Secular stagnation and concentration of corporate power

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Abstract: We identify a set of key stylised facts characterising the evolution of the seven largest advanced economies from the 1960s to 2015 and develop a small one-sector model of growth and distribution broadly consistent with these facts. The model is used to explore the relationship between falling trend growth, the re-distribution of aggregate income towards profits and the concentration of corporate power and wealth. Theory is confronted with history to illustrate how changes in social structure can affect economic behaviour and performance. We argue that finance-led corporate restructuring, involving debt-financed corporate transactions, may have played a crucial role in shaping long-term patterns of growth and distribution.

Keywords: Stagnation, Distribution, Growth, Financialisation, Heterodox Economics

JEL classifications: B22, E11, E12, E44, E65, G01, O11

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Introduction

The issue of secular stagnation has a long intellectual history (Backhouse and Boianovsky, 2016) that precedes the current interest shown in the mainstream literature after the Great Recession of 2008-2009 (Summers, 2013, p. 66; Teulings and Baldwin, 2014). From a modern non-mainstream perspective Hein, 2016, presents a model of secular stagnation inspired by Steindl, 1952, that emphasises the role of institutions and policy as explanatory factors. At the core of Hein's analysis lies an essentially neo-Kaleckian (NK) model of growth and distribution, expanded to integrate the financial dimension. In line with second-generation post-Keynesian (PK) models [1] based on the works of Kalecki, 1954 and 1971, saving adjusts to investment through changes in output growth and capacity utilisation, prices are fundamentally demand inelastic and the economy may operate at a level of utilisation other than "normal" in the long run. Under certain parameter values the paradoxes of "thrift" and "costs" prevail (an increase in saving rates and/or mark-ups reduces utilisation and growth in the long run). Financialisation [2] is introduced in the model by considering the depressing effect of increased shareholder power on the animal spirits of producers and the impact of higher rates of return demanded by rentiers.

Skott, 2010, presents a Harrodian alternative to the NK approach that analyses steady and unsteady growth about an endogenously determined employment rate, with firms producing and accumulating at their desired level of capacity utilisation in the long run. An increase in the saving rate reduces the level of employment consistent with steady growth, whereas an increase in animal spirits (more growth desired for a given profit share) raises the level of employment. From this perspective, a capitalist economy may not be capable of growth at the natural rate and the likelihood of such an outcome increases for low values of the natural rate and high saving rates. Using similar arguments Nakatani and Skott, 2007, argue that Japan's stagnation since the 1990s may be related to structural demand problems of this kind.

Hein's and Skott's models provide alternative PK accounts of stagnation processes, in which structural factors affecting aggregate demand play a crucial role in determining macroeconomic outcomes in the long run. Setterfield, 2010, has called attention to the essential continuity between PK analysis and Regulation Theory (RT), [3] regarding the decisive importance of institutional factors and social relations to explain macroeconomic

[1] Rowthorn, 1981, Dutt, 1984, and Bhaduri and Marglin, 1990.
[2] The effects of financialisation in advanced capitalist economies have been analysed extensively in the NK literature. Reviews of theoretical models and empirical applications can be found in Hein, 2012 and 2014, chapter 10, and Hein and van Treeck, 2010.
[3] Boyer, 2000, and Aglietta and Bretton, 2001.

dynamics. According to Setterfield, a common historical narrative broadly shared by both traditions begins with a phase of post-war economic expansion in which prevailing economic institutions give support to a "golden rule" linking real wage growth to productivity growth. The breakdown of the institutions supporting this rule amid the strike and wage explosions of the late 1960s/early 1970s led to a profit squeeze. The neoliberal reaction in the 1980s replaced the "regulationist" framework characteristic of the golden age by a set of institutions that weakened the bargaining power of labour, keeping real wage growth below productivity growth. This violation of the "golden rule" created an aggregate demand deficiency that was partly compensated by households resorting to debt accumulation to finance consumption. But such a process was ultimately unsustainable, paving the way to the current crisis (Palley, 2002).

From a historical perspective, Brenner, 2006, confronts the thesis of a wage-induced profit squeeze against the empirical evidence. He argues that the long-term economic slowdown that started in the late 1960s/early 1970s in the advanced economies started as a result of increased international competition in the manufacturing sector. The emergence of Germany and Japan as powerful actors in world markets at about that time would have caused chronic excess capacity and below average rates of return across the advanced world. From this point of view, the force of competition as a driving factor of capitalist dynamics carries within the potential for its own demise. Another historian, Arrighi, 1994, views financial expansions as periods of fundamental reorganisation of the accumulation regime, as increased competition at a global scale accentuates the overall tendency of profit margins in trade and production to fall, whereas non-financial firms increase their investment in financial assets at the expense of productive investment in plant and equipment.

Despite the conceptual and methodological differences between these heterodox accounts of stagnation processes in modern capitalism, they are all fundamentally concerned with the interaction between social structure and economic performance. Sharing this general concern, in this paper we borrow key insights from these different traditions to develop a small-scale, one-sector model of growth and distribution that is broadly consistent with the stylised facts characterising the evolution of the largest advanced economies over the last decades. We use the model to explore the relationship between falling trend growth, rising profitability, increasing leverage, finance-led corporate restructuring and the concentration of corporate power and wealth. The paper is organised in four parts. Part 1 identifies a set of long-term trends and short-run cyclical patterns characterising the evolution of the G7 economies in the last fifty-five years. Part 2 lays out the analytical framework. Part 3 confronts history and theory to analyse how changes in social structure interact with economic behaviour and performance. A final section summarises the main conclusions.

1. History

1.1. Long-term trends

Long-term trends are illustrated by comparing the average values of output, output per worker, capital, saving, investment, utilisation, employment, profitability, interest rates and credit in the G7 economies at the aggregate level, from the 1960s to 2015. We divide this long period in three consecutive sub-periods of fifteen years each, preceded by a first period of ten years. [4] Thus, we circumvent the complexity of identifying country-specific intervals by imposing a homogeneous temporal framework, longer than the typical business cycle. (Full details about data sources and concepts are given in an appendix).

We observe the following broadly common patterns: [5]

(a) Diminishing trend rates of growth of output, output per worker and capital stock (T.1.1, T.1.2 and T.1.3).

(b) Falling net saving and investment rates (T.1.4 and T.1.5).

(c) Country-specific, non-systematic patterns for capacity utilisation and the output-capital ratio (T.1.6 and T.1.7).

(d) Higher rates of unemployment and lower growth rates of the labour force, compared to the 1960s and early 1970s (T.1.8 and T.1.9).

(e) Rising net profit shares and profit rates since the mid-1980s (T.1.10 and T.1.11).

(f) Rising real long-term interest rates until the present century, when the trend is reversed (T.1.12) and rising credit-to-GDP ratios (T.1.13).

Table 1.1. Gross Domestic Product at 2010 prices (Y), average annual growth rates

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	4.2	10.2	4.5	3.1	5.7	5.7	5.1
1971-85	3.3	4.4	2.4	2.2	3.0	3.0	3.6
1986-00	3.4	2.4	*2.2*	2.8	2.5	2.5	2.8
2000-15	1.8	0.8	1.1	1.8	1.1	0.0	2.0

[4] Except for capacity utilisation, due to data availability.

[5] There are some exceptions to these general trends in some countries in some sub-periods, but the only clear outlier is Canada, which shows distinct saving and accumulation patterns.

Table 1.2. GDP at 2010 prices per person employed (Y/L), average annual growth rates

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	2.3	8.6	4.2	2.8	5.3	6.2	2.4
1971-85	1.3	3.6	2.1	2.2	2.6	2.3	1.2
1986-00	1.8	2.0	*1.3*	1.9	1.8	1.9	1.2
2000-15	1.2	0.8	0.6	0.9	0.7	0.0	0.5

Table 1.3. Net Capital Stock at 2010 prices (K), average annual growth rates

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	3.0	6.0	4.4	2.8	4.7	4.6	2.7
1971-85	2.7	6.2	2.7	2.0	3.6	3.4	3.2
1986-00	2.7	3.6	*2.1*	2.2	2.1	2.1	2.3
2000-15	2.2	0.4	0.9	1.4	1.8	1.1	*3.0*

Table 1.4. Aggregate Net Saving Rate (s = S/PY), average annual values, % GDP at market prices

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	11.0	20.4	19.3	7.5	15.9	13.5	9.6
1971-85	8.4	17.5	11.8	5.5	10.3	10.0	10.4
1986-00	5.6	11.8	*9.2*	5.5	7.1	7.9	7.5
2000-15	1.1	1.0	7.7	1.7	4.6	3.8	*8.2*

Table 1.5. Gross Fixed Capital Formation / Gross Operating Surplus (σ = GFCF/GOS), a. a. values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	0.738	1.202	0.869	0.605	1.203	0.943	0.875
1971-85	0.741	1.388	0.804	0.652	1.110	0.910	0.773
1986-00	0.678	1.032	0.697	0.583	0.755	0.661	0.693
2000-15	0.583	0.693	0.581	0.538	0.753	0.642	0.669

Table 1.6. Rate of Capacity Utilisation (cu), Industry, %, average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1967-75	83.7	-	-	-	-	-	
1976-85	80.3	86.8	-	-	-	-	-
1986-95	82.3	101.9	85.2	82.1	*82.3*	76.3	*83.5*
1996-05	79.8	101.8	84.6	80.2	84.2	76.0	85.1
2006-15	76.4	98.8	83.2	79.8	82.1	73.5	81.0

Table 1.7. Output-Capital Ratio (u = Y/K), average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	0.365	0.424	0.328	0.342	0.357	0.351	0.388
1971-85	0.388	0.404	0.324	0.339	0.349	0.360	0.437
1986-00	0.425	0.349	*0.335*	0.364	0.343	0.354	0.436
2000-15	0.426	0.323	0.337	0.397	0.339	0.323	*0.447*

Table 1.8. Unemployment Rate (UR), %, average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	4.8	1.3	0.6	1.6	1.8	4.8	5.0
1971-85	7.1	2.0	3.5	6.0	4.7	6.7	8.1
1986-00	5.7	3.0	7.4	8.2	9.3	10.0	9.1
2000-15	6.5	4.4	7.6	6.1	9.0	8.9	7.1

Table 1.9. Total Labour Force (TLF), average annual growth rates

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	1.8	1.3	0.1	-	0.6	-0.5	-
1971-85	2.1	0.9	0.7	-	0.9	1.0	2.8
1986-00	1.3	0.6	*0.9*	*0.4*	1.0	0.5	1.3
2000-15	0.6	-0.1	0.3	0.8	0.6	0.5	*1.3*

Table 1.10. Net Profit Share (π = NOS/PY), average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	18.0	9.5	18.3	15.2	9.0	14.6	11.9
1971-85	16.3	5.4	14.3	12.0	7.9	13.0	15.8
1986-00	17.2	7.7	16.4	15.6	12.9	16.5	14.7
2000-15	19.8	10.9	16.9	15.9	12.2	14.2	*18.1*

Table 1.11. Net Profit Rate (r = π u), average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	6.5	4.0	6.0	5.2	3.2	5.1	4.6
1971-85	6.3	2.2	4.6	4.1	2.8	4.7	6.9
1986-00	7.3	2.7	5.5	5.7	4.4	5.8	6.5
2000-15	8.4	3.5	5.7	6.2	4.2	4.7	*8.1*

Table 1.12. Real Long-Term Interest Rate (i), %, average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	2.0	-	2.9	2.3	1.9	1.1	-
1971-85	2.3	2.0	3.6	0.6	1.3	-1.3	-
1986-00	4.7	3.5	4.4	4.4	5.3	5.0	5.3
2000-15	1.5	2.1	1.8	1.7	1.9	2.3	*2.0*

Table 1.13. Gross Domestic Credit (DC/PY), % GDP at market prices, average annual values

	USA	JAP	GER	GBR	FRA	ITA	CAN
1961-70	110.1	85.3	-	51.9	68.9	*75.7*	36.0
1971-85	117.4	179.0	79.4	44.3	94.2	91.5	72.6
1986-00	162.9	269.0	114.2	105.8	97.0	88.1	106.7
2000-15	220.3	320.0	127.8	173.1	116.2	123.7	*188.1*

1.2. Cyclical patterns

The long-term trends described in the previous section, in terms of average values computed over decades-long periods, co-exist with characteristic cyclical patterns at shorter (i.e. annual) frequencies, reflecting different sets of factors. Specifically, we find a set of strongly positive correlation coefficients (R) between (the first differences) of the following variables:

(a) Capital accumulation (Δg_K) and net profit rates, lagged one period (Δr_{t-1}).

(b) Net saving rates (Δs) and net profit shares ($\Delta \pi$).

(c) Net profit shares ($\Delta \pi$) and output-capital ratios (Δu).

(d) Labour productivity growth ($g_{(Y/L)}$) and output-capital ratios (Δu).

(e) Labour productivity growth ($g_{(Y/L)}$) and capital accumulation (g_K).

Table 1.14. Correlation Coefficients (R), annual values, 1962-2015

	USA	JAP	GER	GBR	FRA	ITA	CAN
a) $\Delta g_K, \Delta r_{t-1}$	0.518	0.354	0.331	0.301	0.325	0.458	0.136
b) Δs, $\Delta\pi$	0.642	0.699	0.710	0.695	0.767	0.690	0.741
c) $\Delta\pi$, Δu	0.572	0.678	0.550	0.578	0.641	0.695	0.596
d) $g_{(Y/L)}$, Δu	0.745	0.718	0.539	0.691	0.636	0.722	0.797
e) $g_{(Y/L)}$, g_K	0.227	0.629	0.670	0.279	0.781	0.706	-0.232

2. Theory

We consider a closed, private economy, producing a single commodity, with three institutional sectors—households, firms and banks—interacting in four markets—for goods, labour, credit and equity. The institutional framework and the market environment are embedded within a historically contingent social structure, with three main social actors: workers, employers and financial investors. In the first two parts of this section we specify the assumptions on social structure and economic behaviour and in the third part we analyse the normal patterns of growth and distribution that arise under different socio-institutional regimes. (The adjustment dynamics involved are explored in an appendix).

2.1. Social structure

The social actors have well-defined roles in the economy. Workers sell their labour services to firms for a wage. Employers hire labour and drive productive investment in pursuit of the profits of enterprise. There are two types of investors: rentiers and financiers. Rentiers hold financial assets (bank deposits and equity in firms) to collect financial rents (interests and dividends). Financiers seek to concentrate corporate power and accumulate financial wealth by means of debt-financed corporate transactions (e.g. mergers and acquisitions, open market takeovers and private equity deals).

The central theme motivating the present analysis is the fundamental insight that economic development and social change are interdependent. Economic development proceeds through the accumulation and reorganisation of industrial capital that, on its turn, transforms the social structure that makes capital accumulation and reorganisation possible at each stage of development. The logic of the social-cum-economic change underlying the analysis runs as follows: as capitalist economies evolve in historical time the reorganisation of industrial capital leads to waves of corporate restructuring that tend to transform the social structure underlying the accumulation regime. This transformation involves the fall in relative importance and decision-making capacity of risk-taking, growth-driven managers and owner-entrepreneurs, while strengthening the role of financial investors. It also changes the nature of financial investment, which becomes increasingly dominated by risk-hedging, value-driven wealth-managers. This social transformation mirrors the increasing subordination of industry to finance, moves the axis of corporate power towards the latter and induces important structural changes in economic behaviour.

In particular, as the influence of the financial class in the economy increases, a set of inter-related structural changes will occur. First, the propensity to "retain and reinvest" of firms will fall as the increasing dominance of financial actors in corporate boards favours "downsize and distribute" policies, such as higher pay-out ratios. [6] Second, the average propensity to save of households will tend to diminish, reflecting imitation and conspicuous consumption effects. [7] Third, the propensity of employers to take entrepreneurial risks by investing in productive capital will become increasingly subordinated to the preference of financiers towards debt-financed, inorganic growth strategies, raising the concentration of corporate power and wealth in the process. [8] The main task of this paper is to examine under which conditions falling trend growth rates, soaring debt levels, rising unemployment and a re-distribution of income towards profits may follow as a result of these long-lasting changes in economic behaviour, reflecting deeper changes in the underlying social structure as advanced economies mature.

2.2. Economic behaviour

<u>Technology</u>

Firms have access to a linear technology with two inputs, the single commodity used as a non-depreciating means of production (K) and labour (L). [9] The output-capital coefficient at full capacity is constant and equal to one ($a_K = 1$), whereas the full-capacity output-labour coefficient increases due to capital-embodied technical progress (Kaldor, 1957)

$$a_L = K^{\alpha} \tag{1}$$

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[6] Lazonick, 2015, and Lazonick and O'Sullivan, 2000.

[7] There is a large PK literature analysing the impact of debt-financed consumption on macroeconomic outcomes. Van Treeck and Sturn, 2012, among others, highlight the role of imitation and conspicuous consumption effects.

[8] In a similar vein, Stockhammer, 2004, argues that financialisation has induced a shift in firms' behaviour from growth objectives towards shareholders' interests –in terms of a representative firm facing a profit-growth trade-off and managers choosing some point along the $g - r$ frontier.

[9] All variables refer to aggregate values at the economy-wide level.

Following Robinson, 1956, and Dutt, 2006, we assume that firms will "experience an increase in the rate of labour productivity growth in response to shortages of labor by adopting at a faster rate technology that economizes labor use" (Dutt, 2010, p. 236). [10] Using the employment ratio as an indicator of labour scarcity we can write

$$\alpha = e^{\beta} \tag{2}$$

where e is the employment ratio (labour employed as a proportion of the labour force) and β a socio-technological parameter. Provided $e < 1$ the values of coefficients α and β would be inversely related. The latter may capture a multiplicity of factors, but to our purposes here β would tend to fall (and α to rise) as a result of corporate restructuring facilitating the diffusion of labour-saving technical progress.

The previous assumptions, combined, lead to the following expression for the rate of growth of labour productivity at full capacity

$$\hat{a} = \alpha g_K = e^{\beta} g_K \tag{3}$$

where $\hat{a} = \Delta a_L / a_L$ and $g_K = \Delta K/K$ is the rate of growth of the capital stock.

The rate of technical progress ($\hat{a}$) and the exogenous rate of growth of the labour force (n) determine the maximum or natural rate of growth at full capacity (g_N)

$$g_N = \hat{a} + n \tag{4}$$

Letting $g_K = g_N$ and rearranging yields an expression for natural growth in terms of demographic trends, the (endogenously determined) rate of employment and socio-technological factors

$$g_N = \frac{n}{1-\alpha} = \frac{n}{1-e^{\beta}} \tag{5}$$

Production

In line with Skott's, 2010, p. 123, interpretation of Robinson, 1956 and 1962, we assume that price and quantity adjustments coexist, with firms responding to transitory fluctuations in demand by adjusting the rates of utilisation of labour and capital as well as prices. With a linear technology rates of capacity utilisation are well defined

[10] Setterfield, 2006, proposes a similar mechanism, involving changes to the Verdoorn coefficient brought about by changes in the employment rate. In a similar vein, Skott and Zipperer, 2010, p. 2, argue that "high employment and incipient labour shortages may serve as incentives for labour saving innovation in the long run".

$$Y = Ku_K = a_L L u_L \quad (6)$$

where Y is actual output, Y^F full capacity output, $0 < u_K = u = \frac{Y}{Y^F} < 1$ the rate of capacity utilisation and $0 < u_L < 1$ an index of the level of effort required of employed labour.

Firms practice labour hoarding to some degree, with changes in labour effort assumed to be proportional to changes in capacity utilisation

$$u_L = u^h \quad (7)$$

where h is a parameter representing the degree of labour hoarding.

Therefore, the actual level of labour productivity at any point of time would reflect the level of technical progress as well as the rate of utilisation of available resources

$$Y/L = a_L u_L = K^\alpha u^h \quad (8)$$

The rate of growth of output ($g_Y = \Delta Y/Y$) can be written in terms of the rates of growth of the capital stock and the change in utilisation, from (6), or, alternatively, in terms of the rates of change of labour productivity and labour employment, combining (3), (6) and (7)

$$g_Y = g_K + \hat{u} = \alpha g_K + h\hat{u} + g_L \quad (9)$$

The demand for labour follows from the aggregate demand for output at the ruling prices, given the technical conditions of production and the degree of labour hoarding, from (9)

$$g_L = (1-\alpha)g_K + (1-h)\hat{u} \quad (10)$$

Using (6) and (8) we can see that labour productivity would tend to grow in line with the capital-labour ratio and fluctuate with changes in utilisation

$$g_{(Y/L)} = g_{(K/L)} + \hat{u} = \alpha g_K + h\hat{u} \quad (11)$$

These formulations are consistent with the characteristic patterns recorded in T.1.14 between productivity growth, capacity utilisation (approximated by changes in the output-capital ratio) and capital accumulation.

<u>Distribution</u>

Firms set output prices (P) as a mark-up on unit labour cost (WL/Y), with the size of the mark-up being such as to balance demand and supply at their desired rate of capacity utilisation (u_n), on average over the long run

$$P = \mu\,(u/u_n)(WL/Y) \tag{12}$$

where $\mu = 1 + m_n$ represents a normal mark-up factor, that can be adjusted in response to short-run deviations between actual and normal rates of capacity utilisation (Skott, 2010, p. 213).

Given the money wage W, the real wage is given by

$$W/P = \frac{Y/L}{\mu(u/u_n)} \tag{13}$$

whereas the profit share $\pi = \Pi/PY$, where $\Pi = PY - WL$, is equal to

$$\pi = 1 - \left(\frac{W/P}{Y/L}\right) = 1 - \left[\frac{1}{\mu(u/u_n)}\right] \tag{14}$$

Multiplying (14) by u yields the following expression for the profit rate

$$r = \pi u = u - (u_n/\mu) \tag{15}$$

When $u = u_n$ the above expression becomes

$$r_n = \left(\frac{\mu - 1}{\mu}\right) u_n \tag{16}$$

where $\pi_n = \left(\frac{\mu-1}{\mu}\right)$ [11]

From (12) it follows that the rate of growth of output prices will deviate from unit labour costs in proportion to changes in the rate of capacity utilisation

$$g_P = g_W - g_{(Y/L)} + \hat{u} \tag{17}$$

Real wages, on their turn, will increase at the same rate as technical progress and decrease with temporary changes in the level of activity—depending on the degree of labour hoarding

$$g_W - g_P = g_{(Y/L)} - \hat{u} = \alpha g_K + (h-1)\hat{u} \tag{18}$$

With full labour hoarding ($h = 1$) real wages grow in line with capital-embodied technical progress, independently of changes in utilisation. More generally, as labour hoarding

[11] Equivalently, in normal conditions the profit share can be expressed in terms of the normal mark-up m, instead of the normal mark-up factor $\mu = 1 + m$, so that $\pi = m / (1 + m)$.

increases, a rising fraction of any transitory increase in output prices induced by rising rates of utilisation would be captured by workers.

Cyclical changes in the profit share would reflect transitory changes in utilisation

$$g_\pi = g_P - g_w + g_{(Y/L)} = \hat{u} \tag{19}$$

which is consistent with the stylised cyclical pattern associating changes in the profit share with changes in the output-capital ratio (T.1.14).

To simplify the analysis, in what follows we will assume that money wages increase in line with productivity growth and target price inflation (g_P^t)

$$g_W = g_P^t + g_{(Y/L)} \tag{20}$$

If we let target price inflation take a zero value ($g_P^t = 0$) and assume that prices gravitate about $P = 1$ on average in the long run, actual price inflation simplifies to

$$g_P = \hat{u} \tag{21}$$

Investment

Firms combine organic and inorganic growth strategies. Organic growth implies investment in new productive capital to expand capacity and reduce unit costs. Inorganic growth involves debt-financed corporate transactions. Organic growth is assumed to be driven by the prospective profits of enterprise and to be constrained by the strength of entry barriers: [12]

a) The prospective profits of enterprise are the difference between the rate of profit on new capacity expected to prevail on average in the product market (r^e) and the minimum rate of return required by employers to engage in risky business projects (r_o). The latter, on its turn, is equal to the policy-determined real interest rate (i), weighted by the increasing risk associated with expected leverage ($\lambda = D/PK$) at the time the new capacity goes on stream.

b) The lower the entry barriers in the product market, [13] the higher the aggregate propensity to invest in the economy as a whole (σ), given current profits, as incumbent

[12] The implications of entry and exit for investment behaviour at the industry level have been analysed extensively in the evolutionary economics literature (e.g. Metcalfe, 1998, pp. 40-71).
[13] We are implicitly assuming that entry barriers and profit prospects are independent variables, which is justified under conditions of less than perfect foresight and/or bounded rationality—aside from perfectly competitive markets.

firms scale up their capital expenditures to preserve or expand their customer base and new entrants try to capture market share by installing additional capacity.

These assumptions lead to the following aggregate investment function

$$g_K = \sigma(r^e - r_o) = \sigma(r^e - i\lambda^e) \tag{22}$$

where λ^e represents expected leverage.

Similarly, Shaikh, 2016, p. 620, specifies investment as a function of the net rate of profits of enterprise (the difference between the return on capital and the interest rate). The essential difference with Shaikh is the joint impact of interest and leverage implicit in (22): when the rate of interest is zero, the degree of leverage has no impact on investment; analogously, when there is no interest-paying debt, and no deposits or loans, there is no alternative allocation to capital and no role for an interest rate in the investment function. An inverse relationship between investment and indebtedness is a common feature in NK models (Hein, 2014, chapter 5.6), building upon the finance constraint implicit in Kalecki's, 1937, "principle of increasing risk". But note that the term $(r^e - i\lambda^e)$ in (22) represents expected net earnings, not internal means of finance, as in Steindl's and Kaleckis's theories of investment.

The inclusion of an expected rate of profit in the investment function was widely used in first generation PK models (e.g. Robinson, 1962, p. 47) and is consistent with the stylised cyclical pattern described in T.1.14 (substituting the actual for the expected rate of profit). In the short run the expected rate of profit will be assumed to depend on two main variables: (a) the "animal spirits" of employers (g_o) and (b) actual profitability at the time investment decisions are made (r_{t-1}), with elasticity γ

$$r^e = g_o + \gamma r_{t-1} \tag{23}$$

This particular specification combines weak short-run effects with a strong long-run impact of demand shocks on accumulation, fulfilling a role similar to the assumption of a gradual adjustment of actual accumulation towards some target rate (Skott, 2010, p. 113).

<u>Saving</u>

Following Kaldor, 1966,[14] we attach different saving propensities to institutional sectors (i.e. firms and households), irrespective of class—while acknowledging that average

[14] Kaldor, 1966, p. 310, considered the high propensity to save out of profits "something which attaches to the nature of business income, and not to the wealth (or other peculiarities) of the individuals who own property".

household saving propensities would reflect the prevailing social structure. All income and saving flows between institutional sectors are stock-flow consistent: [15]

a) Firms receive income from sales of the commodity, pay labour wages and dividends to households plus interests on loans to banks. The difference between income and outlays constitutes firms' savings.

b) Banks take deposits from households and make loans to firms without restriction at the policy-determined (real) interest rate (equal for both loans and deposits). They operate without costs and make no profits.

c) Households receive labour wages, interests from bank deposits and dividends from firms and spend some fraction of their aggregate income on consumption. The difference between income and expenditure determines their savings.

Under these assumptions, aggregate savings can be written

$$S = s_h\left[PY - s_f(\Pi - iD)\right] + s_f(\Pi - iD) \tag{24}$$

where s_h represents households' average propensity to save out of their current income and s_f the retention ratio of firms expressed as a fraction of current profits (net of interests).

Dividing the above expression by the capital stock at replacement cost and letting $P = 1$ for simplicity yields the following saving function $g_S = S/K$

$$g_S = s_h u + \left[\left(s_f - s_h s_f\right)(r - i\lambda)\right] \tag{25}$$

The implicit positive relationship between the aggregate saving rate and the profit share in (25) is consistent with the stylised cyclical pattern described in T.1.14 (assuming $s_f > s_h$).

<u>Finance</u>

Households allocate their savings to bank deposits and equity shares. Firms finance their capital expenditures with their own savings, bank loans and equity issues, as encapsulated by the following expression

$$\Delta F = s_f(\Pi - iD) + \Delta D + \Delta N v \tag{26}$$

[15] A more explicit stock-flow accounting framework is provided in an appendix.

where ΔF represents the change in total financial resources allocated to productive investment, ΔN stands for net new equity issued and v is the price per share.

There are two main types of financial transactions between firms and households: a) firms may purchase outstanding shares from households (e.g. M&A and share buybacks) and b) households may purchase new shares issued by firms to finance their capital expenditures. Firms finance share purchases from households with bank credit, which increases the total value of loans and deposits by an equal amount, raising firm leverage and shareholder concentration in the process. Conversely, new equity issues dilute the property of outstanding shareholders and reduce the leverage ratio. Changes in the total value of equity are the net result of changes in the number of shares issued/purchased by firms to/from the household sector and changes in the price of shares. [16] The greater the amount of shares purchased by the firm sector from the household sector, relative to the new shares issued, the lower the value of ΔNv, and the greater the amount of new credit generated by the banking sector. If shares purchased by firms exceed the value of new shares issued, then $\Delta Nv < 0$.

We assume that firms set the total net value of their equity transactions as some fixed proportion ϕ of their net earnings, [17] so that

$$\Delta Nv = \phi(\Pi - iD) \tag{27}$$

We will refer to ϕ as the equity-finance ratio. For any given amount of new equity issues, the value of ϕ would be inversely related to the amount of debt-financed M&A (which entail a substitution of equity for debt) and, as a result, to the concentration of corporate power and wealth. More generally, the restructuring and reorganisation of industrial capitals associated with inorganic growth strategies will have two main effects: a) it will lift entry barriers and relieve competitive pressures on incumbent producers, reducing the overall propensity to invest, given profit prospects, and b) it will speed up the introduction of labour-saving techniques and organisation methods. Therefore, we may expect a long-term correspondence between the equity-finance ratio, the strength of entry barriers and the coefficients in the technical progress function. Specifically, (σ) and (β) will tend to diminish (inducing α to rise) as (ϕ) decreases.

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[16] Equity transactions between households in the absence of positive net issues would represent a transfer of resources within the household sector.

[17] Similar simplifying approaches based on fixed financing ratios can be found in the Stock Flow Consistent (SFC) literature (e.g. Godley and Lavoie, 2001, and Van Treeck, 2008).

Dividing expression (26) by K yields the following financing function for productive investment $g_F = \Delta F/K = \Delta K/K = \Delta S/K$

$$g_F = \left[(s_f + \phi)(r - i\lambda)\right] + \lambda g_D \tag{28}$$

where $g_D = \Delta D/D$ is the rate of growth of bank credit.

With s_f and ϕ being pre-determined by assumption, the rate of growth of credit becomes a residually adjusting variable

$$g_D = \frac{g_K - \left[(s_f + \phi)(r - i\lambda)\right]}{\lambda} \tag{29}$$

<u>Value</u>

The fundamental value of equity (V^F) to current shareholders is equal to the discounted value of the income flows they expect to receive from firms (Gordon and Shapiro, 1956).

Assuming constant growth this fundamental value is equal to

$$V^F = \frac{(1 - s_f - \phi)(\Pi^e_{t+1} - iD^e_{t+1})}{\rho_n - g^e_{\Pi t+1}} \tag{30}$$

where g^e_Π denotes the expected rate of growth of profits and

$$\rho = \frac{\Pi - iD}{PK - D} = \frac{r - i\lambda}{1 - \lambda} \tag{31}$$

is the ratio of corporate profits (net of interests) to the firms' productive capital valued at replacement cost, minus the market value of outstanding debt (a concept closely related to the equity-yield ratio). Correspondingly, ρ_n represents the normal rate of discount of present and future dividends required by investors over the long period, when a constant average rate of growth may be assumed.

Observe that the expression $-(s_f + \phi)(\Pi^e_{t+1} - iD^e_{t+1})$ in (30) combines three factors: (a) expected retained earnings, which reduce the total amount of income distributed by firms to shareholders out of their net cash flow; (b) income expected to be distributed to new shareholders at the expense of incumbent shareholders, following the issuance of new shares by firms, which dilute the value of the firm to current shareholders and (c) prospective income revenues from financial transactions (e.g. M&A and share buybacks), which benefit current shareholders. If (c) > (a + b) in absolute values, then $\phi < 0$.

Dividing expression (31) by $PK - D$ yields the following fundamental valuation ratio q^F [18]

$$q^F = \frac{V}{PK - D} = \frac{\left(1 - s_f - \phi\right)\left(r_{t+1}^e - i\lambda_{t+1}^e\right)}{(1 - \lambda)\left(\rho_n - g_{\Pi t+1}^e\right)} \tag{32}$$

Using (31) we can re-write expression (32) more compactly as follows

$$q^F = \frac{\left(1 - s_f - \phi\right)\rho_{t+1}^e}{\rho_n - g_{\Pi t+1}^e} \tag{33}$$

The actual market value of equity would be determined partly by fundamental factors (e.g. expected growth and profitability) and partly by the market demand for and supply of equity shares, with the latter being an inverse function of the equity-finance ratio

$$q = q\ (\phi, q^F, z) \tag{34}$$

where z captures other relevant factors, $\partial q / \partial \phi\ < 0$ and $\partial q / \partial q^F > 0$.

The actual market value of equity may differ from its fundamental value, even in the long run (when we may assume $\rho^e = \rho_n$). [19] More specifically, the higher the proportion of investment financed with new equity issues, the lower the valuation ratio, given the higher supply of shares. Conversely, as financial transactions such as share buybacks and debt-financed M&A or private equity deals rise, the value of ϕ is bound to decrease, increasing the value of q and amplifying the concentration of corporate wealth. Expression (33) also contains the potential for sustained speculative bubbles in the transition towards finance-dominated regimes, as the expected value of ρ tends to exceed a discount rate anchored in recent historical experience.

2.3. Macroeconomic performance

In the medium and long runs average product prices are consistent with firms meeting output demand at a normal rate of capacity utilisation. The price and output levels prevailing in the product market, alongside the level of technical progress, determine the real wage and the demand for labour. The supply of loans equals demand at the ruling lending rate and the demand for shares their supply at the price set in the stock market. When these conditions are fulfilled the economy moves along a normal path, with the

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[18] The concept of a valuation ratio was anticipated by Kaldor, 1966, and defined by Tobin and Brainard, 1956, as the "going price in the market for exchanging existing assets" to their "replacement or reproduction cost".

[19] Therefore, the valuation ratio may increase as the growth rate decreases, provided the equity finance and the retention ratio fall. López Bernardo, Stockhammer and López Martínez, 2015, also obtain higher valuation ratios with lower growth, using a different set of arguments, in the spirit of Kaldor, 1966.

structural and behavioural assumptions set out above suggesting a long-term normal relation between investment, saving, finance, valuation and natural growth—while taking as given the standard rate of capacity utilisation, the real interest rate, the propensities to save, the strength of entry barriers and the equity-finance ratio.

Normal equations

Equations (35) to (39) below define investment, saving, finance, valuation and natural growth in normal conditions

(a) Investment, from (22)

$$g_K = \sigma(\pi u - i\lambda) \tag{35}$$

(b) Saving, from (25)

$$g_S = s_h u + \left[(s_f - s_h s_f)(\pi u - i\lambda)\right] \tag{36}$$

(c) Finance, from (28)

$$g_F = \frac{(s_f + \phi)(\pi u - i\lambda)}{1 - \lambda} = (s_f + \phi)\rho \tag{37}$$

using $g_F = g_D = g_K$ and $\rho = \frac{\pi u - i\lambda}{1-\lambda}$

(d) (Fundamental) valuation ratio, from (33)

$$q^F = \frac{(1 - s_f - \phi)\rho^e}{\rho_n - g_\Pi} \tag{38}$$

(e) Natural growth, from (5)

$$g_N = \frac{n}{1 - e^{\beta}} \tag{39}$$

Normal solutions

Using the equilibrium condition $g_K = g_S = g_F$ yields the following normal values for the leverage ratio, the profit share, the rate of growth, the (fundamental) valuation ratio and the employment ratio.

(a) The normal leverage ratio is determined by setting $g_K = g_F$ and solving for λ

$$\lambda = \frac{\sigma - s_f - \phi}{\sigma} \tag{40}$$

(b) The normal profit share is determined by setting $g_K = g_S$ and solving for π

$$\pi = \left(\frac{s_h}{\sigma - s_f + s_h s_f}\right) + \left[\frac{(\sigma - s_f - \phi)i}{\sigma u_n}\right] \tag{41}$$

(c) The normal rate of growth follows by inserting (41) into (35)

$$g = \frac{\sigma s_h u_n}{\sigma - s_f + s_h s_f} \tag{42}$$

(d) The fundamental valuation ratio is determined by letting $g_{\Pi} = g_F = (s_f + \phi)\rho$ in (37) and solving for q^F

$$q^F = \frac{\rho^e}{\rho_n} \tag{43}$$

When $\rho^e = \rho_n$ we have $q^F = 1$ and $V^F = PK - D$ (i.e. the fundamental value of equity equals the difference between the replacement cost of capital and external debt).

However, the actual market value of equity, even in normal conditions, may differ from this fundamental value, as it also depends on the structural conditions of supply of and demand for net equity. To the extent that firms increase the rate at which they buy their own shares and/or the shares of firms they have acquired or merged with, the value of the equity finance ratio would diminish, or even turn negative. When this is the case the valuation ratio may exceed unity ($q > 1$) and the market value of equity may exceed the replacement cost of capital, net of external debt ($V > PK - D$).

(e) Finally, the employment ratio consistent with normal conditions follows from letting $g_N = g_K = g$ in (39) and solving for e

$$e = \left(\frac{g - n}{g}\right)^{(1/\beta)} \tag{44}$$

Normal properties

a) Distribution

First, we analyse the impact of changes in the structural factors on normal income distribution using the corresponding partial derivatives in (41):

(i) A permanent increase in the retention ratio raises the normal profit share for a wide range of empirically plausible values of the relevant variables ($\partial\pi/\partial s_f > 0$).

$$\partial\pi/\partial s_f = \left[\frac{(1-s_h)s_h}{\left(\sigma - s_f + s_h s_f\right)^2}\right] - \left(\frac{i}{\sigma u}\right) \tag{45}$$

(ii) A permanent increase in households' saving raises the normal profit share ($\partial\pi/\partial s_h > 0$).

$$\partial\pi/\partial\, s_h = \frac{\sigma - s_f}{\left(\sigma - s_f - s_h s_f\right)^2} \tag{46}$$

provided $\sigma > s_f$.

(iii) A permanent increase in the equity-finance ratio lowers the normal profit share ($\partial\pi/\partial\phi > 0$).

$$\partial\pi/\partial\,\phi = -\frac{i}{\sigma u} \tag{47}$$

provided $i > 0$.

Note that the lower the value of ϕ, the stronger the tendency towards the concentration of corporate power and wealth and the higher the profit share in normal conditions.

(iv) A permanent increase in the real interest rate raises the normal profit share ($\partial\pi/\partial i > 0$).

$$\partial\pi/\partial i = \frac{\sigma - s_f - \phi}{\sigma u} \tag{48}$$

provided $\sigma > s_f + \phi$

(v) A permanent reduction of entry barriers may lower the normal profit share, for a wide range of empirically plausible values of the relevant parameters ($\partial\pi/\partial\sigma < 0$).

$$\partial\pi/\partial\sigma = \left[\frac{\left(s_f + \phi\right)i}{\sigma^2 u}\right] - \left[\frac{s_h}{\left(\sigma - s_f + s_h s_f\right)^2}\right] \tag{49}$$

b) Growth

Second, we analyse the impact of the same structural factors on normal growth by calculating the corresponding partial derivatives in (42)

(i) A permanent increase in the retention ratio raises normal growth ($\partial g/\partial s_f > 0$).

$$\partial g/\partial s_f = \frac{(1 - s_h)\sigma s_h u}{\left(\sigma - s_f + s_h s_f\right)^2} \tag{50}$$

provided $s_h < 1$.

(ii) A permanent increase in households' saving raises normal growth ($\partial g/\partial s_h > 0$).

$$\partial g/\partial s_h = \frac{\left(\sigma - s_f\right)\sigma u}{\left(\sigma - s_f + s_h s_f\right)^2} \tag{51}$$

provided $\sigma > s_f$.

(iii) A permanent increase of entry barriers lowers normal growth ($\partial g/\partial \sigma < 0$).

$$\partial g/\partial \sigma = \frac{(s_h - 1)s_h s_f u}{\left(\sigma - s_f + s_h s_f\right)^2} \tag{52}$$

provided $s_h < 1$.

(iv) Permanent changes in the real interest rate (i), the leverage ratio (λ) and the equity-finance ratio (ϕ) do not affect normal growth.

3. History and theory

3.1. Historical growth and distribution

Most of the variables used in the model can be approximated using observed data, except the equity-finance ratio, which is assumed to be inversely correlated with the concentration of corporate power and wealth. In this section we insert the values of the empirical proxies for each observable variable into the normal equations (41), (42) and (44). First, we use the equation for normal distribution in (41) to deduce how the equity-finance ratio should have evolved to broadly reproduce the historical pattern of the profit share in the three largest advanced economies: the USA, Japan and Germany. Second, we compute the rate of growth of the capital stock generated by the normal growth equation in (42), using the previously deduced value for ϕ and empirical data for s and σ, and compare the result with the average rate of capital accumulation actually recorded in each economy. Finally, we deduce which value the socio-technological factor β should have taken in each sub-period to replicate the historical value of the employment ratio in these economies. To do so we introduce the following simplifying assumptions:

(i) The average values of the output-capital ratio (u), the real interest rate (i) and the rate of growth of the labour force (n) are taken from T.1.7, T.1.9 and T.1.12.

(ii) The average value of the propensity to invest associated with the strength of entry barriers (σ) is approximated using the GFCF/GOS ratio in T.1.5.

(iii) For simplicity, we will make no distinction between the propensities to save of households and firms, equating both to the aggregate net saving rate (s) recorded in T.1.4.

(iv) The values of the equity finance ratio (ϕ) and the socio-technological factor (β) are chosen for each economy in each sub-period so as to broadly replicate the actual distribution and employment patterns observed in the historical record. [20]

Tables 3.1.a, b and c show in bold type the values the (net) profit share would have taken in the USA, Japan and Germany, respectively, after inserting in (41) the values for σ, s, u, i and ϕ listed in the respective columns ($sim.\pi$) and compares them with the historical average values for the profit share ($act.\pi$)recorded in T.1.10.

Table 3.1.a. Net Profit Share, actual and simulated, USA

	sim. π	act. π	σ	s	u	i	ϕ
1961-70	**0.181**	0.180	0.738	0.110	0.365	0.020	**0.5**
1971-85	**0.171**	0.163	0.741	0.084	0.388	0.023	**0.1**
1986-00	**0.175**	0.172	0.678	0.056	0.425	0.047	**0.1**
2001-15	**0.205**	0.198	0.583	0.011	0.426	0.015	**-2.5**

Table 3.1.b. Net Profit Share, actual and simulated, Japan

	sim. π	act. π	σ	s	u	i	ϕ
1961-70	**0.098**	0.095	1.202	0.204	0.424	0.020	**3.5**
1971-85	**0.059**	0.054	1.388	0.175	0.404	0.020	**3.5**
1986-00	**0.070**	0.077	1.032	0.118	0.349	0.035	**1.5**
2001-15	**0.126**	0.109	0.693	0.010	0.323	0.021	**-0.5**

The value for the real interest rate in Japan in 1961-70 is assumed equal to 1971-1985, for lack of data.

Table 3.1.c. Net Profit Share, actual and simulated, Germany

	sim. π	act. π	σ	s	u	i	ϕ
1961-70	**0.187**	0.183	0.869	0.193	0.328	0.029	**1.5**
1971-85	**0.125**	0.143	0.804	0.118	0.324	0.036	**1.0**
1986-00	**0.170**	0.164	0.697	0.092	0.335	0.044	**0.5**
2001-15	**0.188**	0.169	0.581	0.077	0.337	0.018	**0.1**

The results recorded in Table 3 do not constitute a test of the model. They simply illustrate to which extent the historical pattern of income distribution in these economies can be

[20] We must keep in mind that the empirically-based proxies used to produce the simulations are only very rough measures of their theoretical counterparts. Therefore, the precise numerical values assigned to ϕ and β should not be given much weight. It is the qualitative pattern of evolution that matters.

consistently explained from the interaction between three structurally determined social propensities: to save, to invest and to accumulate power and wealth. [21] For the model to be able to replicate the actual pattern of income distribution using the normal equation for π and empirical proxies for s and σ, we must conclude that ϕ must have fallen—and corporate power concentration risen—to different degrees in the USA and Germany since the 1980s and in Japan since the late 1990s. The USA appears as the more financialised economy, with lower values for ϕ in each sub-period compared to the other two countries. In particular, to explain the US pattern of income distribution in 2000-2015 with this model we must conclude that there must have been a strong increase in the concentration of corporate power and wealth (involving debt-financed corporate transactions) with respect to previous sub-periods. By contrast, the Japanese economy shows a much higher equity-finance ratio for a much longer period, while catching-up with the frontier economy. However, this industry-driven pattern shifts in 1986-2000 and turns into finance-led mode in the present century. Germany lies between these two polar cases.

Table 3.2 below shows the rates of growth of the capital stock generated by inserting the empirical proxies for σ, s and u into equation (44) and compares them with the average rates of capital accumulation recorded in T.1.3. By contrast to T.3.1 above, these results may be considered a (weak) test of the model. Although the simulated values tend to overestimate the actual values, they do capture the general pattern of decline−except for Germany in 2001-2015.

Table 3.2. Capital Accumulation, actual and simulated, USA, Germany and Japan

	USA		Japan		Germany	
	sim. gk	act. gk	sim. gk	act. gk	sim. gk	act. gk
1961-70	**0.046**	0.030	**0.100**	0.060	**0.077**	0.044
1971-85	**0.036**	0.027	**0.079**	0.062	**0.044**	0.027
1986-00	**0.026**	0.027	**0.046**	0.036	**0.035**	0.021
2001-15	**0.005**	0.022	**0.003**	0.004	**0.030**	0.009

3.2. Productivity and employment

Tables 3.3.a), b) and c) show the approximate values coefficient β must take to broadly reproduce the evolution of the employment ratio in the three economies, inserting actual data for the rates of growth of the labour force (n) and the capital stock (g_K) in the normal equation for the employment ratio in (44). They also show the corresponding values of

[21] This is in contrast with Piketty, 2014, for whom the line of causality goes the other way around, with wealth concentration increasing as a result of structural increases in the profit share (for a critique of Piketty's thesis see López Bernardo, Stockhammer and López Martínez, 2014, and Rovira, 2014 and 2015).

$\alpha = e^{\beta}$ using the previously estimated values of β, and compare the simulated value of trend labour productivity growth ($\hat{a}$) with actual productivity growth.

Table 3.3.a. Employment Ratio and Productivity Growth, actual and simulated, USA

	sim. e	act. e	gk	n	β	α	sim. â	act. â
1961-70	**0.956**	0.952	0.030	0.018	**20**	0.374	**0.011**	0.023
1971-85	**0.928**	0.929	0.027	0.021	**20**	0.229	**0.006**	0.013
1986-00	**0.945**	0.943	0.027	0.013	**12**	0.494	**0.013**	0.018
2001-15	**0.934**	0.935	0.022	0.006	**5**	0.715	**0.016**	0.012

Table 3.3.b. Employment Ratio and Productivity Growth, actual and simulated, Japan

	sim. e	act. e	gk	n	β	α	sim. â	act. â
1961-70	**0.983**	0.987	0.060	0.013	**15**	0.822	**0.049**	0.086
1971-85	**0.928**	0.929	0.062	0.009	**2**	0.863	**0.054**	0.036
1986-00	**0.941**	0.943	0.036	0.006	**3**	0.839	**0.030**	0.020
2001-15	**0.936**	0.935	0.004	-0.001	**-4**	1.308	**0.005**	0.008

Table 3.3.c. Employment Ratio and Productivity Growth, actual and simulated, Germany

	sim. e	act. e	Gk	n	β	α	sim. â	act. â
1961-70	**0.998**	0.994	0.044	0.001	**15**	0.914	**0.040**	0.042
1971-85	**0.929**	0.929	0.027	0.007	**4**	0.745	**0.020**	0.021
1986-00	**0.942**	0.943	0.021	0.009	**10**	0.556	**0.012**	0.013
2001-15	**0.933**	0.935	0.009	0.003	**6**	0.668	**0.006**	0.006

Notice that the higher the value of β, the more capacity-expanding—instead of labour-saving—productive investment would be. In both the US and Japan the estimated value of β diminishes over time, as firms speed up the introduction of labour-saving technical progress, eased by finance-led corporate restructuring. But this increasing bias towards labour-saving investment does not avoid the slowdown of labour productivity growth in Japan throughout 1961-2015, as capital accumulation falls. In the US the model captures the observed pattern of trend productivity growth between 1961 and 2000, but misses the decline observed in 2001-2015. The lower values of β in the Japanese economy compared to the US in the same sub-periods are to be expected in an economy rapidly catching up with the technological frontier. Finally, the German economy follows a path similar to Japan in 1961-1985, but diverges from the generally declining trend for β in 1986-2000—coinciding with the reunification of Germany in 1991.

5. CONCLUSION

In this paper we have developed a small model of growth and distribution consistent with the economic evolution of the largest advanced economies over the last fifty-five years, and used it to analyse the relationship between declining trend growth, rising profitability, increasing leverage and the concentration of corporate power and wealth. In line with Steindl-Kalecki models of secular stagnation (Hein, 2016), natural growth adjusts to desired accumulation. As in Harrod-Kaldor models (Skott, 2010), the rate of employment is determined endogenously in the long run. In contrast to Piketty, 2014, financialisation and the socially determined tendency towards the concentration of wealth shapes the pattern of income distribution—not the other way around. On the other hand, the model developed here differs from influential PK accounts of stagnation processes, such as Hein, 2016, or Skott, 2010, in that it allows for a positive relationship between aggregate saving and growth in the long period, while taken as given the trend values of capacity utilisation and the output-capital ratio—in line with classical/Marxian approaches (Foley and Michl, 2010). But it differs from classical models in that it allows for the possibility of a negative long-term relationship between profitability and growth. It also assigns a central role to the profit share to adjust investment and saving over the long run—following the Cambridge Keynesian insights of Kaldor, 1956 and 1957, and Robinson, 1956 and 1962

Historians like Arrighi and Brenner see the emergence and decline of accumulation regimes as arising from the internal contradictions of capitalism, with competition acting simultaneously as a driving force and a barrier to capital accumulation. The model developed in this paper provides analytical structure to their vision of waves of expansion and stagnation in capitalist economies reflecting ebbs and flows in competition and concentration of different types of capital. These are to be explained in relation to specific historical episodes, driven by secular trends such as globalisation and financialisation. On the one hand, globalisation tends to intensify competition among industrial capitals, which may be accompanied by falling rates of profit—particularly so in the manufacturing sectors of open economies. On the other hand, financialisation, as an adaptive response to the tendency of the rate of profit to fall under increased competition on a global scale, favours the concentration of competing industrial capitals through corporate financial transactions and displaces the centre of gravity of capitalist dynamics towards finance.

The main Anglo-Saxon economies (US and UK) have evolved along this path earlier and faster than others, with strong financial actors and institutions driving continuous restructuring in the corporate sector. Japan, by contrast, may have remained committed to an essentially industry-driven mode of expansion followed by decline for much longer, with finance in a more subordinated place. The European economies, with Germany at their core, would fall somewhere in between these two polar cases. There have been, of course, many other decisive factors at work, which the small analytical model developed here cannot capture. We have omitted the role of the public and foreign sectors and abstracted from economic policies. We have mostly ignored the effects of wage and price inflation and the response of monetary policy. We have not dealt directly with household debt and consumption. Yet, the highly stylised nature of the analysis serves to sharpen the focus on the interaction between social change and economic development as a central factor driving the dynamics of capitalism, shaping the concentration of corporate power and wealth in the process.

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APPENDIX I: DATA SOURCES AND CONCEPTS

Unless otherwise stated, the source of the data is *AMECO: Macroeconomic Database of the European Commission* (EC). The data were retrieved between December 2016 and January 2017.

Table 1.1. Gross Domestic Product at 2010 prices (Y), average annual growth rates

Y = Gross domestic product at 2010 reference levels (OVGD). (EC)

Data for West Germany until 1990 (inclusive) and for unified Germany from 1992 (inclusive).

Table 1.2. GDP at 2010 prices per person employed (Y/L), average annual growth rates

Y/L = Gross domestic product at 2010 reference levels per person employed (RVGDE). (EC)

Data for West Germany until 1990 (inclusive) and for unified Germany from 1992 (inclusive).

Table 1.3. Net Capital Stock at 2010 prices (K), average annual growth rates

K = Net capital stock at 2010 prices: total economy (OKND). (EC)

The Net Capital Stock is an economy-wide measure that includes residential capital. Data for West Germany until 1990 (inclusive) and for unified Germany from 1992 (inclusive). Data for Canada until 2014.

Table 1.4. Aggregate Net Saving Rate (s = S/PY), average annual values, % GDP at market prices

S = TC – CFC.

TC = Total consumption at current prices (UCNT). (EC)

CFC = Consumption of fixed capital at current prices: total economy (UKCT). (EC)

PY = Gross domestic product at current prices (UVGD). (EC)

Net savings are gross savings after deducting capital consumption. Data for West Germany until 1990 (inclusive) and for unified Germany from 1991 (inclusive). Data for Canada until 2014.

Table 1.5. Gross Fixed Capital Formation / Gross Operating Surplus (GFCF/GOS), average anual v.

GFCF = Gross fixed capital formation at current prices: total economy (UIGT). (EC)

GOS = Gross operating surplus: total economy:- Adjusted for imputed compensation of self-employed (UQGD). (EC)

Table 1.6. Rate of Capacity Utilization (cu), Industry, %, average annual values

Data retrieved from *MACROBOND* database in December 2016. Average annual values computed from original quarterly series:

USA = United States, Capacity Utilization, Percent of Capacity.

JAP = Japan, Capacity Utilization, Production Capacity, Manufacturing, Total, Index.

GER = Germany, Business Surveys, DG ECFIN, Industrial Confidence Indicator, Total Sector, Quarterly, Current Level of Capacity Utilization.

GBR = United Kingdom, Business Surveys, DG ECFIN, Industrial Confidence Indicator, Total Sector, Quarterly, Current Level of Capacity Utilization.

FRA = France, Business Surveys, DG ECFIN, Industrial Confidence Indicator, Total Sector, Quarterly, Current Level of Capacity Utilization.

ITA = Italy, Business Surveys, DG ECFIN, Industrial Confidence Indicator, Total Sector, Quarterly, Current Level of Capacity Utilization.

CAN = Canada, Capacity Utilization, Total Industrial, Rate of Capacity Use.

Data for Japan start in 1978, for France in 1991 and for Canada in 1987.

Table 1.7. Output-Capital Ratio (u = Y/K), average annual values

u = Y/K.

Y = Gross domestic product at 2010 reference levels (OVGD). (EC)

K = Net capital stock at 2010 prices: total economy (OKND). (EC)

Data for West Germany until 1990 (inclusive) and for unified Germany from 1992 (inclusive). Data for Canada until 2014.

Table 1.8. Unemployment Rate (UR), %, average annual values

UR = Unemployment rate: total : Member States: definition EUROSTAT (ZUTN). (EC)

Table 1.9. Total Labour Force (TLF), average annual growth rates

TLF = Total labour force (Labour force statistics) (NLTN). EC)

Data for West Germany until 1990 (inclusive) and for unified Germany from 1992 (inclusive). Data for UK begin in 1993. Data for Canada from 1970 until 2013.

Table 1.10. Net Profit Share (π = NOS/PY), average annual values

π = NOS/PY

NOS = Net operating surplus: total economy:- Adjusted for imputed compensation of self-employed (UQND). (EC)

PY = Gross domestic product at current prices (UVGD). (EC)

Data for Canada until 2014.

Table 1.11. Net Profit Rate (r = π u); average annual values

r = π u = (NOS/PY) (Y/K)

Data for Canada until 2014.

Table 1.12. Real Long-Term Interest Rate (i), %, average annual values

i = Real long-term interest rates, deflator GDP (ILRV). (EC)

Data for Japan from 1978 and for Canada from 1986 until 2010.

Table 1.13. Gross Domestic Credit (DC/YP), % GDP at market prices, average annual values

Source: *World Bank* (WB), *World Development Indicators*, retrieved December 2016.

DC = Domestic credit provided by financial sector (% of GDP). (WB)

Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

Data for Germany start in 1970, for Italy in 1963 and for Canada end in 2008.

APPENDIX II: STOCK-FLOW CONSISTENCY

The key variables describing the state of the economy at any point of time can be represented in terms of a stock-flow accounting framework, with three institutional sectors (households, firms and financial institutions) interacting in four markets (for goods, labour, loans and equity).

Table II.1. Balance Sheets

	Households	Firms	Banks	Totals
Bank deposits	+M		-M	0
Bank loans		-D	+D	0
Capital goods		+PK		+PK
Equities	+V	-V		0
Net worth	Ω_H	Ω_F	0	PK

Accounting memo: $PK = \Omega_K - \Omega_F = D + V - \Omega_F = M + V - \Omega_F$

Table II.1 records the balance sheets of households, firms and banks. A positive sign denotes an asset and a negative sign a liability. It shows that firms finance their operations with equity (V) and bank loans (D), which constitute their liabilities, and hold one asset: a non-depreciating, produced means of production valued at current replacement cost (PK). The difference between assets and liabilities constitutes their net worth (Ω_F). Households hold two types of assets: bank deposits (M) and equity in firms, which constitute their net worth (Ω_H). Banks have households' deposits as liabilities and firms' loans as assets. All transactions are settled via bank checks and bank credit creates deposits of an equivalent value.

Table II.2. Current Transactions

	Households	F. (current)	F. (capital)	Banks	Totals
Consumption	-C	+C			0
Investment		+ΔPK	-ΔPK		0
Wages	+WL	-WL			0
Int. on loans		$-R_L$		$+R_L$	0
Int. on dep.	$+R_M$			$-R_M$	0
Dividends	$+R_F$	$-R_F$			0
Totals	S_H	S_F	ΔPK	0	0

Accounting memo: $PY = C + \Delta PK = WL + \Pi$

Table II.2 records current transactions between the three institutional sectors. A positive sign denotes a receipt and a negative sign a payment. Production is either consumed by households (C) or invested by firms (ΔPK). (Note that firms pay for the capital good and are simultaneously paid for it.) Firms receive income from sales of the commodity, pay labour wages (WL) and dividends (R_F) to households plus interests on loans to banks (R_L). The difference between income and outlays constitutes firms' savings (S_F). Banks operate without costs and make no profits (interests received from loans equal interests paid for deposits). Households receive labour wages, interests from bank deposits (R_M) and dividends from firms and spend some fraction of their aggregate income on consumption. The difference between income and expenditure determines their savings (S_H).

Table III.3. Capital Transactions

	Households	Firms	Banks	Totals
Saving	$+S_H$	$+S_F$		S
Δ Deposits	-ΔM		+ΔM	0
Δ Loans		+ΔD	-ΔD	0
Δ Capital goods		-ΔPK		-ΔPK
Δ Equity	+ΔNv	-ΔNv		0

Table III.3 records capital transactions (flows) generating changes in assets (stocks). A positive sign denotes a source of funds and a negative sign a use of funds. Firms finance their capital expenditures with their own savings, bank loans and equity issues. Households allocate their savings to bank deposits and equity shares. The net worth of households increases by the amount of their savings, plus the increase in the value of equity. Banks do not hold capital and therefore do not accumulate assets as a result of their transactions. There are two types of capital transactions between firms and households: a) firms purchasing outstanding shares from households (e.g. when acquiring or merging with other firms) and b) households purchasing new shares issued by firms to finance their capital expenditures. Firms finance mergers and acquisitions with bank credit, while rasing the total value of loans and deposits by an equal amount, increasing the degree of firm leverage and shareholder concentration in the process. Conversely, new equity issues dilute the property of outstanding shareholders and reduce the leverage ratio. Changes in the total value of equity are the sum of changes in the number (N) of shares issued/purchased by firms to/from the household sector (+/-ΔNv). Equity transactions between households in the absence of positive net issues would represent a transfer of resources within the household sector.

APPENDIX III: ADJUSTMENT DYNAMICS

In the short run, with the economy operating out of balanced conditions, price and quantity adjustments co-exist in the product market to match supply and demand at rates of utilisation of labour and capital that may deviate from their normal values. Assuming some limit to the speed of price adjustment, capacity utilisation will change to equate saving and investment in the short run. Price and output levels prevailing in the product market at current rates of utilisation, alongside the underlying level of technical progress and the degree of labour hoarding, determine the real wage and the demand for labour. The supply of loans adjusts to the demand for credit at the ruling lending rate, stock prices adjust to clear the equity market, but valuation ratios would typically differ from their normal values.

The investment and saving functions out of balanced conditions are

$$g_K = \sigma[g_o + \gamma u_{t-1} - \gamma(u_n/\mu) - i\lambda^e]$$

and

$$g_S = s_h u + \left(s_f - s_h s_f\right)[u - (u_n/\mu) - i\lambda]$$

from (22), (23) and (25), using $r = \pi u = u - (u_n/\mu)$ from (15).

Applying the equilibrium condition $g_K = g_S$, letting $\lambda^e = \lambda$ and solving for u yields the rate of utilisation prevailing at time t as a function of its own past value and the current value of the leverage ratio

$$u = \left[\frac{\sigma\gamma u_{t-1} + \left(s_f - s_h s_f - \sigma\right)i\lambda}{s_h + s_f - s_h s_f}\right] + z_u \qquad (III.1)$$

where $z_u = \frac{\sigma g_o + [(s_f - s_h s_f - \sigma\gamma)(u_n/\mu)]}{s_h + s_f - s_h s_f}$

In general, the short-run impact on utilisation of temporary changes in the structural variables would differ from the corresponding long-period results. For instance, a transitory increase in the retention ratio would depress capacity utilisation in the same period, reduce the return on capital and slow down investment in the next period. The rates of employment and output per worker would also fall. If the system is stable the adjustment dynamics would tend to bring utilisation, labour productivity and capital accumulation back to their normal levels in the following periods. On the other hand, permanent changes in the structural parameters would lead the economy towards a different growth path with a different pattern of income distribution.

In what follows we develop a fairly intuitive understanding of the adjustment dynamics involved, in two steps. First, we consider the stability properties in terms of three simplified one-dimensional systems: in utilisation, leverage and employment. Secondly, we analyse the properties of a two-dimensional system with utilisation and leverage as state variables. We show that the model is fundamentally consistent with a unified account of trend and cycle, in which fluctuations can be seen as partly endogenous, arising from strong feedbacks effects under certain parameter values.

Stability properties: one-dimensional systems

a) Utilisation

Let the leverage ratio in $III.1$ to be given and constant. In this special case the stability of the resulting difference equation governing the state variable u would depend on the following condition

$$\frac{\sigma\gamma}{s_h + s_f - s_h s_f} < 1$$

Note that we have introduced two crucial behavioural assumptions that favour a stable outcome in this particular case. First, the expected rate of profit in the investment function is only partially sensitive to its actual value (with an intensity captured by γ). Second, the profit share is assumed to change (via the mark-up) with changes in capacity utilisation, as indicated by the term $\mu(u/u_n)$ in the pricing equation. Without these special assumptions stability conditions would become far more restrictive. We can see this by setting $g_o = 0$ and $\gamma = 1$ in the investment equation and $\pi = \pi_0 < 1$ (a constant) in the pricing equation, so that stability requires

$$\frac{\sigma\pi_o}{s_h + (s_f - s_h s_f)\pi_o} < 1$$

where $\sigma\pi_o > s_h + (s_f - s_h s_f)\pi_o$ is the more likely case, leading to instability.

b) Leverage

Next, let us consider the special case where $r^e = r_o$ (constant) and $\lambda^e = \lambda$ in (22), so that from (29) we can write

$$g_\lambda = g_D - g_K = \left\{\frac{g_K - \left[(s_f + \phi)(r_o - i\lambda)\right]}{\lambda}\right\} - g_K$$

$$= \left(\frac{1-\lambda}{\lambda}\right) g_K - \left[\frac{(s_f + \phi)(r_o - i\lambda)}{\lambda}\right]$$

Substituting and simplifying

$$g_\lambda = \frac{\left[(1-\lambda)\sigma - s_f - \phi\right](r_o - i\lambda)}{\lambda} \qquad (III.2)$$

which yields the following partial derivative for g_λ

$$\partial g_\lambda / \partial \lambda = -\,\frac{(\sigma - s_f - \phi) r_o}{\lambda^2}$$

Stability requires $\partial g_\lambda / \partial \lambda < 0$, so that in this special case the leverage ratio will converge to its normal value starting from a disequilibrium position, provided $\sigma > s_f + \phi$.

c) Employment

From (10) the motion of the employment ratio can be written as follows

$$\hat{e} = g_L - n = \left(1 - e^\beta\right) g_K + (1-h)\hat{u} - n \qquad (III.3)$$

Assume that $r^e = r$ and $\lambda^e = \lambda$ in (22) so that

$$g_K = \sigma(r - i\lambda)$$

Also, let $\hat{u} = 0$. After substituting

$$\hat{e} = g_L - n = \left[\left(1 - e^\beta\right)\sigma(r - i\lambda)\right] - n$$

which yields the following partial derivative for $\hat{e}$

$$\partial \hat{e} / \partial e = -\beta\sigma(r - i\lambda)e^{\beta - 1} \qquad (III.4)$$

Stability requires $\partial \hat{e} / \partial e < 0$, which means that the employment ratio will converge back to its normal value, under these special circumstances, provided $r > i\lambda$ and $\beta > 0$.

<u>Stability properties: two-dimensional system</u>

Let us reformulate equations $(III.1)$ and $(III.2)$ in continuous time as follows

$$du/dt = \left[\frac{(\sigma\gamma - s_h - s_f + s_h s_f)u - (\sigma - s_f + s_h s_f)i\lambda}{s_h + s_f - s_h s_f}\right] + z_u \qquad (III.1b)$$

and

$$d\lambda/dt = [(1-\lambda)\sigma - s_f - \phi](r - i\lambda) \qquad (III.2b)$$

Let us write the following linear approximation to $(III.2b)$ using $r = \left(\frac{\mu-1}{\mu}\right)u$ from (16)

$$d\lambda/dt = (\sigma - s_f - \phi)\left[\left(\frac{\mu-1}{\mu}\right)u - i\lambda\right] \qquad (III.2c)$$

Equations $(III.1b)$ and $(III.2c)$ define a two-dimensional system of differential equations in u and λ. Evaluated at a stationary point, the Jacobian of the system $J(u,\lambda)$ is given by

$$\begin{bmatrix} \frac{\sigma\gamma - s_h - s_f + s_h s_f}{s_h + s_f - s_h s_f} & -\frac{(\sigma - s_f + s_h s_f)i}{s_h + s_f - s_h s_f} \\ (\sigma - s_f - \phi)\left(\frac{\mu-1}{\mu}\right) & -(\sigma - s_f - \phi)i \end{bmatrix}$$

with

$$det(J) = \frac{\left\{s_h + (s_f/\mu) - (s_h s_f/\mu) + \sigma\left[\left(\frac{\mu-1}{\mu}\right) - \gamma\right]\right\}(\sigma - s_f - \phi)i}{s_h + s_f - s_h s_f}$$

and

$$tr(J) = \left(\frac{\sigma\gamma - s_h - s_f + s_h s_f}{s_h + s_f - s_h s_f}\right) - (\sigma - s_f - \phi)i$$

This 2D system would be locally asymptotically stable provided $\det(J) > 0$ and $tr(J) < 0$. Consider first $\det(J)$. Assuming $\sigma > s_f + \phi$, the determinant is more likely to take a positive sign the higher the saving propensities of households and firms, s_h and s_f, and the lower the elasticity of investment to actual profitability, γ. Consider now $tr(J)$ and assume, as before, $\sigma > s_f + \phi$. The probability of a negative sign for the trace will also increase the lower the value of γ and the higher the saving propensities of firms and households.

Concluding remarks

Stability may be guaranteed under some conditions (e.g. a gradual enough adjustment of profitability expectations to actual profitability), but the speed and the path of adjustment back towards normal values differs substantially depending on the values assigned to the relevant parameters. We can see from $(III.3)$ that the lower the degree of labour hoarding, the greater the volatility of employment about its normal path after a shock. We can also see from $(III.4)$ that the lower the value of β, the longer it may take for the employment rate to recover its normal value. In the limit, when $\beta = 0$, there is no equilibrium level for e and the actual unemployment rate becomes path-dependent in the long run. Therefore, in the absence of stabilising economic policies the self-adjusting properties of the economic system in motion may be rather weak, and the propagation effects of exogenous disturbances on the future path of the economy strong.