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THE FINANCING OF INVESTMENTS IN LONG-TERM ASSETS AND THE INVERSE MATURITY OF DEPOSITS IN THE COMMODITY-MONEY-COMMODITY TYPE OF MUTUAL CREDIT

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ABSTRACT

This paper focuses on the financing of investments in long-term assets in the Commodity-Money-Commodity (komoko) monetary system (KMS). The KMS is a special, currently still theoretical version of mutual credit, first introduced in the 2016 summer issue of the IJCCR journal. In dealing with capital goods financial circulation is indispensable. However, financial circulation is prone to speculation, a practice not at all endorsed by CC (complementary and community currencies) communities. Separation of the real and financial exchange circles introduced in the original KMS paper is a method by which community currencies can dispense with speculation and other forms of potentially harmful financial circulation. Separation of the real and financial exchange circles proposed by the original KMS paper is based on a rigid, rule-based barrier between the real economy - which produces new goods and services on one side, and the financial economy - which deals with the exchange of old durable and capital goods on the other. This separation method may, however, be potentially either too cumbersome for businesses or too easy to evade. An improved method of separation of the exchange circles is proposed which basically eliminates the elements of the rule-based barrier and substitutes it with a new feature called inverse maturity of deposits. To implement inverse maturity of deposits, the KMS evolves from a plain ledger-based currency into a form that resembles accounts payables and accounts receivables. This new form of KMS which tracks the maturity of credits (demand deposits) puts the KMS in stark contrast to the existing fractional reserve banking which tracks the maturity of loans i.e. debits. The paper discloses how the KMS, featuring inverse maturity of deposits, dispenses with excessive financial circulation without impeding the real circulation and at the same time supports the use, exchange and production of capital goods. This renders KMS a currency that can crowd out legal tender.

KEYWORDS

Mutual Credit, Finance and Investment, Velocity of Money, Inverse Maturity, Liquidity

1. INTRODUCTION

In (Kavčič, 2016), Commodity – Money – Commodity (komoko) currency (abbreviated komoko), or in longer form the komoko monetary system (KMS), was disclosed. The KMS is a special implementation of mutual credit, currently still just a theoretical one. Some authors contribute the origin of the modern implementations of mutual credit to Keynes and his proposition by (Schumacher, 1943) for international credit clearing as the basis of the international trade and finance. Yet, it was E.C.Riegel, a self-educated author, who was the first to propose using a currency based on what he called mutual credit for the national economy. In (Kavčič, 2016), the KMS is compared to mutual credit as it was first defined by Riegel (1978 posthumous) and further developed by Greco Jr (2013). This original form of mutual credit is hereinafter referred to as MCSG. When compared to MCSG, the KMS features three distinctive properties. The first is monetary separation between the real circulation on the one hand and the financial circulation on the other, carried out in the form of explicit restrictions on trading with old goods for businesses in the KMS as compared to no explicit restrictions in the original form of mutual credit (MCSG). The second distinctive property is overdraft limit calculation based on the past period balance of transactions as opposed to overdraft limit calculation based on past sales figures. The third distinctive property is the mandatory periodical clearing of business accounts.

It is quite obvious that the present day national economies, which are based on fractional reserve banking (hereinafter denoted as FRB), suffer from the ever growing financial circulation which impedes the real circulation or as Keen (2011) puts it: "finance destabilises the real economy". Yet, it is quite obvious that any real economy could not possibly function without financial circulation. In particular, financial circulation is indispensable when dealing with capital goods. Schroeder (2018) emphasises the importance of managing and supporting the exchange of capital goods by CC currencies. Other papers (Filho, Rigo, & Silva, 2013), (Stodder & Lietaer, 2016), (Littera, Sartori, Dini, & Antoniadis, 2017) that deal with some of the more successful and prominent present day CC currency implementations (Banco de Palmas, Brasil; Sardex, Italy; WIR, Switzerland respectively) do not expose the deficiencies of these currencies in terms of financing of long-term assets. All the mentioned CC currency systems provide financing, i.e. loans with longer periods of repayment in addition to what can be equated with overdrafts. The basic fact of these currencies is that they all exist in parallel with official currencies (legal tender). Even businesses that use CC currencies use them only as a minor complement to the use of legal tender. For example, as mentioned by some authors (Stodder & Lietaer, 2016), total WIR Balances of 612 million in SFr, represent only one-quarter of one percent of the basic Swiss money supply for 2007, though the penetration of WIR was quite high - 16% in terms of the number of businesses that used it in 2005. Others (Motta, Dini, & Sartori, 2017) report in similar vein that: "Sardex mediated a trade volume of 51m Euro, corresponding to almost 0.2% of the Sardinian gross domestic product (GDP) in 2013". Some authors (Stodder & Lietaer, 2016) describe the 'standard countercyclical pattern' of WIR-exchange, based on which they see WIR as a relevant contributor to the stability of the Swiss economy. Yet, even considering WIR as the strongest CC circle, let alone the other CC initiatives, their main impact and potential economic benefit does not come from their monetary advantage, but rather from the social value that they foster. None of the existing CC currencies are designed to bear the brunt of economic activity in a community, be it local, regional or national, even though the aspirations of some of the CC currency proponents may be very much in favour of doing so. Assuming responsibility for the economic activity of a community would imply that CC currency could 'crowd out' legal tender and thus isolate the economic agents from the disturbances and ills pertinent to the present day national or supra-national fiat currencies on the one hand, and for local or regional authorities to start taking care of liquidity, employment, inflation and GDP on the other. This is rather a utopia. However, life - political in particular - is full of surprises and discussing a CC currency which promises to support the brunt of community exchange may one day be more than just of theoretical interest.

To steer GDP, employment and inflation - even on a local scale, let alone regionally - requires serious knowledge of macroeconomics and confronts decision makers with a series of tough decisions on one or the other among the contentious policies depending on the school and vein of macroeconomics one is disposed to believe and follow. Controlling GDP, employment and inflation requires dealing with capital formation and related financial transactions. As Schroeder (2018) has shown, a search for discussions of 'capital' in academic literature produced almost no results. CC literature does not focus on macroeconomic issues, while various local and regional authorities or grassroots activists involved in the CC initiatives deal with it even less. What makes KMS, in spite of all these facts and in contrast to the other CC currencies, a currency that can crowd out legal tender just through its superior

monetary capability on the one hand and fundamentally simple inner working, one that is easily understandable by practitioners on the other?

It will be shown that the KMS, this special form of mutual credit CC, possess a feature that makes it particularly suitable for dispensing with the excess financial circulation without impeding the real circulation. It is worth noting that according to Blanc (2011) "National currencies, that is money defined and organised by a national or federal sovereign power in a pure sovereignty framework, cannot be considered CCs." Although in this delineation Blanc does not directly address legal tender, one can hardly imagine a currency that is used 'within a pure sovereignty framework' and is not legal tender. Despite the fact that it can provide the liquidity necessary to support the production of new goods and services, Komoko is not designed to act as legal tender if it is taken by its formal definition (Horvitz, 1974) as:-'… valid payment for all debts unless there is a specific agreement to the contrary'. KMS also does not need sovereign power for its promulgation more than any other CC.

In its original form (Kavčič, 2016), the separation of the exchange circles was founded on a rigid, rule-based barrier that almost entirely prohibited, with the exception of loans and purchases of new stock, the use of komoko for financial transactions between businesses. This prohibition, as presented originally, appears to be cumbersome for businesses because (Kavčič, 2016) does not explain how arbitrary financial transactions can be performed by businesses. In addition, the general prohibition of financial transactions with the exception of loans, as conceived originally, was discovered to be easy to evade as businesses could use loans to roll over their profits and/or losses into the following period and thus amass large amounts of currency and/or respective debt.

This paper discloses how the KMS can support financial transactions and introduces the notion of inverse maturity of credits as the distinctive feature that enables the KMS to contain the potential drawbacks of the financial circulation.

(Schroeder, 2018) contends that the KMS does not support the exchange of capital goods. It will be shown that Schroeder's position with respect to the original version of KMS is only partially correct. However, the importance of managing and supporting the exchange of capital goods by CC currencies which is emphasised by (Schroeder, 2018) is fully observed in this paper. The ambiguities related to capital goods from the original KMS proposal (Kavčič, 2016) have been resolved. This paper discloses how to deal with purchases of fixed capital in the KMS. The paper emphasises the distinction between the financing of working versus fixed capital. Fixed capital is dealt with depending on the type of fixed assets. A distinction is drawn between fixed assets built for the market and custom-built investment projects. New solutions dealing with the exchange of shares entering the primary market are explained. A section of this paper is devoted to exchange with other currencies and legal tender in particular. The approach is purely theoretical.

2. DEALING WITH THE FINANCIAL CIRCULATION IN KMS

2.1. Dealing with stock

The version of KMS disclosed in this paper also provides support for financial transactions involving businesses, a functionality that was, with the exception of loans, prohibited in (Kavčič, 2016). The exchange of goods and other komoko transactions between households, which is by definition a financial transaction, was, however, supported in (Kavčič, 2016). Financial transactions are those transactions which do not correspond to the exchange of new goods and services and are therefore usually exempt from VAT. These are examples of what are deemed financial transactions in the KMS: lending/borrowing inclusive related instalments, buying/selling of other currencies, buying/selling of merchandise inventory out of the producer-wholesaler-retailer chain, and buying/selling old durable and capital goods. When referring to 'old durable and capital goods' in (Kavčič, 2016) or in this paper, 'old durable and old capital goods' is always meant. New capital goods, such as new machine tools or new houses, are part of the real circulation as are any other goods produced and sold to consumers or to another business for consumption or use respectively. Old goods that are durable or capital in nature have already been purchased once. There is no ambiguity about what an old capital good is when speaking about tangible items such as a house or a bulldozer. However, when speaking about stocks (shares) or some other intangible items, things are not so clear cut. As a rule, all intangible items are deemed 'old durable and capital goods' in the KMS, however, there can be exceptions. Probably the most important exception is new stock, such as when an established private firm decides to go public and

issues new shares directly or through an investment bank. Not all of the newly-offered stock value is deemed new goods, because the majority of a firm's assets are old goods from the KMS perspective. Factory buildings, production equipment, car parks, etc., everything has already been purchased once and put to use with the exception of good-will. Only the portion of stock corresponding to goodwill can be sold as new goods for komoko money. The details of financing investment projects are explained in a separate section of this paper.

2.2. Maintaining the currency flow

(Kavčič, 2016) introduced a differentiation between households and businesses with respect to how the requisite currency flow is maintained. For households the requisite currency flow is achieved by the grace period followed by the progressive demurrage. For businesses the pace of their respective account's money flow depends on their characteristic natural business turnover period in combination with the mandatory clearing period dictated by the KMS. For example, the characteristic natural business turnover period of a firm (previously in (Kavčič, 2016) referred to as the 'sales cycle') in service industries, such as hairdressing, is usually determined by the lump expense (the periodical payout of salaries) following the incremental revenues (haircuts). The characteristic natural business turnover period of a construction firm is usually determined by the lump revenue (the sale of a house) following the incremental expenses (the periodical payout of salaries and the costs of materials). The balance of the accounts during the characteristic natural business turnover period could be compared to the respiratory cycle. In accounts in the black (black ink accounts), the balance curve first rises from zero to a value and then again falls towards zero, whereas in accounts in the red (red ink accounts), the balance curve first descends to a maximal negative value and then ascends back towards positive. Red ink accounts use a KMS overdraft while black ink accounts do not. In the KMS, businesses are mandated to periodically clear their accounts i.e. bring them to zero. The period in which a business is mandated to clear its account is called the business turnover period. In general, businesses can have their business turnover period equal to or longer than their characteristic natural business turnover period, but no longer than the mandatory clearing period which is determined by the KMS. Businesses with characteristic natural business turnover periods longer than the mandatory clearing period, for instance small shipyards, are an exception to this rule. How the KMS should treat such cases is explained in the section devoted to fixed capital. It is expected that the duration of the mandatory clearing period would be between three and six months. The change in the mandatory clearing period duration would be used by the KMS as a monetary control measure.

2.3. The real and the financial accounts

To support financial transactions and to maintain the requisite currency flow at the same time, this new version of the KMS introduces a new account category for business and household accounts. In addition to their 'normal' transaction account (hereinafter referred to as the 'real' account), each business and household would also have a second account, hereinafter referred to as a 'financial' account. Generally, account holders are free to perform any kind of financial transaction. However, financial accounts are maintained with non-negative balances only. As a rule, transactions can only run from financial accounts that have a positive balance, since the KMS does not allow a KMS overdraft to be used for financial transactions (there is one exception explained further on). Any proceeds from financial transactions, no matter where they stem from, will end up in the financial account of the recipient. Account holders can perform real transactions using credits from their financial accounts, for instance, they can purchase goods or services, or they can pay for labour or dividends. However, account holders are not permitted to transfer credits between their 'real' and 'financial' accounts other than when they transfer credits from the 'financial' account to the 'real' account at the end of the business turnover period in order to comply with the mandatory periodical clearing of accounts. This transfer is, however, ignored by the KMS overdraft limit calculation for the following period.
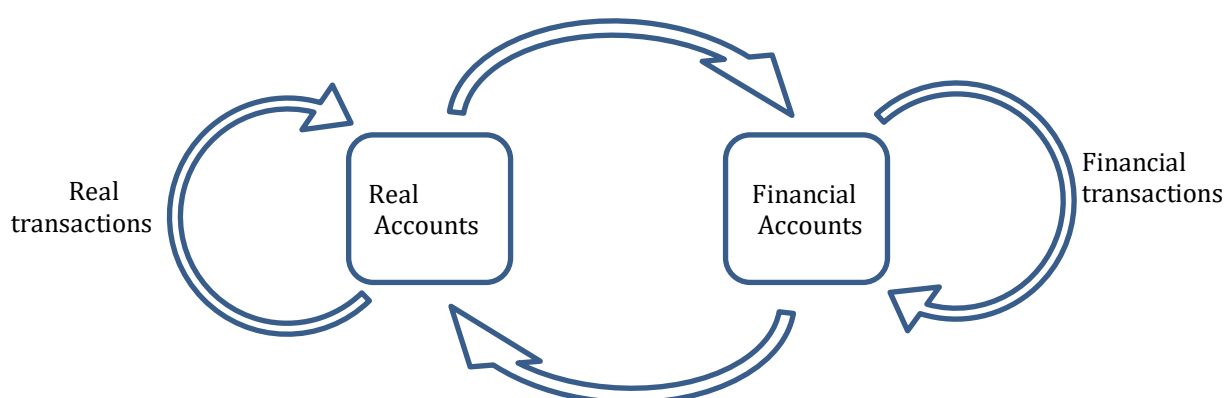
Figure 1: Transition chart of the 'real' and the 'financial' flows and accounts.

2.4. Dealing with the potential money bubble due to the financial circulation

The KMS calculates the overdraft limits and thus the liquidity of the whole system on the assumption that credits are discharged from each economic unit with a pace equivalent to the value of goods or services flowing into it (+ profits + the value of depreciation). Financial transactions, such as loans, can disrupt this equivalency and cause liquidity problems. Short-term loans have the potential to create a bubble of unused credits, though not unlimited in size, yet potentially harmful to the KMS operations. Short-term loans can cause rolling over of credits from period to period from the account of one business to the account of the other. However, due to some less cumbersome possibilities of saving, businesses are not expected to indulge in such activities. Were this still to happen, however, KMS has enough administrative measures at hand, first to detect such a build-up and, second, to deter it.

3. THE INVERSE MATURITY OF DEPOSITS (CREDITS)

3.1. Assuring currency flow on the financial accounts

Balances on financial accounts are not subject to the mandatory periodical clearing, instead, a mechanism similar to the one described in (Kavčič, 2016) for households is implemented for all financial accounts. In (Kavčič, 2016) the following regime is foreseen for household accounts for the sake of maintaining the requisite currency flow. Deposits on household accounts mature and, once they reach maturity, are levied with progressive demurrage. The fact that maturity in the context of KMS financial accounts has the opposite effect to the well-known maturity of the financial instruments should be taken into account. In comparison to the present day (fractional reserve) banking (FRB), deposits feature inverse maturity in the KMS. In (Kavčič, 2016) deposits in household accounts that are transferred from business accounts acquire new maturity, which is dictated by the so-called grace period determined by the KMS. It is expected that the grace period would last from two to four months and that this would be one of the monetary control measures available to the KMS. When deposits are transferred from one household account to another, they are not rejuvenated, their maturity (due date) remains with them and does not change.

Financial accounts keep track of the maturity of the credits being deposited to them and will therefore be referenced to as 'maturity aware' accounts. In addition to the business financial accounts and household financial accounts, household real accounts are also 'maturity aware'. Deposits on 'maturity aware' accounts all mature and, once they reach maturity, they are levied with progressive demurrage. What is referenced to here as a deposit is recorded in the KMS as a credit entry. Each credit entry in the 'maturity aware' accounts has a maturity attribute attached to it. A maturity attribute is a date when a deposit (=credit entry) is charged with progressive negative interest. The maturity of a credit entry is determined at the time of the transaction by the status of its double entry debit counterpart account and thereafter it does not change. When it comes to determining the maturity of a deposit (credit entry) by the status of its double entry counterpart account, there are the following three possibilities:

- When the target account in question is a financial account (be it business or household) and the double entry counterpart account of the financial transaction is a business 'real' account, the maturity of the

corresponding credit on the financial account equals the date when the mandatory clearing of the business 'real' account should have taken place.

- When the target account in question is a household 'real' account and the double entry counterpart account is a business 'real' account (this implies a real transaction), the maturity of each credit deposited to the household 'real' account is assigned a maturity equal to the grace period determined by the KMS.

- In general, for all other situations, the maturity of a (target) deposit is copied from the maturity of the sourcing deposit from the double entry counterpart account. Since 'maturity aware' accounts - with the exception of household 'real' accounts - are kept always positive, there must always be one or more (sourcing) deposits (=credit entries) which create the corresponding positive balance on the double entry counterpart account. Colloquially speaking, the transaction that created the target deposit credit entries consumed the available sourcing deposits and copied their maturities.

3.2. The information content behind the inverse maturity of deposits

The maturity attribute of household deposits introduced in (Kavčič, 2016) described as ageing is basically an implementation of the script money proposed by (Gesell, 1919) adjusted to the mutual credit type of currency and taking advantage of modern information and communication technology. Traditional ledgers do not consider maturity. Each deposit on an account only has its entry (validity) date, which makes it possible to calculate the balance of an account as a function of time. When payments from an account are made in the traditional ledger, only the balance after the withdrawal is checked, to ascertain whether or not it exceeds the limit; if the limit has not been exceeded, then the new entry is recorded. Some important implications have to be dealt with when the maturity attribute is attached to deposits. Firstly, when payments are made, the software must use a rule that guides it in deciding which deposit to use for the payment. The transaction should preferably consume those deposits with the shortest maturity first. Secondly, it is clear that when several deposits with a different maturity need to be used in one financial transaction, this one financial transaction will be composed from several entries and will also result in several new deposits with the respective maturities on the account of the recipient. Thirdly, when deposits are consumed by a transaction, they are marked as closed, much like entries in accounts payable or accounts receivable. In general, the KMS prohibits transactions stemming from a negative financial account, however, this rule does not apply to all maturity aware accounts. Household real accounts have overdrafts assigned to them. It is not practical to prohibit account holders from drawing down on their overdraft facility, for instance to credit a spouse or children with monthly allowances. Since household to household transactions carry with them the maturity of the originating deposit, a question arises over what the maturity should be of the deposit stemming from an overdraft. A negative account has no deposits marked as open or has no deposits (=credit entries) at all, hence a maturity cannot be determined. By convention, the KMS assigns the full grace period to deposits stemming from household real accounts with a negative balance (i.e. those exploiting an overdraft), as if they would stem from a positive household real account with newly recorded credits.

3.3. The implications of the inverse maturity of deposits on monetary stability

There is an important correlation between the KMS and the present day (fractional reserve) banking (FRB) in terms of maturity. The ageing of deposits, i.e. the inverse maturity feature of KMS deposits on maturity aware accounts and mandatory clearing of the real business accounts, can be compared to the maturity of loans granted in FRB, as these features of either system cause currency to be repeatedly destroyed. The general perception that money circulation in the economy can be compared to blood flow is somehow misleading, as blood is one fluid that is driven circularly through the human body. This blood flow perception might have been correct at the times of the gold standard. With modern fiat money, however, this is no longer so accurate. By its very nature, the great majority of fiat money in circulation stems from loans created by commercial banks. Every loan has a maturity. When a loan is repaid, the money is destroyed and thus disappears from circulation. Fortunately for the economy, commercial banks are happy to create new loans, thus effectively supplementing the missing quantity. From an accounting perspective, in the FRB system, loans, i.e. debits, have a maturity whereas deposits, i.e. credits (=money), do not. Once money enters into circulation, there is no force which can coerce it to come back to meet its creator, i.e. to the loan that generated it. A miser might have got their hands on it and will not release it for good. People in possession of money are not necessarily those who need to pay for the costs of production materials and salaries or to buy food

and other goods needed for living. Here again commercial banks are happy to lend them or grant them overdrafts. In doing so, they may again act as creators of money and whisk it out of thin air, or they can act as intermediaries and lend out the money the banks have borrowed, in the first place, from depositors in exchange for interest. On KMS maturity aware accounts the maturity remains with the credits. For KMS real business accounts it can be said that the maturity even pertains to both sides of the account, i.e. to debits and credits, as the account is mandated to clear at the end of its business turnover period from either side of the balance. In the FRB all maturities remain with the debits (loans). There may be substantial sums of currency in the FRB system which are not mandated to participate in regular real circulation, yet they can enter it at the whim of its owners, which is a serious cause of instability. If, hypothetically, the FRB central bank were to demand that all loans must be repaid within six months, a large proportion of loans would default and the same amount of money would probably still linger on some accounts as demand deposits. Many consider overly extensive financial circulation to be an impediment to the economy, however, this supposition reveals that it can be the other way around. In FRB the financial circulation may be a solution because it means that vagabond credits do not enter the real circulation and cause inflation.

4. PROVIDING LIQUIDITY FOR WORKING CAPITAL

(Kavčič, 2016) describes how the KMS can determine the size of the overdraft limit of an account holder based on its account balances in the previous turnover period. Such raw data should serve the purpose of revealing the turnover period of the account holder in addition to the overdraft limit required to cover all the working capital needs. From the perspective of working capital needs, the description in (Kavčič, 2016) lacks some important details, in particular how to deal with opening balances and how to treat past financial transactions, such as instalments when calculating overdraft limits by the KMS. When calculating the working capital needs of an account holder (this also includes households as they must sustain themselves until payday).

The KMS should take into consideration opening balances, i.e. the money available to the account holder at the beginning of the period. For example, if the beginning of a period is around the middle of summer, when the wheat has already been harvested and grain put into silos by a farmer but not yet sold, then the farmer's opening balance would be, for instance, –200,000 komoko (if 200,000 komoko is the farmer's average revenue). The opening balance of the grain wholesaler who buys the crops would be +200,000 komoko. Therefore, in this scenario, the overdraft limit for the farmer would be 200,000 komoko and the overdraft limit for the wholesaler would be 0 komoko. The grain wholesaler in this scenario already has enough working capital and does not need an overdraft. Its account will remain positive throughout its business turnover period since it will receive revenues in excess of expenses when grain is sold to mills. If, however, the opening balance of both economic agents in this scenario was 0, then the KMS would grant an overdraft of 200,000 komoko to the grain wholesaler and 0 komoko to the farmer. When speaking about working capital it should be noted that currency such as komoko is considered working capital only from a microeconomic perspective. A proper macroeconomic perspective should not treat fiat currency as capital. Therefore, the real working capital in this scenario are the grain in silos and the farmer's trust in komoko. No economy can start from scratch without stocks (inventory) or trust.

When calculating overdraft limits for account holders, the KMS applies the following rules:
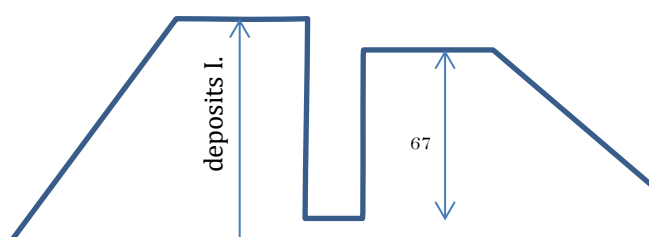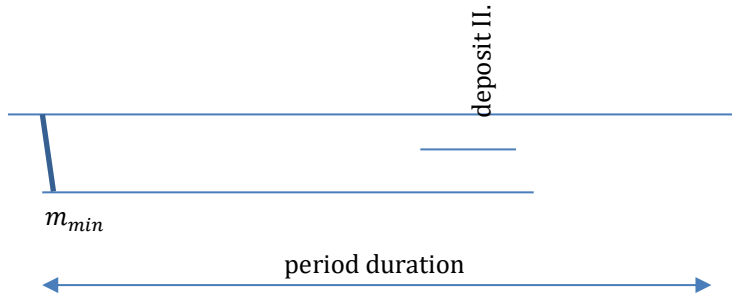
Figure 2: Account balance curve for a period and the relevant variables.

(1)

$$v = \frac{to}{m_{max} - m_{min}}$$

where:

v velocity of money

to period turnover, calculated as a sum of all deposits within a period (to = deposits I.+deposit II.)

m_{max} the maximum net balance of the real account within a period

m_{min} the minimum net balance of the real account within a period

The net balance of the real account is the balance of the account stripped of all financial transactions and purchases of fixed assets. Period turnover means period revenue for businesses and period income for households. The KMS considers all four variables from the above equation as slowly changing and characteristic of each account. When calculating an account's overdraft limit for the coming period, the KMS carries over the value of the money velocity and the value of the maximum net balance from the previous period. The value of the turnover in the current period is forecasted, however, it is supposed to only change by a small amount in comparison to the previous period. This change depends on the growth (de-growth) rate determined by the KMS. The KMS calculates an account's overdraft limit for the coming period thus:

(2)

$$m_{min}(1) = -\frac{to(1)}{v(0)} + m_{max}(0) - c_{de}(0)$$

where:

$m_{min}(1)$ if the value is negative then $|m_{min}(1)|$ means the absolute value of the overdraft limit for the coming period; if the calculated value is positive then the account does not need an overdraft

$to(1)$ forecasted turnover of an account in the coming period

$v(0)$ money velocity of an account in the previous period

$m_{max}(0)$ the maximum net balance of a 'real' account for the previous period

$c_{de}(0)$ depreciation cost of an account for the previous period (a detailed explanation follows in the next section)

The equation (2) can be aggregated across all account holders for the entire community.

(3)

$$\sum m_{min(i)}(1) = \sum -\frac{to_{(i)}(1)}{v_{(i)}(0)} + \sum m_{\max(i)}(0) + \sum -c_{de(i)}(0)$$

The liquidity of a community KMS-based economy is then achieved when the following rule is satisfied:

(4)

$$\sum m_{min(i)}(1) \leq \sum -\frac{to_{(i)}(1)}{v_{(i)}(0)} + \sum m_{\max(i)}(0) + \sum -c_{de(i)}(0)$$

5. PROVIDING LIQUIDITY FOR FIXED CAPITAL

Under the assumption of a closed loop economy, by providing the requisite working capital for each and every economic agent, the KMS can also finance the fixed capital needs of businesses. This is due to the fact that the producers of fixed assets, such as the producers of machine tools, are granted the requisite overdrafts in the same way as any other economic agent. However, this type of financing does not necessarily cater for each and every fixed capital need in the economy. In comparison to financing working capital needs, there are three additional issues which need to be resolved when it comes to financing the fixed capital needs. The first issue relates to how the fixed asset is being built, i.e. is it produced for the market or is it custom-made, the second issue relates to how the overdraft limits are calculated for each economic agent, while the third issue is the potentially long turnover periods related to the production of fixed assets which requires a different KMS treatment for the related businesses.

5.1. Fixed assets produced for the market and depreciation

When fixed assets are produced for the market then their production can be financed by the KMS overdraft facility, as the regular production is exactly what qualifies an economic agent for an overdraft limit sufficient to cover its working capital needs. This rule alone, however, may not provide enough liquidity for the system as a whole. The rules of the KMS provide overdraft limits based on past data for all accounts as discussed in the previous section. When the KMS calculates overdraft limits for businesses based on past data, it considers the purchases of materials or other expenses that are treated as direct and indirect costs entering into the balance sheet. The KMS, however, excludes past fixed asset purchases from this calculation. Fixed assets usually have a much longer turnover period if the turnover period of a fixed asset is deemed equal to its depreciation time and consequently to the maturity of the loan which financed the purchase. Financing purchases (not production) of fixed assets thus bears much higher risks than financing working capital. However, the KMS provides the requisite liquidity for the entire economy without it being bound to bear the higher risks of directly financing purchases of fixed assets. In the KMS, as in any other mutual credit type CC or even in the present day (fractional reserve) banking (FRB) (in as much as it is loan based), to create a unit of currency circular flow between two accounts in one circle i.e. with just two reciprocating exchanges, a unit of overdraft is only needed in one of the accounts - the red ink one. The other account is black ink and does not need an overdraft to perform a back payment. If, hypothetically, the entire production of fixed assets was to by some chance be red ink, then by granting it the requisite overdrafts, the KMS would provide the necessary liquidity for the entire economy, since by being of the red ink type, the producers of fixed assets would discharge into circulation the entire amount of money necessary to purchase their output prior to when the corresponding sale should have taken place. By being paid in advance, the rest of the businesses could thus perform purchases of fixed assets using their own earned credits. The behaviour of the balance curve of each business depends on the opening balances and the contractual relationships between businesses. Hence it would be very difficult, if not impossible, for the KMS to select just fixed asset producers and designate them as red ink. However, when the depreciation cost is included (by imputation) into the overdraft limit calculation, overdraft limits are then calculated for each business resembling the working capital needs of the previous period, thus assuring the successful repetition of the turnover. An explanation follows: providing overdrafts in requisite amounts to each economic agent in the KMS is akin to providing loans in the FRB economy. Overdrafts in the KMS need to be cleared periodically, much like loans need to be repaid in the FRB. This implies earning through economic activity or entitlements to be able to repay which is what 'normal' businesses do. The end price of goods or services should cover the costs of inputs plus some profit. In essence, these costs and profits are mirrored by the discharges of currency into the real circulation throughout the turnover period when businesses pay their suppliers, wages or dividends. In addition to input materials, labour and rent costs, the cost of inputs should include the depreciation of fixed assets. The depreciation

cost is, however, usually not mirrored by a discharge into the real circulation of a proportional sum in a manner similar to the rest of the costs. A possible frequent occurrence could be that a business would approach the end of its business turnover period with a positive sum on its account even after paying for all the periodic supplies, labour and dividends because the depreciation is unrelated to the periodic supplies. Sometimes businesses finance their purchases of fixed assets using their savings whilst at other times they use loans for which they pay periodic instalments. Let's consider the second option and let's assume that the value of the periodic instalment of business A equals that of its periodic depreciation cost. In the overdraft limit calculation, the KMS disregards all past financial transactions including instalments. This alone would mean that the calculated overdraft limit of business A would be less than its working capital requirement for the value of the instalment. By adding the depreciation cost to the calculated overdraft limit as shown in the formulas presented in the previous section, the KMS ensures that the working capital requirements of businesses are met. This imputed depreciation cost in the overdraft limit calculation only has an effect on red ink accounts. When, during the business turnover period, the instalments stemming from the loans granted for the fixed assets purchases of the red ink accounts are due before the earnings, then this added depreciation-related liquidity can be used to finance the payments of these instalments. The other option is that this added liquidity is transformed into savings of the red ink businesses even before the earnings take place. The red ink businesses are supposed to cover all the costs including depreciation plus make some profit by the end of their business turnover period, in the same manner as black ink businesses. All red ink and black ink businesses are bound to clear their accounts at the end of their respective business turnover periods. To avoid being levied for not clearing their accounts in KMS, a business that is not bound to pay instalments should discharge the value of the depreciation cost into financial circulation by lending or buying securities or similar assets. This is an act of saving which, after some time, would enable the business to purchase fixed assets using its own savings. In the KMS, commercial banks and credit unions are supposed to collect savings and transform them into loans through which businesses could purchase fixed assets that are produced within one mandatory clearing period.

5.2. Providing liquidity to businesses with long turnover periods

Those businesses which have longer characteristic business turnover periods than the mandatory clearing period such as construction businesses, could clear their accounts less frequently accordingly as the KMS has been designed to cover all working capital needs. However, in such cases another consideration comes into play. After being produced (using a KMS overdraft) goods (fixed assets) must be sold /purchased. It is assumed that within a time span equal to one mandatory clearing period, the aggregate depreciation would be enough to purchase the aggregate production of fixed assets. Within a large national economy this may hold true, however in a small community economy it is highly likely that this assumption would be wrong. Let's take, for instance, a community which has only one construction business that has one current project that will take a year to complete, and the rest of the businesses which all have business turnover periods equal to the mandatory clearing period, which is three months. The periods prior to the completion of the construction project would exhibit excess credits due to the discharge of credits from the construction project and no corresponding intake as the intake (=sale) of the construction project is only due to take place upon its completion. These excess credits would be destroyed by the progressive demurrage of the KMS prior to the completion of the construction project as the rest of the businesses have much shorter business turnover periods. When finally, the construction project is completed there would not be enough available credits for the sale/purchase to take place. If the aggregate production of fixed assets varies from period to period then the value of an arbitrary aggregate period depreciation may not match it. Due to the KMS clearing requirements, businesses cannot carry over the value of the depreciation from one period to the next and the same also applies to the whole business sector. If the aggregate production of fixed assets within a period is greater than the corresponding aggregate depreciation (ignoring retained earnings), then businesses cannot purchase the former in whole. This paper introduces the following solution to the problem of the varying fixed assets production. In the KMS, the deemed inverse maturity of credits equals the longer of the end of the mandatory clearing period on the one side and the end of the characteristic business turnover period on the other. This means the latter in the case of the varying fixed assets production. When a producer of fixed assets discharges credits into circulation (using an overdraft), the KMS tracks the new maturity of these credits discharged from such a business. If the credits are part of a financial transaction, then they retain the original maturity once deposited into the financial account of the recipient. However, when the credits are part of a real transaction, then they acquire a new maturity once deposited into the real account of the recipient. In cases where a new maturity is shorter than the original one, KMS issues a corresponding time deposit bid. The value and the maturity of this time deposit equals the value and the maturity

of the original credits. The interest rate is determined by the market. The interested parties can purchase this time deposit from the KMS and thus preserve the value of their depreciation past the mandatory clearing date. At the same time the KMS makes sure there will be enough credits when the fixed assets are ready for sale.

The KMS is a complementary currency in the sense that it is designed to primarily support the production and delivery of new goods and services. This new version of the KMS provides some support for trading with old capital goods to businesses. By performing financial transactions businesses can freely trade old capital goods including stock. Yet this does not mean that the KMS supplied liquidity can even come close to the whole demands of trade dictated by contemporary financialisation and monetisation. It does not and is not meant to do so.

5.3. Custom-built investment projects

In the KMS-based economy, the new custom-built investment projects are not covered in the calculation of the approved overdraft limits and thus the quantity of money available does not suffice to enable the whole KMS economy to be run. The KMS cannot supply the missing liquidity by granting overdrafts directly to the custom-built type of investments on the same terms as it does to regular businesses, as the KMS cannot take responsibility for their success or failure. Compared with regular market-oriented production, investment projects are much riskier. The success of the market production funded by KMS overdrafts is proven by repetition, whereas custom-built investment projects are one-of-a-kind by definition and full of unknowns.

One possible solution to this issue would be to adopt the investment banking approach whereby an investor agrees with an investment bank that underwrites the investment project. The KMS then creates a new account and grants it an adequate overdraft. The document that secures the KMS overdraft facility (a pledged collateral or similar) and the forecast are mandatory parts of the KMS investment project. When a project starts, the KMS monitors that project's funds and expenses follow as per the forecast. Should it be necessary to deter potential speculation, KMS can introduce monthly overdraft limits in addition to the overdraft limit valid for the project as a whole. The funds for an investment project are raised in the capital market by the investment bank selling the investor's bonds or shares or the funds are paid directly into the account by the investor. If the project fails, the KMS is refunded by the investment bank or sells the property pledged and recovers the value of any money lost. Investment projects share two features with the businesses producing fixed assets serially for the market. First, it is mandatory for the investment project to be of the red-ink type for the duration. If the investment project was of the black-ink type, then it would consume the liquidity of regular production, thus effectively diminishing it. The investment project must consume the overdraft prior to receiving funding (for instance, collecting savings) in order to discharge enough money into circulation. Secondly, the KMS monitors the maturity of credits issued by investment projects and adequately issues bids for demand deposits to cater for any mismatch of the supply and demand of credits due to mandatory clearing of accounts.

Since investment projects produce new capital goods, buying or selling the shares or the bonds of an investment project is deemed a real transaction by the KMS.

6. EXCHANGE WITH OTHER CURRENCIES

For the purpose of facilitating trade with the rest of the economy (world), the KMS maintains a komoko 'rest of the world' account (hereinafter referred to as the ROW account). For a business in the KMS, exporting goods or services means selling them to the rest of the world, represented in the KMS by the ROW account. The business is being paid for its exports by the ROW account as long as there is a sufficient overdraft. When the overdraft has been used up, it becomes necessary to wait for some imports. Importing goods or services in the KMS means buying them from the ROW account and duly transferring to it an adequate amount. When the KMS is interfaced to the present day fractional reserve banking (FRB)-based economy and thus the rest of the world (ROW) stands for the economy using legal tender such as euro or dollar, then a KMS ROW account can only exist in sync with a 'mirror' account at an FRB bank. The deposits and withdrawals from the KMS ROW account are supposed to spawn corresponding withdrawals and deposits to/from the FRB mirror bank account and vice versa. The exchange rate between komoko and the FRB currency is determined by the KMS and is managed accordingly in order to keep the exchange in balance with the rest of the world.

The rules governing outgoing transactions from the ROW account are similar to those pertaining to outgoing transactions from household 'real' accounts when exploiting an overdraft. An outgoing transaction debits the account in question and credits another account, i.e. it takes credits out of an account. An incoming transaction credits the account in question and debits another account, i.e. it brings credits into the account. A negative account has no deposits marked as open or has no deposits (=credit entries) at all, hence the maturity cannot be determined. By convention the KMS assigns the deposits stemming from the KMS ROW account (necessarily always exploiting the overdraft) a minimal operative maturity. Let's say that this maturity was to last between one and three weeks. To prevent opportunistic speculative financial transactions, KMS would require this same minimal operative maturity from all KMS ROW account incoming financial transactions.

Due to the ageing of the komoko currency, the saving motives of individuals would drive them to use any opportunity to exchange komoko for something more durable and yet easy to exchange into a liquid asset in case of a sudden need. The option most wanted would probably be legal tender such as dollars or euros. Strong demand of that kind would empty the FRB mirror account. This could impede businesses wanting to import raw materials and components or use services with komoko as the FRB mirror account would be empty. Known methods of balancing foreign exchange, such as adapting the exchange rate or increasing the difference between the buying and selling exchange rates, are on hand for KMS. Due to the separation of exchange circles in the KMS, there is one additional and rather unorthodox option possible. KMS can use different exchange rates for the 'real' and 'financial' transactions. Thus, it can supress overly high buying of non-komoko currencies or other securities without any impediment to the real foreign circulation.

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