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THE "COMMODITY – MONEY – COMMODITY" MUTUAL CREDIT COMPLEMENTARY CURRENCY SYSTEM

Marxian money to promote community trade and market economy

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ABSTRACT

The Mutual Credit Currency System, this most radical form of endogenous money, was evaluated and compared with Marx's Commodity-Money-Commodity requirement. A simple simulation of a small community closed loop economy was used to illustrate the functioning of two types of mutual credit currency systems. The first, dubbed MCSG, behaved according to the specifications and recommendations of the mutual credit currency system's founding fathers, Riegel and Greco. The second, dubbed the Komoko Monetary System, or abbreviated to KMS, was a sub-type of the mutual credit currency system with some additional restrictions and one additional liberty. The main restriction introduced in the KMS was that it almost exclusively supported the exchange of only newly produced goods and services. The liberty introduced is forecast-based credit allocation. It was shown that the MCSG has an inconsistency that could potentially lead to instability. The restrictions applied within the KMS can provide a remedy for this potential flaw, while at the same time rendering the KMS compliant with Marx's requirement. The monetary control measures applicable in KMS were discussed, which guarantee robustness and stability and make KMS a true complement to the official fractional reserve banking.

KEYWORDS

Mutual credit system , Commodity – money – commodity, Cash flow forecast, Currency circuit, Monetary control, Endogenous money

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1. INTRODUCTION

The financial crisis of 2008 once again popularised Marx's critique of capitalism and his prophesy of its impending doom. Can the present day free-market economy, in spite of Marx's inimical attitude to capitalism, draw any positive lessons out of his works? In his Capital Volume I, Marx stated that the very precondition for exploitation lies in the capability of capitalists to conduct business in a perverted way. Instead of exchanging goods for money to produce new goods (Commodity-Money-Commodity or C-M-C), businesses are run so as to exchange money for goods in order to earn more money (Money-Commodity-Money or M-C-M) . In his Capital Marx introduces the two ways of the money circle i.e. C-M-C and M-C-M but he doesn't elaborate on this division. There are no further references to these money circles in Marx's works. Most likely Marx thought that the deplorable M-C-M money circle would, in any case, be eradicated in the communist paradise. Nevertheless, it will be shown in this paper that reference to the C-M-C money circle has inherent value. Other Marxian ideas are ignored.

According to DeMeulenaere (2008) mutual credit currency systems (MCS) ranked third and LETS systems ranked second globally among the complementary currency systems. While the former are nominated in monetary units, LETS are nominated in hours of labour. MCS and LETS systems feature mutual i.e. dispersed issuance of currency pertaining to all members and thus both systems can be classified as of mutual credit type. Mutual credit type systems differ from the existing official fractional reserve banking (FRB) in that FRB features concentrated money issuance authorities embodied in central and commercial banks. In FRB, however, there is one exception to this rule, that is overdrafts. In the UK, for instance, in 2012 around 8% of bank money supply needed by businesses was created from overdraft facilities, which, in essence, is identical to mutual credit dispersed issuance of money. The basic tenets of MCS were laid down by Riegel (1949, 1978) and further developed by Greco (2001, 2009, 2013). MCS, by design, is endogenous money as there is no central money issuing authority. All money is created by the economic agents drawing down on their overdraft facility according to the needs of their trade, or, as Riegel (1949) puts it:

Each person or corporation is entitled to create as much money, by buying, as he or it is able to redeem by selling.

It is arguable to which extent the contemporary FRB currencies can be considered endogenous money taking into account recent exogenous shocks such as quantitative easing. However, there is one much more pronounced difference between FRB and MCS. MCS is community money never intended to support speculation, whereas FRB's monetary authorities are doing whatever they can to satisfy and balance the needs of productive and speculative economic agents simultaneously and continuously.

Can the mutual credit system (MCS), if implemented consistently with its basic tenets, fulfil the rather rigorous Marxian C-M-C requirement, seemingly incompatible with the free-market economy, and does this fulfilment have anything in common with MCS's successful growth and stability? A special implementation of MCS called 'komoko' for short, and phonetically 'Commodity-Money–Commodity' and written in its longer form as the Komoko Monetary System (KMS) will be explained. In contrast to MCSG, KMS leaves not just the issuance of currency to businesses, but, based on their own forecasts, also the authority to allocate the overdraft limits. It will be shown that KMS is compliant with Marx's requirement and that this compliance has potential beyond just improving the performance of the existing mutual credit currency systems. KMS only, and not an arbitrary implementation of MCS, can in fact successfully complement, in the true mathematical meaning of this word, the fractional reserve banking (FRB) monetary system as intended by the founding communities in the support of its basic goals (DeMeulenaere, 2008). It will be shown that the 'complementary' must pertain in as much as possible to the exchange of newly created goods and services in contrast to the exchange of old durable and capital goods.

Neither Riegel nor Greco dealt with MCS monetary control in particular. This paper introduces a novel monetary control measure called overdraft limit offset (OLO) applicable to MCS.

The approach is theoretical, but its purpose is to provide a set of practical guidelines to improve the performance and the success of the existing MCS and to encourage their broader adoption by the interested communities. The

discussion presented in this paper is based on a simple simulation which is not included fully in the journal issue for the sake of clarity. Simulation can be provided to interested parties by the author.

List of novel abbreviations used:

KMS - komoko monetary system

MCSG - mutual credit monetary system which allocates overdraft limits according to the specifications and recommendations of the mutual credit currency system's founding fathers, Riegel and Greco

MCS - mutual credit monetary system (generic term which covers KMS and MCSG)

KMK - komoko currency

OLO - overdraft limit offset

2. MODEL AND SIMULATION

The features of KMS were tested and compared to MCSG using a simple simulation consisting of six scenarios, all using the economy of a fictional self-sufficient Midwestern town as its subject. Excel was used as the simulation tool and the results of the first scenario can be seen in the ledger table S1E1 shown in Appendix A. The relevant economic entities are: the people, the merchant, sector I+II, sector III, the town and a carpenter. The people column stands for the population of the town and its neighbourhood, consisting of farm workers, industry workers, services workers, public servants and owners of businesses. Agriculture (farming and cattle breeding) and mining are considered as sector I. Industry is considered as sector II. Sector I and sector II are grouped together as there is no difference between the two with respect to the money use in the presented examples. The services sector is displayed as sector III. The carpenter, who could be qualified as sector II or sector III, depending on what kind of project he/she is working on, is displayed separately to expose some special features of KMS. The merchant is considered separately from the previous three sectors. The public sector is displayed simply as "town". The ledger table shows transaction and balance data for the respective accounts. Both the carpenter's and the merchant's accounts displayed are their business accounts, their private accounts are aggregated in the people's account. The period of interest covers those economic events taking place within one month. The year used throughout all the examples is 2017.

The currency used is 'komoko' with the abbreviation KMK. The basic assumption is that simulations pertain to a scenario of zero growth and zero net capital formation. The premise of zero net capital formation is that all the goods created and services rendered in the economy are consumed within the same period and there is no additional accumulation of assets. Zero growth means that Gross Domestic Product (GDP) of the current period is the same as GDP of the previous period. Two thought experiments will be described in the following sub-sections which will explain how KMS can support zero, positive or negative growth and also zero, positive or negative net capital formation.

2.1 List of scenarios:

S1E1 KMS - operation of KMS in a monthly cycle clearing all accounts and destroying all money at month end

S1E1 MCSG - analogous operation of MCSG in a monthly cycle not being able to clear all accounts at month end

S2E1 KMS- operation of KMS where the carpenter does not clear his account at month end

S2E2 KMS - explains the lending and borrowing in KMS

S2E2 MCSG - analogous to S2E2 KMS

S2E3 MCSG - analogous to S2E2 KMS, continuation of S2E2 MCSG.

3. FORECAST-BASED CREDIT ALLOCATION

Riegel (1978) proposed that, as he called it, debit limits should be determined for businesses by the class of industry and gross sales, and for employees according to their salary. Greco (2013) agrees with Riegel and provides some empirical guidelines about how to calculate the value of the overdraft limit (also credit line or overdraft privilege or credit allocation). According to Greco, the overdraft limit should, in essence, equal 100 days of average daily sales and the daily sales figures should be retrieved from the records of past transactions. However, it will be shown in this sub-section that Greco's method of credit allocation provides no guarantee that his discretionary figures will actually match the needs of the community for exchange.

The approach taken by KMS with respect to credit allocation is quite different. KMS calculates the real need of the community for exchange and, based on that, assigns overdraft limits as close as possible to the target values. Too generous overdraft limits could lead to inflation, too stringent overdraft limits could lead to a period of depression. Riegel (1978) and Greco (2001) are of the opinion that it is better to distribute a bit too much of the credit allocations rather than too little. However, to know what is too little, one must know what is enough. The ideal, set by Riegel (1978), which MCS implementations could measure against, is stable exchange. This translates into money supply being in sync with the supply of goods, services and labour on the market by constant values. Every economic unit has to have on their account enough credits or enough unused overdraft limit to purchase its intended goods, services or labour at any time. How much is that? Greco proposes that a thorough analysis of the past transactions of the account holder should be conducted in order to discern the right amounts. I contend, that this may well be good for some accounts, under the assumption that sophisticated software analysis tools are at hand. But why steer the system by looking back on past data when the events ahead of us could be anticipated in the first place? Account holders may have various spending and earning patterns. It is true that the most frequent pattern is that of earning and spending of employees. They spend minor amounts every day and they earn once a month. Businesses have distinctive earning and spending patterns. Each industry has its own specifics. Farmers usually earn only once or twice a year when they sell their crops. They spend on a daily basis for their living expenses and spend seasonally on seeds, fertiliser and so on. The patterns of income and expenditure for some businesses may appear unclear if observed as time series data by a computer programme, yet for businesses their respective earning and spending patterns should be quite predictable. The very core of running any business is to prepare a forecast of money (cash) flow. That information is sometimes requested even by ordinary banks from their credit applicants. Mutual credit currency systems are based in communities which should exercise a higher level of connectedness compared to the relationships in a society governed just by the rule of law. So, it is not overly ambitious for the KMS to request regular cash flow forecasts from those businesses who have less predictable earning and spending patterns. Every business should regularly submit its forecast as the building block of a KMS regulatory mechanism, whether they need an overdraft, a loan, or are just part of the exchange. Every forecast, if made properly, should have the timeline of expected revenues and expenses. As such, it should yield enough data to calculate the necessary account's limit(s) in the forecasted period. In this manner, KMS will provide every economic agent with the funds necessary to participate in the production and exchange. More precisely, on a revolving basis KMS will finance working capital plus anticipated profits for businesses and salaries or other incomes for consumers. The forecasts do not need to be consolidated as this isn't necessary for the purpose of overdraft limit calculation and is also not possible in real life. For every account, the running balance is calculated based on the timeline of expected deposits and withdrawals in the forecast. Based on the running balance, the monthly and cumulative period overdraft limits are calculated.

In KMS there will be two types of forecasts. Simple forecasts will be done by the KMS itself for the account holders who agree and have predictable forecasts. It is expected that the majority of employees will fall into this category. The complex forecasts will be done by the businesses themselves. The forecasted period in the complex forecast must be equal, or longer than, the minimal period required by the KMS, and the closing balance of the forecast must be non-negative but not bigger than the opening balance. This requirement mandates the businesses to re-

veal their sales and business cycles. The business cycle of an account holder is the period in which its account balance is brought to zero. The sales cycle is the period between two major sales whereby not just the delivery of goods or services but also the related collection of revenue i.e. payment, is taken into consideration. If account holders anticipate excess funds in the forecasted period, they should forecast a transfer of their funds to some other account to comply with the requirement. This forecasted withdrawal could be a payout of dividends or some other KMS permitted investment or saving, such as a purchase of bonds or shares. This will promote the clearing of the credits. Analogously, if account holders anticipate lack of incomes out of sales in the forecasted period, they should forecast the requisite funding from other sources as they are supposed to do as part of running a business, however, this should be indicated in their forecasts. If the forecasted funding is named a KMS loan, then this would be considered as a loan application by the KMS. When the business outlook is bleak and the non-negative closing balance requirement can't realistically be fulfilled, then the business doesn't need working capital, it needs investment. The overdraft privilege isn't the right instrument to cover such needs, neither may this be a loan granted by the KMS bank based on the savings of the other account holders.

The issue with business forecasts is their credibility. Businesses might be tempted to make their forecasts more pessimistic with respect to time and more optimistic with respect to revenue as the mutual credit currency system will provide potentially as much working capital as they need. In other words, businesses will try to inflate the expected revenues, but at the same time they will try to predict them being shifted further in the future. The initial strategy of KMS to cope with this tendency is to anchor the forecasts. This anchor is based on past transactions. At the beginning of KMS operations the account holders are expected to provide some proof of past sales revenues and business outcomes. Tax returns and bank statements may suffice for small businesses and payslips may suffice for employees. Medium and large businesses should provide their P&L and balance sheet data. Those who can't provide verifiable data should not be granted a serious overdraft privilege. The history of transactions may be preventing the business from receiving more credit in the current period than previous period incomes and expenses allow. So, the anchor should be offset for sales patterns such as seasonality, steady long-term growth and similar. In addition, the anchor should be offset for the agreed upon economic outlooks by the community.

Schraven (2001) showed that community currency systems need not collapse under opportunistic behaviour. This means that with time, and with proper MCS design principles being implemented (Schraven, 2001), it can be expected that the level of trust among the community members will rise. The anchoring of forecasts should become less and less stringent. The forecasted growth rates which exceed the growth rates extrapolated from the past transactions (offset for the sales patterns), would be translated into the overdraft limits increases ever more.

When a business predicts growth, which demands an increase in working or fixed capital that exceeds the overdraft limit granted based on the anchored forecast, then the business should apply for a loan at a KMS bank or seek some other source. Not all loans applied for may be granted in the KMS, even when there are enough savings announced in the forecasts. So, not all forecasted savings may be balanced by the loans granted. The surplus of forecasted aggregate savings plus the surplus of the forecasted aggregate bond and share purchases and sales plus the forecasted aggregate net exchange of KMK are the forecasted aggregate net savings, a measure used in the KMS monetary control.

Throughout all simulations, the assumption is that the forecasted overdraft limits in KMS equal the actual overdraft limits. Thus, the overdraft limit of each account was calculated simply as the account's minimum balance in the whole period of simulation. In reality, discrepancies should be expected. How to deal with them will be explained in the monetary control sub-section. KMS limits are calculated so that the account holders are always liquid. Businesses never run out of working capital to cover the costs of labour and material. However, once in the period, every account is cleared.

The MCSG limits are set differently. According to Greco (2013), an absolute maximum line of credit, based on past experience, would be the volume of sales made within the system over about a three- month period, rounded up to 100 days. At the start-up phase of the MCSG, Greco proposes a much lower limit of up to 20 days of sales.

In any MCS, the buying potential of an account holder at the beginning of operations equals the overdraft limit. Once transactions are recorded the buying potential equals overdraft limit plus balance. The question is wouldn't

business and individual account holders be tempted to convert the excess buying potential into savings to earn some interest? In KMS the transactional accounts won't yield any gain through interest. The interest on the saving accounts will be regulated by the supply and demand, which means some positive interest gain is hypothetically possible. So, the idea of converting the excess buying potential into savings seems plausible. However, in KMS this isn't possible. The calculated buying potential of any account holder in KMS reaches zero at least once in its business cycle, because the overdraft limit of the account is calculated so. The excess part of the buying potential is, thus, never exploited.

The initial simulation S1E1 of KMS is set up so that at the end of the month no liabilities remain open, all the money is cancelled out. Theoretically, such an economy could have gone on perpetually using money and destroying it in a monthly cycle. This demonstrates the basic capability of KMS to comply with the Marxian requirement of a Commodity-Money-Commodity type of economy. In reality, this would probably never happen because different businesses have very different business cycles which overlap and some portion of the total money mass is always in the system. However, KMS is designed so that each business alone reaches a point where all its money is exchanged for goods or services and its balance is cleared of credits and debits once in its forecasted business cycle.

The comparable behaviour of MCSG in scenario S1E1 would probably be quite different. The overdraft limit of account holders, when calculated according to Greco as 20 days of sales, would yield enough buying potential for some account holders to carry on with their business undisturbed, whereas it would leave some other account holders without enough credits to conduct their business, which, as a consequence, would surely impact exchange within the community. In scenario S1E1, the carpenter's buying potential at some point during the month is calculated at - 47.58 KMK, which is clearly impossible and just displays the inadequacy of 20 days of sales allocation principle. The second, more generous principle of MCSG, which assigns an overdraft limit equal to 100 days of sales to the account holders, does not leave any of the businesses in this scenario to conduct their daily business without necessary funding. However, it does lead to a different problem. In scenario S1E1 the buying potential of the carpenter is positive throughout the whole period with a minimum surplus of 662.10 KMK.

The surplus means that in MCSG, in addition to buying all the goods produced and services rendered in the period, some businesses can exploit the leftover and create money either by crediting so-called saving accounts or by directly investing into old durable and capital goods.

In scenario S1E1 MCSG, the working of MCSG is simulated with the overdraft limits set to their maximum, according to Greco, at 100 days of average daily sales. In this scenario, the smart merchant exploits its excess overdraft limit and buys a used car for 300 KMK. Now, this sum of 300 KMK lingers in the system. When overdraft limits are based on sales turnover and credits can be spent on old durable and capital goods, then MCSG can never be cleared or can be cleared only after reducing the overdraft limits to a level which causes a shortage of funds for some account holders and thus leads to a downward spiral. Hence, the arbitrary implementation of MCS does not comply with the Marxian C-M-C requirement. At the same time, under the assumption that the overdraft limits in MCSG are granted generously so as not to cause a shortage of funds, a situation ensues which can run out of control. Even if the only goods in the MCSG economy would be the newly produced goods and services, the surplus money supply of the account holders may drive prices up. For instance, the businesses may be interested in purchasing more materials than usual to make their production more flexible. This alone requires corrective measures. Greco recommends careful monitoring of the accounts. Neither Riegel, nor Greco provide any systemic solution to the problem of stability due to excess overdraft limits. When the MCSG economy isn't restricted to the exchange of newly produced goods and services, then the possible discrepancies between money demand and money supply are even more pronounced, and a question arises if any monetary control is good enough to cope with that.

4. SEPARATION OF EXCHANGE CIRCUITS AND CURRENCIES

Productive economy is, for the purpose of this paper, defined as an economy which exchanges newly produced goods and services and doesn't deal with the exchange of old durable and capital goods. It will be proven that any MCS, KMS inclusive, can successfully support the productive economy only and can offer very limited support, if any, to the exchange of old durable and capital goods. Keynes (1930) recommended various monetary policies to a Currency Authority contingent upon the needs of what he called Industrial circulation and Financial circulation

respectively. His division of currency circulation between Industrial circulation and Financial circulation coincides fairly closely with the division of exchange between the exchange of new goods and services and old capital and durable goods as used in this paper. The most quoted purposes for implementing a complementary currency system (DeMeulenaere, 2008) are the following: Community Development, Micro and Small Enterprise Development, Activating the Local Marketplace and Social Integration. One could easily imagine that founding a social business running a local version of the flea market using an alternative currency as the means of exchange is the perfect fulfilment of the alternative currency's mission. Furthermore, it is out of the question that any institution, organisation, movement, or even individual, truly devoted to the founding and development of complementary currency systems would think of using an alternative currency for speculative purposes such as trading shares, derivatives or other securities. Yet, the innocent local flea market and the highly speculative stock market or foreign exchange market, where most of the speculations take place, all have something in common which puts them in opposition to the common food marketplace. They all trade old goods in the sense that the substance which carries the value has, as such, already been purchased.

Let's suppose that a KMS account holder would exploit his/her buying potential and purchase an old puppet for 20 KMK in the local flea market instead of buying the usual meal in a nearby restaurant. Next, the hungry stall tenant would run into the restaurant and spend this 20 KMK to buy himself a meal. No harm would be done to KMS operations or market prices or the economy as a whole. The hungry stall tenant would step in place of the original buyer in the restaurant. This is possible because the velocity of money in the exchange of old goods is very high if the sums are small in comparison to the sales cycle of the individual economic unit. This means that no saving (hoarding) was necessary. If, however, the value of the old goods needed to be exchanged implies saving, then in KMS, or any other MCS, it gets more complicated. Hoarding means that the usual new goods or services aren't purchased and there is nobody to step in place of the buyer because the credits are still being hoarded for the sake of the purchase of the old goods. In reality, the velocity of money in the exchange of old durable goods isn't quite as extreme as described in the above flea market example. Buying and selling old durable goods, even when the values are small, still takes some time. The velocity of money in the exchange of old capital goods, securities in particular, is, however, quite high due to stock exchange transactions. Nevertheless, every flow of money needs some volume, even when the velocity is very high. In any monetary system, the flow of money that is dedicated to the exchange of old goods thus requires its own money mass, which must exist and flow through the economy in addition to the money mass necessary to exchange new goods and services. However, creating and infusing money mass into an economy for the exchange of old durable and capital goods represents an insurmountable challenge for any MCS.

One of the basic tenets of the MCS which differentiates it from the existing FRB is the nature of sureties required from the community members or loan applicants respectively. According to Riegel or Greco, in MCSG the credit allocation should be in proportion to the sales turnover, in contrast to FRB where loans are primarily granted in proportion to the value of assets. At first glance, it doesn't seem that the credit allocation policy would have any influence on the status of goods, either old or new, that can be exchanged for the respective currency. This should be no surprise in the case of the FRB policy, which in general does not discriminate on the type of assets either old or new when granting a loan, whether as collateral (i.e. a surety) or as the subject of the purchase. It is more complicated, however, in the case of MCSG. There is no explicit statement anywhere in the literature (Greco, Riegel), but it can be discerned that the sales turnover as the main criteria of the MCSG credit allocation policy pertains to the regular incomes, either salaries or revenues, of an account holder. Having an old house and wanting to sell it, or just being in a need of some money, shouldn't be grounds for credit allocation equivalent to the value of the house, or should it? Let's first analyse the more plausible interpretation, which is not to allocate the credit. How should the house then be sold? Where should the money come from? It is very unlikely that such a purchase could be financed from the transactional account. It could possibly be financed with a loan stemming from a so-called capital account (Greco, 2001). The capital account is supposed to finance the purchase of goods that hold value. Account holders who want to save would invest their credits and the account holders who want to purchase something valuable will get a loan out of this facility.

The following scenarios were simulated to explain the working of KMS and the inconsistency in MCSG reasoning:

- S2E1 simulates a situation in which the liabilities aren't cleared out at the end of the period (month) when the carpenter ends up with 275 KMK negative balance. People and sector I, II and III businesses have positive balances, but these balances can be named savings only in monetary terms. Economically these savings are balanced out by the depreciation of capital assets, but this isn't a monetary issue and thus isn't reflected in the transactions. All the simulations show only the monetary flows and balances, as this suffices to illustrate the hypothesis. Thus, a thought experiment can be performed which assumes that monthly depreciation of a community's assets is smaller or greater than 275 KMK and, consequently, the economy exhibits positive (or negative) net capital formation respectively. Yet, the underlying spreadsheet remains the same. This explains how KMS can also support net capital formation. Another thought experiment can be performed which assumes that the forecasted and actual overdraft limits were 5% lower in the previous period. Since KMS is designed to periodically clear accounts, the beginning of a period has no record of the past and thus a 5% increase of overdraft limits should lead to a 5% GDP growth, provided that forecasts are credible and the elasticity of supply can cope. Yet, the underlying spreadsheet remains the same. This explains how KMS can also support a growing (or declining) economy. In reality, the growth rates of different account holders will differ and the transactions among them will not change proportionally when compared to the previous year. Finding new ways to clear their accounts will remain the responsibility of each economic unit, much as it is their responsibility to remain solvent in any free market economy. The actual growth will then reflect their average success in doing that. How KMS deals with residual balances will be explained in the monetary control sub-section. In this scenario the carpenter has an established business and he builds one new house every year. According to the accepted policy coded in KMS, the carpenter is assigned an overdraft limit of 275 KMK per month and cumulatively 3300 KMK for one year.

- S2E2 interprets the lending and borrowing mechanism of KMS. After a year of construction, the house has been completed and is ready for sale according to the carpenter's forecasts. To make the example simpler, the house's market value is supposed to equal the costs incurred during the construction, plus VAT, and that amounted to 3960 KMK. However, now the carpenter faces a problem. No single entity in the economy has enough money to purchase the house. The only possibility for the house to be properly sold and paid for is by a loan. In the scenario the credit balances from people, sector I+II and sector III, were transformed into savings. Based on these savings, the bank was able to grant two loans. The new house was bought in two pieces. The second floor of the house was bought by a family which borrows 1440 KMK from the bank. The ground floor of the house was bought by a business which borrows 2520 KMK from the bank. After that purchase, no money exists in the system. From the perspective of risk taking, KMK loans correspond to credit union loans in FRB. The basic assumption of KMS loans is that a community of members exist who know, trust and care for each other enough, so that eventual individual losses from defaults would be consciously carried by other members of the community. KMS loans cannot maintain maturity transformation for saving deposits as usual in FRB. Maturity transformation means that loans issued would have longer maturity than the savings which supply them. The maturity of KMS deposits must correspond to the maturity of loans issued as their counterpart. The KMS bank would maintain an exchange facility where saving deposits could be exchanged for sight deposits at certain discount when the owners of the saving deposits would need money. The rate of discount would be dictated by the supply and demand of new investors versus sellers of saving deposits respectively. For individuals and businesses with enough fixed capital, there would be the possibility of borrowing from FRB banks under the usual terms. It is supposed that such FRB loans, if used to purchase new goods, would immediately be exchanged for the komoko currency. Inversely, individuals and businesses could make their savings within FRB, or an equivalent system, by exchanging the komoko currency for the official FRB currency. It is expected that individuals and businesses would choose the currency of their savings according to their expected expenses in the future.

- Two additional simulations S2E2 MCSG and S2E3 MCSG were performed which simulate the behaviour of MCSG implementation to compare it with the analogous S2E2 KMS implementation.

It can be concluded from S2E2 MCSG and S2E3 MCSG that MCSG empowers economic units to exploit the overdraft limits which exceed their need for working capital several times. MCSG can indeed support the exchange of

old durable and capital goods, at least to some degree, however, two questions arise. Why should economic units exploit their overdraft limits beyond their need for working capital, and by doing that can they act in any way better than the existing FRB bankers? Since there is no clear guideline in Greco (2009,2013) whether this is possible or not, both options must be discussed. If it is not possible or profitable for economic units to exploit their overdraft limits beyond their need for working capital, then MCSG fails to supply the additional currency needed, even to support the businesses which have inventory turnover cycles of longer than a quarter, for example, construction. This means that MCSG is even less able to supply the additional currency needed to support the exchange of old durable and capital goods. If it is possible, however, for economic units to exploit their overdraft limits beyond their need for working capital, then the businesses with positive money flow, or inventory turnover cycles of shorter than a quarter, must finance the businesses with longer than a quarter inventory turnover cycles via savings and lending. In the same way, the exchange of old durable and capital goods might be financed partially, or in whole, depending on the volume of exchange and the capacity of the MCSG limits. The only reason why the businesses would do this is interest. There are two differences between such versions of MCS and FRB. The first difference is that large businesses would step in place of bankers, but the deplorable nature of their incomes, stemming from the interest for fiat money, wouldn't change at all. The second difference is the risk of default, which is at least theoretically taken by the FRB banks, isn't taken by the issuers of money in MCS, but is instead taken by the MCS itself (via loan committee, Greco 2001). This would be a situation even worse than FRB.

The other option is that MCSG also allocates credit based purely on the value of old capital and durable goods. However, again, what then is the benefit of MCSG? It is also this feature of FRB, to create money based on the asset value only, which is the target of criticism of MCS's founding fathers and the cause of many of FRB's flaws and instability. So, in fact, any MCS, according to its basic tenets, cannot support the whole exchange taking place in an economy. It can only support the exchange of newly created goods and services. However, this is no disadvantage. Quite the opposite, this is the solution. The exchange of newly produced goods and services is a matter of the life and death of society as they must all be exchanged for money. Nevertheless, old capital goods don't need to be purchased at all as they can serve a purpose. For example, they can be rented out. The last financial crisis reminded us once again that there is a lot of speculation involved in the exchange of capital goods and that this market is exposed to huge price fluctuations and consequently to defaults. It would be very desirable if these disturbances could be contained within the sphere of speculation and the real productive economy could be somehow isolated from that. That is exactly what KMS can offer.

Keynes (1930) identified possible situations on the market which could lead to conflicting monetary control measures with respect to promoting Industrial or Financial circulation. Further, when dealing with the contemporary situation in the UK, Keynes (1930) writes (Book 5, p.14): "... nevertheless any change is desirable which would make it easier for the Central Bank to consider and deal separately with the Industrial and Financial Circulation."

The feature of KMS which more than fulfils this proposition by Keynes is a total separation of exchange circles by implementing two currencies, one for each of the exchange circles respectively. Let FRB, or some other currency, deal with the exchange of old capital and durable goods and let the KMS take over the support of the productive economy. Both exchange circles should be separated and connected at the same time by the floating exchange rate of their respective currencies.

For the separation to be effective, KMS when compared to MCSG introduces the following restrictions:

1. Limited trading with old durable and capital goods

    a. KMS banks will not grant loans to businesses for the purchase of old goods
    b. No overdrafts will be granted based on the value of assets only.
    c. Assets, if not bought as new goods and own shares when purchased for komoko, are the property of KMS. This includes all purchases of securities. There are only two exceptions to this rule. One is the acquisition of bonds from non-financial businesses. The other is the acquisition of new shares issued by non-financial businesses if the new shares raise the capital of the issuer. To this end, businesses are mandated to report on the value and composition of their non-current assets, equity and shares. Thus, the KMS community has the possibility to control the composition of a

business's own shares and the origin of its assets. Neither the former nor the latter, when not acquired new, dare to be purchased for komoko.

d. Aging of deposits and, following a grace period, progressive demurrage (=negative interest) for deposits on non-business accounts. When transactions are made between individuals, the deposits won't be rejuvenated.

e. If there is a business which is adding value to old goods, then only the added value of labour, raw materials and related margin, should enter into the KMS forecast. Consequently, sales turnover and credit allocation will reflect just the added new value. When these goods are sold on the market, the accounting must separately record the added new value in KMK and the purchase value of old goods in the original FRB currency. The transaction must be split and performed separately in each currency.

2. Businesses are mandated to provide forecasts.

3. Anything produced within the KMS system, meaning using a KMS overdraft or using a KMS loan, must be sold for komoko. This should be the contractual obligation of any account holder. The goods produced are the property of KMS until redeemed by the komoko currency. If an account holder produces goods within the KMS system without using an overdraft or loan, then he/she is also free to sell for some other currency.

4. Monthly overdraft limits for businesses that have longer sales cycles should be applied in addition to the cumulative overdraft limit based on the forecasted working capital requirement.

5. To assure C-M-C compliance, restrictions on KMS saving and lending such as:

   a. No transfer of funds via KMS saving and lending between the household and business sectors.
   b. Short term saving and lending within the business sector upon approval only to prevent bogus clearing of accounts.
   c. The forecasted payments of KMS loans and bonds should not exceed the forecasted profits for any business.

Keynes (1930) writes that attempts were made both in Great Britain and the United States to discriminate in terms of lending between financial and industrial borrowers, though with dubious success. However, there is much more potential in the total separation of the exchange circles than just easier and less conflicting monetary control measured quantitatively in terms of effort and costs expected from the Central Bank. The separation of the industrial and financial circulation by two currencies introduces not one, but three stabilising elements into the economy. As previously mentioned dealing with separate currencies for industrial and financial circulation reduces the complexity of monetary control and dispenses with the conflicting effects of monetary control measures upon one or the other exchange circle. Secondly, KMS, by design, does not permit the level of indebtedness usual in FRB. This is because KMS does not create new money when providing loans (not to be confused with overdrafts) in support of purchasing new goods and services, and, hence, does not create excess liquid assets which could be transformed into additional loans. Finally, KMS, by design, is a regulatory mechanism which, in itself, is much more rigorous than the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA), or its USA counterpart the Securities and Exchange Commission (SEC). In addition to bonds issued by the industrial sector, KMS supports one-time trading with one type of securities only i.e. new issued stock. The US Financial Crisis Inquiry Commission (FCIC 2011) contended that the main causes of the recent Great Recession can be attributed, apart from the issues of accountability and ethics, to inadequate control by the Federal Reserve, excess indebtedness of households and lack of regulation.

5. MONETARY CONTROL

KMS maintains the balance between money supply and money demand by design. KMS is a forward looking and bottom up monetary system, in sharp contrast to FRB, which is reactive and top down using statistical feedback. In KMS, the forecasts contain future sales (incomes) and purchases (expenses) which is the demand and the supply of money, balanced as predicted by the businesses. The other feature of KMS is that it deals almost exclusively

with a productive economy which has a very stable output and hence a very stable money demand. This makes KMS, for an order of magnitude, more stable than FRB. As such, KMS should only need minor adjustments while in operation. There are three main causes of instability which are targeted by monetary control measures in KMS. One is hoarding, i.e. saving on transactional accounts, for later use. The second is the lack of money supply due to the discrepancies between the forecast-based overdraft limits and actual data of the businesses. The third is the forecasted aggregate net savings.

The basic mechanism of control in any monetary system is interest. Complementary monetary systems, in contrast to FRB, in practice also apply negative interest (demurrage). KMS features one additional measure of monetary control. This measure is overdraft limit offset (OLO) which is an offset to the initially calculated overdraft limits. Overdraft limits can be changed, combined, or for the consumer and business sphere, separated. Usually OLO will be a proportional rise and sometimes to a lesser degree, it will be a reduction of the calculated overdraft limits. OLO can compensate for all three causes of instability. The basic purpose of this measure is to increase the money mass by raising all overdraft limits when there is a shortage or when the velocity of money falls. The latter is usually due to hoarding. The former is due to the other two causes of instability i.e. discrepancies of forecasts and forecasted aggregate net savings. These two causes can only be compensated by the proportional rise of overdraft limits. The goal is to keep the money flow at the target level. The money flow equals the exchange. Once risen above the forecasted levels, when the money flow and prices dictate so, the overdraft limits can be proportionally lowered in the next monetary control period, but probably never below the forecasted levels. The monetary control period most likely can't be shorter than a month, but it can be longer. OLO changes the periodical C-M-C account clearing requirement which is thus shifted from zero balance to the value of account's limit offset.

There are many possible reasons for hoarding. Keynes (1936) identifies three main motives for what he calls liquidity preference. These are transactions-motive, precautionary-motive and speculative-motive. While the money mass demand spawned by the first two motives do not vary much as they depend on general economic activity, according to Keynes (1936) it is the speculative-motive which causes changing money demand sensitive to the varying proportions between interest rates of bank money, bonds and shares of different maturity. From a KMS perspective, the transactions-motive can be satisfied by the overdraft facility. The speculative-motive does not need to be satisfied by KMS at all, as KMS does not support speculations. Individuals and businesses that are apt to speculate can do this as usual in FRB with the official currency under the authority of SEC and other known institutions.

The satisfaction of the precautionary-motive in KMS however, requires a bit more explanation. When the aggregate hording of cash and demand deposits of individuals tends to be neutral i.e. close to zero, then the precautionary-motive can be satisfied in KMS by an adequate OLO for all individuals. When the aggregate hording of cash and demand deposits of individuals tends to be positive, meaning that on the average individuals prefer to hoard credits instead of being in debt, then the precautionary-motive can be satisfied in KMS by positive OLO for businesses. Businesses are more rational. When provided with cheap loans, they can increase inventories and thus render their production more flexible and responsive.

So, even in KMS, no demurrage or other policy can totally eradicate hoarding induced by the precautionary motive. Hoarding can only be, and must be, compensated for by an increase of money mass. The recent popular quantitative easing is FRB's way of increasing the money mass. Luckily, KMS has a much more direct possibility of infusing money into an economy. The raise must be done as an offset to the anchored forecast-based overdraft limit in proportion to the sales turnover of the business unit, not in proportion to the assigned overdraft limit. Thus, the businesses with forecasted permanent positive balance will also be granted an overdraft to compensate for the effects of hoarding or mistakes in forecasts. To make KMS more robust, a certain positive OLO must be introduced at the beginning of KMS operations.

6. CONCLUSION

Pondering the repercussions of its present day control measures such as quantitative easing and close to zero interest rates, combined with the questionable ethics of those in charge of money issue, the existing FRB monetary system offers little confidence that it will suit the needs of communities any better than it has done so far. In such a situation one would expect Complementary and Community Currency Systems (CCS) to flourish, yet, I quote

Gomez (2015): "...the failure of CCS to scale up remains unexplained, quite like the question on whether they should scale-up, to what extent and on what grounds."

This paper answers the above question. Komoko introduces a borderline between the economy of used goods and the economy of new goods and services to which CCS should scale-up.

In a broader perspective, the progressive demurrage for deposits on non-business accounts, and the obligation to balance the accounts once in their business cycle for businesses in KMS, combined with OLO, should generate constant demand for new goods and services even in situations that provoke thrift, which together should render Keynesian type state intervention redundant and thus support the much valued autonomy of CCS when scaling-up to their full potential.

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APPENDIX

Table S1E1:

No		date	people		merchant		I+II sector		III sector		town		carpenter		people	merch.	I+II sec.	III sec.	town	carpent.	agg.	agg.
			D	C	D	C	D	C	D	C	D	C	D	C	balance	balance	balance	balance	balance	balance	debit	credit
0	opening balance	1. 1. 2017													0,00	0,00	0,00	0,00	0,00	0,00	0	0
1	weekly shopping	3. 1. 2017	90,00			90,00									-90,00	90,00	0,00	0,00	0,00	0,00	-90	90
2	weekly services	3. 1. 2017	90,00							90,00					-180,00	90,00	0,00	90,00	0,00	0,00	-180	180
3	shopping carpenter	3. 1. 2017				10,00							10,00		-180,00	100,00	0,00	90,00	0,00	-10,00	-190	190
4	services carpenter	3. 1. 2017								10,00			10,00		-180,00	100,00	0,00	100,00	0,00	-20,00	-200	200
5	salary public serv.+social transfers	5. 1. 2017		403,32							403,32				223,32	100,00	0,00	100,00	-403,32	-20,00	-423	423
6	weekly shopping	10. 1. 2017	90,00			90,00									133,32	190,00	0,00	100,00	-403,32	-20,00	-423	423
7	weekly services	10. 1. 2017	90,00							90,00					43,32	190,00	0,00	190,00	-403,32	-20,00	-423	423
8	shopping carpenter	10. 1. 2017				10,00							10,00		43,32	200,00	0,00	190,00	-403,32	-30,00	-433	433
9	services carpenter	10. 1. 2017								10,00			10,00		43,32	200,00	0,00	200,00	-403,32	-40,00	-443	443
10	weekly shopping	17. 1. 2017	90,00			90,00									-46,68	290,00	0,00	200,00	-403,32	-40,00	-490	490
11	weekly services	17. 1. 2017	90,00							90,00					-136,68	290,00	0,00	290,00	-403,32	-40,00	-580	580
12	shopping carpenter	17. 1. 2017				10,00							10,00		-136,68	300,00	0,00	290,00	-403,32	-50,00	-590	590
13	services carpenter	17. 1. 2017								10,00			10,00		-136,68	300,00	0,00	300,00	-403,32	-60,00	-600	600
14	weekly shopping	24. 1. 2017	90,00			90,00									-226,68	390,00	0,00	300,00	-403,32	-60,00	-690	690
15	weekly services	24. 1. 2017	90,00							90,00					-316,68	390,00	0,00	390,00	-403,32	-60,00	-780	780
16	shopping carpenter	24. 1. 2017				10,00							10,00		-316,68	400,00	0,00	390,00	-403,32	-70,00	-790	790
17	services carpenter	24. 1. 2017								10,00			10,00		-316,68	400,00	0,00	400,00	-403,32	-80,00	-800	800
18	weekly shopping	31. 1. 2017	90,00			90,00									-406,68	490,00	0,00	400,00	-403,32	-80,00	-890	890
19	weekly services	31. 1. 2017	90,00							90,00					-496,68	490,00	0,00	490,00	-403,32	-80,00	-980	980
20	shopping carpenter	31. 1. 2017				10,00							10,00		-496,68	500,00	0,00	490,00	-403,32	-90,00	-990	990
21	services carpenter	31. 1. 2017								10,00			10,00		-496,68	500,00	0,00	500,00	-403,32	-100,00	-1000	1000
22	VAT I+II sector	31. 1. 2017			100,00							100,00			-496,68	400,00	0,00	500,00	-303,32	-100,00	-900	900
23	VAT III sector	31. 1. 2017							100,00			100,00			-496,68	400,00	0,00	400,00	-203,32	-100,00	-800	800
24	salary I+II sector	31. 1. 2017		246,08			246,08								-250,60	400,00	-246,08	400,00	-203,32	-100,00	-800	800
25	income tax advance I+II sec.	31. 1. 2017					61,52					61,52			-250,60	400,00	-307,60	400,00	-141,80	-100,00	-800	800
26	salary III sector	31. 1. 2017		253,60					153,60				100,00		3,00	400,00	-307,60	246,40	-141,80	-200,00	-649	649
27	income tax advance III.sec	31. 1. 2017							38,40			63,40	25,00		3,00	400,00	-307,60	208,00	-78,40	-225,00	-611	611
28	owners' income merchant	31. 1. 2017		50,00	50,00										53,00	350,00	-307,60	208,00	-78,40	-225,00	-611	611
29	company tax	31. 1. 2017			10,00							10,00			53,00	340,00	-307,60	208,00	-68,40	-225,00	-601	601
30	owners' income I+II sector	31. 1. 2017		17,00			17,00								70,00	340,00	-324,60	208,00	-68,40	-225,00	-618	618
31	company tax	31. 1. 2017					3,40					3,40			70,00	340,00	-328,00	208,00	-65,00	-225,00	-618	618
32	owners' income III sector	31. 1. 2017		50,00					50,00						120,00	340,00	-328,00	158,00	-65,00	-225,00	-618	618
33	company tax	31. 1. 2017							10,00			10,00			120,00	340,00	-328,00	148,00	-55,00	-225,00	-608	608
34	paying out the carpenter	31. 1. 2017	100,00				60,00		115,00					275	20,00	340,00	-388,00	33,00	-55,00	50,00	-443	443
35	VAT	31. 1. 2017	20,00				12,00		23,00			55,00			0,00	340,00	-400,00	10,00	0,00	50,00	-400	400
36	settlement supplies II->III	31. 1. 2017						10,00	10,00						0,00	340,00	-390,00	0,00	0,00	50,00	-390	390
37	settlement supplies II->carpenter	31. 1. 2017						50,00					50,00		0,00	340,00	-340,00	0,00	0,00	0,00	-340	340
38	settlement-replenish. of goods	31. 1. 2017			340,00			340,00							0,00	0,00	0,00	0,00	0,00	0,00	0	0