Reconstructing the Quantity Theory (II)

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2 August 2011

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Abstract

Part (I) and (II) of this paper reconstruct the quantity theory from structural axiomatic foundations. This yields a coherent view of the interrelations of quantity of money, transaction money, saving–dissaving, liquidity–illiquidity, rates of interest, leverage, allocation, prices, profits, unit of account, and employment. Part (II) focuses on the symmetric and asymmetric process of nominal and real saving–dissaving and on the monetization of nonfinancial assets. The distinction between liquidity preferences of individual households and the household sector as a whole proves to be crucial.

JEL E10, E20, E40

Keywords New framework of concepts, Structure-centric, Axiom set, Complementary time preference, Time transfer, Real rate of interest, Inventory, Nonfinancial profit, Transmission mechanism, Asset–liability structure, Capital market

Part (I) dealt with the development of the quantity of money and the average stock of transaction money in the process of saving–dissaving under the conditions of fixed and variable employment. Part (II) is concerned, first, with the different nominal and real ways of realizing the households' time preference and, second, with the various effects of an exogenous increase of the quantity of money.

Based on the structural axiom set, which represents the pure consumption economy, first the structure of the business sector and the initial distribution of resources is defined. The process of symmetric nominal and real saving–dissaving is then set in motion in section 1.1. From this process the real rate of interest is derived in section 1.2 and the essential difference between the real and the money economy is elaborated. As a counterpart the asymmetric process is analyzed in section 1.3. For a comprehensive view the processes of part (I) and (II) are concatenated in section 2 in order to determine the resulting structure of assets and liabilities of the household- and business sector. The latter includes the transaction- and banking unit of the central bank. In section 3 the classical case of an exogenous increase of the quantity of money is reconstructed in structural axiomatic terms with regard to the two main transmission routes. Section 4 concludes.

1 Nominal and real time travels

The household sector, to begin with, builds up current deposits at the central bank through saving. The business sector has, basically, two possibilities to react to the fall of nominal demand. It may keep price constant and build up temporary inventories. Or, in order to clear the market in the current period, it may lower the price. We look at both limiting cases in turn.

1.1 Nominal and real symmetry

The structure of the economy is quite simple in the initial period. The business sector consists of the consumption goods producing firm_1 and the central bank which handles all monetary transactions. Hence total income is given by:

$$Y = \underbrace{W_1}_{W} L_1 + \underbrace{W_2}_{W} L_2 + \underbrace{(D_1 N_1 + D_2 N_2)}_{Y_D=0} \quad |0 \tag{1}$$

To simplify matters, the wage rates are set equal for all firms and distributed profits are set to zero. Total employment L is taken as constant:

$$L = L_1 + L_2 \quad |0 \tag{2}$$

Total consumption expenditures are initially equal to income, i.e. $\rho_E=1$, and spent on the output of both firms:

$$C_1 = P_1 X_1 + P_2 X_2 \quad |0 \tag{3}$$

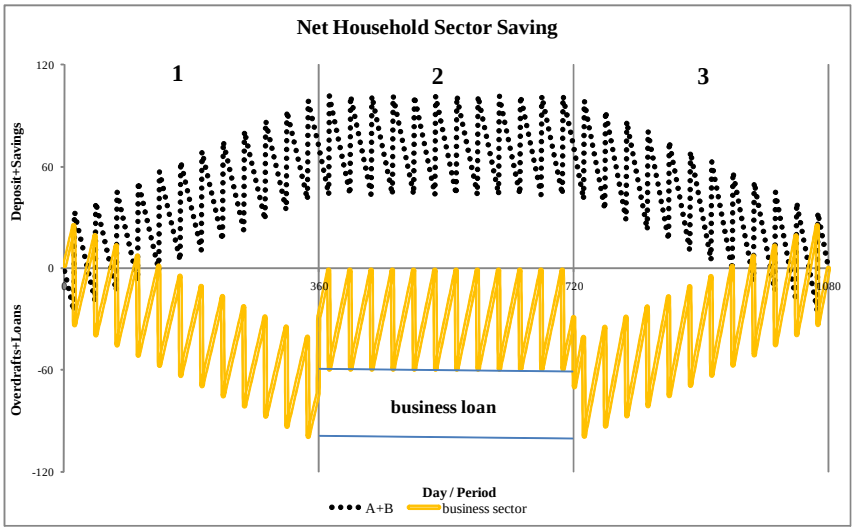

Figure 1: Household sector saving and dissaving over three periods with the business sector consolidating its current overdrafts in period$_2$

Under the condition that both markets are cleared, i.e. $\rho X=1$, profits are given by:

$$\begin{aligned} Q_{fi1} &\equiv P_1 R_1 L_1 \left(1 - \frac{W}{P_1 R_1}\right) \quad \rho_{X1} = 1 \\ Q_{fi2} &\equiv P_2 R_2 L_2 \left(1 - \frac{W}{P_2 R_2}\right) \quad \rho_{X2} = 1 \quad |0 \end{aligned} \tag{4}$$

In the initial period profits of both firms are zero, i.e. $W/PR=1$. With the zero profit condition the market clearing prices for both firms are determined.

Period$_1$

The household sector as a whole is now supposed to save, i.e. $\rho E<1$. This can be achieved with different distributions of saving among households. Either all households save in exact proportion to their income, or group A saves, group B consists of nonsavers, and group C of dissavers; with group A outweighing the others. As a net result the current deposits of the household sector increase in period$_1$ as shown in Figure 1.

Since wage income remains unaltered and consumption expenditures decline compared to the initial period current overdrafts of the business sector as a whole increase as a mirror image of the current deposits of the household sector.

It is assumed now that firm$_1$ keeps the price constant. This entails that the quantity bought X decreases in proportion to falling consumption expenditures. Since output O remains unaltered the stock of unsold products increases in period$_1$:

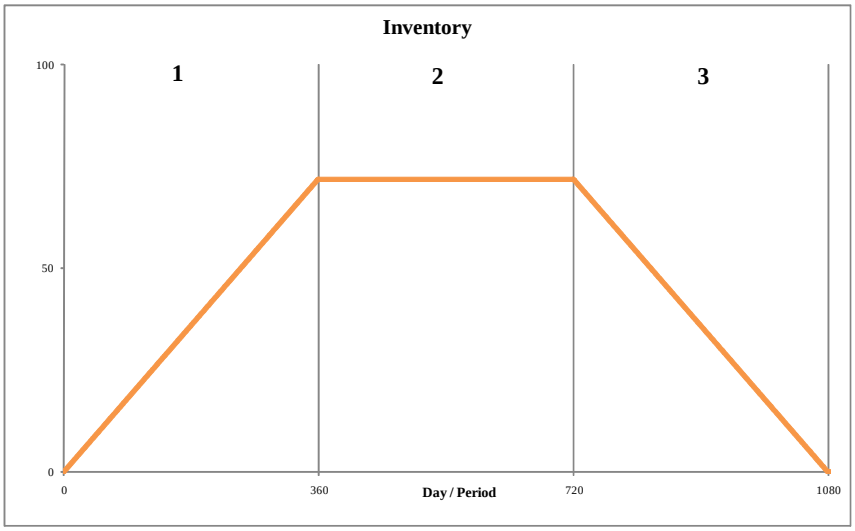

Figure 2: Inventory accumulation and decumulation over three periods parallel to saving and dissaving

$$\Delta\bar{O}_1 \equiv O_1 - X_1 = O_1\,(1-\rho_{X1}) \quad |1 \tag{5}$$

The stock at the end of an arbitrary number of periods is given by definition as the numerical integral of all previous stock changes plus the initial endowment

$$\bar{O}_1 \equiv \sum_{t=1}^{t} \Delta\bar{O}_{1t} + \Delta\bar{O}_{10} \quad |\bar{t} \tag{6}$$

and is depicted in Figure 2. The growth of the business sector's inventory thus corresponds to the household sector's saving.

With falling consumption expenditures, i.e. $C_{11}<C_{10}$, and unchanged wage costs the financial profit of the consumption goods producing firm becomes negative:

$$Q_{fi1} \equiv P_1 X_1 - W L_1 \quad |1 \tag{7}$$

This can be rewritten as:

$$Q_{fi1} \equiv P_1 R_1 L_1\,(\rho_{X1} - \rho_{F1}) \quad \text{with} \quad \rho_{F1} \equiv \frac{W}{P_1 R_1} \quad |1 \tag{8}$$

Since $\rho_X<1$ and $\rho_F=1$, the consumption goods producing firm incurs a financial loss. On the other hand the valued stock of products comes up to a nonfinancial profit. Nonfinancial profit in period$_1$ corresponds to the increase of the value of inventory:

$$Q_{nf1} \equiv (O_1 - X_1)\,P_1 \quad |1 \tag{9}$$

This can be rewritten as:

$$Q_{nf1} \equiv P_1 R_1 L_1 (1 - \rho_{X1}) \quad |1 \tag{10}$$

The 5th axiom states that total profit is the sum of financial and nonfinancial profit:

$$Q = Q_{fi} + Q_{nf} \quad |\mathrm{t} \tag{11}$$

By inserting (8) and (10) the sales ratio drops out and this gives for total profit:

$$Q = P_1 R_1 L_1 (1 - \rho_{F1}) \quad \text{with} \quad \rho_{\mathrm{F1}} = 1; Q_{fi2} = 0; Q_{nf2} = 0 \quad |1 \tag{12}$$

There is no effect on total profit if the change of inventory is valued with the market price P. The financial loss is counterbalanced by a nonfinancial profit of equal magnitude.

The liquidity of the household sector increases with current deposits $\bar{M}_H$. As a mirror image the illiquidity of the business sector increases with current overdrafts. Since the inventory has to be taken into account as a nonfinancial asset overall liquidity outside the banking industry is given by:

$$\Lambda \equiv \bar{M}_H \lambda_H + (\bar{M}_B \lambda_B + \Delta \bar{X} P \lambda_{B1}) \quad |\bar{1} \tag{13}$$

Liquidity of the household and business sector taken together increases when a liquidity factor of 0.6, for example, is assigned to the inventory:

$$\lambda_H = 1 \quad \lambda_B = -1 \quad \lambda_{B1} = 0.6 \quad \Rightarrow \quad \Lambda = 0.6 \bar{M}_H \quad \text{if} \quad \bar{M}_H = \bar{M}_B = \Delta \bar{X} P \tag{14}$$

Analogous to (2011c, p. 9) the average quantity of money is given by:

$$\hat{M} \equiv H\left[\hat{M}_{TH}\right] \hat{M}_{TH} + H\left[\hat{M}_{SH}\right] \hat{M}_{SH} + H\left[\hat{M}_{TB}\right] \hat{M}_{TB} + H\left[\hat{M}_{QB}\right] \hat{M}_{QB} \quad |\mathrm{t} \tag{15}$$

In the first period current deposits, liquidity and the average quantity of money all increase while the price remains constant.

Period$_2$

In the next period consumption expenditures return to their previous level, i.e. ρ_E=*1*, as shown in Figure 1. To reduce illiquidity firm$_1$ takes up a one-period loan with the banking unit of the central bank. The inclusion of the banking unit entails that the given resources of the business sector L have first to be reallocated:

$$L = L_1 + L_2 + L_3 \quad |2 \tag{16}$$

The labor input of firm$_3$ has been taken from firm$_1$. As a consequence output X_1 shrinks. Total income remains constant, but, after the inclusion of the banking unit, it now flows from three firms:

$$Y = \underbrace{W_1}_{W} L_1 + \underbrace{W_2}_{W} L_2 + \underbrace{W_3}_{W} L_3 + \underbrace{(D_1 N_1 + D_2 N_2 + D_3 N_3)}_{Y_D=0} \quad |2 \tag{17}$$

The partitioning of consumption expenditures between firm_1 and firm_2 remains unaltered. Since output X_1 shrinks the market clearing price P_1 goes up in the interim period because C_1 remains constant. The output of the banking unit is bought by firm_1 and *not* by the households.

$$C_1 = P_1 X_1 + P_2 X_2 \quad |2 \tag{18}$$

With reduced labor input the wage costs of firm_1 fall. On the other hand the firm now pays interest to the banking unit. The interests the banking unit receives are equal to its wage costs. Profits for both firms are therefore zero. The rate of interest is determined by the zero profit condition.

$$\begin{aligned} Q_{fi1} &\equiv P_1 X_1 - W L_1 - J_{\bar{A}} \bar{A}_B \\ Q_{fi3} &\equiv J_{\bar{A}} \bar{A}_B - W L_3 \qquad |2 \end{aligned} \tag{19}$$

Firm_1 is now better off with regard to imminent factual illiquidity. Its profit situation is not affected. The reduction of illiquidity consumes resources and firm_1 pays for it in the form of interests. Ultimately, though, all households pay in the form of a higher price for a lower output of consumption goods. This does not lead to further distributional effects if all households saved in exact proportion to their income. Then all are affected 'equally' by the price increase and the reduction of output. When we have two diverse groups of households, then the nonsavers or dissavers B involuntarily and unwittingly pay in real terms for the savers A who are the indirect economic cause of the business sector's loan demand. The price increase in period_2 redistributes the real costs of the temporal avoidance of imminent bankruptcy more or less equally among the households.

At period end the banking unit disappears again and the reallocation of labor input is reversed.

Period_3

In the final period the household sector dissaves. Current deposits return to zero at period end. As a mirror image the business sector's current overdrafts return also to zero as shown in Figure 1.

Output of the consumption goods producing firm is again at the level of period_1. So is price. The additional nominal demand from dissaving, i.e. $\rho_E > 1$, successively absorbs the inventory.

Financial profit of firm_1 is now positive. It is compensated for by a nonfinancial loss from the decrease of the valued inventory. Total profit is again zero. The same holds for liquidity.

With regard to the quantity theory we observe that there is *no* relation between price and the quantity of money. There has been an increase in period$_1$ with no effect on the price and now the reversal has no effect either.

What has been achieved in real terms is a transfer of parts of output from period$_1$ to period$_3$. In the nominal sphere this transfer was effected by saving and dissaving. The household sector realized its time preference with the involuntary help of the business sector. The whole process de facto expresses that the households taken as a whole value a certain quantity of consumption goods *higher* in the future than in the present. They indirectly move present goods into the future because these will be of higher subjective value then. The households are not the least concerned with the physical transfer over time. They simply expect that they can buy the desired quantity of the consumption good with their savings at the same price at a future date. It has to be emphasized that the symmetric process of saving–dissaving has nothing to do with the rate of interest. The households keep their current deposits because their liquidity preference is higher, measured against a subjective scale, than the interest rate on the available saving accounts.

1.2 Real rates of interest

The time preference of all households taken together, which is expressed by saving and dissaving, i.e. $\rho_E<1$ and $\rho_E>1$, has a real counterpart in the accumulation and decumulation of the business sector's inventory. The business sector takes care of the physical side of the time transfer. Involuntarily, it has to be stressed, because the stock of unsold products is not the result of the determination of an optimal inventory by setting the first derivative of a target function to zero and checking whether the second derivative has the proper sign. The marginal principle is inapplicable to the situation.

The business sector's costs increase. The interest on a one-period loan, however, is only one additional item on the profit and loss account. Others are: rent for extended storage space, insurance, heating, cooling, et cetera. The rate of interest stands only as pars pro toto for the costs of the transfer of goods over time. These storage costs are the nominal expression of the consumption of real resources. Ultimately the household sector bears the real costs unknowingly in the form of foregone consumptions goods.

Now, suppose the households keep the inventory themselves. The expenditure ratio in period$_1$ is unity. The business sector is not the least affected, the whole output is sold at the going price, and the households take care of the physical time transfer. That is, each household bears the real storage costs strictly in relation to its concrete time preference. Let us express the real storage costs $\bar{X}_S$ as certain part of the inventory, then we can calculate a real rate of interest for period$_2$:

$$J_2^{real} \equiv \frac{\bar{X}_2^* - \bar{X}_1}{\bar{X}_1} \quad \text{with} \quad \bar{X}_2^* = \bar{X}_1 - \bar{X}_S \tag{20}$$

The real rate of interest is negative and at best zero if there are no real storage costs. This means that, if we abstract from the monetary sphere and thereby reduce the structural axiomatic consumption economy to a real model, a positive rate of interest cannot be derived from the aggregate time preference of the household sector. Let us generalize this result: in all real models the real rate of interest must be negative if a real time transfer takes place.

A positive rate of interest can only occur in a money economy. Here the rate of interest is determined by the production conditions of the banking unit. Therefore a money economy is not a real economy with absolute prices determined by the quantity of money. It is *qualitatively* different because it turns the negative real rate of interest into a positive rate. In a money economy the negative real interest is paid for by all households; it is invisibly redistributed by a higher price and vanishes from sight. The monetary rate of interest is visible as interest on loans and as a premium for parting with liquidity.

It is important to distinguish between complementary time preferences of individual households and aggregate time preferences of the household sector. Complementary time preferences have been discussed in part (I) (2011c, p. 7-9). Expressed in real terms the complementary case consists in *A's* handing over 10 units of current consumption good output to *B* in period_1 and receiving at least 10 units back out of the current consumption good output in period_3. For this case a real rate of interest is calculable. However, no *real* time transfer comes about in this case. Current output is voluntarily redistributed between household *A* and *B*; first in period_1 and then in period_3. The time link consists of a claim of household *A* and an obligation of household *B*.

The point for a money economy is: one cannot distinguish between complementary and aggregate saving by looking only at the saver. When a household saves, two things can happen: there is a complementary dissaving within the household sector and the business sector is not affected, i.e. $\rho_E=1$. No real time transfer takes place. Or, second, a complementary dissaver is lacking. This affects the business sector because of $\rho_E<1$. Hence saving is an ambiguous term. Without further qualification it is not clear whether we talk of *household* saving or of *household sector* saving. This has repercussions for the theory of interest. From complementary household saving a positive real rate of interest can be derived. From household sector saving a negative real rate of interest follows.

It is hard to think of saving without habitually thinking of investment. Hence it could be said that the saving of the household sector corresponds to the inventory investment of the business sector. This, though, is not a good idea as shall become obvious presently.

1.3 Nominal and real asymmetry

The process of nominal saving–dissaving is the same as depicted in Figure 1, but since no real saving-dissaving in the form of inventory accumulation and decumulation takes place the curve in Figure 2 remains flat.

Period$_1$

Again, the household sector as a whole is supposed to save, i.e. $\rho_E<1$. The business sector now reacts with a price reduction, such that the whole period output is sold. The product market is cleared, i.e. $\rho_{X1}=1$. In contradistinction to the symmetric case no inventory builds up.

The price can be derived from the axiom set as dependent variable. Under the condition of market clearing and zero profit distribution the market clearing price depends alone on the expenditure ratio and unit wage costs:

$$P_1^* = \rho_{E1}\frac{W}{R_1} \quad \text{if} \quad \rho_{X1} = 1 \quad |1 \tag{21}$$

The market clearing price falls since consumption expenditures fall while total income remains unaltered according to (1), hence $\rho_{E1}<1$. The lower price effects a redistribution of current output from savers to nonsavers because the purchasing power of their unchanged consumption expenditures is now greater. In real terms we have complementary saving and dissaving with the difference that the nonsavers have not lost one thought about becoming real dissavers. Distributional effects, however, can be excluded by assuming that all households save in proportion to their individual income. In this case there is nominal saving but no real saving because each household gets the same share of the unaltered output as before with lower consumption expenditures at a lower price.

The financial loss of firm$_1$ is given by:

$$Q_{fi1} \equiv P_1^* X_1 - WL_1 \quad |1 \tag{22}$$

Since there is no valued inventory nonfinancial profit is zero and the former zero total profit turns into a loss.

The liquidity of the household and business sector taken together is zero because the valued inventory in (14) is absent.

Since wage income remains unchanged and consumption expenditures decline current overdrafts of the business sector increase as a mirror image of the current deposits of the household sector. No alterations occur in the movements of deposits and overdrafts in Figure 1 compared to the symmetric case.

Period$_2$

The business sector again takes up a loan but this time it cannot offer the valued inventory as collateral. In order to grant the loan the officer at the credit unit of the central bank has to ignore the rules of sound banking. De facto the greater part of the loss of period$_1$ is financed.

The expenditure ratio is again unity and the price returns to its former level, but not completely because of the temporary existence of the credit unit. The reallocation of labor input and the temporary reduction of the consumption goods

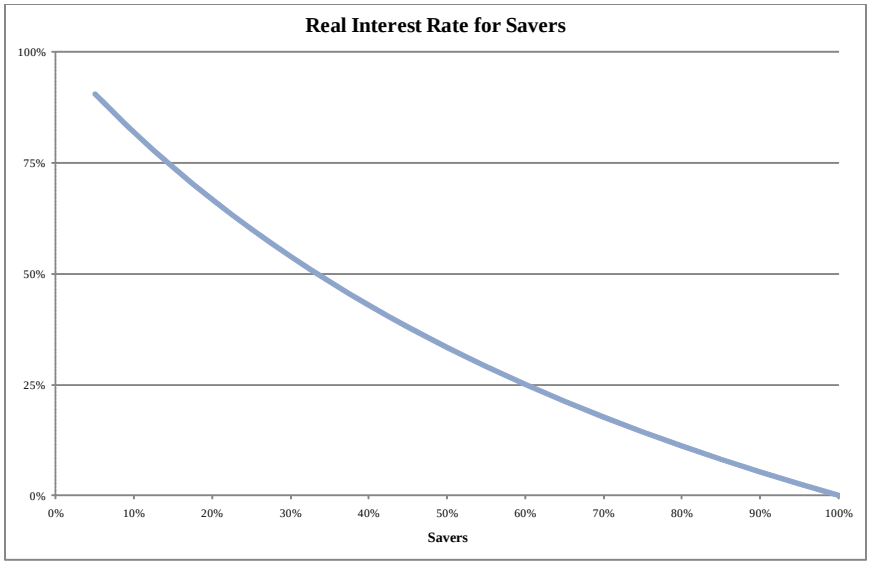

Figure 3: Relation of the fraction of savers and the real rate of interest for one full period

output is the same as in the symmetric case above. However, the interests on the loan can now hardly be subsumed under storage costs.

Period$_3$

The household sector dissaves again. With an expenditure ratio above unity the market clearing price must be higher according to (21). This effects a redistribution of current output from nonsavers to the now dissaving group A.

Financial profit is positive and the business sector pays off the overdrafts as shown in Figure 1. With regard to cumulated total profits over the whole time span symmetry or asymmetry makes no difference.

In real terms there is no physical time transfer, only a redistribution of the current outputs in period$_1$ and period$_3$. This redistribution is in accordance with the time preference of the savers. The nonsavers play their complementary role involuntarily. This process cannot be reproduced in a real economy because of the lack of voluntary dissavers. Their real dissaving and saving is not the result of rational choice. Hence neither a positive nor a negative real interest rate can be derived for a real economy. This is possible, however, for the money economy. Depending on the fraction of savers the real rate of interest is, for example, about 82 percent if 10 percent of households are savers. This real interest rate, which is invisibly induced by price changes, declines as the group of savers becomes larger (see Figure 3). It declines also if wages increase in the meantime.

With regard to the quantity theory one can observe a lower price in period$_1$ and this correlates with a higher quantity of money. In period$_3$ it is just the oppo-

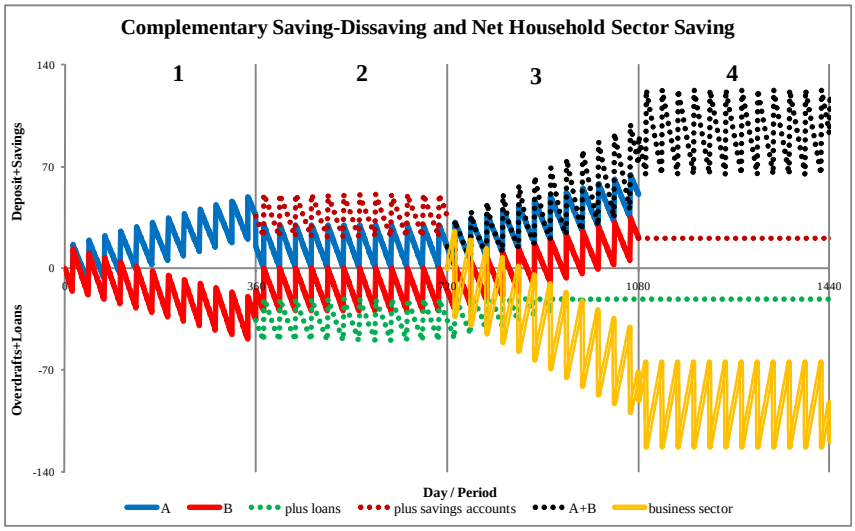

Figure 4: Complementary saving–dissaving and net household sector saving

site. These observations are *contrary* to what should be expected according to the commonplace quantity theory.

With regard to the saving-equals-investment tenet it has to be emphasized that there is saving-dissaving in the asymmetric case but *nothing* that could be subsumed under investment. Hence it must be something wrong with the assertion that saving and investment are equal by logical necessity (2011b, p. 21).

2 Assets, liabilities, and the quantity of money

For easy comparison part (I) and (II) are combined in Figure 4. Households *A* save in period$_1$ and put their money in savings accounts in period$_2$. In parallel households *B* dissave and take a loan from the banking unit. Current deposits and overdrafts of the households mirror each other. The condition $\rho_E=1$ ensures that the consumption goods producing industry is not the least affected by changes of the expenditure behavior of households because these changes are compensated *within* the household sector. The behavioral changes materialize in the monetary sphere.

In period$_3$ *both* groups save and the household sector's expenditure ratio ρ_E is less than unity. The buildup of current deposits is mirrored by current overdrafts of the business sector. In period$_4$ the expenditure ratio is set to unity.

The household sector's assets consist in period$_4$ of current deposits and saving accounts. Part of the current deposits is used for transactions the rest is at first held as a free reserve. The household sector's liabilities consist since period$_2$ of a one-period loan that is revolved in subsequent periods.

The business sector's liabilities consist in period$_4$ of current overdrafts of which one part is fix and the other varies with current transactions.

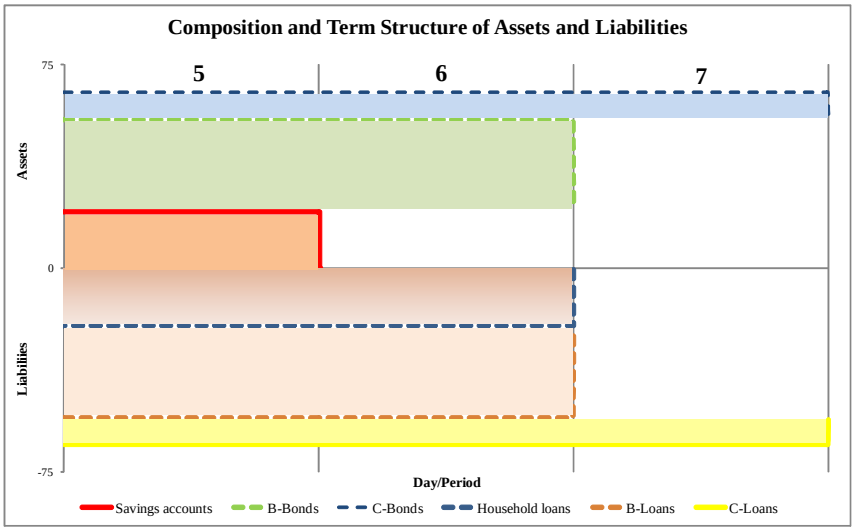

Figure 5: Household and business sector's assets and liabilities excluding transaction balances

Both, the household and the business sector then restructure their assets and liabilities. The result is shown, as an example, in Figure 5. The household sector's loan from the banking unit is now fixed for two periods. This loan is refinanced by one-period savings accounts. The banking unit expects that the savings accounts are renewed more or less completely after the first term.

The banking unit redeems a part of the business sector's overdrafts by granting a two-period commercial loan and issues two-period, i.e. very short-term, bonds that are in full amount sold to the household sector. Correspondingly the free current deposits of the household sector diminish. The asset side of the banking unit is exactly equal to the liability side. The credit leverage is unity, the term leverage is greater than unity.

To consolidate the rest of the fix part of current overdrafts the business sector issues three-period, i.e. very short-term, bonds. These corporate bonds are in full amount sold to the household sector. Thereby the household sector's current deposits and the business sector's current overdrafts vanish by the same amount simultaneously from the central bank's balance sheet. The quantity of money declines.

After this consolidation the role of the transaction unit is again reduced to the execution of day to day transaction between the business and the household sector. The household sector's free current deposits are zero. The bonds are subsequently traded in the short-term segment of the capital market. This, however, presupposes the creation of new free current deposits because at the moment there exists no buyer with free reserves of current deposits. There are only transaction balances left over.

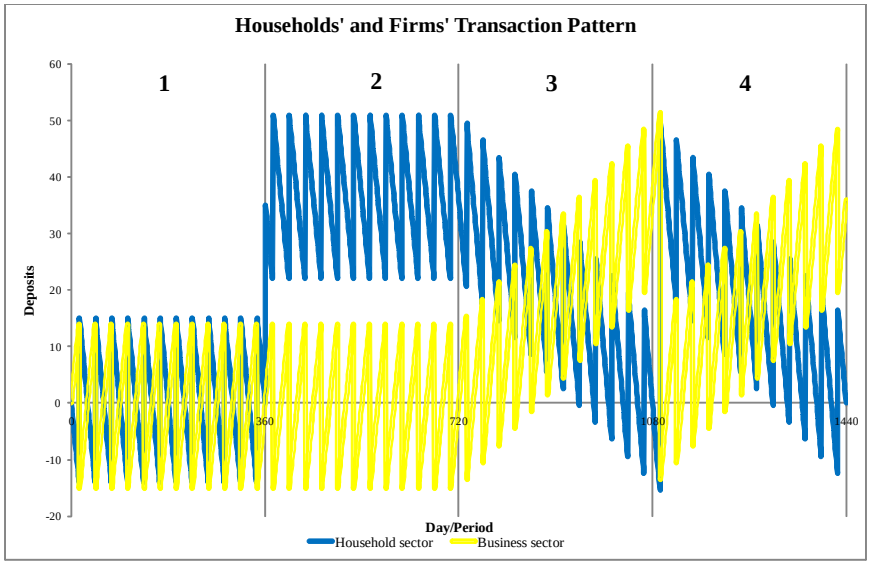

Figure 6: Monetization of nonfinancial assets; subsequent spending and then full spending out of profit distribution

With regard to the quantity theory it follows that all these purely financial transactions, which ultimately reduce free current deposits to zero, have *no* effect on the price of the consumption good.

3 Monetization

Money in the form of current deposits has been entirely endogenous until now. Exogenously induced changes, however, are possible at any time and have to be formally incorporated. The quantity theory was conceived in the sixteenth century as a theoretical response to the price increases set off by gold and silver discoveries in the New World. This exogenous impact is now reconstructed in structural axiomatic terms. In order to obtain the means of payment the households sell gold to the central bank. The quantity of money increases. For the further development basically two routes are open.

3.1 Spending and profit distribution

The household sector gets in the possession of a certain quantity of gold in period_1. As shown in Figure 6 this appreciation of the household sector's nonfinancial net worth has at first no effect on the average stock of transaction money and on spending. Profit of the consumption goods producing firm is zero. The operating costs of the central bank are ignored and the transaction price is zero.

At the beginning of period_2 the gold is sold to the central bank and we see a steep increase of current deposits. The balance sheet of the central bank lengthens

and the composition of net worth, i.e. the household sector's portfolio of financial and nonfinancial assets, displays a higher liquidity. That part of current deposits at the central bank that is backed by gold is outside money, i.e. money that is no longer a symmetric liability of the household or business sector. Profit is still zero. It is assumed that labor input and product output remain unchanged over all periods.

In period_3 the households successively spend their additional money balances. Consumption expenditures rise above the unchanged income, i.e. $\rho_E > 1$. The market clearing price increases:

$$P^* = \rho_E \frac{W}{R} \quad \text{if} \quad \rho_X = 1; Y_D = 0 \quad |3 \tag{23}$$

The price increase lags one period behind the monetization of gold. The lag is arbitrary and can very well be much longer. The insertion of (23) into (22) gives for financial profit:

$$Q_{fi} \equiv WL(\rho_E - 1) \quad \rho_X = 1 \quad |3 \tag{24}$$

With a higher expenditure ratio the business sector posts a profit at the end of period_3. Financial profit and dissaving of the household sector are of the same amount under the given conditions. So far we have simply rephrased the familiar quantity theory scenario: money up, price up, profit up. These are the favorable effects that have been observed since Hume (Hicks, 1973, pp. 258-259).

As the households run down their free current deposits those of the business sector increase. After the household sector has handed over the fresh money to the business sector in period_3 no further additional spending is possible in the following periods. The expenditure ratio returns to unity and the price increase is *reversed* under the condition of market clearing. The injection of outside money causes a one-time price hike. All depends now on what happens in the subsequent periods. One way to keep price on the higher plane is to repeat the injection in subsequent periods.

The other way is profit distribution, i.e. $Y_D > 0$ in (1), and full spending of distributed profits. Thereby income mounts exactly to the level of consumption expenditures reached in period_3. The payout of distributed profit income takes place at the beginning of period_4. The corresponding consumption expenditures are evenly distributed over the rest of the year. The market clearing price is given by

$$P^* = \frac{W}{R} + \frac{Y_D}{RL} \quad \text{if} \quad \rho_X = 1 \quad |4 \tag{25}$$

and equal to that of period_3, i.e. to (23). Profit and distributed profit are equal in period_4; retained profit is therefore zero. This configuration of income, price, and profit can be repeated indefinitely (cf. Tobin, 1970, p. 316).

The one-time injection of outside money conducts to a higher price and to a lasting alteration of the income distribution (2011a, pp. 8-11). The effects of this injection are not different from a straightforward increase of the expenditure

ratio with the exception that there is no need for the household sector to increase overdrafts.

If the central bank is legally bound to buy on request certain nonfinancial assets from the household sector it cannot autonomously control the quantity of money, but has to resort to indirect countermeasures. Compared to period_1 price and the average stock of transaction money are higher, just as to be expected if one believes in Hume's doctrine (Blaug, 1995, p. 27). In addition to Hume's qualitative account the structural axiomatic approach allows for the identification and quantification of every single link in the transmission mechanism. It is important to recall, however, that we have simplified a lot and left out many details, therefore it would be premature to expect a straightforward proportionality of price and the average stock of transaction money.

Figure 6 makes it immediately clear that the transaction patterns of period_1 and period_3 are wildly different. Therefore the transaction index κ is not constant and for this reason alone proportionality cannot be expected according to the transaction equation of part (I). Moreover, the chain of events is not a deterministic one. The households may very well be content with the monetization of their gold and with the new composition of their net worth. In this case the adaption process ends in period_2 with a higher quantity of money and no price increase.

3.2 Trying to get rid of liquidity

An alternative route open to the individual household is to switch from current deposits to, for example, interest bearing savings accounts at the banking unit. Given the structure of Figure 5 the banking unit, though, has no incentive for lengthening its balance sheet on the asset side with current deposits and on the liability side with additional savings accounts because the effect on the profit and loss account would be negative. The banking unit, however, is always intrigued by a lower interest rate on existing savings accounts. But a full replacement of existing accounts by new and cheaper ones would only transfer the current deposits from the new possessors of saving accounts to the old ones. Seen from the behavioral perspective the situation becomes stable only if the lower rate of interest motivates the households *taken as a whole* to hold the current deposits voluntarily. That is, the overall liquidity preference has to grow stronger with falling interest rates on savings accounts. Collectively the households cannot get rid of liquidity in this way.

Basically the same holds if the households that are equipped with fresh current deposits enter the capital market in order to buy bonds. The change of bond holders is simply mirrored by a change of deposit holders. Only when the effective rate of interest on bonds falls sufficiently to motivate the households *taken as a whole* to hold the current deposits voluntarily the situation becomes behaviorally stable.

A loan repayment effects only a change of ownership of current deposits at the transaction unit of the central bank. The households are replaced as owners by the banking unit. The amount of current deposits remains unaltered; they do not vanish by purely financial transactions.

The additional demand for financial assets drives down the interest rate and drives up the value of bonds. In the limiting case the interest rates approach zero and the bond values go through the roof. As long as the current deposits are not held voluntarily at some 'normal' rate of interest there is the risk of an asset price inflation. If the liquidity preference does not only depend on the rate of interest but also on rising or falling asset prices, liquidity preference will be *negatively* related to rising prices of financial assets and this in turn establishes a *positive* feedback loop. The simple arithmetical fact that, with a *given* amount of current deposits and rising asset prices, the real demand exhausts itself puts a brake on positive feedback. This, however, does not necessarily prevent a bubble in a particular sub-section of the financial market.

In our model case we have, in sum, basically three effects of a one-time monetization of nonfinancial assets:

- A one-time price hike of the consumption goods if the households increase consumption expenditures and the business sector does not distribute profits and holds the additional current deposits.
- An increase of the price of consumption goods that lasts as long, yet does not accelerate, as profits are fully distributed and then fully spent by the receivers of distributed profits.
- A fall of the rate of interest of financial assets, or, what amounts to the same, an increase of the price of bonds.

Seen from the business sector all these effects are favorable. Since employment has been kept constant by assumption there is at the moment no improvement for the households *taken as a whole* in real terms. The real effect consists in the redistribution of output among the receivers of wage income and distributed profit income.

It is obvious, indeed, that the monetization of nonmonetary assets creates ideal conditions for an employment expansion. Moreover, an employment expansion curbs price increases according to (25). For a creeping or galloping inflation of consumer prices therefore a lot more is needed than a one-time purchase of nonfinancial assets by the central bank. As a matter of principle a nominal demand expansion can result in an employment expansion at given prices (2011d, p. 5). Abstracting from finer details and second round effects the structural axiomatic analysis of the transmission mechanism by and large confirms, for the pure consumption economy with given employment, the correlation between exogenous increases of the quantity of money and the price of consumption goods and/or financial assets.

4 Conclusions

The main results of part (II) are:

- There are basically two ways of realizing the aggregate time preferences of the household sector: symmetric nominal *and* real saving–dissaving and nominal saving–dissaving without a real time transfer of output. In the symmetric process the time preference of all households taken together has a real counterpart in the accumulation and decumulation of the business sector's inventory.
- In the symmetric process there is no relation between price and the increasing and decreasing quantity of money.
- In the asymmetric process the relation between price and quantity of money is just the opposite of what should be expected according to the quantity theory.
- In all real models the real rate of interest must be negative if a real time transfer takes place.
- A positive real rate of interest can only occur if the households' time preferences are complementary. In this case no real time transfer takes place.
- In the asymmetric process, which cannot be reproduced in a real economy, the real interest rate is derived from price and distributional changes that are effected by nominal saving–dissaving.
- A restructuring of the household- and business sector's assets and liabilities that reduces the quantity of money has no effect on prices.
- The classical case of the quantity theory is the monetization of gold with subsequent spending. This has basically two effects in the structural axiomatic consumption economy: a) a one-time price hike if the business sector does not distribute profits and holds the additional current deposits, and b) an increase of the price of the consumption good, that last as long, yet does not accelerate, as profits are fully distributed and then fully spent by the receivers of distributed profits.
- The one-time injection of outside-money leads to a fall of the rate of interest on financial assets, respectively to an increase of the price of bonds. Since the additional liquidity does not vanish by purely financial transactions a higher liquidity preference is required. If the liquidity preference does not only depend on the rate of interest but also on rising or falling asset prices, liquidity preference will be *negatively* related to rising prices of financial assets and this in turn may establish a *positive* feedback loop in a particular sub-section of the capital market.
- The monetization of nonmonetary assets creates ideal conditions for an employment expansion that is not by necessity inflationary.

The commonplace correlation between quantity of money and price does not emerge in the symmetric or asymmetric process of real and nominal saving–dissaving, yet it emerges from the monetization of nonfinancial assets.

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