPLIER AND NEO-GOODWINIAN MODELS: PSEUDO-GOODWIN CYCLES, EXTERNAL MARKETS AND PRO-CYCLICAL LABOUR PRODUCTIVITY

Brett Fiebiger

ABSTRACT

This paper provides a theoretical and empirical evaluation of neo-Kaleckian supermultiplier and neo-Goodwinian models. The benchmark structuralist and Harrodian neo-Goodwinian models posit a macro economy with only one asset: the capital stock. Demand leakages presuppose that at least one sector is able to realise an excess of revenues over expenditures as a positive accumulation of net financial assets vis-à-vis other sectors. Models with a single real asset – and which assume each sector always has nil net lending/borrowing – provide pseudo explanations of real world economic activity. We show that neo-Kaleckian supermultiplier models with overhead labour can account for the induced nature of capacity investment, a pro-cyclical profit share and stylised net lending/borrowing patterns.

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Key words: Pseudo-Goodwin cycles, External markets, Net lending/borrowing, Overhead labour

JEL classifications: B22, B50, E11, E20, E30, O40

1. Introduction

A large literature has followed Goodwin (1967) in attempting to explain business cycle fluctuations with a narrow focus on two variables: the wage share plus an economic activity measure (e.g. the rate of employment or capacity utilisation). In the neo-Goodwinian framework the effect of a change in the wage share on the activity measure gives the "demand curve"; if positive it is labelled as "wage-led", and if negative then as "profit-led". The effect of a change in the activity measure on the wage share gives the "distributive curve"; if positive it is labelled as "profit-squeeze", and if negative then as "forced saving". A profit-led demand regime with profit-squeeze corresponds to the "Goodwin pattern" that is widely celebrated by "structuralist" neo-Goodwinians (Taylor 2004, Barbosa-Filho/Taylor 2006, Barrales-Ruiz *et al*. 2020). "Harrodian" neo-Goodwinians instead combine a profit-led demand regime with forced saving and "fast" price adjustments (Skott 1989, 2010, Skott/Zipperer 2012).

Structuralist neo-Goodwinians have reported evidence of Goodwin patterns in U.S. data at various frequencies (Barbosa-Filho/Taylor 2006, Barrales/von Arnim 2017). A pro-cyclical profit share *vis-à-vis* the rate of employment and/or the utilisation rate is touted as confirming profit-led theory. von Arnim/Barrales (2015: 326) put it: 'wage-led theory has so far offered few models that generate the cyclical stylized facts'. A first counter-point is that neo-Kaleckian models with overhead labour can generate a pro-cyclical profit share (e.g. Rowthorn 1981, Lavoie 2009, 2014: Ch. 5, Lavoie/Nah 2020). A second counter-point is that neo-Goodwinian profit-led theory has yet to offer models consistent with cyclical stylised facts. Referring now to post-WWII U.S. business cycles these facets are indispensable:

1. Leading role of residential investment and debt-financed consumption.
2. Lagged and induced role of business fixed investment.
3. Counter-cyclical monetary policy (especially viz. recurrent housing boom and bust cycles).
4. Counter-cyclical fiscal policy (especially viz. enabling the business sector to run higher net lending/borrowing in downturns and thereby rebuild the liquidity profile of balance sheets).
5. Contemporaneous pro-cyclical effects of aggregate demand on labour productivity, which by altering the productivity of overhead labour, produce a short-run counter-cyclical relation between the wage share and economic activity.
6. Stylised patterns for the net lending/borrowing of the main sectors.

Point 6 is also a core prerequisite to modelling a Keynesian monetary production economy. Consider that the saving of a domestic sector is equal to its tangible saving (i.e. investment) plus its net financial saving (i.e. net lending/borrowing). The latter is equal to a sectors' net acquisitions of financial assets minus its net incurrence of liabilities (both before revelation gains/losses); and, conceptually equivalent to its revenues minus expenditures. Accordingly, as demand leakages occur when one or more sectors have an excess of revenues over expenditures, it is patent that the principle of effective demand requires formal attention to the net lending/borrowing of sectors.

Pace Goodwin (1967) the benchmark neo-Goodwinian models contemplate a macro economy with only one asset: the capital stock (Skott 1989, 2010, Taylor 2004: Ch. 9, Flaschel 2009: Ch. 4, Skott/Zipperer 2012, von Arnim/Barrales 2015). The models have no financial assets (or liabilities), financial sector, interest rate, monetary policy, government, foreign sector, dwelling investment, debt-financed consumption or overhead labour. For critics, in abstracting from crucial determinants of economic activity, neo-Goodwinians are offering pseudo explanations of real world economic activity.

Along these lines Stockhammer/Michell (2017) present limit cycle models that generate *pseudo*-Goodwin cycles in wage share/output space via Minskyan financial fragility in the firm sector (in place of a profit-led demand regime). Fiebiger (2018) and Fiebiger/Lavoie (2019) also refer to pseudo-Goodwin cycles in view of the empirical importance of Luxemburg/Kalecki "external markets". Kalecki ([1967] 1991) concurred with Luxemburg ([1913] 1951) that government spending and exports

can drive capital accumulation by enabling the realisation of monetary profits. Luxemburg/Kalecki external markets have also received attention from Sraffian proponents of the supermultiplier, who see capacity investment as induced by semi-autonomous demand expenditures (Cesaratto 2015).

Dwelling investment and debt-financed consumption can also function as an external market. Fiebiger (2018) reports that household semi-autonomous expenditures—comprised of household gross fixed investment and debt-financed consumption—lead post-WWII U.S. business cycles while corporate gross fixed investment lags behind. Pérez-Montiel/Pariboni (2020) find that residential investment determines both the cycle and trend of the U.S. economy. Into the critique of pseudo Goodwin-cycles, one can add contemporaneous demand effects on labour productivity and thereby on the profit share, as emphasised by Lavoie (2017). Neo-Goodwinians assume either constant labour productivity growth (Goodwin 1967, Skott 1989, 2010, von Arnim/Barrales 2015) or that aggregate demand only has a lagged effect on labour productivity (Barbosa-Filho/Taylor 2006). Such assumptions lie in contrast to the Kaleckians (Kalecki 1971: 50-57, Steindl [1952] 1976, Rowthorn 1981, Lavoie, 2009, 2014: Ch. 5, Lavoie/Nah 2020)—and Marxians (Baran/Sweezy 1966, Weisskopf 1979)—who identify overhead labour as a key reason for the short-run highly pro-cyclical variations in labour productivity aka Okun's law.

This paper evaluates neo-Kaleckian supermultiplier and neo-Goodwinian models. The analysis proceeds with Section 2 clarifying the concepts of tangible saving and net financial saving. Section 3 queries the structural realism of the benchmark neo-Goodwinians; notably, the absence of relations for the financial side of the macro economy. Section 3 contrasts neo-Goodwinian profit-led theory with the neo-Kaleckian/Sraffian accent on Luxemburg/Kalecki external markets. Causal chains are relayed and the approaches assessed in respect to U.S. cyclical patterns. Section 5 presents a stock-flow consistent neo-Kaleckian supermultiplier model. The model when extended to include overhead labour is able to account for several important cyclical stylised facts. Section 6 presents concluding remarks.

2. Tangible Saving and Net Financial Saving

There are two ways that domestic sectors can save. For any group of i domestic sectors, saving S_i is equal to its investment I_i plus the change in its net financial assets due to *flows* $\Delta NFA_i^{\not f}$.[1] The latter is equal to a sectors' net acquisition of financial assets $\Delta FA_i^{\not f}$ minus its net issuance of liabilities $\Delta L_i^{\not f}$ and, conceptually equivalent, to its revenues R_i minus expenditures E_i.

$$S_i \overset{\text{def}}{\equiv} I_i + \Delta NFA_i^{\not f} \tag{i}$$

$$\Delta NFA_i^{\not f} \overset{\text{def}}{\equiv} \Delta FA_i^{\not f} - \Delta L_i^{\not f} \equiv R_i - E_i \tag{ii}$$

In national accounts $\Delta NFA_i^{\not f}$ is known as a sectors' $(+)$ net lending / $(-)$ net borrowing, Importantly, the aggregate-level $I \overset{\text{def}}{\equiv} S$ identity is a mere tautology because the $\Delta NFA_i^{\not f}$ of all sectors *must* net out to zero, thereby leaving behind only the I_i expenditures of domestic sectors.[2]

$$\sum_i S_i \overset{\text{def}}{\equiv} \sum_i I_i + \sum_i \Delta NFA_i^{\not f} \tag{iii}$$

$$\because \sum_i \Delta NFA_i^{\not f} \overset{\text{def}}{\equiv} \sum_i \Delta FA_i^{\not f} - \sum_i \Delta L_i^{\not f} \equiv \sum_i R_i - \sum_i E_i \equiv 0 \tag{iv}$$

$$\therefore \sum_i S_i \overset{\text{def}}{\equiv} \sum_i I_i + 0 \Longrightarrow S \overset{\text{def}}{\equiv} I \tag{iiia}$$

[1] The superscript $\not f$ is used to denote *flows* before revaluation changes. See Lindner (2015).
[2] In an open economy the saving of the domestic economy is its investment plus net exports.

It is worth noticing that the relevant definition of thrift—i.e. not spending a portion of income—is necessarily a sectoral-level phenomenon (i.e. $\Delta NFA_i^{\not f} \equiv R_i - E_i > 0$) that has no counterpart at the aggregate-level (i.e. $\sum_i \Delta NFA_i^{\not f} \equiv \sum_i R_i - \sum_i E_i \equiv 0$). It follows that modelling demand leakages requires explicit formal attention to the net financial saving aka net lending/borrowing of sectors.

From equation (i) we can define the saving of the firm sector S_f as equal to its investment I_f, comprised of fixed investment I_K and inventory investment ΔIN, plus its net lending/borrowing $\Delta NFA_f^{\not f}$. In a closed economy, the firm sector's saving is also equal to its undistributed profits Π_U. Thus:

$$S_f \stackrel{\text{def}}{\equiv} I_K + \Delta IN + \Delta NFA_f^{\not f} \equiv \Pi_U \qquad \text{(v)}$$

Drawing on equation (iv), the firm sector's net lending/borrowing can be related to the net lending/borrowing of all the other sectors of the macro economy, as follows:

$$\Delta NFA_f^{\not f} \equiv -\left(\Delta NFA_h^{\not f} + \Delta NFA_b^{\not f} + \Delta NFA_g^{\not f}\right) \qquad \text{(vi)}$$

Where the subscripts h, b, and g denote respectively households, banks and government. Inserting equation (vi) in equation (v):

$$S_f \equiv I_K + \Delta IN - \left(\Delta NFA_h^{\not f} + \Delta NFA_b^{\not f} + \Delta NFA_g^{\not f}\right) \equiv \Pi_U \qquad \text{(va)}$$

And in an open economy:

$$S_f \equiv I_K + \Delta IN - \left(\Delta NFA_h^{\not f} + \Delta NFA_b^{\not f} + \Delta NFA_g^{\not f} + \Delta NFA_{row}^{\not f}\right) \equiv \Pi_U + FERA \qquad \text{(vb)}$$

Where $FERA$ is the firm sector's foreign earnings retained abroad and $\Delta NFA_{row}^{\not f}$ is the net lending/borrowing of the rest of the world. Equations (va) and (vb) underscore that any analysis of undistributed profits—and the profit share—needs to take into consideration the net lending/borrowing of all the other sectors of the macro economy. In Section 3 we will see that Goodwin (1967) and the benchmark neo-Goodwinian models adopt a limiting assumption that each sector always has zero net lending/borrowing. Section 4 will in turn investigate the empirical plausibility of such an assumption.

3. Neo-Goodwinian Models and Structural Realism

This section examines the structural realism of neo-Goodwinian models with a focus on net lending/borrowing. Goodwin's (1967) supply-side driven model lies in the tradition of "real" analysis. He postulates the so-called classical saving assumptions where 'all wages consumed, all profits saved and invested' (*ibid*: 54). Nominal output is equal to worker consumption and firm fixed investment:

$$p \cdot y = p \cdot c + p \cdot i_K$$
$$p \cdot c = w \cdot L$$
$$p \cdot i_K = s_\pi \cdot \Pi = \Pi_U, \qquad s_\pi = 1$$

Where p is the price level, y is real output, c is real consumption, i_K is real fixed investment, w is the nominal wage rate, L is employed labour, s_π is the saving rate out of nominal profits Π and Π_U is nominal retained profits. Table 1 presents a transaction matrix for Goodwin's model. The model has one asset: the capital stock. Each sector is assumed to always have $\Delta NFA_i^{\not f} \stackrel{\text{def}}{\equiv} \Delta FA_i^{\not f} - \Delta L_i^{\not f} \equiv R_i - E_i = 0$. A Keynesian monetary production economy requires money and debt relations:

> The absurd… idea that an act of individual saving is just as good for effective demand as an act of individual consumption, has been fostered by the fallacy… that an increased desire to hold wealth, being much the same thing as an increased desire to hold investments, must… provide a stimulus to their production … [Yet,] there is always an alternative to the ownership of real capital-assets, namely the ownership of money and debts (Keynes 1936: 211-212).

Table 1: Transaction Matrix for neo-Goodwinian Model – Type 1

	Capitalist Households	Workers	Firms		Σ
			Current	Capital	
Consumption		$-p \cdot c$	$+p \cdot c$		0
Capacity Investment			$+I_K$	$-I_K$	0
Wage Bill		$+w \cdot L$	$-w \cdot L$		0
Profits			$-\Pi$	$+\Pi_U$	0
Σ	0	0	0	0	0

Demand leakages—aka the forces of thrift—presuppose that at least one sector realises an excess of R_i over E_i as a positive accumulation of net financial assets on other sectors. Taylor (2004: 9) reaches a different conclusion in his remarks on the classical saving assumptions:

> The "net lending" or "financial surplus" of profit recipients is nil ($S_\pi - PI = 0$) because they put all their newly saved resources into capital formation … Not all income flows are spent for current purposes, however, profits are saved … The saving-investment identity, $S_\pi = PI$, follows from these flows as a theorem of accounting. Its ramifications are many, but the trunk of the tree is the fact that in capitalist economies the households or divisions of corporations which save are not the same as those which invest.

In national accounts, whenever a domestic sector invests in physical capital, it *saves* in a tangible form. In the limiting case where capacity investment is equal to profits, and each sector has *nil* net lending/borrowing, all income *is* necessarily spent on current purposes. In order for a portion of income to *not* be spent for current purposes, then at least one sector must have $\Delta NFA_i^{\not f} \equiv R_i - E_i > 0$, and therefore at least one other sector must have $\Delta NFA_i^{\not f} \equiv R_i - E_i < 0$ (as $\sum_i \Delta NFA_i^{\not f} \equiv 0$).

Neo-Goodwinians admit that Goodwin's (1967) model is inconsistent with the principle of effective demand due to his unrealistic assumptions of a fixed output/capital ratio and saving-determined-investment. The so-called "*demand-driven* Goodwin models" include a variable rate of capacity utilisation and have independent functions for aggregate investment and aggregate saving. Skott (1989) is credited as the first to integrate demand issues into neo-Goodwinian models. Yet, despite the independent functions, the models of Skott (1989, 2010) and Skott/Zipperer (2012) do not have any financial assets (and counterpart liabilities). There is implicit theorising on the concepts of saving, finance and ex-post funding relations in the benchmark neo-Goodwinian models.[3]

We continue to the alternative case where the saving rate out of profits s_π is less than one. Capitalist household consumption $p \cdot c_c$ is equal to distributed profits $\Pi_D = (1 - s_\pi) \cdot \Pi$. Neo-Goodwinian type 2 models uphold a unity relation between undistributed profits and capacity investment (Table 2). Each sector is again assumed to always have $\Delta NFA_i^{\not f} \stackrel{\text{def}}{\equiv} \Delta FA_i^{\not f} - \Delta L_i^{\not f} \equiv R_i - E_i = 0$. The principle of effective demand comes in a peculiar form when *all* sectors *always* spend *all* of their R_i on E_i.

Table 2: Transaction Matrix for neo-Goodwinian Model – Type 2

	Capitalist Households	Workers	Firms		Σ
			Current	Capital	
Consumption	$-p \cdot c_c$	$-p \cdot c_w$	$+p \cdot c$		0
Capacity Investment			$+p \cdot i_K$	$-p \cdot i_K$	0
Wage Bill		$+w \cdot L$	$-w \cdot L$		0
Profits	$+\Pi_D$		$-\Pi$	$+\Pi_U$	0
Σ	0	0	0	0	0

[3] Skott (1989: 234) offers that: 'S = gross saving in real terms'. There are no further remarks that clarify the concept of saving, and no equations that specify financial assets. Skott (2010: 109) is also vague: 'the saving rate out of income $\big(s(\pi)\big)$ is an increasing function of the profit share (π)'. And likewise for Skott/Zipperer (2012: 282) 'S… [is] (real, gross) saving… s is the saving rate out of profits' and for von Arnim/Barrales (2015: 359) '$s_\pi \pi u$ represents aggregate savings relative to the capital stock'. Barbosa-Filho/Taylor (2006) offer even less.

There is another possible interpretation of the neo-Goodwinian models. Taylor *et al*. (2016: 5) offer that: 'Growth theory presupposes that households own physical capital instead of claims on business firms, so corporate ownership is a veil'. The assumption is highly counter-intuitive. It also lies in contradiction to Keynes's (1936: 212) view that 'there is always an alternative to the ownership of real capital-assets, namely the ownership of money and debts'. In Taylor *et al.'s* (2016) model both types of households; capitalist and workers, realise saving *as* physical capital. The corollaries are that the firm sector no longer invests in productive capacity and has zero undistributed profits (Table 3).

Table 3: Transaction Matrix for neo-Goodwinian Model - Type 3

	Capitalist Households	Workers	Firms		Σ
			Current	Capital	
Consumption	$-p \cdot c_c$	$-p \cdot c_w$	$+p \cdot c$		0
Capacity Investment	$-p \cdot i_{K,c}$	$-p \cdot i_{K,w}$	$+p \cdot i_K$		0
Wage Bill		$+w \cdot L$	$-w \cdot L$		0
Profits	$+\Pi_{D,c}$	$+\Pi_{D,w}$	$-\Pi$		0
Σ	0	0	0	0	0

Tavani/Petach (2019, 2020) and Tavani/Zamparelli (2021) dispense with an independent investment function in favour of the following assumption: 'Say's law holds… capitalist savings are immediately invested at all times' (Tavani/Petach 2019: 207). Barrales-Ruiz *et al*. (2020: 30) remark on Tavani/Zamparelli's (2021) model that including an independent investment function 'tends to come at a cost of abandoning microeconomic foundations'. The microeconomic foundations are forward-looking capitalist households who have an Euler equation, decide the utilisation rate of productive capacity, and whose thrift governs the rate of capital accumulation. Seemingly, for some neo-Goodwinians it is more important to embrace unworldly orthodox microeconomic foundations, than it is to model a Keynesian monetary production economy where Say's law does not apply. As the type 3 models do not conform to real world ownership structures—i.e. households own financial claims on firms while firms own the capital stock—we will put them to the side in the subsequent discussion.

4. Causal Chains and Cyclical Stylised Facts

This section begins by contrasting the causal chains of neo-Goodwinian profit-led theory with those of neo-Kaleckian/Sraffian external markets theory. It then proceeds to cyclical stylised facts.

4.1. Neo-Goodwinian Causal Chains

Goodwin's (1967) model has the wage share as the predator and the rate of employment as the prey. Structuralist neo-Goodwinians often replace the employment rate with the utilisation rate. An end to upswings is triggered by a real wage inflation that, by squeezing profits, depresses capacity investment (Taylor 2004: Ch. 9, Barbosa-Filho/Taylor 2006). Harrodian neo-Goodwinians merge forced saving with "fast" price adjustments and a strong negative effect of the employment rate on capital accumulation (Skott 1989, 2010, Skott/Zipperer 2012). von Arnim/Barrales (2015) present a hybrid model that takes real wage inflation from the structuralist neo-Goodwinians and destabilising investment dynamics from the Harrodian neo-Goodwinians. The shared causal chains are twofold:

Reserve army function: higher employment rate (and/or utilisation rate) → strengthening in labour's bargaining power → higher real wage growth → higher wage share

Profit-led demand function: weakening in labour's bargaining power → lower real wage growth → higher profit share → higher level and output share of capacity investment → higher output growth

In structuralist (Harrodian) neo-Goodwinian models the profit-led demand function works via the investment function (output expansion function). Shared empirical predictions are:

1) Capacity investment leads the business cycle

2) Capacity investment equals undistributed profits
3) No sector accumulates financial assets (or incur the counterpart liabilities); hence, each sector always has zero net lending/borrowing (and revenues exactly equal to expenditures)

4.2. Luxemburg/Kalecki External Markets Causal Chains

Next we will provide an alternative perspective on cyclical activity. The first alternative causal chain is an investment function based on the capital stock adjustment principle:

Capital stock adjustment principle: higher utilisation rate → lagged and induced positive effect on the rate of capital accumulation (with firms aiming to restore a normal utilisation rate)

In neo-Kaleckian supermultiplier (SM) models, the capital stock adjustment principle is incorporated through an investment function parameter for the discrepancy between the actual utilisation rate and a slow-changing structurally-determined normal utilisation rate. Neo-Kaleckian investment functions do not include a parameter for the profit share; hence, the models are necessarily wage-led. To generate a pro-cyclical profit share in a wage-led economy, and as discussed in Section 5, one can separate workers into variable and fixed/overhead labour:

Overhead labour driven profit share: higher utilisation rate → higher productivity of overhead labour and decrease in unit overhead labour costs → higher profit share

A final causal chain is required for external markets. SM models often integrate a role for external markets by assuming that semi-autonomous non-capacity generating expenditures Z grow at an exogenously-given constant rate such as, for example, in Freitas/Serrano's (2015) Sraffian SM model and Lavoie's (2016) neo-Kaleckian SM model. The simplifying pedagogical assumption has become something of a "zombie" critique of SM models (more on this below). For our purposes here:

Semi-autonomous demand function: low utilisation rate → prompts counter-cyclical macro policies → higher level of Z = higher (lower) output shares of Z and the firm sector's ΔNFA_i^{ff} (capacity investment and the non-firm sector's $\Delta NFA_i^{\overline{ff}}$) → higher aggregate demand and higher utilisation rate

We distinguish three channels for expansionary fiscal policy: (1) automatic stabilisers (e.g. unemployment benefits, income bracket tax relief); (2) discretionary stimulus (spending and taxation); and, (3) keeping non-discretionary spending near trend output growth. All three channels imply that the output share of the government's net lending/borrowing will be pro-cyclical (and the government budget deficit counter-cyclical). Next we distinguish two channels for expansionary monetary policy in the form of lower interest rates: (1) increased demand for new dwellings and consumer credit; and, (2) lower exchange rate and thereby higher net exports. The first channel does not imply that the household sector's net lending/borrowing output share will be pro-cyclical (as per the government); however, the greater interest rate sensitivity of residential investment and consumer credit *vis-à-vis* business fixed investment does imply that the household sector will contribute to countering-act the upward (downward) impetuses to economic growth from firms' decisions to expand (contract) capacity.

A dwindling macro role for external markets in the upswing lays the seeds for the downswing (Fiebiger 2018, Fiebiger/Lavoie 2019). The neo-Kaleckian/Sraffian external markets approach predicts:

1) Capacity investment lags the business cycle
2) Capacity investment will vary systematically in relation to undistributed profits: the I_K/Π_U ratio will increase (decrease) during upswings (downswings)
3) The firm (non-firm) sector's net lending/borrowing will be counter-cyclical (pro-cyclical)

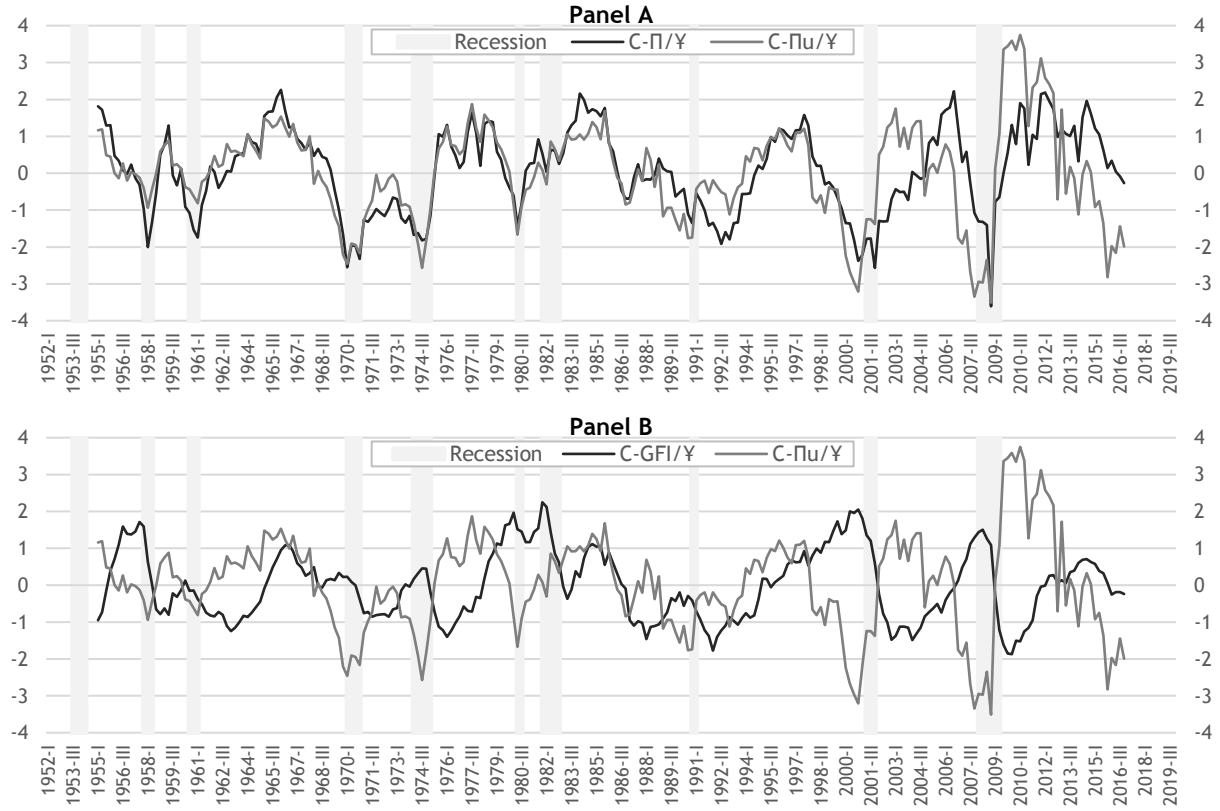
4.3. Cyclical Stylised Facts

Figure 1 presents short-run deviations from the Hodrick-Prescott (HP) filtered long-run trend for the output shares of the U.S. corporate sector's profits, undistributed profits, fixed investment and net

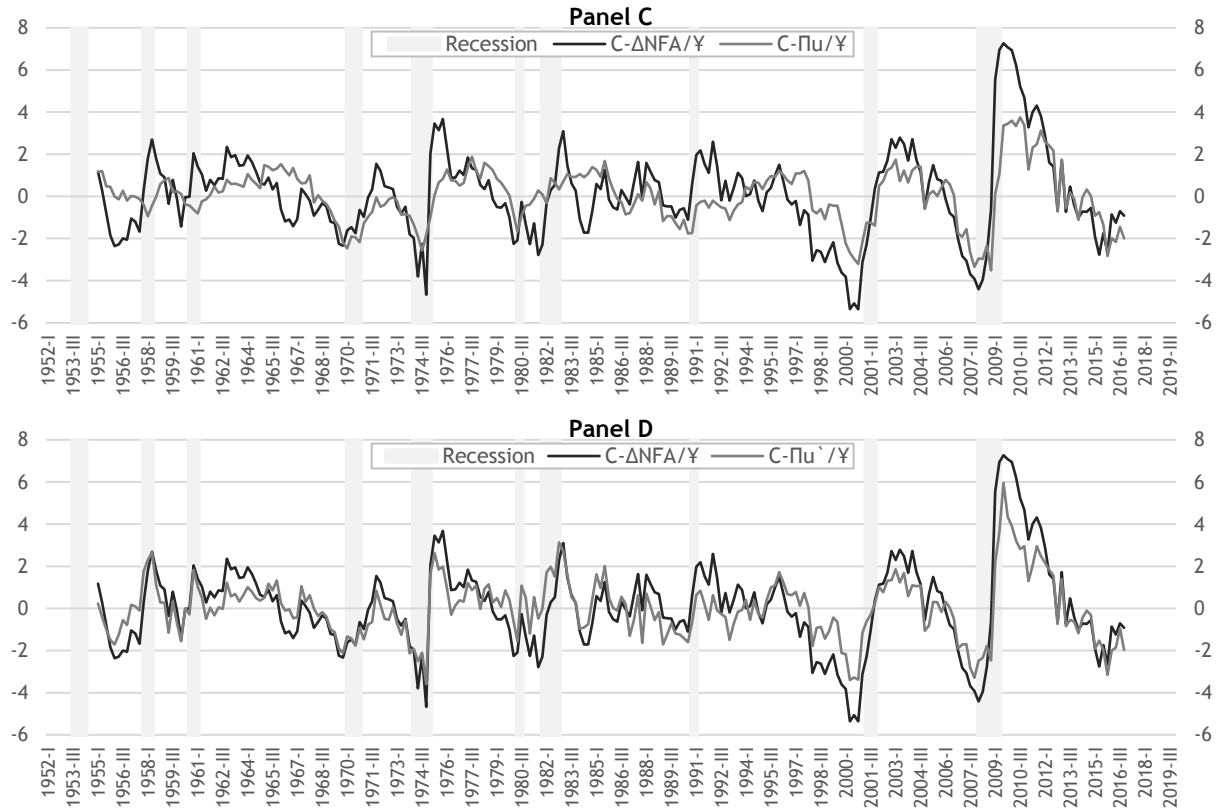
lending/borrowing.[4] Output is the sector's gross value added ¥. As the HP filter is sensitive to endpoints we construct the trend over 1952-2019 and then remove three years of data from both sides. Panel A shows the output share of corporate profits C-Π (defined as gross operating surplus) and gross undistributed profits C-Πu. Those two variables display similar although not identical cyclical variation. A striking observation is the inverse movements in the corporate sector's gross fixed investment C-GFI and undistributed profits C-Πu especially around troughs (Panel B). Panel C plots the output share of the corporate sector's net lending/borrowing C-ΔNFA again alongside C-Πu/¥. Comparing Panel B to Panel C it can be observed that short-run movements in C-Πu are driven, not by the corporate sector's fixed investment, but by its net lending/borrowing. Panel D reveals that undistributed profits minus inventory investment C-Πu` is even more closely related to C-ΔNFA.

Correlation coefficients confirm what is suggested in the graphs; namely, that short-run shifts in the corporate sector's gross undistributed profits are driven by its net lending/borrowing rather than gross fixed investment. Table 3 also reports correlations for corporate gross capital formation (C-GCF). That the contemporaneous filtered trend correlation between C-GFI/¥ and C-Πu/¥ is negative presents an uncomfortable fact to the neo-Goodwinian models that assume $p \cdot i_K = s_\pi \cdot \Pi = \Pi_U$.

Figure 1: Cyclical Deviations in Profits, Fixed Investment and Net Lending/Borrowing (Output Shares in %)*



[4] In 2005 U.S. corporations were allowed to temporarily repatriate foreign earnings at a lower tax rate. Undistributed profits swelled as a result. Another temporary surge in foreign earnings repatriation occurred in the first-half of 2018 following the Trump administration's tax cuts. Data in Figure 1 adjusts undistributed profits for the distorting effect of these tax changes. The average ratio of undistributed profits to gross value added one year either side of 2005(I)-2005(IV) and 2018(I)-2018(II) is used to calculate an adjusted measure.



* HP trend is constructed over 1952-2019 with a smoothing parameter of 129,600. Sources: St. Louis Federal Reserve, *FRED*, NCBGCFQ027S, NCBIAVQ027S, NCBLACQ027S, BOGZ1FA795000905Q. U.S. Bureau of Economic Analysis, *GDP & Personal Income*, Table 1.14.

Table 4: Filtered Trend Correlations for Corporate Sector Undistributed Profits *vis-à-vis* Investment and Net Lending/Borrowing, 1955(I)-2016(IV)

C-Πu /¥	C-GFI /¥	C-GCF/¥	C-ΔNFA/¥	C-Πu` /¥	C-GFI /¥	C-GCF/¥	C-ΔNFA/¥
+8	-0.020	-0.184	0.167	+8	0.075	-0.024	-0.026
+7	-0.075	-0.201	0.260	+7	0.063	-0.023	0.035
+6	-0.139	-0.248	0.351	+6	0.037	-0.051	0.093
+5	-0.203	-0.287	0.459	+5	0.013	-0.063	0.167
+4	-0.262	-0.331	0.574	+4	-0.029	-0.124	0.280
+3	-0.320	-0.332	0.669	+3	-0.082	-0.228	0.431
+2	-0.359	-0.327	0.741	+2	-0.172	-0.339	0.594
+1	-0.373	-0.269	0.744	+1	-0.269	-0.429	0.725
0	-0.349	-0.146	0.704	0	-0.342	-0.557	0.870
-1	-0.267	-0.022	0.535	-1	-0.379	-0.357	0.714
-2	-0.168	0.099	0.395	-2	-0.355	-0.208	0.595
-3	-0.061	0.202	0.240	-3	-0.293	-0.062	0.447
-4	0.061	0.276	0.093	-4	-0.198	0.092	0.276
-5	0.174	0.333	-0.028	-5	-0.081	0.190	0.131
-6	0.259	0.372	-0.137	-6	0.026	0.241	0.030
-7	0.348	0.411	-0.218	-7	0.128	0.300	-0.053
-8	0.417	0.429	-0.299	-8	0.219	0.353	-0.133

Sources: St. Louis Federal Reserve, *FRED*, NCBGCFQ027S, NCBIAVQ027S, NCBLACQ027S, BOGZ1FA795000905Q. U.S. Bureau of Economic Analysis, *GDP & Personal Income*, Table 1.14.

Neither Goodwin's (1967) model nor the benchmark neo-Goodwinian models can account for the stylised cyclical patterns in sectoral net lending/borrowing. Recall that: (i) the firm sector's net lending/borrowing is inversely equal to the non-firm sector's net lending/borrowing; and, (ii) a sectors' net lending/borrowing is its revenues minus expenditures. The counter-cyclicality of the U.S. corporate

(and business) sector's net lending/borrowing output share entails that the other sectors become more (less) thriftier in collective during upswings (downswings). As so the drivers of U.S. business cycles find a Keynesian demand-side explanation rather than a Marxian real wage explanation.

U.S. data supports the Luxemburg/Kalecki external markets view in respect to: (1) C-GFI/¥ lags the cycle; (2) non-unity relation between C-GFI and C-Πu; and, (3) counter-cyclicality of C-ΔNFA/¥. The recession bars in Figure 1 give some indication that corporate fixed investment lags the cycle. Nikiforos *et al*. (2021) report data that "investment" leads U.S. business cycles. The authors cast the finding as undermining SM models. SM models predict that changes in the utilisation rate will induce likewise changes in the output share of *capacity* investment. It is puzzling why Nikiforos *et al*. regress private gross domestic investment (P-GDI) given that it includes private inventory investment (P-ΔIN) and private gross residential fixed investment (P-GRFI). The relevant data for testing SM theory and neo-Goodwinian profit-led theory is private gross nonresidential fixed investment (P-GNFI).

Table 5 presents filtered trend correlations between the utilisation rate (taken from the U.S. Federal Reserve's manufacturing sector index) and various investment measures as a share of gross domestic product (Y). The strong contemporaneous relation between u and P-GDI/Y is due significantly to P-ΔIN/Y. It would be destabilising if firms' decisions to expand production where associated with inverse movements in the inventory investment output share. The most significant positive (negative) correlation between the utilisation rate and private gross nonresidential fixed investment output share is when u has a negative (positive) lag of three (eight) quarters. Those results fit SM theory; a change in u has a positive effect on P-GNFI/Y (as firms adjust capacity to demand), while a change in P-GNFI/Y has a negative effect on u (as capacity adjustments have the desired effect on the utilisation rate).

Table 5: Filtered Trend Correlations for Capacity Utilisation *vis-a-vis* Selected Variables, 1955(I)-2016(IV)

u	P-GDI /Y	P-GNFI /Y	P-ΔIN /Y	P-GRFI /Y	H-SAE /Y	H-SAE+G /Y	H-SAE+G +NX /Y
+8	-0.209	-0.459	0.054	0.057	0.080	0.252	0.405
+7	-0.126	-0.446	0.105	0.155	0.176	0.317	0.434
+6	-0.030	-0.413	0.166	0.250	0.268	0.371	0.455
+5	0.073	-0.359	0.229	0.334	0.350	0.396	0.458
+4	0.186	-0.279	0.299	0.403	0.437	0.414	0.462
+3	0.321	-0.173	0.417	0.447	0.500	0.402	0.422
+2	0.451	-0.034	0.515	0.464	0.543	0.370	0.350
+1	0.569	0.121	0.606	0.447	0.545	0.299	0.229
0	0.636	0.273	0.644	0.381	0.473	0.179	0.068
-1	0.579	0.389	0.495	0.272	0.344	0.049	-0.051
-2	0.462	0.452	0.283	0.155	0.193	-0.079	-0.130
-3	0.332	0.467	0.096	0.045	0.039	-0.194	-0.186
-4	0.204	0.440	-0.044	-0.056	-0.099	-0.272	-0.206
-5	0.090	0.386	-0.136	-0.137	-0.210	-0.325	-0.207
-6	-0.005	0.318	-0.188	-0.200	-0.294	-0.352	-0.189
-7	-0.088	0.253	-0.228	-0.250	-0.354	-0.358	-0.170
-8	-0.160	0.187	-0.259	-0.286	-0.391	-0.353	-0.149

Sources: St. Louis Federal Reserve, *FRED*, CUMFNS, HNOCCLQ027S. U.S. Bureau of Economic Analysis, *GDP & Personal Income*, Table 1.1.5.

Business fixed investment is typically robust leading into troughs. Presumably, one reason for the lagged fixed investment response is that firms make decisions to adjust capacity to demand on the basis of sales expectations, which means that realised sales have to first change to alter expectations. Out of troughs the characteristic sluggishness of business fixed investment finds a simple explanation: it would be illogical from a cost-minimisation perspective to expand productive capacity when the existing stock is significantly under-utilised. So the idea that business fixed investment leads and turns

business cycles lacks both theoretical and empirical plausibility. Kalecki ([1954] 1991: 297) made the same observation: 'Our scatter diagrams [of U.S. data] do not seem to bear out this hypothesis'.

Turning to private gross residential fixed investment, it leads the utilisation rate, and with the most significant positive correlation when u has a positive lag of two quarters. Table 5 also reports results for Fiebiger's (2018) household semi-autonomous expenditures (H-SAE) comprised of P-GRFI plus the change in consumer credit (as a proxy for debt-financed consumption). The series H-SAE+G adds in government consumption and investment expenditures. The series H-SAE+G+NX adds in net exports. That the most significant correlations for the utilisation rate *vis-à-vis* P-GRFI/Y, H-SAE/Y, (H-SAE+G)/Y and (H-SAE+G+NX)/Y, all occur when u has a positive lag, lend support to the external markets / SM induced capacity investment explanation of U.S. business cycles.

Barrales-Ruiz *et al*. (2020), in their survey of the recent literature on the Goodwin pattern distributive cycle, pay no attention to Luxemburg/Kalecki external markets. Freitas/Serrano's (2015) SM model is listed in the studies that allegedly can be disregarded as it assumes exogenous functional income distribution: 'this is wrong both in terms of theory and empirics' (Barrales-Ruiz *et al*. 2020: 15). The authors claim to refute the post-Keynesian critique that neo-Goodwinian models ignore Keynesian monetary factors, finance and financial cycles. According to them: 'monetary factors are implicit in Goodwinian frameworks with endogenous aggregate demand, since the financial system (relatively) elastically supplies the funds that drive an expansion' (*ibid*: 25). Completely abstracting from the financial system is hardly adequate in a debate over theoretical and empirical relevance.[5]

5. A Neo-Kaleckian Supermultiplier (NK-SM) Model with Semi-Autonomous Consumption

This section presents a simple NK-SM model with semi-autonomous consumption. We start by defining the baseline model, and then subject it to various simulations. The baseline model assumes an exogenous profit share. In subsequent extensions the profit share is endogenised, first by including overhead labour, and then augmented by the radical price adjustment mechanism.

5.1. Baseline Model

Table 6 shows a transaction matrix for a simple economy that consists of non-supervisory (NS) workers, rich households (encompassing managers, rentiers and capitalists), firms and banks.

Table 6: Transaction Matrix for Simple NK-SM Model

	Households		Firms		Banks		Σ
	NS Workers	Rich	Current	Capital	Current	Capital	
Induced consumption	$-p \cdot c_w$	$-p \cdot c_r$	$+p \cdot c$				0
Semi-auto. consumption		$-p \cdot z$	$+p \cdot z$				0
Capacity investment			$+p \cdot i_K$	$-p \cdot i_K$			0
Wage bill	$+w_w \cdot L_w$	$+\sigma \cdot w_w \cdot L_r$	$-WB$				0
Entrepreneurial profits		$+\Pi_{D,f}$	$-\Pi_f^n$	$+\Pi_{U,f}^n$			0
Depreciation allowances			$-DA$	$+DA$			0
Interest on deposits		$+i_{\mathcal{D},-1} \cdot \mathcal{D}_{-1}$			$-i_{\mathcal{D},-1} \cdot \mathcal{D}_{-1}$		0
Interest on loans			$-i_{\mathcal{L},-1} \cdot \mathcal{L}_{-1}$		$+i_{\mathcal{L},-1} \cdot \mathcal{L}_{-1}$		0
Bank profits		$+\Pi_{D,b}$			$+\Pi_b$	$+\Pi_{U,b}$	0
Δ Deposits		$-\Delta\mathcal{D}$				$+\Delta\mathcal{D}$	0
Δ Loans				$+\Delta\mathcal{L}$		$-\Delta\mathcal{L}$	0
Σ		0	0	0	0	0	0

[5] Nor is it obvious how inserting Tobin's q into a vector autoregressive model could substantiate the claims of Barrales-Ruiz *et al*. (2020). A theoretical model that could account for net lending/borrowing patterns and overhead labour—and which has explicit financial relations—would seem to be of greater utility.

Table 7 shows the balance sheet. Firms and banks are noncorporate businesses. The equity of firms and banks is attributed to the net worth of rich households as a revaluation gain.

Table 7: Balance Sheet for Simple NK-SM Model

	Households		Firms	Banks	Σ
	NS Workers	Rich			
Capital stock			$+p \cdot k$		$+p \cdot k$
Deposits		$+\mathcal{D}$		$-\mathcal{D}$	0
Loans			$-\mathcal{L}$	$+\mathcal{L}$	0
Firm equity		$+\mathcal{E}_f$	$-\mathcal{E}_f$		0
Bank equity		$+\mathcal{E}_b$		$-\mathcal{E}_b$	0
Balance (net worth)	0	$-V_r$	0	0	$-p \cdot k$
Σ	0	0	0	0	0

Equations (1)-(8) define respectively real output y, real gross capacity investment i_K, real net capacity investment i_K^n, real capital k, the growth of real capital g_K, expected sales γ, the capacity utilisation rate u and real full-capacity output y_{fc}. We adopt a standard NK-SM investment function with positive parameters for expected sales γ and the lagged utilisation gap γ_u. Expected sales are a positive function of the utilisation gap times the γ_u parameter and an adjustment speed parameter λ.

(1)	$y = c_w + c_r + z + i_K$	Real output
(2)	$i_K = i_K^n + \delta \cdot k_{-1}, \quad \bar{\delta} > 0$	Real gross capacity investment
(3)	$i_K^n = k_{-1} \cdot g_K$	Real net capacity investment
(4)	$k = k_{-1} \cdot (1 + g_K)$	Real capital stock
(5)	$g_K = \gamma + \gamma_u \cdot (u_{-1} - u_n), \quad \bar{\gamma}_u > 0, \bar{u}_n > 0$	Growth of real capital stock
(6)	$\gamma = \gamma_{-1} + \lambda \cdot \gamma_u \cdot (u_{-1} - u_n), \quad \bar{\lambda} > 0$	Expected sales
(7)	$u = y/y_{fc}$	Capacity utilisation rate
(8)	$y_{fc} = k_{-1}/v, \quad \bar{v} > 0$	Real full-capacity output

Nominal output Y, nominal net capacity investment I_K^n and the nominal capital stock K are their real quantities times the price level p. In the baseline model the growth of prices g_p is constant. Nominal gross profits Π is equal to nominal output Y minus the wage bill WB. The wage bill is the product of $w_w \cdot L_w + \sigma \cdot w_w \cdot L_r$, where w_w is the nominal wage rate w_w of NS workers, σ is a multiple, and L_w and L_r stand respectively, for the employment of NS workers and rich households.

(9)	$Y = p \cdot y$	Nominal output
(10)	$I_K^n = p \cdot i_K^n$	Nominal net capacity investment
(11)	$K = p \cdot k$	Nominal capital stock
(12)	$p = p_{-1} \cdot (1 + g_p), \quad \bar{g}_p > 0$	Price level
(13)	$\Pi = Y - WB$	Nominal gross profits
(14)	$WB = w_w \cdot L_w + \sigma \cdot w_w \cdot L_r, \quad \bar{\sigma} > 1$	Wage bill

Nominal net entrepreneurial profits Π_f^n subtracts depreciation allowances DA and firms' interest payments $i_{\mathcal{L}-1} \cdot \mathcal{L}_{-1}$ from nominal gross profits. The real capital stock depreciates at the constant rate δ. The nominal loan rate $i_{\mathcal{L}}$ is fixed. Firms distribute profits $\Pi_{D,f}$ at a fixed rate $i_{\mathcal{E}}$ on the nominal value of proprietors' equity in the last period $\mathcal{E}_{f,-1}$. For brevity we assume that the loan rate and dividend rate are the same. Firms are deficit-units that incur bank loans $\mathcal{L}$ whenever nominal net capacity investment I_K^n is greater than nominal net undistributed profits $\Pi_{U,f}^n$.

(15)	$\Pi_f^n = \Pi - DA - i_{\mathcal{L},-1} \cdot \mathcal{L}_{-1}, \quad \bar{i}_{\mathcal{L}} > 0$	Nominal net entrepreneurial profits
(16)	$DA = \delta \cdot p \cdot k_{-1}$	Depreciation allowances
(17)	$\Pi_{D,f} = i_{\mathcal{E},-1} \cdot \mathcal{E}_{f,-1}, \quad i_{\mathcal{E}} = i_{\mathcal{L}}$	Nominal firm distributed profits
(18)	$\Pi_{U,f}^n = \Pi_f^n - \Pi_{D,f}$	Nominal firm net undistributed profits

(19) $\mathcal{E}_f = K - \mathcal{L}$ Proprietors' equity in firms

(20) $\mathcal{L} = \mathcal{L}_{-1} + I_K^n - \Pi_{U,f}^n$ Bank loans

Equations (21)-(27) define respectively bank profits Π_b as the lagged interest payments on loans minus the lagged interest payments on deposits, the nominal deposit rate $\imath_{\mathcal{D}}$ as a mark-down $\mathfrak{m}$ on the nominal loan rate, bank distributed profits $\Pi_{D,b}$, bank undistributed profits $\Pi_{U,b}$, bank equity $\mathcal{E}_b$, the deposit supply $\mathcal{D}_s$ and deposit demand $\mathcal{D}_d$. Banks retain a portion of profits sufficient to meet a regulatory capital requirement κ on loans, and distribute the remainder to rich household owners.

(21) $\Pi_b = \imath_{\mathcal{L}-1} \cdot \mathcal{L}_{-1} - \imath_{\mathcal{D},-1} \cdot \mathcal{D}_{s,-1}$ Nominal bank profits

(22) $\imath_{\mathcal{D}} = \imath_{\mathcal{L}} - \mathfrak{m}, \quad \bar{\mathfrak{m}} > 0$ Nominal bank deposit rate

(23) $\Pi_{D,b} = \Pi_b - \Pi_{U,b}$ Nominal bank distributed profits

(24) $\Pi_{U,b} = \mathcal{E}_b - \mathcal{E}_{b,-1}$ Nominal bank undistributed profits

(25) $\mathcal{E}_b = \kappa \cdot \mathcal{L}, \quad \bar{\kappa} > 0$ Proprietors' equity in banks

(26) $\mathcal{D}_s = \mathcal{L} - \mathcal{E}_b$ Bank deposit supply

(27) $\mathcal{D}_d = \mathcal{D}_{d,-1} + \Delta NFA_r^{\not F}$ Bank deposit demand

NS workers are the canonical Kaleckian-type, who receive disposable income YD_w equal to their wages, and consume it entirely. NS worker labour demand depends on the ratio of real output to NS worker full-capacity labour productivity ξ_w^{fc}. Throughout this paper we assume that the growth rate of full-capacity labour productivity is zero (for both households). In the baseline model the growth rate of nominal NS worker wage rate g_{w_w} is exogenously-given. Accordingly, setting $g_{w_w} = g_p$ (and when all labour is assumed to be variable), the profit share π will remain constant.

(28) $YD_w = w_w \cdot L_w$ NS worker nominal income

(29) $c_w = YD_w / p$ NS worker real consumption

(30) $L_w = y / \xi_w^{fc}, \quad \bar{\xi}_w^{fc} > 0$ NS worker employment

(31) $w_w = w_{w,-1} \cdot (1 + g_{w_w}), \quad \bar{g}_{w_w} > 0$ NS worker nominal wage rate

Rich household real consumption is differentiated into an induced component c_r determined by their consumption propensity α out of real disposable income; and, a semi-autonomous component z that grows at the constant rate $\bar{g}_Z$. These households accrue positive net financial saving $\Delta NFA_r^{\not F}$ whenever their disposable income exceeds their nominal induced and semi-autonomous consumption.[6] Rich household net wealth V_r increases with their net financial saving plus the undistributed profits of firms and banks and the current cost accounting revaluation to the capital stock $\Delta p \cdot k_{-1}$ (although note that due to our assumptions $V_r = K$). In the baseline model rich households are "variable" labour (rather than fixed overhead labour); hence, their labour demand L_r like that of NS workers depends on the ratio of real output to the full-capacity labour productivity of rich households ξ_r^{fc}.

(32) $YD_r = \sigma \cdot w_w \cdot L_r + \Pi_{f,D} + \Pi_{b,D} + \imath_{\mathcal{D},-1} \cdot \mathcal{D}_{d,-1}$ RH nominal income

(33) $c_r = \alpha \cdot YD_r / p, \quad \bar{\alpha} > 0$ RH real induced consumption

(34) $z = z_{-1} \cdot (1 + g_Z), \quad \bar{g}_Z > 0$ Real semi-autonomous consumption

(35) $\Delta NFA_r^{\not F} = YD_r - p \cdot c_r - p \cdot z$ RH nominal net financial saving

(36) $V_r = V_{r,-1} + \Delta NFA_r^{\not F} + \Pi_{U,f}^n + \Pi_{U,b} + \Delta p \cdot k_{-1}$ RH net wealth

(37) $L_r = y / \xi_r^{fc}, \quad \bar{\xi}_r^{fc} > 0$ RH employment

In the baseline model the redundant equation is that which equates the supply of deposits to the demand for demands: $\mathcal{D}_s = \mathcal{D}_d$. Next we list parameter and variable values (Table 8). In line with

[6] In some simulations the net financial saving of households will temporarily turn negative while that of firms will temporarily be positive. The model requires for stability that the stock of bank loans remain positive.

Franke's (2017) estimates for the equilibrium output/capital ratio we set $y/k_{-1} = u_n/v = 1$.[7] A value of one-third for the semi-autonomous non-capacity generating expenditure output share is consistent with Girardi/Pariboni's (2015) estimates for the U.S. over 1947-2013. A value for the profit share of 0.24 may appear low; however, in this model with no public sector the profit share is that after sales tax and corporate income taxes. For the NS worker wage share and employment we draw on Mohun (2014).

Table 8: Values in Baseline Model

u_n	v	δ	γ_u	λ	α	$i_{\mathcal{L}}$	m	κ	σ
0.8	0.8	0.12	0.28	0.0714	0.2125	0.102	0.05	0.08	4.0909
$\frac{w_w \cdot L_w}{WB}$	$\frac{\xi_w^{fc}}{\xi_r^{fc}}$	$\frac{\Pi}{Y}$	$\frac{\Pi_U^n}{Y}$	$\frac{I_K^n}{Y}$	$\frac{z}{y}$	$\frac{\mathcal{L}}{K}$	g_p	g_{w_w}	g_Z
0.55	0.2	0.24	0.02	0.035	0.3333	0.2747	0.02	0.02	0.035

5.1.1. Permanent Increase in Growth Rate of Semi-Autonomous Consumption

Our first experiment is a permanent increase in the growth rate of semi-autonomous consumption from 0.035 to 0.045 starting at the tenth period.[8] The simulation also will allow us to address the claim that NK-SM models require "sluggish" investment dynamics to be stable (Skott 2017, Skott *et al*. 2021).

Equation (6) is a discrete time version of Allain's (2015) expected sales adjustment mechanism given as: $\dot{\gamma} = \lambda\gamma_u(u - u_n)$. Skott *et al*.'s (2021) version of Allain's model instead assumes $\dot{\gamma} = \lambda(u - u_n)$. The authors set λ at 0.0025 and γ_u at 0.166. Referring now to Allain's original formation; $\lambda\gamma_u(u - u_n)$, if $\gamma_u = 0.166$ and $\lambda\gamma_u = 0.0025$ then $\lambda = 0.01506$. Those parameters will be used as a comparison to our selected values. Other formulations of expected sales are possible. The version in equation (6) will be referred to as "ultra-Harrodian" (UH). Firms seem to believe that the secular sales growth trend lacks any persistence. Such firms form expectations with myopia about the possibility of counter-cyclical macro stabilisation policies. One alternative adjustment mechanism would be:

(6a) $\gamma = \gamma_{-1} + \lambda \cdot (g_{Z,-1} - \gamma_{-1})$ Expected sales

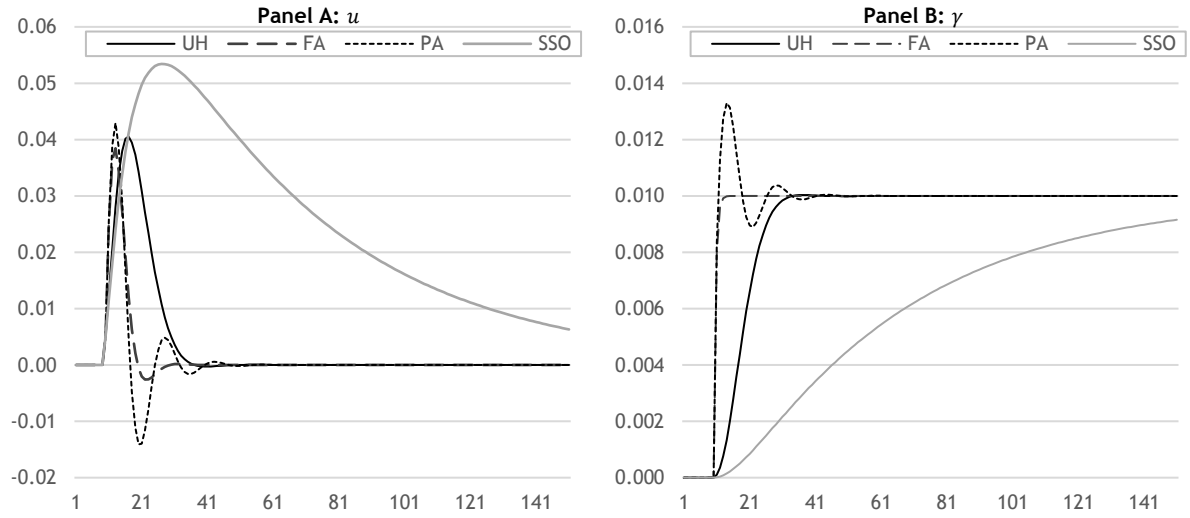
Firms' expectations of the secular trend in sales growth are now anchored by the growth rate of semi-autonomous demand expenditures. As so we will call the expected sales adjustment mechanism in equation (6a) "fully-anchored" (FA). Another possibility would be:

(6a) $\gamma = \gamma_{-1} + \lambda \cdot [g_{Z,-1} + \phi \cdot (u_{-1} - u_n) - \gamma_{-1}], \quad \bar{\phi} > 0$ Expected sales

Where the ϕ parameter measures the weight that firms assign to the utilisation gap as signalling a potential quasi-permanent change to the secular trend in sales growth. The expected sales adjustment mechanism in equation (6b) will be labelled "partly-anchored" (PA). In the simulations we set $\lambda = 0.8$ for both the FA and PA cases and also set $\phi = 0.08$ for the PA case. Figure 2 presents the percentage point deviations from the baseline scenario for the UH, PA and FA cases in the scenario of a permanent increase in g_Z. The SSO case is for Skott, Santos and Oreiro, and uses the parameter values mentioned above. Panel A shows the utilisation rate u and Panel B expected sales γ. As the reader can see the adjustment dynamics of the UH, PA and FA cases are significantly faster than the SSO case.[9]

[7] Franke (2017) estimates the equilibrium output/capital ratio for U.S. firms over 1980(I)-2007(II) using two different approaches to the perpetual inventory method. Our value for $y/k_{-1} = 1$ lies between his two estimates of 0.823 and 1.090. Note that we use a higher rate of capital depreciation than estimated by Franke in order to better reflect the consumption of fixed capital to gross value added ratio of the U.S. corporate sector.
[8] Simulations were run with Joao Macalos's R software package: https://joaomacalos.github.io/sfcr/index.html.
[9] In the baseline model a permanent 0.01 increase in g_Z leads to a steady-state increase in the investment share of 0.001 and to respective decreases in the output shares of semi-autonomous and induced consumption of 0.0098 and 0.0002. Such magnitudes are more empirically-plausible than those reported by Skott *et al*. (2021).

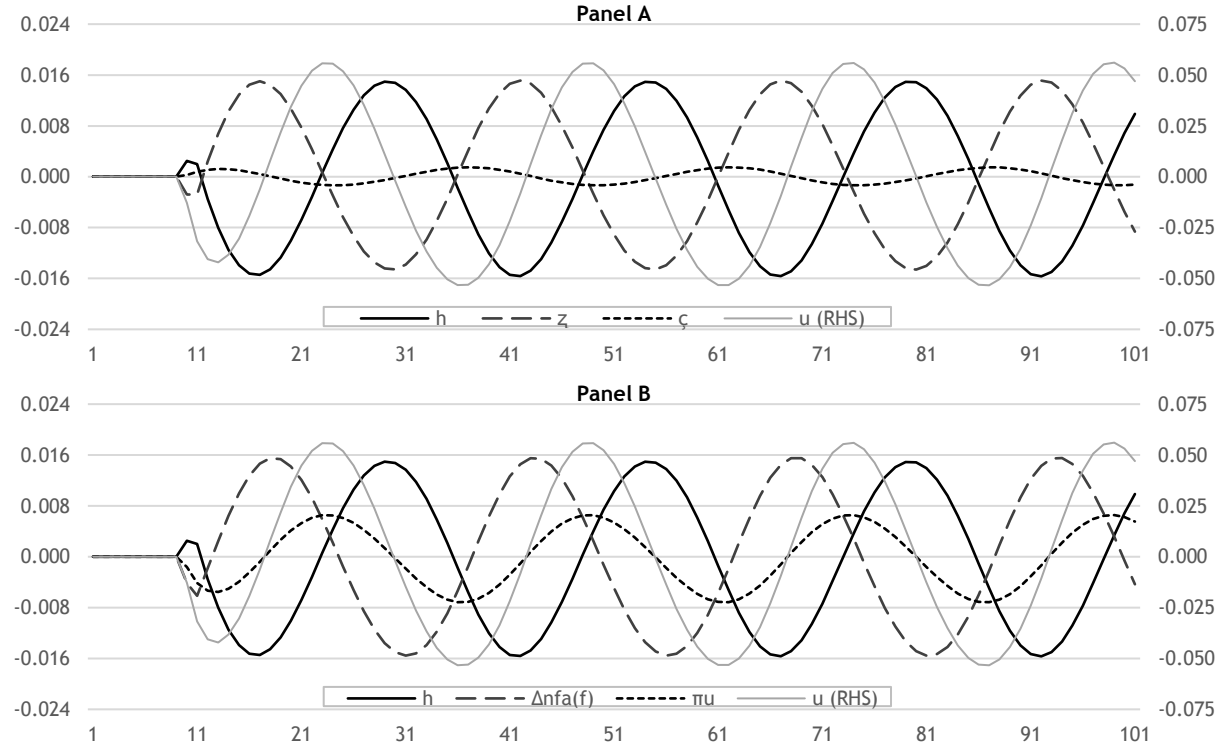
Figure 2: Permanent Increase in Growth Rate of Semi-Autonomous Consumption

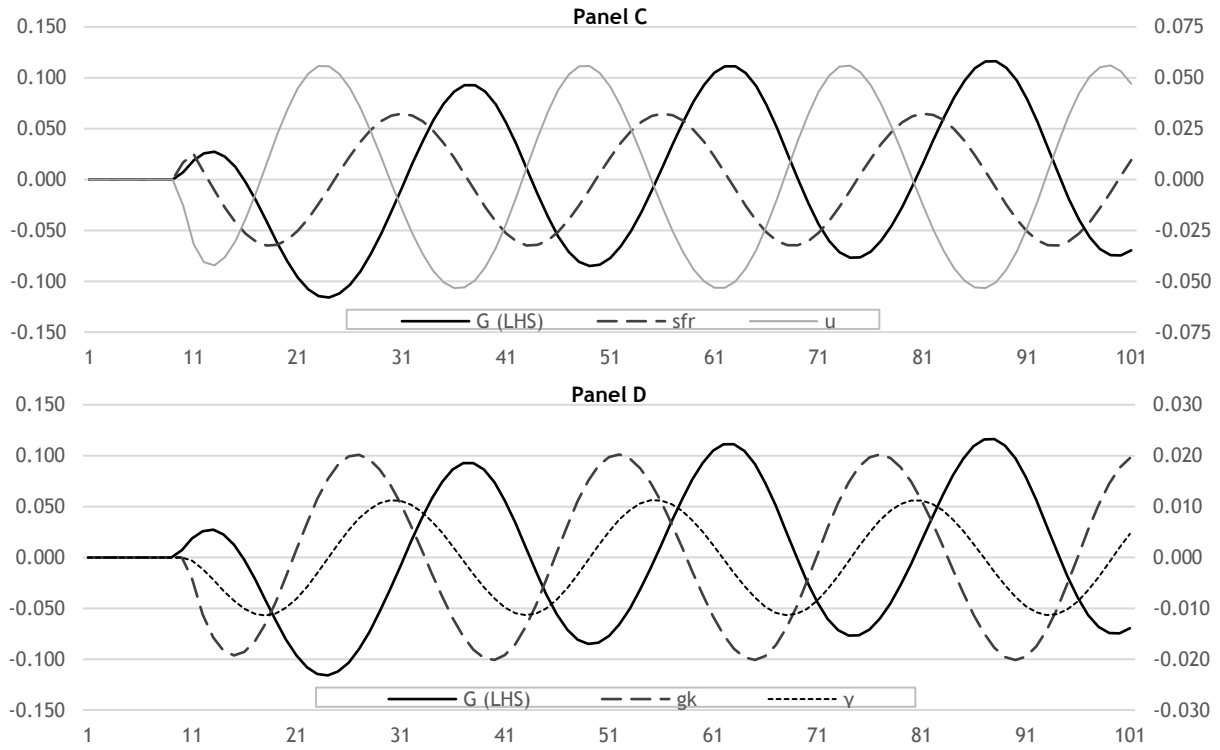


5.1.2. Temporary Shock and Cyclical Patterns

Our next simulation will reveal the cyclical patterns of the baseline model. We simulate a one-period temporary negative shock to g_Z and set λ at a value so that any shock will instigate persistent cycles. Panel A in Figure 3 reports the simulation results for the output shares of gross capacity investment h, semi-autonomous consumption z, induced consumption ç and the utilisation rate u. It can be observed that z leads u which in turn leads h. There are also phases where h and u move together. Such a property differs from the canonical neo-Kaleckian model, where the "Keynesian stability condition" precludes the possibility of $\dot{h} > 0$ with $\dot{u} > 0$, and thereby imposes sluggish investment dynamics.

Figure 3: Temporary Shock to Baseline Model





Panel B presents the output shares of undistributed profits π_U and the firm sector's net lending/borrowing $\Delta nfa_{(f)}$. The baseline model can generate the observed divergent movements between h and π_U around cyclical turning points. Panel C shows Steindl's ([1952] 1976) gearing ratio $\mathcal{G} = K/\mathcal{E}_f$, the net financial saving rate of rich households $s_r^f = \Delta NFA_r^{\$}/YD_r$ and the utilisation rate u. The short-run utilisation regime exhibits the Steindlian *paradox of debt*: an increase in u decreases $\mathcal{G}$. In contrast, whenever expected sales γ is above (below) its steady-state value (Panel D), $\mathcal{G}$ rises (falls). One corollary is that the long-run accumulation regime is characterised by pro-cyclical firm leverage (such that the gearing ratio is a positive function of the steady-state rate of capital accumulation).

In the model, semi-autonomous demand expenditures endogenise the net financial saving rate of rich households, and it is the endogeneity in s_r^f which constrains upward (downward) instability in growth processes. Macro stability prevails because the non-firm sector's net financial saving propensity moves in the same direction as firm decisions to expand (contract) the rate of capital accumulation.

5.1.3. Semi-Endogenous Semi-Autonomous Expenditures

The simplifying pedagogical assumption that g_Z grows at an exogenous rate has received criticism (Nikiforos 2018, Skott *et al*. 2021). There are SM models where g_Z is partially or fully endogenised. Brochier/Macedo e Silva (2019) endogenise the semi-autonomous consumption of an aggregate household sector via wealth effects. Cassetti (2020) and Fiebiger (2021) allow the pure expenditures of a Lernerian government to fluctuate as a part of its counter-cyclical fiscal reaction function. The latter also contemplates the possibility that the government's long-run semi-autonomous demand function is responsive to bounded endogeneity in the natural rate of employment.

Here we will endogenise the growth rate of semi-autonomous demand expenditures g_Z in a counter-cyclical fashion through intervals for when the utilisation rate is low u_L and high u_H.

(38) $g_Z = \psi_0 - \psi_1 \cdot [x_1 \cdot (u_{-1} - u_H) + x_2 \cdot (u_{-1} - u_L)]$, $\bar{\psi}_0 > 0, \bar{\psi}_1 > 0, 0 < \bar{u}_L < \bar{u}_n < \bar{u}_H$ — Growth of semi-autonomous consumption expenditures

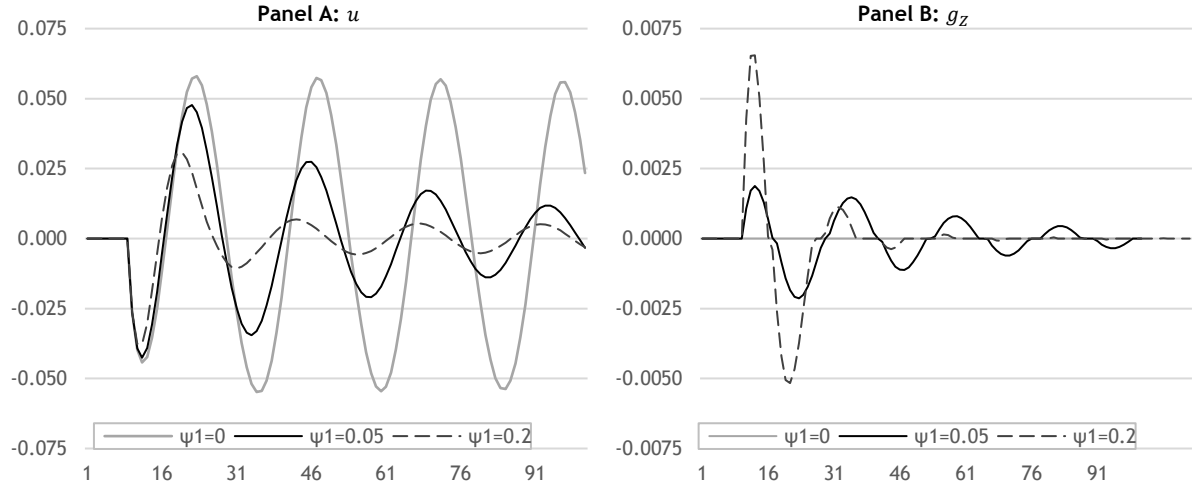
(39) $x_1 \begin{cases} = 1, & \text{iff } u_{-1} > u_H \\ = 0, & \text{otherwise} \end{cases}$

(40) $x_2 \begin{cases} = 1, & \text{iff } u_{-1} < u_L \\ = 0, & \text{otherwise} \end{cases}$

Logical functions dependent on if the utilisation rate is greater or less than high and low values

Figure 4 shows the results of subjecting the baseline model, with equations (38)-(40), to a permanent negative shock to rich household's induced consumption propensity α. Again we set λ at a value to trigger persistent cycles. As expected, the more that the growth rate of g_Z is counter-cyclical (and thus the greater the value assigned to ψ_1), the lower is the amplitude of cycles.

Figure 4: Permanent Shock with Semi-Endogenous Semi-Autonomous Expenditures



5.2. Overhead Labour Model

The baseline model is now amended to include overhead labour. The overhead labour model consists of the first 36 equations of the baseline model. It replaces equation (37) with the following:

(37a) $L_r = u_n \cdot y_{fc}/\xi_r^{fc}, \qquad \bar{\xi}_r^{fc} > 0$ RH employment

Where $u_n \cdot y_{fc}$ is the level of normal real output that firms would produce if the plants were operated at the normal utilisation rate. When rich households in their capacity as managers are always employed at their full-capacity labour demand $L_r = L_r^{fc}$, their labour productivity $\xi_r = y/L_r = y/L_r^{fc}$ becomes a positive function of, and their wage share a negative function of, the utilisation rate. As so with equation (37a) the profit share is now endogenous and pro-cyclical with the utilisation rate.

To better understand the implications of overhead labour we will distinguish between actual labour productivity ξ and full-capacity labour productivity ξ_{fc}. The latter is the labour productivity that would occur if output was produced, and labour was employed, at the full-capacity level. Hence:

$\xi_{fc} = y_{fc}/L_{fc}, \qquad L_{fc} = L_w^{fc} + L_r^{fc}$ Full-capacity labour productivity

Where L_{fc} is full-capacity labour demand. Full-capacity labour productivity growth $g_{\xi_{fc}}$ excludes the effects of short-run cyclical variations in capacity utilisation. A generic function for $g_{\xi_{fc}}$ might suppose that it depends positively on the rate of capital accumulation g_K *à la* Kaldor's (1957) technical progress function; the rate of employment e due to hysteresis effects and Marx-Hicks induced technical change (Storm/Naastepad 2012); and real wage growth g_ω *à la* Webb effect (Lavoie 2014).

$g_{\xi_{fc}} = g_{\xi_{fc}}(g_{K,-1}, e_{-1}, g_{\omega,-1}),$
$g_{\xi_{fc}}^{`}(g_{K,-1}) > 0, g_{\xi_{fc}}^{`}(e_{-1}) > 0, g_{\xi_{fc}}^{`}(g_{\omega,-1}) > 0$ Full-capacity labour productivity growth

Next we define actual labour productivity in the overhead labour model:

$$\xi = \frac{y}{L} = \frac{y}{L_w}\frac{L_w}{L} = \frac{\xi_w^{fc}}{1 + f/(u/u_n)}, \qquad \bar{f} = \frac{\xi_w^{fc}}{\xi_r^{fc}} = \frac{L_r^{fc}}{L_w^{fc}} \qquad \text{Labour productivity}$$

Where f is the NS worker to manager full-capacity labour productivity ratio. It is a constant equal to the ratio of managers to NS workers employed at full-capacity labour demand. In the case where full-capacity labour productivity growth $g_{\xi_{fc}}$ is slowly-changing (in response to the determinants just discussed), constant or zero (as we will assume), actual labour productivity growth g_ξ will be greater (less) than $g_{\xi_{fc}}$ whenever u is increasing (decreasing). The effect of aggregate demand growth on the two measures of labour productivity growth are dissimilar: (1) a lagged and relatively modest positive effect on $g_{\xi_{fc}}$ (via g_K, e and g_ω); and, (2) a contemporaneous and large positive effect on g_ξ (via changes in the actual labour productivity of fixed overhead labour).

Overhead labour also introduces cyclical variation into the average nominal wage rate:

$$w = \frac{w_{\mathrm{w}} \cdot L_{\mathrm{w}} + \sigma \cdot w_{\mathrm{w}} \cdot L_{\mathrm{r}}}{L} = \frac{w_w \cdot [1 + \sigma \cdot f/(u/u_n)]}{1 + f/(u/u_n)} \qquad \text{Average nominal wage rate}$$

In the overhead labour model, where the nominal wage rate of working-rich managers is a constant proportion σ of the NS worker nominal wage rate, the nominal wage rate of managers will be growing at the same rate as that of NS workers: g_{w_w}. The growth of the average nominal wage rate g_w, in contrast, will be greater (less) than g_{w_w} whenever u is decreasing (increasing).

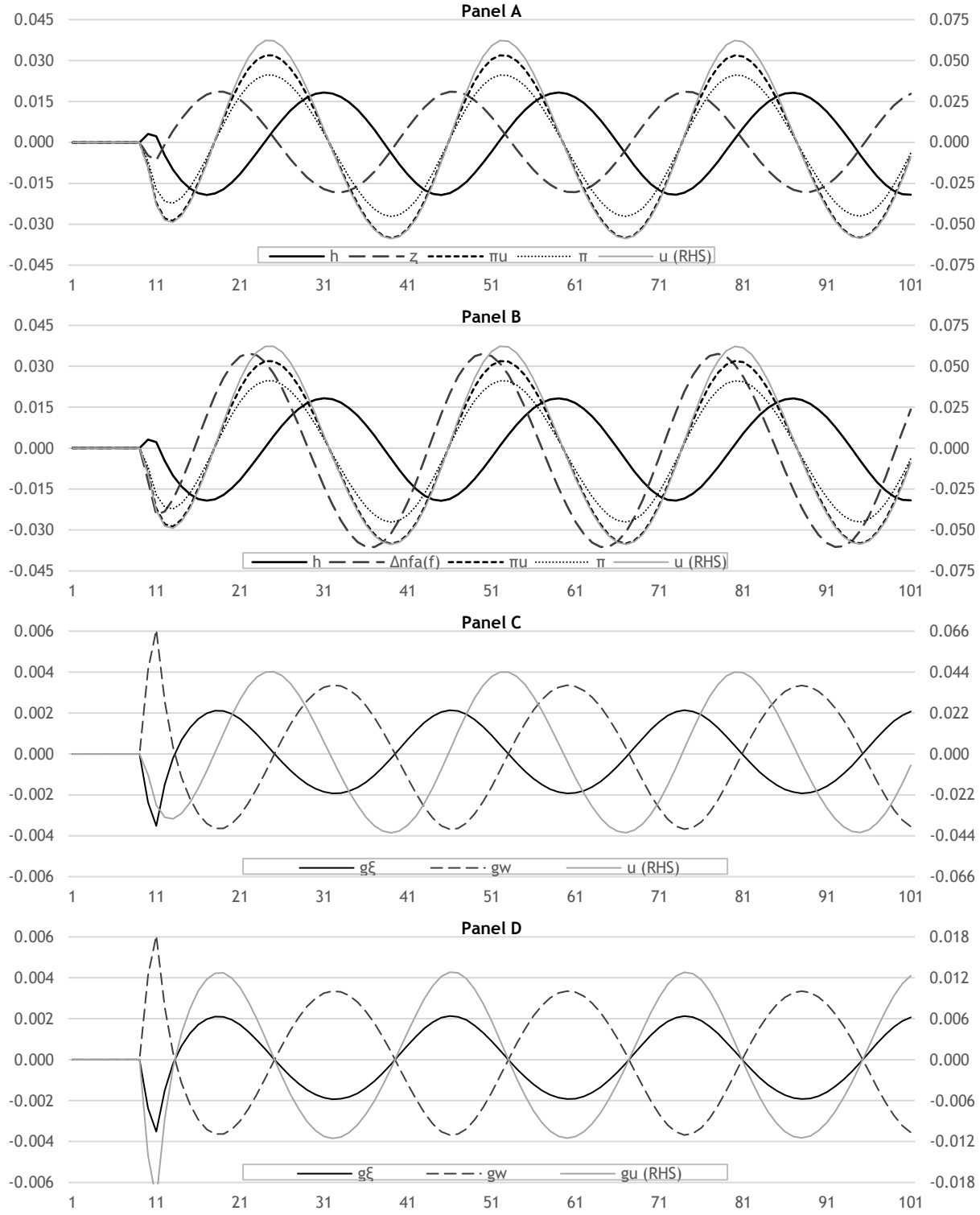
5.2.1. Temporary Shock to Overhead Labour Model

Our next experiment is a temporary shock to the overhead labour model. Again a negative shock to g_Z and with λ set to generate persistent cycles. The profit share π is now endogenous and pro-cyclical with the utilisation rate u (Panel A in Figure 5). The addition of overhead labour has increased the amplitude of cycles for the output share of undistributed profits π_U *vis-à-vis* the investment share h, relative to the baseline model, and in line with cyclical stylised facts. There is also now greater synchronicity between π_U and the output share of the firm sector's net lending/borrowing $\Delta nfa_{(f)}$, again relative to the baseline model, and also in line with cyclical stylised facts (Panel B).

The overhead labour model assumes: (1) no growth in the full-capacity labour productivity of NS workers and managers (i.e. $g_{\xi_{fc}} = 0$); and, (2) a constant growth rate for the nominal wage rate of NS workers and managers equal to the growth rate of prices (i.e. $g_{w_w} = g_p$). A pro-cyclical profit share arises because overhead labour affects both the growth rates of actual labour productivity g_ξ and the average nominal wage rate g_w; the former leads u, while the latter lags u (Panel C). In the model g_ξ (g_w) is positively (negatively) associated with the growth rate of the utilisation rate g_u (Panel D).

Cauvel (2019) challenges the neo-Goodwinian findings of a profit-led demand regime and profit-squeeze in U.S. data. In a three-variable vector autoregressive model that includes the utilisation rate, and decomposes the wage share into labour productivity and the wage rate, he finds that the results depend crucially on the ordering of the regression. If labour productivity is placed after the utilisation rate so that u has a contemporaneous effect on ξ while ξ only has a lagged effect on u, the Goodwin pattern effects are much diminished, and disappear when the wage share is adjusted for cyclical variations in labour productivity. The alternative ordering, where u is placed after ξ (or the wage share in a two-variable model), embeds the neo-Goodwinian assumption that the wage share has a contemporaneous effect on u but not vice-versa. An assumption that aggregate demand only has a lagged effect on labour productivity would be reasonable for $g_{\xi_{fc}}$ but it is not for g_ξ.

Figure 5: Temporary Shock to Overhead Labour Model



Barrales-Ruiz *et al*. (2020: 17) claim that the pro-cyclical labour productivity effects stressed by Cauvel (2019) are 'difficult to reconcile with theory', although no reasons are given to corroborate the claim. Certainly, the stylised fact of strong and highly pro-cyclical short-run variations in labour productivity growth is difficult to reconcile with the "theory" of Goodwin (1967), but that is only

because he assumed constant labour productivity growth and ignored overhead labour and Okun's law. We can say categorically that there has never been a "Goodwin cycle" where a recession occurs while labour productivity growth and the utilisation rate of productive capacity *both remain constant*.

Continuing with analysis of Barrales-Ruiz *et al*. (2020: 18, fn. 20): 'the labor share falls throughout the trough, and provides the lower turning point—whether this arises from lower wages (as in the baseline model), or a procyclical labor productivity effect, is secondary'. It does matter what is driving cyclical variations in the wage share. Writing the wage share as $(w/p)/\xi$, and when assuming all labour is variable, there is no necessary relation between changes in the real wage $\omega = w/p$ and those in labour productivity $\xi = y/L$. Nor is there any reason to expect a contemporaneous effect of aggregate demand on ω or ξ. However, once the existence of overhead labour is admitted, the degree of capacity utilisation will have a strong contemporaneous effect on w and thus on $\omega = w/p$ that is in the opposite direction to ξ. The short story is that overhead labour undermines the neo-Goodwinian assumptions that: (1) cyclical shifts in the profit share necessarily reflect distributive conflict (i.e. Marxian reserve army induced changes in the relative strength of labours' bargaining power); and, (2) contemporaneous causality runs primarily from functional income distribution to aggregate demand.

Furthermore, and contrary to Barrales-Ruiz *et al*. (2020), it is not a lower labour share that provides the lower turning point. The neo-Goodwinian story is that the conditions for recovery are established via unemployment, and then after real wages have been squeezed, capacity investment leads the upswing. In the U.S. economy, it is government deficits that provide the floor under profits and employment (and enable firms to rebuild the liquidity profile of their balance sheets), while the recovery is typically led by investment in new dwellings and debt-financed consumption.[10,11] In all of the NK-SM models presented in this paper the lower (upper) cyclical turning point occur when the output share of semi-autonomous consumption z_t rises above (falls below) its steady-state value.

5.2.2. Temporary Shock to Extended Overhead Labour Model

We now endogenise the growth rates of NS worker nominal wage rates and prices. The former is sensitive to the utilisation gap and the latter to a lagged moving average of the utilisation gap $\widehat{ugap}$. The lagged sensitivity for the growth of prices aims to capture the well-known inertia in price setting. Into the overhead labour we add the following equations:

(41) $g_{w_w} = g_p^T + \Omega \cdot (u_{-1} - u_n), \quad \bar{\Omega} > 0$ Growth of NS worker nominal wage rate

(42) $g_p = g_p^T + \Psi \cdot \widehat{ugap}, \quad \bar{\Psi} > 0$ Growth of prices

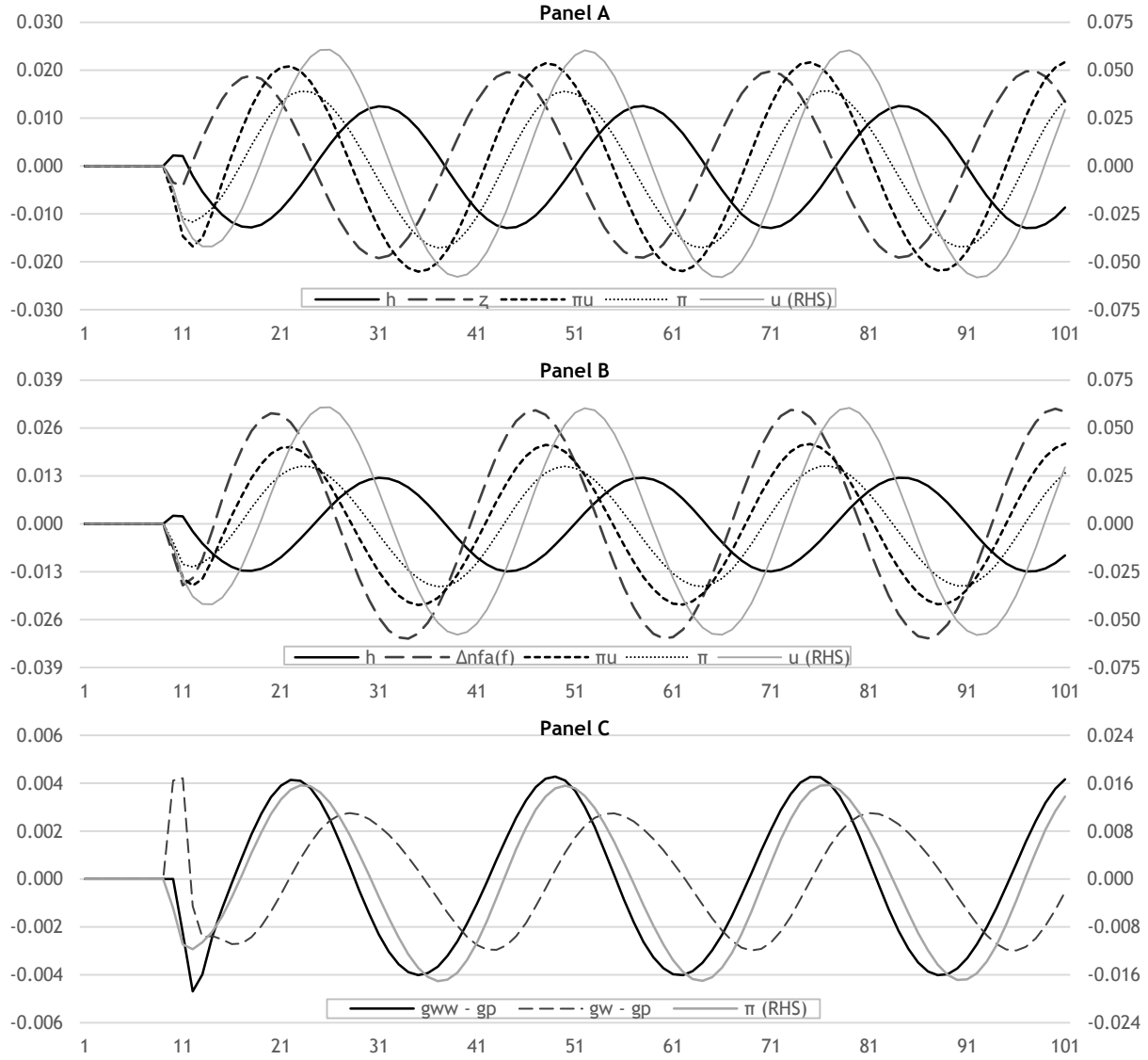
Where g_p^T can be interpreted as the policymaker target rate of inflation while Ω and Ψ are the respective parameters for the sensitivity of NS worker nominal wage growth and price inflation to the utilisation gap. Setting $\Omega = 0.2$ and $\Psi = 0.18$ corresponds to the radical price adjustment mechanism. The extended overhead labour model will also include an effect for counter-cyclical monetary policy:[12]

(43) $i_{\mathcal{L}} = \varsigma_{,0} + \varsigma_1 \cdot \widehat{ugap}, \quad \bar{\varsigma}_0 > 0, \bar{\varsigma}_1 > 0$ Loan rate

[10] Barrales-Ruiz *et al*. (2020: 32-33) offer in the conclusion: 'Further work could seek to identify to what extent aggregate demand expectations or specific expenditure components (residential investment, etc.) contribute to the initial upturn'. It is surprising that neo-Goodwinians have yet to take a closer look at the data in the decade and half since the 2007 U.S. housing crisis. Serious observers point out that residential investment has always played a key driving role in U.S. cycles and growth during the post-WWII era (Sherman/Evans 1984, Leamer 2009, Fiebiger 2018, Stockhammer *et al*. 2018, Fiebiger/Lavoie 2019, Blecker *et al*. 2020, Pérez-Montiel/Pariboni 2020).
[11] We shall also mention that, as in the real world workers owe debt, the neo-Goodwinian "recovery mechanisms" of unemployment and real wage squeezes are more likely to prompt a systemic collapse of the financial system.
[12] Note also that the output share of U.S. corporate dividends also tends to move with the utilisation rate.

Figure 6 presents data for a temporary shock to the extended overhead labour model under the same assumptions as the previous simulations. The profit share π now peaks slightly before the utilisation rate in line with the cyclical stylised facts (Panel A). Cycles in the output shares of undistributed profits π_U and firm net lending/borrowing $\Delta nfa_{(f)}$ are even more closely synchronised which is also in line with the cyclical stylised facts (Panel B). Once again the model can generate the divergent movements between the output shares of capacity investment and undistributed profits.

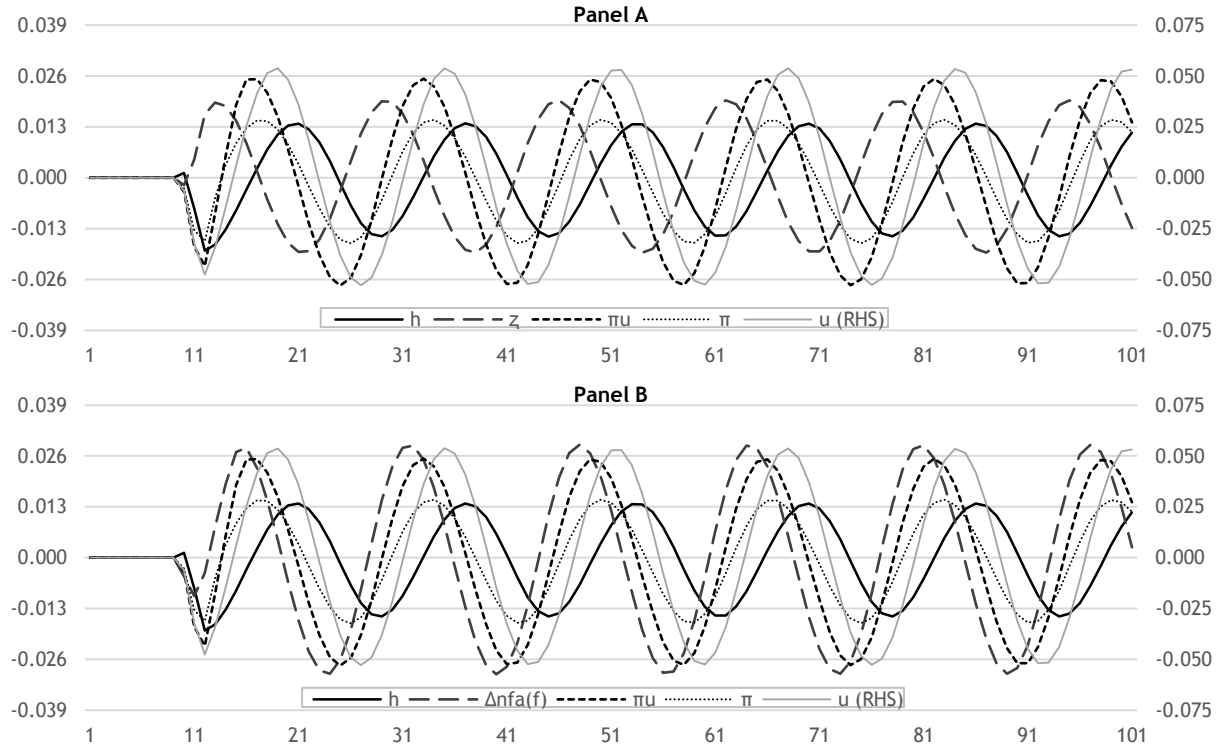
Figure 6: Temporary Shock to Extended Overhead Labour Model



Panel C in Figure 6 shows the discrepancy between the growth rates of the NS worker nominal wage rate g_{w_w} and the average nominal wage rate g_w *vis-à-vis* prices g_p. With our assumptions when $g_{w_w} - g_p > 0$, then NS workers and rich households will both experience growth in the real wage rate, although this need not always coincide when $g_w - g_p > 0$. It can be seen that $g_{w_w} > g_p$ tends to occur when the profit share is above its steady-state value. The simulation provides further confirmation that overhead labour complicates an interpretation of aggregate data. Short-run shifts in the aggregate wage share are not a reliable indicator to distributive conflict over functional income distribution.

The final experiment subjects the extended overhead labour model to a temporary shock but with firms' sales expectations given by equation (6B). This time we set $\lambda = 0.8$ and adjust ϕ to obtain persistent cycles. The PA expected sales adjustment mechanism increases the frequency of cycles (Figure 7). Adjustments in NK-SM models can occur at empirically-plausible speeds.

Figure 7: Temporary Shock to Extended Overhead Labour Model - PA Case



6. Conclusion

An astute observer of sectoral net lending/borrowing patterns was Wynne Godley, a co-developer of the post-Keynesian stock-flow consistent modelling approach (Godley/Lavoie 2007). A basic message of this paper is that models which assume that each sector always has nil net lending/borrowing cannot possibly provide a satisfactory explanation of real world economic phenomena. A realistic explanation of real world economic activity requires attention to how the non-firm sector's decisions to save in net financial terms impact the sales, profitability and leverage of the firm sector. The Keynesian pedigree of contemplating a macro economy where each sector always spends all of its income is also lacking.

This paper has shown that a simple NK-SM model with overhead labour can account for several important cyclical stylised facts. Steps towards greater realism would be to include a public sector and dwelling investment. Whether the growth rate of semi-autonomous demand expenditures is held as exogenous for pedagogical purposes, or endogenised in some way, the critical formal property is that such expenditures function to counter-act firms' decisions on capital accumulation. Even volatile demand components such as residential investment can contribute to macro stability by having a cycle that is non-synchronous with capacity investment. Kalecki's ([1967] 1991, 1971: 50-57) concerns with external markets and overhead labour are surely facets that heterodoxy should integrate and build on.

References

Allain, O. (2015): 'Tackling the instability of growth: a Kaleckian-Harrodian model with an autonomous expenditure component', *Cambridge Journal of Economics*, 39(5), 1351–1371.

Baran, P., Sweezy, P. (1966): *Monopoly Capital,* New York: Monthly Review Press.

Barbosa-Filho, N., Taylor, L. (2006): 'Distributive and demand cycles in the US economy—a structuralist Goodwin model', *Metroeconomica*, 57(3), 389–411.

Barrales-Ruiz, J. Mendieta-Muñoz, I., Rada, C., Tavani, D., von Arnim, R. (2020): 'The distributive cycle: evidence and current debates', Working Paper No. 2020-07, Department of Economics, University of Utah.

Blecker, R.A., Kim, Y, Cauvel, M. (2020): 'Systems estimation of a structural model of distribution and demand in the US economy', Working Paper No. 2012, Post-Keynesian Economics Society.

Brochier, L., Macedo e Silva, A.C. (2019): 'A supermultiplier stock-flow consistent model: the "return" of the paradoxes of thrift and costs in the long run?', *Cambridge Journal of Economics*, 43(2), 413–442.

Cassetti, M. (2020): 'Fiscal policy as a long-run stabilization tool. Simulations with a stock-flow consistent model', Working Paper No. PKWP2003, Post Keynesian Economics Society.

Cauvel, M. (2019): 'The neo-Goodwinian model reconsidered', Working Paper No. 1915, Post-Keynesian Economics Society.

Cesaratto, S. (2015): 'Neo-Kaleckian and Sraffian controversies on the theory of accumulation', *Review of Political Economy*, 27(2), 154-182.

Fiebiger, B. (2018): 'Semi-autonomous household expenditures as the causa causans of post-war US business cycles: the stability and instability of Luxemburg-type external markets', *Cambridge Journal of Economics*, 42(1), 155–175.

_____. (2021): 'The post-Keynesian "crowding-in" policy meme: government-led semi-autonomous demand growth', FMM Working Papers No. 67, IMK Macroeconomic Policy Institute, Düsseldorf.

Fiebiger, B., Lavoie, M. (2019): 'Trend and business cycles with external markets: non-capacity generating semi-autonomous expenditures and effective demand', *Metroeconomica*, 70(2), 247–262.

Flaschel, P. (2009): *The Macrodynamics of Capitalism: Elements for a Synthesis of Marx, Keynes and Schumpeter, 2nd Edition*, Berlin: Springer-Verlag.

Franke, R. (2017): 'What output-capital ratio to adopt for macroeconomic calibrations?', *International Review of Applied Economics*, 31(2), 208-224.

Freitas, F., Serrano, F. (2015): 'Growth rate and level effects: the adjustment of capacity to demand and the Sraffian supermultiplier', *Review of Political Economy*, 27(3), 257–281.

Girardi, D., Pariboni, R. (2015): 'Autonomous demand and economic growth: some empirical evidence', Centro Sraffa Working Paper No. 13, Rome.

Godley, W., Lavoie, M. (2007): *Monetary Economics: An Integrated Approach to Credit, Money, Income, Production and Wealth*, Basingstoke: Palgrave Macmillan.

Goodwin, R.M. (1967): 'A growth cycle', in Feinstein, C.H. (ed.), *Socialism, Capitalism and Economic Growth,* Cambridge UK: Cambridge University Press.

Kaldor, N. (1957): 'A model of economic growth', *Economic Journal*, 67(268), 591–624.

Kalecki, M. ([1954] 1991): 'Theory of economic dynamics: an essay on cyclical and long-run changes in capitalist economy', reprinted in Osiatynski, J. (ed.), *Collected Works of Michal Kalecki, Volume II*, Oxford: Oxford University Press, 203–348.

_____. ([1967] 1991): 'The problem of effective demand with Tugan-Baranovsky and Rosa Luxemburg', reprinted in Osiatynski, J. (ed.), *Collected Works of Michal Kalecki, Volume II*, Oxford: Oxford University Press, 451–458.

_____. (1971): *Selected Essays on the Dynamics of the Capitalist Economy*, Cambridge: Cambridge University Press.

Keynes, J.M. (1936): *The General Theory of Employment, Interest and Money*, London: Macmillan.

Lavoie, M. (2009): 'Cadrisme within a Kaleckian model of growth and distribution', *Review of Political Economy*, 21(3), 371–393

_____. (2014): *Post-Keynesian Economics: New Foundations*, Cheltenham: Edward Elgar.

_____. (2016): 'Convergence towards the normal rate of capacity utilization in neo-Kaleckian models: the role of non-capacity creating autonomous expenditures', *Metroeconomica*, 67(1), 172–201.

_____. (2017): 'The origins and evolution of the debate on wage-led and profit-led regimes', *European Journal of Economics and Economic Policies: Intervention*, 14(2), 200-221.

Lavoie, M., Nah, W.J. (2020): 'Overhead labour costs in a neo-Kaleckian growth model with autonomous non-capacity creating expenditures', *Review of Political Economy*, 32(4), 511-537.

Leamer, E.E. (2009): 'Housing IS the business cycle', NBER Working Paper no. 13428, http://www.nber.org/papers/w13428

Lindner, F. (2015): 'Does saving increase the supply of credit? A critique of loanable funds theory', *World Economic Review*, 4, 1-28.

Luxemburg, R. ([1913] 1951): *The Accumulation of Capital*, London, Routledge and Kegan Paul.

Mohun, S. (2014): 'Unproductive labor in the U.S. economy: 1964-2010', *Review of Radical Political Economics*, 46(3), 355-379.

Nah, W.J., Lavoie, M. (2019): 'The role of autonomous demand growth in a neo-Kaleckian conflicting-claims framework', *Structural Change and Economic Dynamics*, 51 (December), 427-444.

Nikiforos, M. (2018): 'Some comments on the Sraffian Supermultiplier approach to growth and distribution', *Journal of Post Keynesian Economics*, 41(4), 659–667.

Nikiforos, M., Santetti, M., von Arnim, R. (2021): 'The Sraffian Supermultiplier and cycles: theory and empirics', Working Paper No. 993, Levy Economics Institute Annandale-on-Hudson, NY.

Pérez-Montiel, J.A., Pariboni, R. (2020): 'Housing is NOT ONLY the business cycle: a Luxemburg-Kalecki external market empirical investigation for the United States', *Review of Political Economy*, DOI: https://doi.org/10.1080/09538259.2020.1859718

Rowthorn, B. (1981): 'Demand, real wages and economic growth', *Thames Papers in Political Economy*, Autumn, 1-39.

Sherman, H.J., Evans, G.R. (1984): *Macroeconomics: Keynesian, Monetarist and Marxist views*, New York: Harper & Row.

Skott, P. (1989): 'Effective demand, class struggle and cyclical growth', *International Economic Review*, 30(1), 231–247.

_____. (2010): 'Growth, instability and cycles', in Setterfield, M. (ed.), *Handbook of alternative theories of economic growth*, Cheltenham: Edward Elgar, 108–131.

_____. (2017): 'Autonomous demand and the Harrodian criticisms of the Kaleckian model', *Metroeconomica*, 68(1), 185–193.

Skott, P., Santos, J.F.C., Oreiro, J.L. (2021): 'Supermultipliers, 'endogenous autonomous demand' and functional finance', *Metroeconomica,* Advanced Access, DOI: 10.1111/meca.12360.

Skott, P., Zipperer, B. (2012): 'An empirical evaluation of three post-Keynesian models', *European Journal of Economics and Economic Policies: Intervention*, 9(2), 277–308.

Steindl, J. ([1952] 1976): *Maturity and Stagnation in American Capitalism*, New York: Monthly Review Press.

Stockhammer, E., Michell, J. (2017): 'Pseudo-Goodwin cycles in a Minsky model', *Cambridge Journal of Economics*, 41(1), 105–125.

Stockhammer, E., Rabinovich, J., Reddy, N. (2018): 'Distribution, wealth and demand regimes in historical perspective: USA, UK, France and Germany, 1855-2010. Working Paper No. 1805, Post-Keynesian Economics Society.

Storm, S., Naastepad, C.W.M. (2012): *Macroeconomics Beyond the NAIRU*, Cambridge, MA: Harvard University Press.

Tavani, D., Petach, L. (2019): 'No one is alone: strategic complementarities, capacity utilization, growth, and distribution', *Structural Change and Economic Dynamics*, 50, September, 203-215.

_____. (2020): 'Firm beliefs and long-run demand effects in a labor-constrained model of growth and distribution', *Journal of Evolutionary Economics*, 31, 353–377.

Tavani, D., Zamparelli, L. (2021): 'Labor-augmenting technical change and the labor share: new microeconomic foundations', *Structural Change and Economic Dynamics*, 56, March, 27-34.

Taylor, L. 2004. *Reconstructing Macroeconomics*, Cambridge, MA, Harvard University Press.

Taylor, L., Foley, D.K., Rezai, A., Pires, L. Ömer, O., Scharfenaker, E. (2016): 'Demand drives growth all the way', Working Paper No. 2016-4, New School for Social Research.

von Arnim, R., Barrales, J. (2015): 'Demand-driven Goodwin cycles with Kaldorian and Kaleckian features, *Review of Keynesian Economics*, 3(3), 351–373.

Weisskopf, T.E. (1979): 'Marxian crisis theory and the rate of profit in the postwar U.S. economy', *Cambridge Journal of Economics*, 3(4), 341–378.

Imprint

Publisher
Macroeconomic Policy Institute (IMK) of Hans-Böckler-Foundation, Georg-Glock-Str. 18,
40474 Düsseldorf, Contact: fmm@boeckler.de, https://www.fmm-macro.net

FMM Working Paper is an irregular online publication series available at:
https://www.boeckler.de/de/fmm-working-paper-22457.htm

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ISSN 2512-8655