Beginning, crises, and end of the money economy in three consistent steps

Kakarot-Handtke, Egmont

29 May 2011

Beginning, Crises, and End of the Money Economy in Three Consistent Steps

Egmont Kakarot-Handtke

Abstract

A crisis is but a crisis when the long run outlook is definitively positive. Then a lower turning point must exist. This implicates a vision or, in the ideal case, a formalized theory of the money economy's possible end states. This theory has to provide an endogenous explanation of end states and crises. The equilibrium approach excludes endogenous causes in principle. Thus disturbances can only be explained by exogenous random shocks. The structural axiomatic approach, that is applied in the following, consistently defines the potential systemic crisis point and the conditions of an economic happy end.

JEL B41, D33, E21, E32, E40

Keywords New framework of conceps, Structure-centric, Axiom set, Zero profit economy, Distributed profit, Systemic crisis point, Logical end states

An economic disturbance, no matter how small or big, first provokes the question: is it an accident, caused by some exogenous factor, or is it the symptom of some deeper systemic malfunction? The first question is more specific and of short term practical interest, the second is more general and of fundamental theoretical interest. Classical economics extrapolated the Law of the tendency of the rate of profit to fall into the future and therefore regarded disturbances, downswings or stagnation not as anomalies. Standard economics, by contrast, entails a timeless equilibrium with welfare at its optimum. The equilibrium approach excludes in principle an endogenous explanation of disturbances. This, with substantial logical consequence, led Jevons to identify sunspots as origin of financial crises:

> I am aware that speculations of this kind may seem somewhat far-fetched and finely wrought; but financial collapses have occurred with such approach to regularity in the last fifty years, that either this or some other explanation is needed. (Jevons, 1884, quoted in Mirowski, 1988, p. 47)

The criticism of panglossianism and timelessness in particular is as old as equilibrium theory itself (Veblen, 1961; Hodgson, 2001).

Between the classical and neoclassical poles the theories of cyclic crises are located. What is implicitly present in every assessment of an economic disturbance is a vision or theory about the long run development of the economy. A crisis is but a crisis if the general outlook is definitively positive. For Schumpeter it was a purgatory that makes the Nietzschean entrepreneur (Streissler, 1994, p. 13) only stronger and the market economy healthier. This is psycho-kitsch. A disturbance without a nearby turning point is the beginning of a free fall.

Each theory rests on a small set of fundamental assumptions. Conclusions about possible long run end states are implicitly prefigured in these assumptions. General equilibrium theory rests on a set of *behavioral* axioms. The main thesis of the present paper is that human behavior does not yield to the axiomatic method, yet the axiomatization of the money economy's fundamental structure is feasible. The crucial point is not axiomatization per se but the real world content of axioms[1]. Our objective is to make the implications of the *structural* axiom set about possible end states explicit. This is somewhat different from both prediction and prophecy.

We proceed as follows. The minimalistic formal frame that constitutes the random consumption economy is set up in section 1. Thereby the premature specification of behavioral assumptions is forestalled. Then, in sections 2 to 4 the development of profit and distributed profit from the inital period to a logical end state is ascertained. This clarifies the origination of profit, the relation between profit and the distribution of output, and why myopic agents misinterpret profit as factor income. In sections 5 and 6 the potential crisis point is located and the alternative routes of circumvention are enumerated. Section 7 concludes.

[1] The case for axiomatization has been made at length in (Kakarot-Handtke, 2011) and (2011a).

1 Phase Zero

1.1 The Formal Framework

The first three structural axioms relate to income, production, and expenditures in a period of arbitrary length. For the remainder of this inquiry the period length is conveniently assumed to be the calendar year. Simplicity demands that we have for the time being one world economy, one firm, and one product.

Total income of the household sector Y is the sum of wage income, i.e. the product of wage rate W and working hours L, and distributed profit, i.e. the product of dividend D and the number of shares N.

$$Y_t = W_t L_t + D_t N_t \tag{1}$$

Output of the business sector O is the product of productivity R and working hours.

$$O_t = R_t L_t \tag{2}$$

Consumption expenditures C of the household sector is the product of price P and quantity bought X.

$$C_t = P_t X_t \tag{3}$$

The period values of the variables are connected formally by the familiar growth equation, which is added to the structural set as the fourth axiom:

$$Z_t = Z_{t-1}\left(1+\overline{Z}_t\right) \tag{4}$$

The path of the representative variable Z_t, which stands for the elementary (*W, L, D, N, R, P, X*) and composed *(Y, O, C)* axiomatic variables is then determined by the initial value Z_0 and the rates of change $\overline{Z}_t$ for each period:

$$Z_t = Z_0\left(1+\overline{Z}_1\right)\left(1+\overline{Z}_2\right)\ldots\left(1+\overline{Z}_t\right) = Z_0\prod_{t=1}^{t}\left(1+\overline{Z}_t\right) \tag{5}$$

By feeding the axiom set with random rates of change (50 changes of the elementary variables between the range of -2.91 % and +3.00 %) the random consumption economy[2] develops over time as shown in Figure 1.

The chosen random distribution of the rates of change produces a drifting economy without upward or downward trend. The elementary variables vary independently, there is no endogenous coordination of any sort. Exogenous restrictions are absent. To simplify matters employment L is kept constant. Profit distribution shall be dealt with later, so dividend D and number of shares N are at first set to zero. Under this conditions the indexed paths of wage rate W and total income Y, as well

[2] The term random economy has been introduced for the equilibrium analysis of pure exchange economies (Föllmer, 1974). It is adopted in the present paper without this specific connotation.

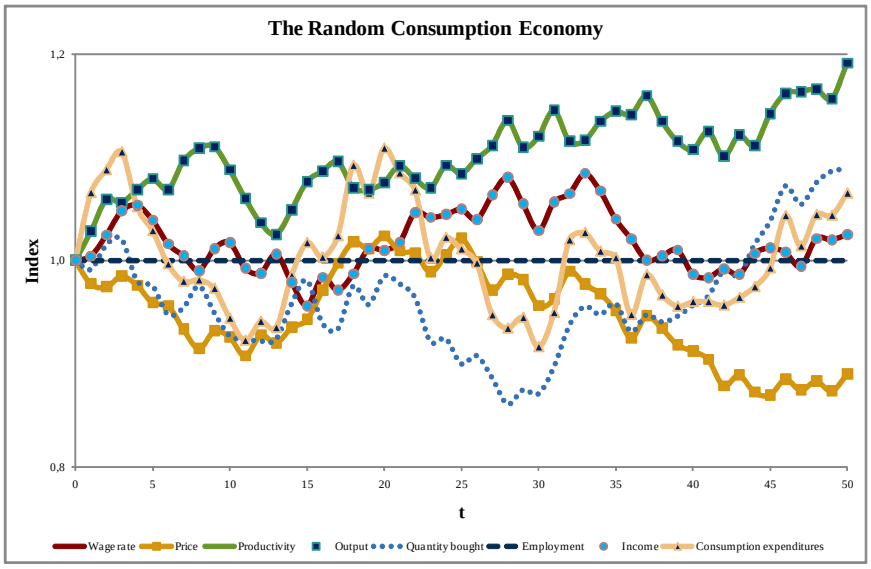


Figure 1: Development of the Axiomatic Variables of the Random Consumption Economy Over 50 Periods

as the paths of output O and productivity R are congruent and barely distinguishable in Figure 1.

1.2 The Money-Credit Mirror

If income is higher than consumption expenditures the household sector's stock of money increases. The change in period t is defined as:

$$\Delta M_H \equiv Y - C \quad |t \tag{6}$$

The stock of money at the end of an arbitrary number of periods is defined as the numerical integral of the previous changes of the stock plus the initial endowment:

$$M_H \equiv \sum_{t=1}^{t} \Delta M_{Ht} + M_{H0} \tag{7}$$

The changes in the stock of money as seen from the business sector are symmetrical to those of the household sector:

$$\Delta M_B \equiv C - Y \quad |t \tag{8}$$

The business sector's stock of money at the end of an arbitrary number of periods is accordingly given by:

$$M_B \equiv \sum_{t=1}^{t} \Delta M_{Bt} + M_{B0} \tag{9}$$

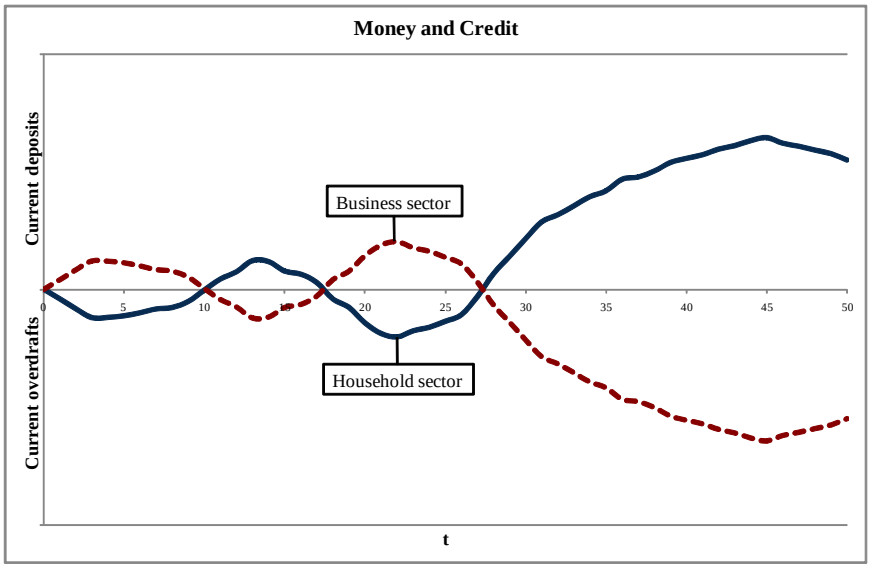
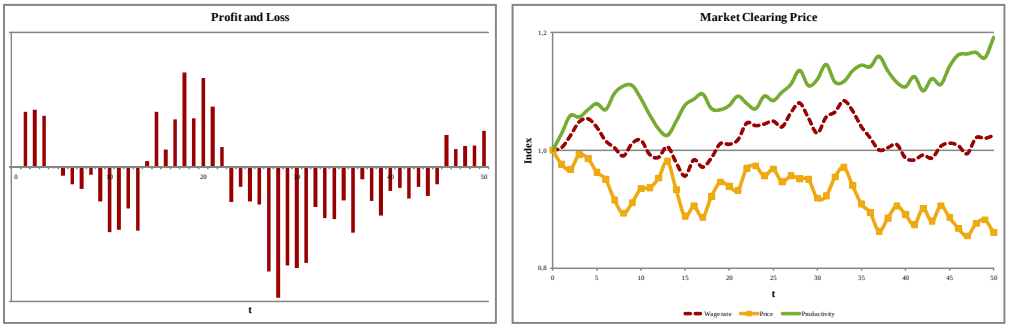


Figure 2: Cumulated Changes of Money and Credit Due to the Random Variations of Income and Consumption Expenditures as shown in Figure 1

To simplify matters here it is supposed that all financial transactions are carried out without costs by the central bank. The stock of money then takes the form of current deposits or current overdrafts (Wicksell, 1936, p. 70). Initial endowments can be set to zero. Then, if the household sector owns current deposits according to eq. (7) the current overdrafts of the business sector are of equal amount according to eq. (9) and vice versa if the business sector owns current deposits. Money and credit are symmetrical. The current assets and liabilities of the central bank are equal by construction. From its perspective the quantity of money at the end of an arbitrary number of periods is given by the absolute value either from (7) or (9):

$$M_t \equiv \left| \sum_{t=1}^{t} \Delta M_t \right| \quad \text{if} \quad M_0 = 0 \tag{10}$$

The quantity of money thus follows directly from the axioms and this implies for the time being that the central bank plays an accommodative role. Thus it is not necessary for the firms and households to resort to funds that have been accumulated before period$_1$. The central bank provides elastic currency to support the autonomous market transactions. The quantity of money appears in the upper half of Figure 2 and the amount of credit appears in the lower half.



(a) Profits and Losses Resulting From the Development of Consumption Expenditures and Wage Income in Figure 1

(b) The Market Clearing Price P^* as Determined by Wage Rate and Productivity

Figure 3

1.3 Profit and Price

The business sector's profit in period t is defined with eq. (11) as the difference between the sales revenues – for the economy as a whole identical with consumption expenditures C – and costs – here identical with wage income Y_F[3]:

$$\Delta Q_{fi} \equiv C - Y_F \quad \text{with} \quad Y_F \equiv WL \quad |t \tag{11}$$

The profits and losses that accrue over fifty periods in the random consumption economy are directly derived from the axiom set and depicted in Figure 3a.

With (12) the expenditure ratio ρ_E and the sales ratio ρ_X is defined:

$$\rho_E \equiv \frac{C}{Y} \qquad \rho_X \equiv \frac{X}{O} \quad |t \tag{12}$$

An expenditure ratio $\rho_E = 1$ indicates that consumption expenditures are equal to income and a value of $\rho_X = 1$ of the sales ratio means that the quantities produced and sold are equal in period t or, in other words, that the product market is cleared. Under the condition of market clearing *and* budget balancing follows that the price in Figure 3b is according to eq. (13) always equal to unit wage costs W/R, i.e. the profit per unit is zero and by consequence profit is zero in all periods.

$$P^* = \frac{\rho_E}{\rho_X}\frac{W}{R} = \frac{W}{R} \quad \text{if} \quad \rho_{Xt} = 1;\ \rho_E = 1;\ D = 0;\ N = 0 \quad |t \tag{13}$$

Phase zero is characterized by an initial absence of exogenous and endogenous dependencies or restrictions. Only employment is fixed. In the second step the

[3] This financial part of profit does not depend on questions of valuation. Profits from changes in the value of non-financial assets are neglected here. One member of this class is the stock of products which may change with regard to quantity and valuation price if the product market is *not cleared* in successive periods. This case is excluded in the following by the condition $\rho_X = 1$. For the general case profit has to be introduced with the 5th axiom as the sum of financial and non-financial profit.

independent random movements of the axiomatic variables are confined to the ideal limiting case of market clearing and budget balancing over all periods. Reality is to be found between these two analytical limiting cases. The drifting consumption economy with zero profit sets the frame for the development of profit in the expansion and contraction phases.

2 Expansion and Contraction

For the business sector as a whole to make a profit consumption expenditures C have in the simplest case to be greater than wage income Y_F. So that profit comes into existence in the pure consumption economy the household sector must run a deficit at least in one period. This in turn makes the inclusion of the financial sector mandatory. A theory that does not include at least one bank that supports the concomitant credit expansion, which is covered by eq. (7), fails to capture the essential features of the market economy. Money is not a veil to be treated in an afterthought; it must be present from the very beginning.

Under the condition of market clearing $\rho_X=1$ and $\rho_E>1$ the price P^* rises above unit wage costs:

$$P^* = \rho_E \frac{W}{R} \quad \text{if} \quad \rho_X = 1 \quad |t \tag{14}$$

Profit per unit is now positive and total profit is given by:

$$\Delta Q_{fi} \equiv_a C - Y \equiv_b \Delta M_B \quad \text{if} \quad Y_F = Y \quad |t \tag{15}$$

Profit ΔQ_{fi} is the residual C-Y as it appears at the business sector; the same residual appears at the central bank as an increase of the business sector's stock of money ΔM_B. The *two aspects* are kept formally apart by the notation $\equiv_a$ and $\equiv_b$ respectively. Profit and the increase of the business sector's stock of money are numerically identical in period$_1$ as shown in the upper half of Figure 4.

Saving ΔS_{fi} is the residual Y-C as it appears at the household sector[4]; the same residual appears at the central bank as an increase of the household sector's stock of money ΔM_H according to eq. (6). In period$_1$, however, the households dissave and this results either in decreasing current deposits or increasing current overdrafts. The *two aspects* of saving are formally kept apart by the notation $\equiv_a$ and $\equiv_b$ respectively:

$$\Delta S_{fi} \equiv Y - C \quad \Rightarrow \quad \Delta S_{fi} \equiv_a Y - C \equiv_b \Delta M_H \quad |t \tag{16}$$

Dissaving and the increase of the household sector's current overdrafts are numerically identical in period$_1$ as shown in the lower half of Figure 4.

[4] The 6th axiom states that saving, like profit, has a financial and non-financial component. The non-financial component is neglected here for the sake of simplicity. Hence the definition of financial saving is sufficient and the 6th axiom is not required.

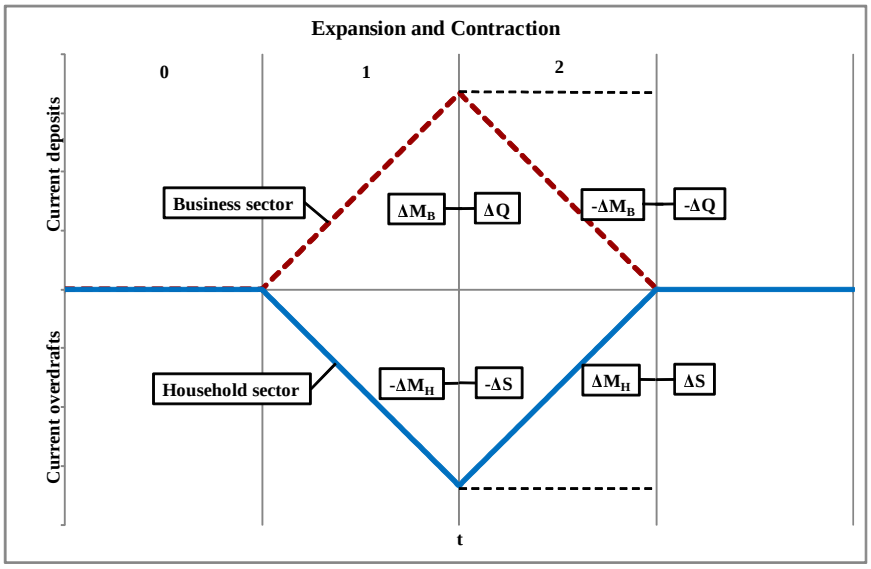


Figure 4: Profit and Loss in the Expansion and Contraction Phase

The households have to pay off their overdrafts eventually. It is assumed here that this happens in period$_2$. Since the expenditure ratio ρ_E is then below unity the market clearing price falls according to eq. (14). To the extent the households save business cannot recoup current wage costs. Since the households reverse their dissaving of period$_1$ completely and fully pay off their overdrafts the business sector's loss in period$_2$ is identical to the profit in period$_1$. Over all periods the sum of profits is zero:

$$\sum_{t=1}^{t} \Delta Q_{fit} = 0 \tag{17}$$

If the households do not pay off their overdrafts but fully spend their income and default at the end of period$_2$ the banking industry (here the central bank) incurs a loss. The sum of profits of the consumption goods industry and and losses of the banking industry add up to zero for the business sector as a whole. The result over all periods is in any case the same, but the distribution of profits and losses within the business sector is random.

In summary: since the household sector eventually has to pay off all overdrafts, the business sector's profits of an expansion phase of arbitrary length will exactly be wiped out by the losses of a contraction phase of arbitrary length in the pure consumption economy. Interest payments of the households do not alter this result and therefore can be neglected here.

3 Reality and Appearance

General equilibrium theory is right in insisting that Marshallian partial analysis cannot, as a matter of principle, lead to general results. To be sure, partial analysis may lead to useful practical results, because the repercussions of the rest of the system may in fact be negligible; that, however, cannot be known from partial analysis. Hence partial analysis is lacking a sound methodological foundation. From this in turn follows with regard to time that period analysis, too, is partial analysis as long as it does not take *all* periods into account. And when it is methodologically illegitimate to extrapolate the results of the analysis of a single market to the economy as a whole it is also illegitimate to extrapolate the results of period analysis into the indefinite future[5]. The inclusion of all periods, though, runs against the obvious difficulty that we know next to nothing about the future[6]. Therefore, the only thing we can do is to posit a *logical* end state without a time index and to ascertain its economic properties. We cannot know when it happens, but we can know what happens, when it happens. The economy is an open system, no doubt, yet we have to close it analytically (cf. Chick, 1998, p. 1866). The result of this counterfactual closure – zero profit for the business sector as a whole over all periods – follows from the *certain* economic fact that the households will either repay their debt or not; it does not depend on any specific assumption about human behavior. This result holds, of course, with the proviso that the structural axiom set captures the elementary properties of the money economy.

Under this condition follows that profit is essentially a temporary and reversible phenomenon, quite different from factor income. The myopic agents, unsurprising in virtue of Adam Smith's invisible hand metaphor, cannot see it as such. They extrapolate the experience of a couple of centuries into the future. The prolonged existence of positive profits is not a theoretical riddle for them as it was for the classics (Dmitriev, 1986, p. 63-68), but a well established empirical fact. Actually profit has more resemblance with credit than with income. Without intending it, households grant a loan to business that takes the form of profit, which is, again unintentionally, repaid in the form of loss.

By the same token profit has, in the first instance, nothing to do with exploitation. The workers (including all levels of management) get the whole output in the expansion and the contraction phase. Profit has no real counterpart in the form of a share of produced goods. What happens is a redistribution of output *within* the household sector from those who spend only their current income to those who spend their current income plus overdrafts. This redistribution is anonymously effected by a higher market clearing price. What is open to all eyes is the correlation

[5] This, of course, is Hume's problem of inductive proof (Boland, 2003, p. 13). In the economy it reappears as Ponzi fallacy.

[6] The physicist's assertion that the future is determined by the Second Law of Thermodynamics is relevant to economics first of all as an exogenous constraint that appears in the form of resource depletion or environmental problems.

of higher prices and higher profits. How it is feasible that the price is higher than unit wage costs over longer stretches of time is opaque.

The classics maintained that profit originates in the sphere of production. The classical notion of surplus stands in no relation to profit as determined with definition (11). Neither is the neoclassical equilibrium condition, profit rate = marginal productivity of capital, applicable in the pure consumption economy, because we have profit but no capital. Profit cannot be counted as factor income (cf. Knight, 2006, pp. 308-309, Schumpeter, 2008, p. 153). Profit is credit.

Profit and loss for the economy as a whole have nothing to do with reward for good performance or punishment for economic misbehavior. These psychological categories are entirely misplaced. For the economy as a whole there is no relation between efficiency and profit. All other things equal, except the market clearing price, a low-productivity economy and a high-productivity economy yields the same absolute amount of profit. Profit may even be *higher* in the low-productivity economy if the expenditure ratio is higher. Neither the achievement principle nor the marginal principle is applicable when it comes to the issue of distribution and fair rewards. It is *relative* efficiency that governs the *relative* profitability of firms. Firms do not 'make' profit, they redistribute it among themselves basically as a consequence of productivity or wage rate differentials (Kakarot-Handtke, 2011b, p. 10-14). Innovation, risk taking, monopolization and all other alleged sources of profit are different *forms of profit redistribution*. Competition does not wash profits away, only to other places.

Profit is essentially a temporal phenomenon. The general equilibrium approach, which is essentially atemporal, by logical necessity arrived at Walras's profit formula 'Ni bénéfice, ni perte'. This formula excludes overall positive profits over a longer time span and therefore cannot explain economic reality.

4 Distributed Profits

To clarify the fundamentals, profit has been analyzed hitherto in a minimalistic formal setup. What cannot provisionally be left out of the picture, though, are the repercussions of profit distribution on overall profits. Firms and shareholders have to be kept analytically apart. Profit accrues to the *firm* and some individual or board is responsible to decide whether to distribute it to shareholders or to retain it (Ellerman, 1986, p. 46).

It is assumed now that the profit of period$_1$ is fully distributed in period$_2$:

$$Y_t = Y_{Ft} + Y_{Dt} \quad \text{with} \quad Y_{Dt} \equiv D_t N_t \quad \Rightarrow \quad Y_2 = Y_{F2} + \Delta Q_{fi1} \tag{18}$$

Compared to period$_1$ total income rises since Y_D is now greater than zero. Wage income remains unchanged. Wage income and distributed profit is fully spent, i.e. $\rho_E=1$. This means that wage income receivers reduce their consumption expenditures compared to period$_1$, i.e. $C_{F2}=C_{F0}<C_{F1}$, and this entails that their overdrafts remain at the level of period$_1$. That part of the consumption expenditures of wage

income receivers that was formerly financed by overdrafts is now replaced by the consumption expenditures of distributed profit receivers. As total consumption expenditures remain unaltered and total income rises by $Y_{D2}=\Delta Q_{fi1}=-\Delta S_{fi1}$ saving is zero:

$$\Delta S_{fi2} = Y_2 - C_2 = 0 \tag{19}$$

Exactly that part of output that has been absorbed in period$_1$ by spending out of overdrafts goes now to the receivers of distributed profits. The redistribution of output presupposes both profit distribution *and* spending out of distributed profits. Otherwise neither profit not distributed profit has any effect on the real income of workers. The whole output goes (under the condition of market clearing) to them if the whole amount of distributed profits is saved. Then, in the first round, only the stock of money of the receivers of distributed profit increases. Manifest exploitation in a single firm through extreme wage cuts leads via the anonymous price mechanism to a redistribution of total output *among workers* and of total profit *among firms* but *not* to a redistribution of output between 'workers' and 'capitalists'. Therefore profit or distributed profit cannot be taken as an indicator of exploitation in the classical sense.

The price follows as dependent variable from the axiom set as:

$$P = \frac{\rho_E}{\rho_X}\left(\frac{W}{R}+\frac{Y_D}{RL}\right) \quad |t \tag{20}$$

Under the condition of market clearing and budget balancing one gets for period$_2$:

$$P_2^* = \frac{W_2}{R_2}+\frac{Y_{D2}}{R_2 L_2} \quad \text{if} \quad \rho_{X2}=1;\, \rho_{E2}=1 \tag{21}$$

Wage rate W, productivity R, and employment L remain unchanged. Under this condition the market clearing price in period$_2$ P_2^* is equal to that in period$_1$ P_1^*, because dissaving in period$_1$ is equal to profit which in turn is equal to distributed profit in period$_2$, i.e. $-\Delta S_{fi1}=\Delta Q_{fi1}=Y_{D2}$.

Profit remains unchanged:

$$\Delta Q_{fi2} \equiv C_2 - Y_{F2} \equiv Y_{D2} - \Delta S_{fi2} \quad \Rightarrow \quad \Delta Q_{fi2} = \Delta Q_{fi1} \quad \text{if} \quad \Delta S_{fi2} = 0 \tag{22}$$

The current deposits of the business sector and the current overdrafts of the household sector remain also unchanged:

$$\Delta M_{B2} \equiv C_2 - Y_{F2} - Y_{D2} \equiv \Delta Q_{fi2} - Y_{D2} = 0 \quad \text{because} \quad \Delta Q_{fi2} = Y_{D2} \tag{23}$$

This configuration is reproducible in principle for an indefinite time span. As long as profits are fully distributed and total income is fully spent no changes occur

until the households start to pay off their overdrafts. Profit reproduces and stabilizes itself. Current deposits and overdrafts stay at the end level of period$_1$.

Eventually households reverse exactly their dissaving of period$_1$. Profit falls to zero in the final period t. Since profit is distributed for the last time in period t the current deposits of the business sector reduce to zero:

$$\Delta M_{Bt} \equiv \Delta Q_{fi2} - Y_{Dt} \quad \Rightarrow \quad \Delta M_{Bt} = -Y_{Dt} \tag{24}$$

With profit distribution the cumulated profits over all periods are greater than zero and equal to the sum of cumulated distributed profits:

$$\sum_{t=1}^{t} \Delta Q_{fit} = \sum_{t=1}^{t} Y_{Dt} \tag{25}$$

The conditions for stationary self-reproducing profits are: L constant, W constant, full profit distribution and $\rho_E=1$. With R constant the system is then completely deterministic by assumption. Profit distribution and spending out of distributed profits prevents that profit is wiped out by a loss of equal magnitude in the next period. Profit is positive and stable as long as profit distribution and spending out of distributed profits are perpetuated. This outcome, however, is improbable.

5 The Potential Crisis Point

Let us start with self-reproducing profits as defined by eq. (22) which implies that the overall expenditure ratio is unity, $\rho_E=1$, and that profits are always fully distributed in the next period. The enduring existence of retained profits testifies that the latter is not the case in the real world. Neither is the former. It would indeed be miraculous if it were. We consider first the possibility of $\rho_E>1$.

When the expenditure ratio rises above unity and stays there for some periods a positive feedback loop emerges as a systemic property. It works as follows: profit up, distributed profits up, consumption out of distributed profits up, profits up and so on. This chain is weakened when, for example, profits are not fully distributed. The loop, which consists of iterated structural and behavioral links, is not a fixed deterministic mechanism. It is stronger in one period and weaker in another. It can be derived from eq. (22) as:

$$\Delta Q_{fi2} = (\rho_{E2} - 1)Y_2 + \rho_{G2}\Delta Q_{fi1} \quad \text{with} \quad \rho_{G2} \equiv \frac{Y_{D2}}{Q_{fi1}} \tag{26}$$

The profit loop is virtuous if the expenditure ratio ρ_E and the distributed profit ratio ρ_G is ≥ 1. This circulus virtuosus, though, is a mixed blessing, because it works as well in the opposite direction, that is, if at least one ratio in (26) happens to be below unity. The crucial point is that the pure consumption economy is inherently unstable because of the profit feedback loop. We definitively have no tendency of (absolute) profits to fall, but a tendency of profits to cycle. This property of the

money economy follows in direct lineage from the structural axiom set and that means, first of all, that sunspots are not required to explain the recurrence of crises.

The notion of equilibrium, too, is not required. To the contrary, it would be misleading. We can derive a stationary profit under the condition of market clearing, budget balancing and full profit distribution. But this is not enough. The very concept of equilibrium requires that the system moves towards it. This cannot happen when there is a positive feedback loop with variable directionality and strength in the system. Hence an equilibrium simply does not exist. It does not exist in general equilibrium theory either, existence proofs notwithstanding. A simultaneous equilibrium is a contradiction in terms. It invokes a commonplace phenomenon but at the same time excludes its realization. The nonexistence of equilibrium implies that the notion of disequilibrium has no counterpart and therefore no meaning. To obviate 'Babylonian incoherent babble' (Davidson, see Dow, 2005, p. 385) the analysis has to be relieved from this conceptual trap.

The upward movement of profits poses of course no immediate problem for the business sector. But it may lead to problems in the longer run because an expenditure ratio $\rho_E > 1$ implicates mounting overdrafts of the household sector. All depends on whether the banks stick to old-fashioned rules of credit assessment and leverage or not.

When the downward movement of profits is slow and reversed before long no great problems arise. The firm's management curtails dividends and continues the normal business operations. The question is how deep profits can fall before the firm's management considers laying off workers or even to get out of business. Probably there exists a psychological minimum profit but we know next to nothing about it. How long a loss-making firm can stay in business depends ultimately on the sum of retained profits of former periods and on the credit lines of banks, that is, in the last instance on historical contingencies that defy any generalization.

More important is the *structural* minimum profit for the economy as a whole. This magnitude has been derived in (Kakarot-Handtke, 2011b, p. 12) and it is given by:

$$\Delta Q_{fi}^{min} \equiv PL_h R_2 \left(\frac{R_1}{R_2} - \frac{W_1}{W_2} \right) \quad \text{if} \quad \frac{W_2}{PR_2} = 1 \quad |t \tag{27}$$

The structural minimum profit ensures that the marginal firm_2 can stay in business with zero profit and that the given overall level of employment is maintained. To begin with, it is assumed that the wage rates of the two firms that operate in one market and sell at the same market clearing price are equal. Under the given conditions the minimum profit (27) must be the higher for two otherwise identical firms the greater the productivity disparity between them. The degree of heterogeneity is expressed by the productivity ratio $\rho_R \equiv R_1/R_2$. If profit for the business sector as a whole is below this minimum profit the structure of the business sector is bound to change. Hence structural stress is a function of the profit for the business sector as a whole and the degree of heterogeneity within the business sector. Structural stress

is lowered when the wage ratio $\rho_W \equiv W_1/W_2$ adapts to the productivity ratio ρ_R. The structural minimum profit is a variable that changes from period to period.

The point where profit falls below the structural minimum profit and the marginal firm starts making losses is objectively given but movable and unknown in advance. The economy does not move towards this potential crisis point, but may hit it with some regularity.

In summary: for the pure consumption economy the potential crisis point where structural change sets in is determined by the expenditure ratio, the distributed profit ratio and the structural minimum profit. All these factors are volatile. The probability that this point is repeatedly hit is closer to unity than to zero because of the positive feedback between profit and distributed profit. This is a *structural* property of the consumption economy. It is to be expected that the profit feedback loop will not vanish in the investment economy.

6 Happy End Conditions

Profit distribution is the means to avoid a final zero sum profit outcome. As an ultimate bottom line eq. (25) is clearly preferable to eq. (17), at least, but not alone, from the perspective of the business sector.

The first task of the invisible hand is in any case to keep profit above the structural minimum of eq. (27). This could be done, firstly, by an expenditure ratio greater than unity which is accompanied by a credit expansion. This works, trivially, until the complementary credit contraction eventually sets in with losses and finally ends with zero profits over the whole time span for the business sector as a whole and probably with losses in the banking industry. The real grandchildren-problem therefore consists not in inheriting debt, but in implicitly inheriting losses. This problem does not arise as long as already existing credit is revolved.

The second alternative of keeping profits safely above the structural minimum is a flattening of the profit loop by holding the expenditure ratio and the distributed profit ratio close around unity. This involves that the receivers of distributed profits get a stable share of output which depends indirectly on the structural minimum profit. By itself this does not pose distributional problems. The question is who the receivers of distributed profits are and this depends on the current distribution of shares. The question of how this distribution occurred or how it could be changed in order to ensure the warranted expenditure ratio is left open here.

The third possibility to keep profits above the structural minimum is to lower the latter. According to eq. (27) this could be done by equalizing the productivity ratio and the wage ratio.

Granted that the structural axiom set captures the elementary facts of the money economy then follows for the pure consumption economy: endogenous crises are possible, the system is not moving towards a long run equilibrium, but it is not moving towards the abyss either – except the overall expenditure ratio stays below unity over a longer time span.

7 Conclusions

The analytical priority claim of the structural axiomatic approach rests on the simple fact that, since the structure that is given by the axiom set does not adapt to behavior, behavior has to adapt to structure. When behavioral and structural logic are at odds, behavioral logic is conductive to frustrated plans and expectations. That is the normal state of economic affairs. The main results of the structural axiomatic inquiry are:

- In the logical end state of a consumption economy without profit distribution the profits and losses over all periods sum up to zero. In the case of household defaults the losses of the banking industry are equal to the profits of the consumption goods industry.
- In the logical end state of a consumption economy with profit distribution the cumulated profits are equal to cumulated distributed profits.
- Profit and distributed profit have no effect on the distribution of output, only the spending out of distributed profit has. Profit does not originate in the sphere of production.
- Because of the positive feedback loop of profit and distributed profit the pure consumption economy is inherently unstable.
- The point where profit falls below the structural minimum profit and the marginal firm starts making losses is objectively given but movable and unknown in advance. The potential crisis point is determined by the expenditure ratio, the distributed profit ratio and the structural minimum profit.
- In the pure consumption economy recurring endogenous crises are probable; the system is not moving towards an equilibrium in the long run, but it is not moving towards the abyss either.

References

Boland, L. A. (2003). *The Foundations of Economic Method. A Popperian Perspective.* London, New York, NY: Routledge, 2nd edition.

Chick, V. (1998). On Knowing One's Place: The Role of Formalism in Economics. *The Economic Journal*, 108(451): 1859–1869. URL http://www.jstor.org/stable/2565849.

Dmitriev, V. (1986). David Ricardos Werttheorie. Versuch einer strengen Analyse. In B. Schefold (Ed.), *Ökonomische Klassik im Umbruch*, pages 63–136. Frankfurt am Main: Suhrkamp.

Dow, S. C. (2005). Axioms and Babylonian Thought: A Reply. *Journal of Post Keynesian Economics*, 27(3): 385–391.

Ellerman, D. P. (1986). Property Appropriation and Economic Theory. In P. Mirowski (Ed.), *The Reconstruction of Economic Theory*, pages 41–92. Boston, MA, Dordrecht, Lancaster: Kluwer-Nijhoff.

Föllmer, H. (1974). Random Economies with Many Interacting Agents. *Journal of Mathematical Economics*, 1: 51–62.

Hodgson, G. M. (2001). *How Economics Forgot History. The Problem of Historical Specificity in Social Science.* London, New York, NY: Routledge.

Kakarot-Handtke, E. (2011). Keynes's Missing Axioms. *SSRN Working Paper Series*, pages 1–29. URL http://ssrn.com/abstract=1841408.

Kakarot-Handtke, E. (2011a). The Pure Logic of Value, Profit, Interest. *SSRN Working Paper Series*, pages 1–21. URL http://ssrn.com/abstract=1838203.

Kakarot-Handtke, E. (2011b). Schumpeter and the Essence of Profit. *SSRN Working Paper Series*, pages 1–25. URL http://ssrn.com/abstract=1845771.

Knight, F. H. (2006). *Risk, Uncertainty and Profit*. Mineola, NY: Dover. (1921).

Mirowski, P. (1988). *Against Mechanism*. Totowa, NJ: Rowman & Littlefield.

Schumpeter, J. A. (2008). *The Theory of Economic Development. An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. New Brunswick, NJ, London: Transaction Publishers. (1934).

Streissler (1994). The Influence of German and Austrian Economics on Joseph A. Schumpeter. In Y. Shionoya, and M. Perlman (Eds.), *Schumpeter in the History of Ideas*, pages 13–38. Ann Arbor: University of Michigan Press.

Veblen, T. (1961). Why is Economics Not an Evolutionary Science? In *The Place of Science in Modern Civilisation*, pages 56–81. New York, NY: Russel & Russel. (1898).

Wicksell, K. (1936). *Interest and Prices*. London: Macmillan.

Correspondence address:
AXEC
Egmont Kakarot-Handtke
Hohenzollernstraße 11
80801 Munich, Germany
e-mail: handtke@axec.de