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Monetary Circuit Theory and the Role of Banks in the Monetization of Profits

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Abstract

Using the tools of the monetary circuit the paradox of profits on how the firm sector as a whole can realize profits is addressed. The thesis innovates with the banking system facing the same profit paradox as firms and how it can be overcome. Observing the microeconomics of the monetary circuit and introducing overlapping circuits of different lengths the paradox of profits is solved. It is the banking systems' role in providing accommodative credit putting new money into circulation that allows profits to be realized. After a firm takes a loan the newly created money flows through other firms creating profits on the way, therefore an emphasis on the velocity of money is taken. Other studies emphasizing the velocity are therefore confirmed. The aggregation of different types of microeconomic monetary flows results in the national accounts as an ex post notion. The result is that the components of the national accounts should not be interpreted as restricting each other, they rather move in line. It is found that stock-flow consistent modelling provides a sound basis for displaying the banking systems' role in enabling profits.

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Keywords: Monetary Circuit Theory, Post-Keynesian Economics, Endogenous Money, Paradox of Profits, Circulation, Velocity of Money, Stock-Flow Consistent Approach.

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"The banks in their lending business are not only not limited by their own capital; they are not, at least not immediately, limited by any capital whatever; by concentrating in their hands almost all payments, they themselves create the money required, or, what is the same thing, they accelerate *ad libitum* the rapidity of the circulation of money. ... As the German author Emil Struck, justly says in his well-known sketch of the English money market: in our days demand and supply of money have become about the same thing, the demand to a large extent creating its own supply."

Knut Wicksell, 1907

1. Introduction

1.1. Background

The introductory quote from the well-known Swedish economist Knut Wicksell is more than a century old, but provides a striking message, money is not just like any other commodity. There is no restriction in its supply that would regulate the pricing mechanism as in almost any other good. It is the demand of money that creates its own supply.

Monetary Circuit Theory puts the banks' ability to extend credit by creating new deposits at the core of its analysis. It is a heterodox school of thought, which is based on Knut Wicksell's first description of a monetary circuit in 1898. Monetary Circuit Theory investigates the creation and destruction of money through the credit granting process of the banking system. It views our modern economy as a credit economy.

Post-Keynesian Economic Theory is another school of thought that shares large ground with Monetary Circuit Theory, they largely agree on the monetary circuit as a basic explanation of productive monetary flows in the economy. Post-Keynesians derive themselves from Keynes' post-General Theory alienation of his own main work (Rochon, 1999, p. 2), when he asks for a monetary theory of production. Although this comment of his was published before the General Theory, it is striking: [italics are his]

> "In my opinion the main reason why the problem of crises is unsolved, or at any rate why this theory is so unsatisfactory, is to be found in the lack of what might be termed a *monetary theory of production*" (Keynes CW XIII, 1933).

He goes on to mention that this means a theory where money would not be neutral[1].

Within Monetary Circuit Theory and Post-Keynesian Economics there has been a recent flare up in scholarly debate on the troubles of explaining aggregate firm profits by means of the monetary circuit. While the question of profits is an old one, many Circuitists have claimed to have found answers.

1.2. Problem

The emergence of profits for individuals and the economy as a whole provides a driving force for entrepreneurs and producers in their actions. However, a universal and detailed explanation for why profits occur has not been reached. The emergence of profits never loses in relevance as it is, among others, very important for the pricing of financial claims. Post-Keynesian Economics and Monetary Circuit Theory have recently discussed the possibility of explaining aggregate profits with the monetary circuit, but in the simple monetary circuit profits cannot emerge. Therefore discussions of relaxing some strict assumptions have been pursued resulting in new models that focus on relaxing the assumption of a one-period model.

The problem to be answered with this thesis is what determines the aggregate profit level and how the banking system contributes in allowing higher profit levels to occur. The analysis is done using Monetary Circuit Theory as there are currently active contributions trying to answer the emergence of profits in this field and as the monetary circuit provides an appropriate framework for including the role of banks in the emergence of profits.

1.3. Purpose

This thesis contributes to the discussion and attempts to clarify some issues on already proposed solutions on how aggregate firm profits can be realized in a Monetary Circuit Theory framework. In order to do so profits need to be properly defined. The aim is to find the mechanisms that allow aggregate profits by observing the role of the banking system and relaxing some of the

[1] The neutrality of money is an idea that a change in money supply only affects nominal, but not real variables.

strict assumptions of Monetary Circuit Theory allowing for several overlapping circuits and circuits of different lengths.

There has been literature on the use of circuits of different lengths, but it does not hold up to real world comparisons. The use of overlapping circuits has been suggested, but not yet implemented. This thesis attempts to address the emergence of profits from the view of the banking system and in combination with many overlapping circuits of different lengths.

1.4. Outline

The approach taken begins with a descriptive section in chapter 2. It provides a description of money in current financial systems. The section is included in order to present known mechanisms of monetary creation and destruction and to justify the assumptions taken in Monetary Circuit Theory.

Chapter 3 presents the most common assumptions taken in Monetary Circuit Theory and how they relate to reality. Chapter 4 introduces the monetary circuit and the paradox of profits that arises from it. In chapter 5 profits are defined and the previous literature by Circuitists and non-Circuitists on attempts of overcoming the profit paradox is presented.

The attempt to solve the profit paradox begins in chapter 6 by addressing the issue from the view of the banking system. It turns out that the banking system provides a mirror of the profit paradox, as neither sustainable firm- nor bank profits can be explained. This chapter helps understanding why it is necessary to attack the profit paradox with profits defined as ‘net profits’, a precondition for the analysis done in chapter 7.

The approach taken in chapter 7 is to relax the assumption of a single circuit by introducing first overlapping circuits and then overlapping circuits of differing lengths. Profits on the microeconomic level are explained by money circulating through several firms. This money is newly created by the banking system and therefore it is the banking systems’ ability of extending credit that enables the economy to reach higher profit levels.

In chapter 8 the findings of the microeconomic view are put to a macroeconomic level. It is found that commonly interpreted implications from the national accounts about the paradox of profits are erroneous. Profits as a type of flow are not limited, but are easily increased with credit- production and consumption decisions combined with the velocity of money. The quantity theory of money is addressed and chapter 9 concludes.

2. Description of Money in Current Financial Systems

A descriptive section is necessary in order to understand the reasoning for taking certain assumptions in Monetary Circuit Theory and to reflect how the results refer to reality. The descriptive section tries to provide an accurate picture of current observed economic realities and is included as a methodological unit.

As this thesis is primarily focused on monetary creation and corresponding effects on the economy, more precisely on how monetary profits can be realized, it is necessary to understand what money is in the real world and how this is captured in theory. Therefore a description of money in the financial system is presented.

2.1. What is money?

Keynes in his 'A Treatise on Money' (1930) provides a thorough description of different forms of money together with the banking system, which can be understood as the monetary mechanisms in most countries of the world even today. He describes a *money-of-account* as the unit of money which is defined by the State or Community, who also enforce delivery of monetary contracts and decide *what thing* is to be used as payment. He concludes that these properties lead to an acceptance of Knapp's Chartalism, that money is a creation of the State by law. (Keynes, 1930, p. 4)

Bank money

The two most important types of money are *bank money* and *central bank money*. Bank money is a bank liability expressed in the money-of-account and is more commonly known under the name 'deposits'. Deposits are created as a bank creates claims against itself for the delivery of central bank money. These claims are created when a bank purchases assets or when it gives a loan and creates a claim against itself in return for the promise of repayment. Individual banks also create deposits when depositors deposit cash with them. Cash is a form of central bank money. (Keynes, 1930, p. 24)

Adam Smith already well understood and described that banks in Scotland and elsewhere in many parts of the world create 'cash accounts' and promissory notes when extending credit, and that these could circulate for transactions (Smith, 1776, Vol. 1 Book 2 ch. 2).

Keynes (1930, p. 25f) argues that during his times, as borrowing customers generally borrow in order to spend, new loans will usually lead to cash outflows for the bank. This depends on who the borrower is intended to pay, because if the payment receiver has his deposit account at the same bank and is paid by cheque or more modernly by bank transfer, then no immediate cash outflow will result for the bank. But if the receiver is associated with a different bank the borrower's bank loses cash and the receiver's bank receives cash. He further argues that this reduces the lending potential of the borrower's bank, but increases the lending potential of the receiver's bank by the same amount. This is because the lending potential of a single bank is related to its cash in- and outflows, especially due to receiving claims against other banks and having to meet claims from other banks due to the payment- or settlement system.

Keynes (1930, p. 27) goes on and supposes that a more or less stable proportion of bank money is used in cash payments. An increase in bank money would therefore drain the cash out of banks and set a limit to bank money creation. This leads to the question of the supply of cash and thereby central bank money.

Central bank money

Central bank money is a central bank liability and consists of cash and bank reserves. Bank reserves, or more precisely member banks' reserves, are essentially central bank deposits (Keynes, 1930, p. 28). Banks can withdraw their reserve deposits and receive cash and the central bank prints the necessary amounts needed, while the issued cash is formally still a central bank liability. This has historical reasons from the times that each bank issued its own bank notes against deposits of coins or from extending loans in the form of bank notes. The bank notes stated a liability and were therefore noted on the passive side of the balance sheet (Bagehot, 1873, ch. 3).

The more important question relating to the lending practices of banks is how the reserves are created. These are created just as bank money, just from the perspective of the central bank. The central bank creates claims against itself by purchasing assets or extending loans. It leaves the central bank with a monopoly power to decide on how many reserves exist. This is important as banks generally use central bank money to clear their differences with a Clearing House which is used for interbank payment settlement (Keynes, 1930, p. 28).

Keynes (1930, p. 30) describes different possible relations of influence or power between member banks and the central bank resulting in the central bank being restrictive or accommodative with its supply of central bank money. Even today there remains a discussion among economists on the causality from central bank money to bank money or the other way around.

Monetary Policy

Since the 1920's the Federal Reserve System has focused on a 'reserve position doctrine' that gained its momentum with Friedman's Monetarism and Paul Volcker, Chairman of the Board of Governors, implementing it from 1979-82 (Bindseil, 2004a). The experiment of targeting a certain amount of non-borrowed reserves led, as expected by the Federal Reserve, to a high volatility in short term interbank interest rates, but also to a higher volatility in monetary aggregates and was therefore aborted (Bindseil, 2004b, p. 221). The reasons for this volatility can be found in the inherent short-term instability of the demand- and supply conditions in the money market as already described by Bagehot in 1873 in his seminal work 'Lombard Street: A Description of the Money Market' (Bagehot, 1873, ch. 6).

Since then the Federal Reserve System under Alan Greenspan and other central banks have gradually moved back to a 'short term interest rate doctrine', which was common monetary policy before the 1920's and used by the Bank of England during the whole 20th century. Today the Federal Reserve System, the Bank of England and the European Central Bank use interest rates to target inflation (Bindseil, 2004a). They manipulate the price of money, not its quantity (Bank of England, 2014, p.17). This is also represented in the fact that increasingly many central banks provide a corridor for the interbank repo-interest rates using standing facilities, the Federal Reserve System's implementation began in 2003 (Furfine, 2003).

The central banks also hope to influence long term interest rates by manipulating short term rates, the transmission mechanism could be well described using Treynor's Dealer Model (Treynor, 1987) where unmatched securities dealers fund themselves short term in the money market and invest into long term securities (Stigum, 1990, p. 124ff). Central banks can also influence long term interest rates, more specifically bond yields, simply by purchasing government bonds.

Monetary Policy Implications for Bank Lending

The standing facilities ensure banks to always have access to refinancing opportunities in order to meet reserve requirements or central bank money outflows. The result is banks lending their excess reserves whenever not in need of them and banks rather borrowing in the cheaper uncollateralized interbank market than paying a premium for borrowing through the standing facilities. Banks also reduce their interest-bearing debt towards the central bank when not in need of their excess reserves. According to Lavoie (1984) this sometimes results in monetary aggregates to seem as if the money multiplier theory would be valid, that the central bank sets the central bank money supply and reserve requirements such that bank deposits simply emerge as a multiple of the central bank money.

It has been stated above that central banks instead usually set interest rates, this is confirmed by the Bank of England in their Quarterly Bulletin Q1, 2014 (p. 15).

The Bank of England further explains the consequences of readily available funding. Banks first decide how much to lend depending on available profitable lending opportunities, they give loans with a resulting increase in deposits, and then they turn to the central bank to obtain the necessary funding (ibid., p. 15).

From the fact that bank lending creates new deposits we can conclude that a bank is not transmitting liquidity from one agent to another, but creating new liquidity (Hawtrey, 1931, p. 548; as cited in Graziani, 2003, p. 83). Taking further into account that the supply of central bank money is accommodative, banks do not act as intermediaries between savers and investors[2], but as liquidity providers for investors or entrepreneurs and as wealth storage for savers who received their money from the investors. The Bank of England states it clearly (2014):

> "One common misconception is that banks simply act as intermediaries, lending out the deposits that savers place with them." (ibid., p. 15)

> "Rather than banks receiving deposits when households save and then lending them out, bank lending creates deposits." (ibid., p. 14)

[2] For a more detailed analysis on the discussion of banks as financial intermediaries see Werner (2014).

The money multiplier should therefore rather be seen as a money divisor, with the central bank money supply following the amount of aggregate deposits (Lavoie, 1984).

We can conclude that if a single bank increases its lending activities, it can refinance its central bank money outflows in the interbank market. If this is not possible the bank needs to refinance itself through the main refinancing operations or the marginal lending facility of the central bank, which requires collateral.

Therefore it is truly the bank's assets which function as collateral to the central bank that restrict individual lending practices. Central banks additionally administer haircuts to the required collateral[3]. Worth noting is that increased bank lending can provide the bank with additional collateral, e.g. if the bank buys bonds instead of outright lending.

Repackaged loans as CDOs[4] can also be used as collateral for central bank lending and were sometimes created for this sole purpose (ECB, 2011, p. 12).

The regular cost for individual banks to increase lending can be stated as the short term interbank interest rate, which in this case I refer to as settlement cost. However, as a new deposit is created by lending, the true cost for the banking system extending loans is the deposit rate. The distribution of these costs between the individual bank and the rest of the banking system is determined by the interbank rate.

Additionally, if all banks behave in a similar way and extend their lending at the same time proportionally to their market share, there will be no enduring central bank money outflow for each bank and therefore no settlement cost for the individual banks. Most likely small timing differences of banks would result in short term borrowing and lending in same amounts such that income from short term lending is equal to expenses.

The limit to individual bank money creation is therefore dependent on the behaviour of other banks and essentially on the monetary policy and collateral requirements of the central bank. It is the assurance of being able to borrow from the central bank that changes individual- and therefore also collective bank behaviour in the financial system.

[3] As an example a bank might provide collateral for which the central bank requires a haircut of 10 %. This means that collateral worth 100 currency units can be used for loans for the nominal amount of 90.
[4] Collateralized Debt Obligations

Money in foreign currency

Claims that banks create against themselves need not be denominated in their domestic money-of-account as can be seen in the very important Eurodollar market (Stigum, 1990, p. 199ff). These claims should not be underestimated, foreign exchange consists of banks buying and selling deposits denominated in various monies-of-account (currencies) with a daily turnover of more than $1 trillion (Mishkin, 2010, p. 436).

Money as a Liability

The notion of money as a liability disturbs a common sense of money as something absolute. Are X-million € deposited at two different banks really worth the same if the two banks differ in their creditworthiness? The answer must be no, as there is a differing risk of default at any time. Nevertheless both deposits can easily be transformed into the same nominal amount of cash and therefore into a central bank liability, which can be regarded as default risk-free.

The situation is comparable to two different bonds that both mature in one day. Their intrinsic value will be very close to face value. Regular households could be subject to deposit insurance and thereby refrain from choosing a bank by means of observing their creditworthiness, but the money market reveals the difference in bank liabilities.

The overnight interbank interest rate is not an interest rate for every bank, but is an average of transactions of lending to different debtors of differing creditworthiness (Bindseil, 2004b, p. 84).

Therefore short term bank liabilities, like deposits, are traded at par, but redeemed at different rates of interest.

Limits of the description

This description excludes further details known from money markets, the shadow banking system, and settlements that are done without central bank money. Moreover I will refrain from exploring time differences between lending, payments and interbank settlements observable in the payment system[5].

[5] As an example intraday credit from the ECB's TARGET 2 settlement system results in the central bank money supply being larger during daytime than at night (Bundesbank, 2015).

2.2. Implications for Economic Theory

Money supply

Following the exposition above the supply of bank money is inherently determined by banks in combination with their customers and owners. Easily reproducible micro- and macroeconomic accounting shows that when firms or households take loans from banks new deposits are created, when loans are repaid these deposits are destroyed, the two claims cancel out. Interest payments from non-banks to banks reduce aggregate deposits and increase bank equity by the same amount. Banks' dividends to non-banks, or bank expenses towards non-banks reduce bank equity and increase aggregate deposits by the same amount. When banks purchase assets from non-banks deposits are created in same amount. For a more detailed view on the accounting I refer to a booklet from the Federal Reserve Bank of Chicago named 'Modern Money Mechanics' (1992).

There are only two necessary conditions for the previously stated to hold, first, that non-bank cash holding does not increase, and second, that banks use central bank money for settlement, both are observable.

Le Bourva (1992) states there are two opposing views concerning the supply of bank money. On the one hand the Quantity Theorists and Keynes believe the quantity to be fixed independently by the banking system, on the other, the Banking School and Wicksell believe that banks do not set a quantity but a price for money, interest rates. Keynes in this respect regards to his views presented in his General Theory, and not changing views he expressed thereafter.

How the Banking School views the behavior of banks is an analogy to the described supply of central bank money, but much harder to prove since the banking system consists of many banks.

Noteworthy is that a central bank can force central bank money and bank money into the economy through quantitative easing even without the consent of banks[6].

Investment and Saving

One of the larger conclusions Post-Keynesian Theory derives from the 'Loans create deposits' postulate is the opinion of investment causing saving, and not the popular reverse which stems from the misconception of deposits enabling loans (Lavoie, 2009, p. 54). The causality should be

[6] This happens when central banks purchase assets from non-banks, e.g. investment funds.

understood in a way that investment creates its own saving, or as Kalecki says it, investment ‘finances itself’ (Kalecki, 1933, p. 84), as will be elaborated further in section 5.3.

3. Common Assumptions in Monetary Circuit Theory

The following assumptions regard to the most common views of Monetary Circuit Theory and Post-Keynesian Economic Theory on the monetary circuit. There are still discussions on some of the made assumptions and proponents of contrasting ideas exist. The differences between Monetary Circuitists and Post-Keynesian Economists regarding the monetary circuit are small and blurry as many writers can be assigned to both schools of thought.

Assumption 1: There exists only one type of bank liability that fulfills monetary functions.

It becomes clear that in order to present a simple model for monetary circulation with regards to profits in the economy, the financial system must be simplified. This is done as the relationship between central banks and regular banks is not of main focus in this thesis, but is nevertheless important for an understanding of the money creation potential of banks. Therefore central bank money and other debt instruments that fulfill certain monetary functions will be excluded.

The banks' role is to provide the economy with means of payment (Graziani, 1996, p. 141).

Assumption 2: There exists only one bank in the system and all payments are done by bank transfer, a so called Wicksellian one-bank system.

The Wicksellian one-bank system is first described in Knut Wicksell's book 'Interest and Prices' and describes a hypothetical banking system consisting of only a single bank (Wicksell, 1898, p. 94f).

This assumption is justified for that depositors switching from one bank to another, or payments resulting in money moving from one bank to another, do not significantly alter the money creation potential of the whole banking system.

The Wicksellian one bank system is an approximation of the behaviour of the banking system as a whole incorporated in a single bank (Wicksell, 1898, p. 168).

Assumption 3: The Wicksellian one bank system can meet all credit demand with new money.

The money creation potential could be restricted by central banks through the provision of central bank money, but if central banks supply unlimited money for a given interest rate, meeting all demand, this poses no restriction to their possible supply (Wicksell, 1898, p. 168).

Keynes concludes that in a closed banking system with all payments made by cheque and no cash used, where banks' settlements are done by the transfer of other assets, provided the banks move forward in step, there is no limit to the amount of bank money that could be safely created. This is possible as when every bank extends its loans proportionally they will have no cash outflows (Keynes, 1930, p. 26). This description fits well to a Wicksellian one-bank system, although Keynes talks of the banking system with many banks.

Wicksell (1907) argues in the quote displayed at the beginning of this thesis that banks for their lending are not limited by their own capital as they together concentrate in their hands almost all payments. They can create the necessary money required, or simply accelerate the circulation of money.

Other limits of credit creation could be the minimum reserve and capital requirements. The minimum reserve which a bank needs to hold in central bank money as a proportion of their deposits cannot be seen as a limit to credit creation when the central bank behaves accommodative.

Rochon (1999, p. 17) states that Monetary Circuitists regard reserves as a leftover from non-credit economies.

Koo (2003, p. 149) describes that capital requirements pose a problem when asset prices are falling, reducing banks equity and endangering banks of not meeting the requirements. In such a situation banks are unwilling to expose their balance sheet problems by issuing shares, but prefer to reduce lending in order to fulfill the requirements. This can result in capital requirements reducing the amount of loans banks extend.

Using the above reasoning it is assumed that the Wicksellian one-bank system can provide, if wanted, unlimited loans. The assumption can be restated in a way that no capital requirements exist, as a monopolistic bank with only one type of money could produce unlimited loans anyway, but the reader should keep in mind the Wicksellian bank as a representation of the banking system as a whole consisting of many banks.

Assumption 4: Money is endogenously set by creditworthy credit demand

Banks creating deposits when they extend loans does not automatically imply endogenous money. Only the combination with the accommodative behaviour of the central bank implies money to be endogenously set by the interaction and behaviour of banks and firms.

This behaviour can be assessed using surveys, such as the Tankan survey in Japan asking firms if their demands for bank credit are met or not. The surveys reveal that in normal times creditworthy firms are granted virtually all the loans demanded (Koo, 2003, p. 3).

Additionally in times of increasing (decreasing) prices collateral value increases (decreases) and banks are willing to lend more (less). This, together with pro-cyclical risk attitudes as outlined by Hyman Minsky, explains pro-cyclical credit extension (Lavoie, 2009, p. 72f). There is also reason to believe that banks change their requirements for creditworthiness in a pro-cyclical way (Rochon, 1999, p. 76).

Further the surveys show that in times of financial distress banks tend not to comply with all creditworthy firm demands for credit (Koo, 2003, p. 42).

For matters of analysis the assumption is taken that only normal times exist and banks provide unlimited credit to creditworthy firms demanding funds. This poses an analogy to the behaviour of the central bank setting the price of money, the interest rate, and supplying all quantity demanded for that rate. Banks are assumed to behave in a similar matter and set their interest rates as well and accommodate all creditworthy demand. The quantity of money is then endogenously determined by credit demand.

With this understanding an increased demand for money to a large extent creates its own supply. This was already mentioned by Emil Struck in 1886 in his description of the London money market (Struck, 1886, p. 43f), and it was accepted by Wicksell (1907)[7]. As a result some Circuitists post that supply is demand, and they reject to talk of money supply otherwise, as it conjures up the notion of a function, thereby suggesting a relationship between the supply of credit and the rate of interest (Rochon, 1999, p. 16f).

Some Post-Keynesian authors discuss whether bank money can be completely endogenous, as when the central banks purchase government bonds, which can be seen in recent quantitative easing policies, new bank money is created due to an asset purchase. The total money supply would then be partly endogenous and partly exogenous (Cavalieri, 2004, p. 67). As mentioned above, such an increase in bank money is therefore forced upon the banking system, which current central banks pursue in order not to drift into deflation.

[7] See the introductory quote on page 1.

Critics could argue the money supply being exogenously determined by the central bank by setting interest rates affecting credit demand directly. But empirical evidence by Monnet (Monnet et al., 2001) shows a positive relationship between money supply growth and interest rates, which contradicts the asserted notion.

For now money is assumed to be endogenously set by creditworthy firm demand for credit (Rochon, 2005, p. 126).

Assumption 5: Interest rates are set exogenously by the central bank

As mentioned above most central banks today act according to a 'short term interest rate doctrine' trying to influence banks' and firms' behaviour through interest rates and accommodating the necessary central bank money. The objective of steering interest rates is most clearly seen in the corridor for interbank interest rates provided by the central banks' standing facilities. Lavoie (2009, p. 60) mentions that this can also be seen in the market reactions on interest rate announcements by the central bank.

However the question arises, which macroeconomic variables drive the decision of a central bank to change their target interest rate, that is, what is the reaction function of the central bank (Lavoie, 2009, p. 64)?

If one determines such a reaction function in macroeconomic models the interest rate becomes endogenously determined. Howells (2007) suggests that recent trends in monetary policy making have shifted from interest rates as a policy determined variable towards an endogenous variable. The driving force behind is to make policy fully transparent, which in its ultimate way is to publish an interest rate-setting rule such as the Taylor rule[8] and a commitment to following this rule. The idea is that market participants react to economic data, and that the policy decisions of the central bank follow a predictable policy reaction function.

For purposes of simplification the assumption is taken that there is only one interest rate and it is set exogenously (Rochon, 2005, p. 131).

[8] The Taylor rule is a rule describing how central banks should set their interest rates in order to reach their inflation target. It depends on past inflation, deviations towards desired inflation target, and deviations of GDP against its long-run average (Taylor, 1993).

Assumption 6: There is only one time period and one monetary circuit

The monetary circuit has a length reflecting the duration of production and credit (Deleplace et al., 1996, p. 13). It is a one-period model with production decisions at the beginning of the circuit and with consumption and saving decisions at the end of the circuit. It is common to analyze only a single monetary circuit (Rochon 2005, p. 127).

Assumption 7: There are three different agents, banks, producers and wage earners, while the latter do not have access to credit.

According to Graziani (2003, p. 26) Monetary Circuit Theory sees the role of banks as to fulfill the task of providing loans when firms demand them. The agents left to make decisions are split in two groups, wage earners and producers. They differ from each other in that producers can take loans and are creditworthy and wage earners simply work and do not have access to credit and can only spend their income.

Assumption 8: Only production is financed

By assumption the producers take loans in order to finance production and not consumption. Some Post-Keynesian Economists place emphasis on consumption being financed as well and divide the goods produced into consumption and production goods (Graziani, 2003, p. 27).

Assumption 9: The economy is closed

By assumption there are no loans to be obtained from outside the economy, e.g. in foreign currency, the economy is closed (Rochon, 2005, p. 127).

Money is not neutral

In an economy where different agents have different access to credit, money cannot be neutral. This comes as a consequence from the previous assumptions (Graziani, 2003, p. 26).

4. The Simple Monetary Circuit and the Paradox of Profits

The following shows the basic steps of the monetary circuit as first described by the Swedish economist Knut Wicksell in his work 'Interest and Prices' (1898). He can be acclaimed for the earliest descriptions of the monetary circuit, but Graziani also names before him Galiani (1780) who made a remarkable description of monetary circulation (Graziani, 2003, p. 27). Section 4.1 presents the simple monetary circuit as described by Wicksell and section 4.2 outlines the paradox of profits that arises from the simple monetary circuit. Section 4.3 shows differences between Wicksell's and Graziani's description of the monetary circuit.

4.1. The Simple Monetary Circuit

Step 1: Initial Finance

Firms, represented as the producers, borrow a certain '*K'* amount of money from the bank which is newly created by crediting to the producers on a bank account.

Step 2: Production

Firms pay wages '*K'* to workers in order to produce, the workers then have the money credited to their bank accounts. The process of production takes one year and therefore the loan maturity is set at one year. Graziani (2003, p. 27) notes that wages are the only costs for production as for the simple case every non-wage expense can be broken down into wage expenses for other firms, if one regards the firms as a single sector.

Step 3: Sale

At the end of the year when the products are produced, workers buy them, receive the goods and pay the money '*K'* back to the firms.

Step 4: Repayment

The firms receive the money and cancel their debts with the bank. The bank money is destroyed.

4.2. The Paradox of Profits

The problem named 'paradox of profits' occurs in this model by Wicksell (1898, pp. 171-173) as the amount of '*K'* money is created and equal to the costs of the firms, but the firms cannot raise more than '*K'* when selling their products, as *'K'* is the total amount of money in the economy. In this model firms cannot have profits and neither can banks. When an interest rate is introduced

the problem gets even worse, if there is only '*K'* amount of money in the economy, where should the interest come from when the debt is repaid? Wicksell solves this issue by letting the bank pay interest *i* on deposits at the same rate as they charge for loans, the households would then have *(1+i)K* to spend for goods and firms could repay their loans plus interest. Wicksell notes that this is an unrealistic scenario as banks generally charge higher interest rates for loans than they pay on deposits. But the situation still leaves banks and firms without any monetary profits. The incomes of both equal their expenses.

4.3. Differences in the Description of the Monetary Circuit

Wicksell

In Wicksell's description (1898, p. 170ff) the firms are restricted to the amount of *'K'* for loans which is equal to the real capital in existence at the beginning of the period, produced in previous periods. For the circuit Wicksell puts workers and capitalists in one group, which I call households, and they are paid by the firm for work and for usage of the real capital. At the end of the circuit Wicksell puts an emphasis on households holding profits in *real* terms as in the produced goods. These goods worth *(1+i)K* can then be exchanged with each other without requiring any additional money, because the monetary transactions cancel out in a way that all bank accounts end up at zero. Goods worth *iK* are consumed and goods worth *K* are kept as real capital for the next period (ibid., p. 173f). The profits in terms of goods are then *iK*. Wicksell more precisely assumes banks to have no expenses except interest on deposits (ibid., p. 172) and he assumes that firms can only get loans for the next period, when their loans from the previous periods are repaid (ibid., p. 170). For his analysis of the circuit he assumes the natural rate of interest to be equal to the rate of interest on money (ibid., p. 174). The natural rate of interest can be understood as the interest paid if a loan was granted and later repaid in goods and not in money (ibid., p. 130).

Graziani

Augusto Graziani in his book 'The Monetary Theory of Production' (2003) provides another description of the monetary circuit with slight differences. He presents a more recent view of Monetary Circuit Theory.

Graziani's first stage is reflected by firm demand of loans depending on the wage rate and the number of workers firms intend to hire. A single firm represents the firm sector as a whole.

Graziani states that the wage rate determines the amount of loans needed and negotiations between banks and firms determine the amount of credit and level of interest rates (ibid., p. 29). In his view interest rates are therefore not strictly exogenous and the money supply not solely dependent on firm demand.

For the production in stage two Graziani names consumer goods and investment goods of which investment goods are for sale within the firms sector. Firms enjoy independence in decisions regarding production and employment. Households have the choice between spending on consumption, saving their cash balances or purchasing securities in financial markets. (ibid., p. 29)

The amount of goods sold in stage three depends on the households' decisions regarding their spending. Consumption and the purchase of newly issued securities creates income for firms, saving in the form of bank deposits leaves the firms with an equal amount of debt unpaid to the bank. (ibid., p. 30)

For the fourth stage of repayment of bank debt Graziani states the possibility of revolving loans with banks extending the maturity for the next period without early repayment. Firms then use their receipts from selling goods in order to finance a new round of production. If households save in the form of deposits the circuit remains unclosed and if banks decide to lend more, the total money supply will increase. (ibid., p. 30)

Graziani (ibid., p. 31) adds a fifth stage in order to discuss the interest rate problem. He argues that as there is not enough money in the economy the interest can only be paid in kind, that is in goods. Formally banks could just use expenses and buy the goods leading to the creation of new money that can be used for paying interest. He mentions another possibility that banks could buy equities from the firms creating new money for the firms to pay interest on their loans. He further states that in a closed economy the only thing that could create losses for firms as a whole is the decision of savers to hoard part of their savings in the form of cash balances (ibid., p. 31f).

Graziani (ibid., p. 26) makes a mention that for the social group being admitted to bank credit money is a source of profits. He does not elaborate his point further, but it will be shortly addressed in chapter 7.

5. Literature Review on the Paradox of Profits

The literature review is split into three sections. The first section explains how different types of monetary profits are defined. This is followed by a description of past attempts to solve the profit paradox by non-circuit writers. The third section provides a review of the literature of Monetary Circuitists attempting to solve the profit paradox with Monetary Circuit Theory.

5.1. What are Monetary Profits?

Monetary profits in a narrow sense

Comparing the literature on the paradox of profits it seems different authors have different definitions for monetary profits. The narrowest definition is that of profits held in monetary form at the end of the circuit, as there is a Wicksellian one-bank system assumed these profits would be held as claims against the bank. This can also be referred to net cash flows as profits, which are simply cash in- minus outflows during the time of the circuit. They are shown in a firm's cash flow statement.

Monetary Profits in a wider sense (Gross Profits)

Parguez (2003) states three conditions in order to accept profits as monetary profits: [italics are his]

> "I. Profits must exist for firms *as a whole* and they must be accounted at the macro-economic level;
> II. Profits are generated in their money form as a share of receipts in money;
> III. In the pure capitalist money profits are instantaneously transformed into real wealth as firms in their role of capitalists spend that share of receipts to acquire in full property a share of the available output."

Thus he means profits once received in monetary terms, but spent to purchase capital goods e.g. machines. This definition includes profits held in the form of securities or assets in general, so called *real* profits. Monetary profits in a wider sense can be represented as gross profits, profits including depreciation.

Net profits

Net profits refer to profits derived from common accounting practices, and in the model setting are calculated as gross profits minus depreciation. These net profits increase firm equity by the same amount and are therefore reflected in the change of the balance sheet.

5.2. The Paradox of Profits in other Schools of Thought

The view of the economy as a circular flow dates back to Francois Quesnay in his Tableau Economique, which was also accepted by Adam Smith naming the economy a 'great wheel of circulation' (Bezemer et al., 2010). But they did not recognize equality between in- and outputs that results in zero aggregate profit.

In Neoclassical Theory the standard Walrasian General Equilibrium model assumes that profits do not exist. This is also due to Jean-Baptiste Say stating Say's law that supply and demand are by definition equal (Bezemer et al., 2010).

Marx could not solve the profit paradox as for him it was not clear how additional money could be thrown into circulation without this additional money coming from the circular flow. This results in his famous equation M-C-M'. How can money M, that is spent for commodities C, result in a larger amount of money M'?

Marx in his Capital (1885) vol. 2 chapter 17:

> "the class of capitalists cannot extract from circulation what has not previously been thrown in... In fact, although paradoxical at first sight, the capitalist class itself throws into circulation the money which serves to realize the surplus value embedded in the commodities."

Marx proposed two solutions to what he termed a monetary problem of profits. The first was additional gold that comes into circulation. The second was that additional money was created by the capitalists themselves by means of increasing the velocity of circulation. With this solution the capitalists spend what is to become their own profit. (Bezemer et al., 2010)

Michal Kalecki did not address the problem as a monetary profit (monetary profits at the end of the period), but comes to a similar result. He states that gross profits are equal to gross investment plus capitalists' consumption minus workers' savings (ibid.). So if workers spend all their savings gross profits are equal to gross investment plus capitalists' consumption. This has

coined the term by Joan Robinson that ‘the workers spend what they get and capitalists get what they spend’ (1969, p. 260). The difference to Marx is therefore the introduction of investment decisions in providing a profit.

Jeremy Bentham argued that unproductive credit creation, that is consumption credit, provides a mean of explaining monetary profits. He also distinguished between primary and secondary uses of money, such that money is spent in a first round and again in a second round. In his opinion the additional money would in the first round increase the quantity of sold goods, but after that only increase prices (Bezemer et al., 2010). This hints at a solution where the money supply plays a central role in solving the paradox of profits.

5.3. The Paradox of Profits in Monetary Circuit Theory

Investment as a solution

Many proposed solutions within Monetary Circuit Theory and Post-Keynesian Economics are based on Kalecki’s profit equations. Kalecki first showed that the inclusion of investment can provide a source of profit (Kalecki, 1933, p. 78ff). He splits the income side of the Gross National Product (GNP) into gross profits π_G and wages W. The expenditure side of GNP is the sum of gross investment I_G, capitalists’ consumption C_C, and workers’ consumption C_W.

Incomes: $$GNP = \pi_G + W \quad (1)$$

Expenses: $$GNP = I_G + C_C + C_W \quad (2)$$

Assuming that workers spend all their wages such that $C_W = W$, we can rewrite the two equations above into Kalecki’s profit equation.

Gross Profits: $$\pi_G = I_G + C_C \quad (3)$$

Kalecki obtains gross profits to be equal to gross investment plus capitalists’ consumption. As capitalists cannot decide on their income Kalecki concludes that it is current and past investment decisions that shape current profits. Kalecki even mentions the possibility of additional investment being financed by bank credit resulting in profits held as new bank deposits in same amount. Thus he was aware of the credit creation process and argued that because the demand for money is met with the supply of new money, investment ‘finances itself’. A display of Kalecki’s own description using the Marxian ‘schemes of reproduction’ is given in Appendix A.

It is important to note that otherwise Kalecki in his aggregation of gross investment and capitalists' consumption did not have monetary profits in mind. Kalecki merely explains total profits to be realized at the size of the value of production of investment goods and consumption goods for capitalists. (Kalecki, 1933, p. 80)

A simplification of Kalecki's analysis is presented in a paper by Edouard Cottin-Euziol (2013), it includes monetary flows and is consistent with the monetary circuit. Table 1 depicts Cottin-Euziol's equations in a simple flow-of-funds chart.

Table 1: Monetary Flows showing how Investment creates Gross Profits

	Transaction	**Households**	**C-Goods-Sector**	**I-Goods-Sector**	**Bank**
t=0	Loans for Wages		$+L_C$	$+L_I$	$-L_C$ $-L_I$
	Wages	$+W_C + W_I$	$-W_C$	$-W_I$	
t=1	Consumption	$-W_C - W_I$	$+W_C + W_I$		
	Investment		$-I$	$+I$	
	Loan-Repayment		$-L_C$	$-L_I$	$+L_C$ $+L_I$
	Σ- Cash flows	0	$W_I - I$	$I - W_I$	0
	Σ- Goods	$+C$	$+I$		
	Gross Profits		$+W_C + W_I - W_C = W_I$	$I - W_I$	
	Depreciation		$-I$		
	Net Profits		$W_I - I$	$I - W_I$	

Table derived from equations presented in Cottin-Euziol (2013).

The model is introduced assuming a consumption goods and an investment goods sector. Each sector takes a loan at the beginning of the circuit in order to finance the corresponding wages W_C and W_I. At the end of the circuit the households are assumed to spend all their income W_C and W_I on consumption goods, there is no saving. Then consumption goods-producing firms purchase investment goods I. The loans are repaid, the money is destroyed.

The economic transactions result in the consumer goods sector having a net cash flow of $W_I - I$, and the investment goods sector having a net cash flow of $I - W_I$. In aggregate the firm sector

has net cash flows of zero. The investments I of the consumer goods sector result in a cash outflow, but the accounting rules dictate the loss to be distributed over future periods, that is, to book the newly purchased capital goods as an asset and not as a cost (Cottin-Euziol, 2013, p. 206f). The gross profits of the consumer goods sector π_C are therefore W_I.

In contrast, for the investment goods sector the investment expenditures from the consumption goods sector are booked as regular revenue, subtracting the wages results in gross profits of $\pi_I = I - W_I$. Total firm gross profits are therefore equal to investment and held as capital goods in the form of real profits on the balance sheet of the firm sector worth I. These goods were paid for by money, but are held as goods, as the money was spent for buying these goods.

If we follow the cash flows closely or assume individual sectors not being able to have negative cash flows, I can be at maximum as large as W_I and therefore the profits are limited at size W_I (Seccareccia, 1996, p. 408).

Long-term repetition of the cycle will result in zero net profits due to depreciation of the goods produced in previous periods. Following Kalecki's profit equation net profits should be equal to capitalists' consumption, but where is the capitalists' income for consumption to derive from, if only wages are financed by credit? The Marxian dilemma remains. So far this cannot be accepted as a sufficient solution to the paradox of profits.

A modification of the presented model introduces that investment expenditures are also financed by credit, which was already suggested by Kalecki, but it does not change the results. The investment expenditures of the consumption goods sector create income for the investment goods sector, but it makes it harder for the consumption goods sector to recover its funds in order to repay the loan (Rochon, 2005, p. 134f). Gross profits are still equal to investment I, and I is still constrained by the size of W_I in order for both sectors to repay their debts (Seccareccia, 1996, p. 408).

Nell (2002) splits the investment goods sector into subsectors such that investment goods-producing firms purchase investment goods as well and this creates a gross profit as large as investment I. The difference to previous results is that he shows that only wages in the investment-goods sector need to be financed as he argues the wages of the consumer goods sector need not be advanced and could be paid as soon as demand for consumer goods occurs.

He adds an additional delayed demand from wages W_C that provides additional revenue for the consumer-goods sector.

Household credit and saving

A minority opinion originally suggested by Jeremy Bentham[9] is held by Arestis and Howells (1999), who state that the greater part of the loan demand in the UK comes from households and that this demand is probably driven by other factors than production costs, thus being in contrast to the common idea of production costs determining credit demand. Additional support is provided by Pasarella (2012) who refers to the savings rate of the household sector in most Anglo-Saxon countries falling since the 1990s, with households increasingly turning into net borrowers. Within Monetary Circuit Theory the household consumption loan increases the firms' gross and net profits by the size of the loan.

However, Gnos (2005, p. 176) insists that the core of Monetary Circuit Theory is about wages creating incomes through economic transactions and that it suffices to explain profits with households' income following wages.

Worth a note is that Monetary Circuit Theorists and Post-Keynesians generally agree that household saving reduces demand and therefore also firms' income. Parguez (2002) states that saving in accumulated deposits has no more anchor into output. In the monetary circuit the consequence is that firms remain with a debt towards the bank and households with a balance at their deposit account in same size.

Household saving at the end of the circuit can also be explained by a household demand for money as an asset, or in Keynes' terminology, liquidity preference (Rochon, 1999, p. 33). This is not a decision between consumption and saving, but a decision with respect to how to allocate total saving (Rochon, 2005, p. 136). This is further emphasized with a quote from Rochon (1999, p. 33): [italics are his]

> "...demand for money is an *ex post* notion, that is *ex post* to credit demand and production decisions. The demand for money therefore carries no real significance: it does not determine firms' investment decisions, although it impacts on their realized profits."

[9] See page 22.

In order to overcome the firms' losses due to household savings at the end of the circuit, firms can issue equity and recoup the money otherwise lost, in order to repay their loans (Zezza, 2012). Household saving would then be in the form of equities or deposits, depending on the households' demand for money.

Extending the timeframe

A class of suggested solutions relaxes Assumption 6 of the one-period time frame of the monetary circuit. One approach consists of assuming a number of overlapping circuits (Gnos, 2003, p. 334). Gnos notes Monetary Circuit Theory to be consistent with the notion of prices exceeding factor costs resulting in profits when consumers spend their income on firms' products. In his notion firms only need to finance wages, households spend their income and firms spend their profits, and this is possible due to overlapping circuits. Rochon (2005, p. 127) makes it clear that many circuits exist simultaneously, but that simplification requires researchers to deal with a single circuit.

Another approach is pursued by Allain (2007), who splits the period into sub-periods in order to let firms sell only part of their produce, but for all the wages *W*. They therefore receive a profit margin θ. The profits are used for buying capital goods or paying dividends to the households, which in later sub-periods will buy the rest of the products, until all the products are sold. The profit level reached is equal to net profits of $\theta \cdot W$.

This solves the profit paradox, by enabling profits to be used to purchase products again. Allain therefore puts, like Marx before him, an emphasis on the velocity of money. He uses a velocity of greater than one and thus enables a multiple of transactions with the same amount of money.

An associated solution is that of extending the timeframe, more precisely extending the maturity of loans, such that profits can be distributed to households in order to buy more products with the same money. Rochon (2009) suggests part of the credit on investment goods to be repaid in future circuits, but only examines the first circuit. Only a proportion φ of investment loans is repaid in the first circuit. His result of overall profit is $\pi = (1 - \varphi)I$ (Cottin-Euziol, 2013). We follow Cottin-Euziol's representation of Rochon's solution as Rochon's solution is very misleading with him also excluding bank profit from the equation.

Further it is argued here that Rochon misunderstood the notion that when bank loans are repaid this does not affect profits, as it is a simple balance sheet reduction for both the firm and the

bank sector. Perhaps his focus is on the cash flow profits of the firm sector, which holds the money of the loan that is not repaid yet at the end of the first period, which is exactly at the size of $(1-\varphi)I$. Still the firm sector has a gross profit of I, which it is holding as goods worth I. But the money of size $(1-\varphi)I$ which the firm sector is holding is simply an asset, which has a corresponding liability of outstanding debt in same amount. It is important not to confuse stocks and flows in this matter. The firm sector holds a stock of money, with a corresponding debt, but the real profits, as flows, still remain at size I.

Keen (2010) provides another solution by extending the time frame and using a continuous time model with differential equations. In his model he uses a monetary economy where tokens are used as money. Keen overcomes the paradox of profits by extending the time horizon to 7-year loan periods and letting the loans of the firm sector be repaid at a rate of 1/7 every year. Interest payments occur every year and increase bank equity, which is spent again in order to buy goods from the firm sector. The principal amount of loans repaid is re-lent to the firm sector on a regular basis. Keen uses time constants to let workers' consumption and the wage bill occur several times a year.

His simulation results in workers' wages to be a multiple of the total money stock of the economy per year, he explains this with the difference of income as a flow and money as a stock, i.e. money can circulate several times a year and create incomes in a multiple of its size.

The actual size of the profits depends on a number of parameters but is essentially equal to the difference between the monetary value of output and wages. The profits are received by banks and spent for buying goods and thus enable firm profits. This is comparable to Allain's approach mentioned above, with the difference that instead of firm owners' profits, banks' profits are re-spent.

Interest payments

Before proceeding with a deeper role of banks, the payment of interest is addressed. Interest payments further reduce firms' profits, with a result of gross profits $\pi = I - i \cdot L$, with i being the interest rate and L being total loans (Cottin-Euziol, 2013, p. 208). This can be solved, as Wicksell already noted, if the bank pays interest on the deposits at the same rate as they lend. A solution to the problem of interest is also when banks pay wages in advance and receive interest in same amount. The paid wages in advance are newly created money which can be used by the

firms to pay interest. This possibility was put forward by Joan Robinson (1966, p. 228) and she explains gross profits to be investment plus banker's expenses minus interest and results again in gross profits at size of investments. It is assumed that interest expenses are equal to bank advances.

Possible interest payments can also be explained by bankruptcies, such that firms retrieve the money from the loans of bankrupt firms in order to repay their loans plus interest (Rochon, 2005, p. 135), this is often considered a Schumpeterian solution (Messori et al., 2004).

Banks and financial markets

Observing the role of banks in closing the circuit Graziani (2003, p. 31) shortly mentions the possibility of banks purchasing consumption goods or equity from the firms in order for them to pay interest. Bossone (2001, p. 871) remarks that during the circuit process when banks are buying consumption goods in order to enable firms to pay interest in same amount, banks extract seigniorage, that is a pure rent that banks extract from borrowers by virtue of their exclusive power to create money.

Bossone (2001, p. 866) further states that banks can through their financial departments also act as intermediaries in the capital market directing deposits into long term loans. Otherwise this could also be done by non-bank financial intermediaries. He explains that firms can transform their short term debt into long term liabilities using the financial markets. Messori and Zazzaro (2005) claim this to be Ponzi finance. Pasarella (2012) uses a model including capital-asset inflation and households taking debt, but his conclusion is that household debt increases lending and fuels the expansion of the financial markets with corporate demand for financing declining.

Stock-flow consistent models

A class of models called 'stock-flow consistent models' take a different methodological approach in modeling the economy as a whole, they put emphasis on money being a stock and income being a flow (Rossi, 2003). Extending and using these models in Post-Keynesian Theory[10] is a heritage of the economist Wynne Godley (Caverzasi et al., 2015, p. 162). A model can be considered stock-flow consistent if all stocks and flows between a multitude of sectors can be explained (Lavoie, 2009, p. 74). That is a model that explains all sectoral balance sheets

[10] For an overview of Post-Keynesian stock-flow consistent models see the recent paper by Caverzasi and Godin (2015).

and their financial flows within a certain time period. All flows must come from somewhere and go somewhere and thereby explain the changes in stocks. These models are used by some Post-Keynesians and Monetary Circuitists to simulate and solve the paradox of profits and provide a solid base to do so, as they are easily extendable to include all kinds of payments and banking transactions in the economy.

Zezza (2012) uses a stock-flow consistent (SFC) model where banks use their undistributed profits to purchase equities or buy consumption goods. He obtains profits at size of investment, with loans plus interest repaid. He argues the velocity of money in itself not to be sufficient to extinguish the initial loan and for an extension of the production period to overcome saving. Bruun and Heyn (2009) instead use SFC modelling to put focus on real capital appreciation on financial markets.

As SFC modelling provides a comfortable framework for displaying monetary flows, a short model including the most relevant flows for displaying possible profits and the role of banks is presented in Appendix B.

Summary

The heterodoxy even within Post-Keynesian Economics and Monetary Circuit Theory is visible in the differing methodological approaches and also in differing definitions of profits. There has not yet been a general agreement on how to formalize behavioral equations and approach economics, but SFC-modelling is on the rise to take this position. Circuitists like to stick with the formal structure of their model and according to Chick (2000, p. 132) they do this at the cost of ignoring actual facts in order to maintain the idea that firms' decisions play the central role in the households receiving money (Gnos, 2003, p. 322). It must be said that it has been accepted that in the tight monetary circuit model including all strict assumptions, profits cannot be explained (De La Fonteijne, 2014).

According to Zazzaro (2003, p. 233) a general problem with these circuitist models is that they are based on the unrealistic scenario that entrepreneurs systematically spend their income before earning it. This dilemma is also reflected in Kalecki's view according to which actual profits arise from the expenditure of their anticipated amount (Renaud, 2000). Explanations based on the government deficit or trade surplus do provide solutions to the paradox of profits, but to have a universally accepted solution we must refrain from them (Rochon, 2005, p. 132).

How are profits reached within the models? The sole inclusion of an investment goods sector does not explain any net profits, the other solutions concerning time frame, household credit and banks seem more promising, although it is unclear how banks can contribute to more than firms being able to repay their loans plus interest. However, it is clear that banks as creators of credit money ensure that the economy is not constrained by private sector savings (Seccareccia, 2012). In short, banks deserve more attention, especially in a credit economy.

6. Approaching the Profit Paradox from the view of the Banking System

This chapter expresses an attempt to address the issues of the paradox of profits from the view of the banking system as a whole. It is expressed by analyzing the effect of banking operations on the aggregate balance sheet of the banking system. After that a view on banks taking an active role is presented.

6.1. The Balance Sheet of the Banking System

Sticking to the narrowest definition of profits, one does not need to go into details concerning firms and households. It is much easier to be seen at the aggregate balance sheet of the banking sector, in our representation the Wicksellian one-bank. If at the end of the circuit any non-bank agent holds claims against the bank, this can only have two general possible causes.

The first cause for non-bank agents to hold claims against the bank at the end of the circuit is the increase of deposits without a corresponding increase in assets. The size of the banks' balance sheet remains the same, but on the liability side equity is reduced and replaced by claims against the bank. This occurs when the bank purchases consumption goods, pays interest on deposits or pays wages to bank employees. All of these positions represent a monetary income for non-banks and if they exceed their monetary costs they would have monetary profits. But the bank would have the corresponding loss in equity, these type of bank expenses are limited by the banks' equity and therefore by the banks' income. Thus the non-bank sector cannot receive monetary profits through bank expenses unless the bank makes losses, which we exclude. Another rather similar case is when the bank pays dividends, which also reduces its' equity, but it is also limited by the banks' income.

If we consider narrow profits as cash flow profits, it is obvious that if one agent has a profit by net-cash-flow position, another agent must have the corresponding loss. This could only be overcome by extending the banking systems' balance sheet.

The second cause is that the bank extends its' balance sheet by purchasing investment goods or securities, which results in a corresponding increase in claims against the bank. It is important to recognize that banks together can buy more than their income if they buy financial assets or investment goods. The difference in the two is that the bank purchasing investment goods results in profits for the firm sector in the form of monetary profits, but that a purchase of securities results in the bank holding a new claim against the firms.

For the narrow definition of monetary profits it seems that banks purchasing investment goods can be considered as a convincing case of non-banks gaining a net-claim position towards the bank, and thus, hold monetary profits.

However, the question arises if this is possible in the long run. In the long run the bank faces troubles as investment goods lose in value and need to be depreciated over time. While regular bank expenses reduce previously accumulated equity, the purchase of investment goods pushes equity reductions into the future by means of depreciation.

If bank re-investments remain constant over time that would lead to an annual bookkeeping loss at the size of the annual monetary profits of the non-bank sector. The size of the balance sheet would remain the same due to the re-investments. In summary the bank accumulates losses in the form of increasing deposits held by the non-bank sector, reducing bank equity.

Are these bank losses i.e. depreciation of investment goods, monetary losses such that total monetary profits would again be zero? I would argue yes, as purchasing investment goods is considered a necessary cost for production, even for banking, and it is only the curiosity of accounting that distributes this monetary loss through bookkeeping rules on to several years. Aggregating the losses of the bank and the profits of the firms still results in zero net profits.

An interesting case to consider is when the investments increase from year to year. The lag of bookkeeping loss in comparison to the cash outflow of the bank and monetary profit for the non-banks could be interpreted as resulting in monetary profits. The bank could also reclaim enough of their equity-position by charging interest on loans, with the bank and firms sharing the common profits in size of the increase in investments. This would require the economy to grow in order to have profits, an unsatisfactory result.

If the balance sheet is extended by the purchase of newly issued equity-securities, the firm sector still faces the dilemma of how to create a surplus of revenue over costs. The firm sector has a new asset as deposits, but also a new liability in the form of equity. The difference to investment goods is that banks don’t face the problem of depreciation anymore as securities are often valued at market prices.

If firms hold monetary claims at the end of the circuit, and also have corresponding debts to the bank in the form of debt or equity, can these claims really be termed monetary profits? It is argued here, that the net-claim position against the bank is not altered, and therefore no real

monetary profits are held. Although arguably the equity and debt claims by the bank have differing maturities and thus do affect the firms' balance sheet position.

Considering all cases one must come to the conclusion that in the regular one-period framework of Monetary Circuit Theory sustainable "narrow" monetary profits cannot be held at the end of the circuit. This makes clear that net-claims against the bank do not provide a reasonable solution to the paradox of profits.

In short, the paradox of monetary profits in a narrow sense is unsolvable, as has been argued by different authors using different approaches (De La Fonteijne, 2014).

One must further take into consideration accounting profits, which include profits once earned in monetary form, but at the end of the circuit held in other than monetary form.

The necessary analysis involves the question of what firms do with their profits, or rather with their income. Do they reduce debt, purchase investment goods, or distribute their income to their owners, respectively the households. Gross profits could be used for this analysis, but they still include depreciation. The concept of depreciation theoretically requires a model to include previous periods, but a satisfactory result can be obtained assuming that previous periods are exactly the same as the current period. In such a case if firm investment remains constant over time investment expenditures would equal depreciation and we obtain net profits.

6.2. Bank Behaviour and Bank Profits

We need to consider an active role for banks, which pursue asset- and liability management. This view is taken by James Tobin (1963). Banks could decide to actively encourage lending, or they could purchase stocks and bonds and take a portfolio management approach to their assets. Similarly banks could use liability management and target a certain quantity of debt by issuing short term debt or bonds. They can also decide on a leverage ratio and the extent of their dividend payments. Within the monetary circuit these measures do not provide sustainable profits for the firm sector, as described in the previous section on the aggregate bank balance sheet. A weakening of the assumptions becomes necessary, e.g. banks purchasing firms‘ equity at the beginning of the circuit, but this still remains with firms as an aggregate having zero profits. The paradox of profits remains.

In fact, observing the banking system as an aggregate one again faces the dilemma of where actually bank profits are supposed to derive from. This is the exact mirror of the profit paradox

of firms. Banks could simply advance consumption and wages, but they can never recoup more than they have spent. Once there is a profit banks could pay dividends which allows households to consume and firms to repay loans with interest and banks to earn interest and pay dividends again. But where is the initial profit to come from? We remain with Marx's dilemma of how to extract from circulation what has not been previously thrown in.

7. Microeconomic view of Monetary Circuits

The thesis that is reasoned for in chapters 7 and 8 is that it is precisely the banking systems' role in extending the money supply that allows profits to be realized. For this to be visible we must split the firm sector into several firms and allow the timeframe to be relaxed, such that overlapping cycles with possibly different lengths exist. Then we must analyze where banks inject new money into circulation, and how that affects firms. Note that it will remain the households' and firms' decisions that increase the money supply through credit, but the banking system will provide it. Assumptions 6 and 8 are therefore relaxed.

This chapter outlines the microeconomics of overlapping circuits in order to understand how profits can be created on the microeconomic level. The macroeconomic aggregations thereof are presented in chapter 8.

7.1. Overlapping Circuits

Table 2 depicts the simplest example with several monetary circuits overlapping. It differs from Table 1 shown above in that it presents a microeconomic view and not macroeconomic aggregates.

Table 2: Overlapping Circuits allowing for Firm Profits

	Transaction	**Households**	**Firm 1**	**Firm 2**	**Firm 3**	**Bank**
t=0	Loans Firm 1		$+L$			$-L$
	Wages Firm 1	$+W$	$-W$			
t=1	Loans Firm 2			$+L$		$-L$
	Wages Firm 2	$+W$		$-W$		
t=2	Consumption	$-2W$	$+2W$			
	Interest payments		$-rL$			$+rL$
	Loan-Repayment		$-L$			$+L$
	Dividends	$+rL+\pi$	$-\pi$			$-rL$
	Loans Firm 3				$+L$	$-L$
	Wages Firm 3	$+W$			$-W$	

The overlapping happens in a way that the first firm takes a loan L and hires workers W and starts to produce at $t = 0$. Shortly after that a second firm hires workers and begins to produce at

$t = 1$. It is assumed that both firms are the same in every respect, except the time when they produce, the length of production is equal for both firms as well and requires two time units.

At $t = 2$ firm 1 has produced its goods, sells them to the households and is able to charge a price $2W$ exceeding its production costs, since the households have a wealth of $2W$ at that time. This allows firm 1 to generate a profit and repay its loan L plus interest rL to the bank. After dividends $\pi + rL$ are paid a third firm enters and takes a loan in order to produce and pay wages. This is necessary in order to maintain the same level of production over time and to ensure that firm 2 can make a profit as well, and so on with another firm entering as soon as a firm leaves.

Thus overlapping circuits provide a simple example of explaining profits for banks and firms, even though it is maintained with some of the strict assumptions from Monetary Circuit Theory. The profits were able to form as there was an increased money supply in the hands of the households, together with not every firm in the market producing and selling at the same time. In essence, the money created by the loan of the second firm passes through firm 1 and enables profits, before the money returns to firm 2 to be destroyed with a repayment of debt. The profits of firm 1 together with the bank are at size W, precisely the additional amount of money available due to firm 2 entering the economy. In reality there exist many circuits of different lengths from different firms.

7.2. Circuits of different lengths

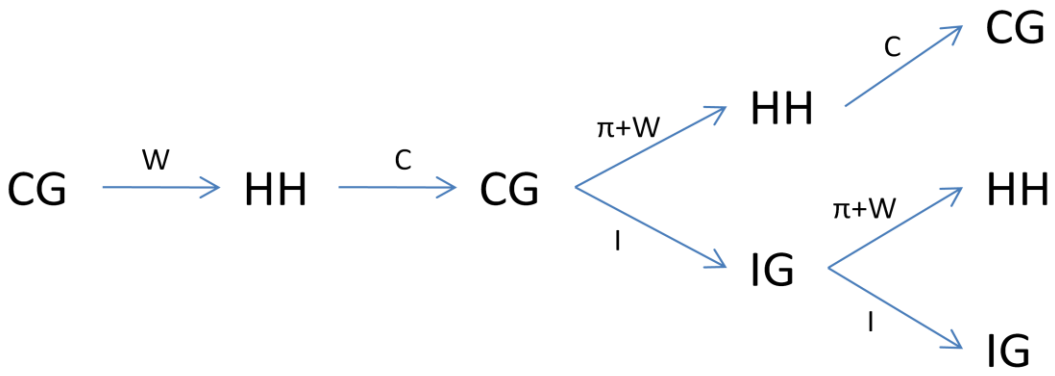
Taking into account a large number of firms with circuits of different lengths we must take a slightly different view. A separation between consumption goods- (CG) and investment goods-producing (IG) firms is introduced, as used further above. The introduction of different lengths of circuits extends the analysis of overlapping circuits of same-type firms. A firm might take a loan with a 5 year maturity and until the money is repaid it flows through a number of firms and households enabling profits to be realized.

More precise, the money that the firm obtains in order to repay its loan in 5 years must not be the same money it initially received as a loan. It could be money that another firm put into circulation by taking a loan from a bank. But to extend this analysis would require a philosophical discussion of how individually identifiable a bank liability can truly be, even within the notion of a Wicksellian bank. A contrast would be a Bitcoin which is a uniquely identifiable electronic key that traces all transactions that are made with it.

In Monetary Circuit Theory the time span of the circuit merely reflects the consequence of the duration of credit (Deleplace et al., 1996, p. 13). In order to have a perfect understanding one would therefore also need to consider different firms from different industries with differing lengths of investments and loans.

Figure 1 below shows a simple flow that could occur after a firm takes a loan in order to pay wages, it shows how the money would continue to flow afterwards. A consumption goods-producing firm CG takes a loan and pays wages W to the households HH. These buy consumption goods C from other firms than the first one, which use the proceeds to pay wages W and profits π to households and purchase investment goods I from investment goods-producing firms IG. The households continue to use their incomes from wages and profits to purchase consumption goods. The investment goods-producing firms pay wages and profits to households and purchase investment goods from other investment goods-producing firms. Note that in contrast to the rest of this exposition the labels in Figure 1 indicate only a type of flow, and not their absolute size.

Figure 1: Monetary Flows between Sectors



The diagram outlines the creation of profits, wages, investment, and consumption due to a single firm taking a loan and paying wages. Excluding saving this money would continue to circulate creating profits until it is destroyed by a firm repaying its debt to the bank, or possibly even by another firm having to pay interest on its loan to a bank. The mechanisms of money entering and leaving the circulation are known from accounting equations.

Interestingly it is precisely the other firms that benefit from the initial firm taking a loan. The initial firm does not obtain monetary profits from its own loan, unless it sells its produce at

different points in time as shown by others[11]. The other firms face increased demand. The initial firm might likewise benefit from other firms taking loans. This solution is based on the velocity of money as a certain amount of money enables a multiple in wages, profits, and on the way, the production in goods. It also contradicts Graziani's notion mentioned above of the social group being admitted to credit being the main beneficiary thereof, at least on a microeconomic level.

We should also observe the other two types of credit that enter circulation, if firms take loans for investment, or if households take credit for consumption. They do not fundamentally differ if the velocity is high, since profits and wages will be a multiple of the extended credit. But if the velocity is low, it does make a difference for firms if the additional money enters by consumption credit or by investment or wages. Consumption provides a direct increase to revenue for firms without increasing their costs at the exact same time. Investment and paying wages however provide immediate costs when the money enters circulation. This difference stems from the nature of households compared against firms. Further the maturities of loans might differ between households and firms, households generally use much credit for purchasing houses and intend to pay it back at a much later point in time. This gives time for money to circulate until it is repaid.

Theoretically it is even possible that a certain portion of money circulates infinitely, this could happen when loans default and there is no equivalent claim towards non-banks that could return the money to destruction. But in reality this money can easily be recouped by banks charging interest on loans.

[11] See page 26.

8. Macroeconomic view of Monetary Circuits

This chapter outlines the macroeconomic implications of the findings from the previous chapter. The implications are addressed concerning the national accounts, the general profit level and how this relates to the Quantity Theory of Money.

8.1. National Accounts

Understanding the economy in flows of funds one must recognize that each expense provides an income for another entity, and that each income derives from an expense of another entity. Credit displays some sort of exception to this rule, such that when it is created there is no expense from another entity, and that when it is repaid it does not provide income for anybody.

Aggregating the individual flows in the economy it is important to understand that if there is saving the amount of flows are not completely predictable. Saving in a blatant way is money that is kept idle on a bank account and is not used for transactions. If it is not spent, it cannot create income for anybody else. A bank cannot use its own existing liability, that states that it owes entity A an amount of money, for extending credit to entity B. As this type of saving reduces incomes and expenditures, it is not reflected in the components of the national accounts.

Noteworthy is that national saving without government, as defined by $S = Y - C = I$, does not correspond to the saving by keeping money on bank accounts as mentioned above. National saving measures the amount of income that firms do not give as profits to their owners, but use for investment.

If firms increase their investment by issuing bonds, which recoup money that would otherwise be spent on consumption, profits would not increase. This illustrates the difference between pure investment decisions and investment-credit decisions that provide an increase in money supply.

In the aggregation of flows one simply adds flows of differing types of transactions as seen in Figure 1. These result in national account flows as shown in Equations (4) and (5) representing incomes and expenses. Equation (6) represents the amount of goods produced, consumption goods and investment goods.

Incomes: $$Y = Wages + Gross\ Profits + \Delta Credit \tag{4}$$

Expenses: $$Y = C_C + C_W + I \tag{5}$$

Production: $$Y = C + I \quad (6)$$

Kalecki (1933, p. 78f) states that profits include undistributed profits, dividends, and interest. He assumes constant prices and households consuming all their wage income, and he also mentions the possibility of credit enabling more investment and therefore profits. His result is stated in Equation (3), in which credit for investment would increase gross investment and therefore also gross profits.

In my opinion Kalecki misses the main point of how profits are enabled only slightly. I argue the increased money supply enables the economy to reach a higher profit level. This money supply enters the economy through credit decisions, which can be traced to investment and consumption decisions. The additional money enables a multiple of wages and profits to be created.

Equation (7) shows the combined equation of Equations (4) and (5) but in comparison to Equation (3) a credit component is added and wages as well as consumption out of wages are not canceled yet. The left hand side of Equation (7) shows incomes and the right hand side shows expenses of the national accounts.

$$Gross\ Profits + \Delta Credit + Wages = I + C_C + C_W \quad (7)$$

Subtracting wages from both sides of Equation (7) allows a representation of gross profits by breakdown into revenue and costs as shown in Equations (8) and (9), this is possible as wages are the only costs in determining gross profits. Taking into account depreciation Equation (10) shows net profits and $\Delta Credit$ allowing for capitalists' consumption to increase.

$$\Delta Credit + Gross\ Profits = Revenue - Costs \quad (8)$$

$$\Delta Credit + Gross\ Profits = (C_C + I + C_W) - W = C_C + I \quad (9)$$

$$\Delta Credit + Net\ Profits = (C_C + I + C_W) - (W + I) = C_C \quad (10)$$

If credit does not change then aggregate gross profits are indeed equal to capitalists' consumption plus investment and net profits are equal to capitalists' consumption. However, the national accounts do not provide us with a great tool to understand the causalities at work. The national accounts should not be interpreted as decisions of either consumption or investment, these rather move in line, they both increase and decrease at the same time, with the money supply pushing them both to a higher level.

In terms of causality an increase of $\Delta Credit$ allows an increase in investment and consumption in the first step which can lead to an increase in gross profits and wages thereafter, which can again increase consumption and investment thereafter again. The change in credit is not a large variable, it is more enabling to increase capitalists' consumption, wages and profits at the same time in a multiple of its size.

But does the dilemma of capitalists consuming what is to become their profit prevail? At this stage I argue that it is not a dilemma at all. It is simply the *ex post* notion of how much profit was created in circulation and how it was spent. It is not constrained by one another, but by the money supply and its velocity. That does not argue that the causality comes solely from the money supply, the causality comes from money expenditure, which is further enabled through an increase in money supply, most often created to meet credit demand. That is households' and firms' decisions that determine the money supply in aggregate and therefore the profit levels reachable. It is also the households' and firms' consumption, investment, and saving decisions that determine the velocity of money and a corresponding increase or decrease in wages and profits.

It turns out that stock-flow consistent modelling provides an excellent base for displaying these aggregate flows in relation to each other. It provides a tool which can be used to break down and grasp flows of individual sectors, the banking system, financial markets, the government, the open economy, and much more. I therefore provide a model including the most common money creating mechanisms in Appendix B. The model can be understood as a mix between Lavoies' (2009, p. 77) and Godley and Lavoies' (2007, p. 217ff) representations. However, in my opinion these models do not provide a proper explanation of what determines households and firms to increase their credit demand and enable the economy to reach a higher profit and wage level.

8.2. The General Profit Level

What influences the aggregate size of profits? From the microeconomic view to the national accounts we realize aggregate profits are simply a type of flow aggregated over a certain period of time. This type of flow is defined as aggregate firm revenue minus costs. Firms taking loans for production increases the money supply, firms' revenues, and firms' costs. The same happens for households' consumption by credit. Following this reasoning it is truly creditworthy credit demand that enables a higher profit level.

What are the determinants of credit demand? Besides interest rates there are a number of other behavioral factors such as expectations that influence credit demand. This includes expectations on the demand firms face on their products in the future. It also includes uncertainty about the general economic performance, including exchange rates and many other factors. This results in self-fulfilling and self-reinforcing expectations. If firms expect the economy to do well, they will demand more credit and invest with the result of revenue and profits increasing and the expectations to be met. The same works in the other direction. If firms expect the economy to truncate, they will invest less and demand less credit, in consequence the economy will perform worse. The same mechanism applies to households' demand for credit. Households expecting higher incomes in the future feel secure enough to take loans today, which results in higher incomes in the future, and vice versa. These forces are well known and Irving Fisher in his book on the great depression (1932) already complained about a pro-cyclical credit creation. This fundamentally contradicts the Neoclassical assumption of a stable equilibrium with forces that always pull the economy back to equilibrium.

The issue of the wage share of prices, revenues or GDP must be addressed. We can interpret all firm costs to be traceable to wages, with the last firm using wage expenses to supply commodities and energy. Will a generally lower wage share automatically imply a larger profit? This is a conclusion one could easily arrive at, but we should not forget to interpret the national accounts as an *ex post* result. It is far more likely that a larger wage share will lead to an increase in velocity, as wage earners tend to have lower saving rates than capitalists. In other words the result is unclear, changes in wage share can affect GDP, prices, profits, and also investment decisions and money supply. Distributional properties therefore matter, so does union power and unemployment.

8.3. The Quantity Theory of Money

When reaching the conclusion that the money supply and velocity is fundamental for reaching higher profit levels one cannot avoid addressing the widely popular Quantity Theory of Money. The Quantity Theory of Money has its origins in the Quantity Theory of Exchange:

$$M \times V = P \times T \tag{11}$$

The Quantity Theory of Exchange asserts the identity of the stock of money M times the velocity of money V used for transactions being equal to the price per transaction P times the number of

transactions T. Early representations are to be found in Newcomb (1885) and Fisher and Brown (1911). The Quantity Theory of Money substitutes T for the real GDP Y and interprets P as a variable for the price level.

$$M \times V = P \times Y \tag{12}$$

This remains an identity if all monetary transactions contribute to GDP, something highly doubtable (Werner, 2007, p. 234). With the rise of Milton Friedman's Monetarism the Quantity Theory of Money gained in popularity being used as an equation showing the neutrality of money, that the banking system fixes the supply of money and that money supply changes would only result in price changes (Lavoie, 2009, p. 55).

It is argued in this thesis that the money supply is not fixed at all and that an increase of it does not necessarily cause a proportional increase in prices. This traces back to the struggle between the banking school and the currency school in the 19th century (Le Bourva, 1992). Concerning the use of the Quantity Theory for expressing causalities one could just as well suggest the money supply M and velocity V causing an increase in real GDP Y and prices P. An increase in economic activity Y could demand an increase in money supply M and velocity V. Lavoie (1984) states that Post-Keynesians usually regard MV as determined by PY.

But most strikingly Monetary Circuit Theory tells us with loans creating money, that an increase in production Y and an increase in money supply M go hand-in-hand. It is therefore argued that production decisions contribute to money supply and GDP at the same time, enabling profits on the way.

Werner (2007, p. 238f) provides a decomposition of the Quantity Theory of Exchange into spending for GDP transactions (subscript R) and spending for non-GDP transactions (subscript F).

$$MV = M_R V_R + M_F V_F \tag{13}$$

$$PT = P_R T_R + P_F T_F \tag{14}$$

He displays the changes of the equations as the following:

$$\Delta(MV) = \Delta(PT) \tag{15}$$

$$\Delta(MV) = \Delta(M_R V_R) + \Delta(M_F V_F) \tag{16}$$

$$\Delta(PT) = \Delta(P_R T_R) + \Delta(P_F T_F) \tag{17}$$

Werner implies a split of the traditional Quantity Theory of Exchange into the two equations (18) and (19).

$$\Delta(M_R V_R) = \Delta(P_R T_R) = \Delta(P_R Y) \tag{18}$$

$$\Delta(M_F V_F) = \Delta(P_F T_F) \tag{19}$$

Equation (18) states that an increase in money used for GDP transactions increases nominal GDP and Equation (19) states the corresponding for non-GDP transactions. Werner (2003, p. 99f) tests his analysis and finds a high correlation between credit creation used for GDP transactions and nominal GDP in Japan. It is a result which is in line with Monetary Circuit Theory and the analysis done.

A flipside to the results is that a growing economy requires more money or an increase in circulation. But money enters by debt, thus Sigurjonsson[12] (2015, p. 70) claims that a precondition for a growing economy is households and firms taking more debt, an unsatisfactory situation.

[12] Frosti Sigurjonsson is currently Chairman of the Committee for Economic Affairs and Trade in the Icelandic parliament.

9. Conclusion

Abandoning too much formalism I reach the conclusion that monetary profits are indeed explainable with the tools of the monetary circuit. These profits can increase and decrease with credit decisions determining the supply of money that can flow around and create profits over time. It is the banking system that provides the credit and money, it is therefore at the core of creating monetary profits.

As it is money used for transactions that result in profits, it is important to recognize the principles of monetary creation and destruction as well as the velocity for the time in between. This includes bank dividends, bank wages, interest payments, asset purchases, and loans.

Marx got close to the same result when searching for additional money that could enable profits, but he failed to recognize that bank deposits provide such a mean. He could have known, since Adam Smith in his most famous book ‘Wealth of Nations’ already explained how the Scottish banking system created money by credit for the use of transactions. Marx and others suffer under the view of the firm sector behaving as a single firm, something I disagree with in this exposition.

This thesis contributes with an inclusion of the perspective of the banking system on the profit paradox in Monetary Circuit Theory. It also contributes in displaying overlapping circuits and concluding that it is the other firms that did not take the loans who benefit most by the credit extension. The paradox of profits disappears on a microeconomic level with overlapping circuits and on the macroeconomic level it turns out not to be a paradox at all. Previous research conclusions that the velocity of money is crucial in explaining profits are confirmed, and the descriptive section innovates with disregarding the absoluteness of money in the form of bank deposits.

Implications are that if policy makers want to increase profits in the economy they need to create an environment that enables firms to take loans and invest and hire people, but also take into account distributive properties. Policy makers need to take into account and influence the expectations of economic agents. Firms as a collective expecting higher demand in the future will increase credit-financed investment and consequently face higher demand in the future, and vice versa. As a consequence economic trends can be self-reinforcing, and do not always pull back to equilibrium.

Variations in credit expansion and human behaviour can affect the economy in a pro-cyclical way and contribute to crises. One should therefore consider closely monitoring and regulating banks. Irving Fisher suggested credit controls as a mean of achieving this, a concept I agree with. His theory of debt deflation crises deserves more attention. A Sovereign Money[13] reform should also be considered, as is currently addressed in Iceland (Sigurjonsson, 2015).

The broader implications of this thesis are to increase awareness that money does matter in a credit economy. It therefore deserves research, already on the grounds of understanding economic forces. It is important to understand that the notion of endogenous money fundamentally contradicts many theoretical concepts of money in economic theory. If bank lending creates new deposits and banks are not restricted in borrowing from the central bank, then banks in their lending practices do not act as financial intermediaries. This affects a large number of implications derived from economic theory, starting by Modigliani and Miller that firm financing doesn't matter, ending with the IS-LM model that assumes bank saving to find an anchor into output in order to ensure that Say's law always holds.

[13] It describes a financial system where households and firms have bank accounts at the central bank.

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Appendix

Appendix A: Kalecki's Profit equations using Marxian schemes of reproduction

Table A1: Kalecki's Profits using Marxian schemes of reproduction

	Department I Investment goods	Department II Consumption goods for capitalists	Department III Consumption goods for workers
Wages	$-W_{IG}$	$-W_{CG}^{C}$	$-W_{CG}^{W}$
Income (production value)	$\pi_{IG}+W_{IG}$	$\pi_{CG}^{C}+W_{CG}^{C}$	$+W_{IG}+W_{CG}^{C}+W_{CG}^{W}$
Profits	π_{IG}	π_{CG}^{C}	$\pi_{CG}^{W}=W_{CG}^{C}+W_{IG}$

Source: Kalecki (1933, p. 80)

Notation:

W_{IG}: Wages in the investment goods sector

W_{CG}^{C}: Wages in the consumption goods for capitalists sector

W_{CG}^{W}: Wages in the consumption goods for workers sector

π_{IG}: Profits in the investment goods sector

π_{CG}^{C}: Profits in the consumption goods for capitalists sector

π_{CG}^{W}: Profits in the consumption goods for workers sector

In order to further explain his point, Kalecki divides the economy into three departments, department I produces investment goods, department II produces consumption goods for capitalists, and department III produces consumption goods for workers. After the wages are paid the workers buy consumption goods and department III creates a profit at the size of the wages of departments I and II. Kalecki concludes that total profits, the sum of the profits of all departments, are the sum of the profits of departments I and II and the wages paid in departments I and II. This is equal to the production value of departments I and II. Profits are therefore gross investments plus capitalists' consumption.

Appendix B: Bank operations that create money in a stock-flow consistent model

Table A2: Transactions-flow matrix of a stock-flow consistent model including banking operations which contribute to money supply

Account	Households	Firms		Banks		∑
		Current	Capital	Current	Capital	
Consumption	$-C_{HH}$	$+C_{HH}+C_B$		$-C_B$		0
Investment		$+I_F+I_B$	$-I_F$		$-I_B$	0
Wages	$+W$	$-W_F$		$-W_B$		0
Depreciation Allowances		$-AF_F$	$+AF_F$	$-AF_B$	$+AF_B$	0
Net Profits	$+P_D^F + P_D^B$	$-(P_D^F + P_{ND}^F)$	$+P_{ND}^F$	$-(P_D^B + P_{ND}^B)$	$+P_{ND}^B$	0
Shares on financial markets	$-p_e^{HH}\Delta e^{HH}$		$+p_e^{HH}\Delta e^{HH}$ $+ p_e^B \Delta e^B$		$-p_e^B \Delta e^B$	0
Interest on Loans	$-i_l L_{-1}^{HH}$	$-i_l L_{-1}^F$		$+i_l L_{-1}^{HH} + i_l L_{-1}^F$		0
Interest on Deposits	$+i_M D_{-1}^{HH}$	$+i_M D_{-1}^F$		$-i_M D_{-1}$		0
Change in Loans	$+\Delta L^{HH}$		$+\Delta L^F$		$-\Delta L^{HH} - \Delta L^F$	0
Change in Deposits	$-\Delta D^{HH}$	$-\Delta D^F$			$+\Delta D^{HH} + \Delta D^F$	0
∑	0	0	0	0	0	0

The table is inspired by Lavoies' (2009, p. 77) and Godley and Lavoies' (2007, p. 217ff) representations. The notation and explanation is on the next page.

Notation:

C_{HH}: Household consumption
C_B: Bank consumption
I_F: Firm investment
I_B: Bank investment
W: Total wages
W_B: Bank wages
W_F: Firm wages
AF_F: Firm depreciation allowances
AF_B: Bank depreciation allowances
P_D^F: Distributed firm profits
P_D^B: Distributed bank profits
P_{ND}^F: Undistributed firm profits
P_{ND}^B: Undistributed bank profits
p_e^{HH}: Price of newly issued equity purchased by households
Δe^{HH}: Change in equities held by households
p_e^B: Price of newly issued equity purchased by banks
Δe^B: Change in equities held by banks
i_l: Interest on loans
i_M: Interest on deposits
L_{-1}^{HH}: Household debt in previous period
L_{-1}^F: Firm debt in previous period
D_{-1}^{HH}: Household deposits in previous period
D_{-1}^F: Firm deposits in previous period
D_{-1}: Total deposits in previous period
ΔL^{HH}: Change in household debt
ΔL^F: Change in firm debt
ΔD^{HH}: Change in household deposits
ΔD^F: Change in firm deposits

Table A2 presents the transactions-flow matrix of a stock-flow consistent model. Each column and row must sum to zero. The table is derived from a system of accounting identities which requires all variables to be measured at current prices (Godley and Lavoie, 2007, p. 8). Each variable represents a nominal flow of money. The rows indicate the monetary outflow of each transaction and where the flow arrives. A positive sign represents a source of funds and a negative sign represents a use of funds. The columns represent the budget constraints that each sector must respect (Lavoie, 2009, p. 76f). From the bank's capital account we can see that

investment expenses, equity purchases and the change in loans must be offset by depreciation allowances, undistributed profits and newly created deposits. If the bank would only extend wages this would translate to a reduction in bank equity and an increase in deposits. The mechanism would work through the variable P_{ND}^{B}, which would be negative as it would present a loss. The model can be easily extended to include central banks, an open economy and much more. For a more extended explanation of stock-flow consistent modelling I refer to the well-respected handbook provided by Wynne Godley and Marc Lavoie (2007).