Supplementary Material for the Paper

Models of Banking: Loanable Funds or Loans That Create Funds?

(not for circulation)

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I. Introduction

The present paper is a companion paper of “Models of Banking: Loanable Funds or Loans That Create Funds?”. It provides additional background material concerning the problems with the loanable funds (LF) model of banking, but also with the popular deposit multiplier (DM) model of banking, and contrasts these with the financing and money creation (FMC) model of banking. The emphasis throughout is on the balance sheet mechanics implied by these models. For continuity of the presentation, some of the material presented below repeats material contained in the main paper.

In the LF model, bank loans represent the intermediation of real savings, or loanable funds, between non-bank savers and non-bank borrowers. Lending starts with banks collecting deposits, in other words with an agent depositing resources in the bank, and ends with the lending of those resources to another agent. However, in the real world, whenever a bank makes a new loan to a non-bank customer X, it creates a new loan entry in the name of customer X on the asset side of its balance sheet, and it simultaneously creates a new and equal-sized deposit entry, also in the name of customer X, on the liability side of its balance sheet. The bank therefore creates its own funding, deposits, through lending. And because both entries are in the name of customer X, there is no intermediation of loanable funds at the moment a new loan is made. No real resources need to be diverted from other uses, by other agents, in order to be able to lend to customer X. What is needed from third parties is only the acceptance of the newly created purchasing power in payment for goods and services. This is never in question, because bank deposits are any modern economy’s dominant medium of exchange, in other words its money. Furthermore, if the loan is for physical investment purposes, this new money facilitates economic transactions that ex-post cause macroeconomic (national accounts) saving to take place. Saving is therefore a consequence, not a cause, of lending and investment. What matters is financing, not saving.

We will demonstrate that a model of bank intermediation of loanable funds describes an economy based on barter, with physical goods flowing through the banking system to be intermediated and exchanged against other goods. By contrast, financing is the creation of monetary purchasing power through matching gross asset and liability positions on banks’ balance sheets, a transaction that by itself involves no flows of real goods through the banking system, but that subsequently facilitates goods exchange outside the banking sector, by lowering transactions costs. Banks do of course face constraints on this activity. But, provided that there is a sufficient demand for credit and money on the part of banks’ customers, banks’ main constraint is their own perception of how a new loan will affect their profitability, and thus their solvency or capital adequacy. The availability of central bank reserves (and cash) does not impose additional constraints, contrary to what is suggested by the deposit multiplier (DM) model of banking.

In the deposit multiplier model, an injection of central bank reserves is a precondition for the creation of broader monetary aggregates, because private banks can only create such aggregates by repeated re-lending of the initial injection. This ignores the fact that central 

1Bank deposits can fulfill this role because the central bank and/or government, through a combination of deposit insurance, prudential regulation and lender of last resort functions, ensures that bank deposits are considered safe by the public, and therefore trade at par with base money. See McLeay and others (2014a,b).
Bank reserves cannot be lent to non-banks (and that cash is never lent directly but only withdrawn against deposits that have first been created through lending). But more importantly, it does not recognize that modern central banks target interest rates, and therefore have to be committed to supplying as many reserves (and cash) as banks demand at that rate, both to meet the interest rate target and to safeguard financial stability. Reserves are therefore a consequence, not a cause, of lending and money creation.

All of the foregoing statements can easily be verified by studying the publications of the world’s leading central banks, including two excellent and very recent publications by the Bank of England (McLeay and others (2014a,b)).

The bottom line is, the banking system as a whole does not collect additional deposits from non-bank depositors, it creates additional deposits for non-bank borrowers. There are no pre-existing loanable funds, new funds materialize on the banker’s keyboard at the moment he makes a new loan. And there is no deposit multiplier mechanism to impose quantitative constraints on banks’ money creation. The main constraint on bank lending, given a sufficient demand for credit, is banks’ expectation concerning the implications of additional lending for their profitability and solvency.

The rest of the paper is organized as follows. In Section II we discuss the problems with the LF model of banking and contrast it with the FMC model. In Section III we discuss the problems with the DM model of banking. Section IV concludes.

II. Loanable Funds? New Loans Lead to Deposit Creation, Not Vice Versa

The critical feature of our theoretical model is that it exhibits the key function of banks in modern economies, which is not the intermediation of pre-existing real savings (obtained through increased production or reduced consumption) between different groups of depositors and borrowers, but rather financing, or the creation of new monetary purchasing power through loans, for a single agent that is both borrower and depositor. This funding model is in fact not limited to lending - payments for purchases of other assets such as real estate are also made through deposit creation. Financing, unlike saving, involves no real resource flows through the banking system at the time of making a loan, it only involves accounting entries. In other words, the only tool that the bank requires to complete this process is a keyboard or, in earlier times, a pen. A particularly concise statement of this fact can be found in Friedman (1971, p. 2): “The correct answer for [the question of the origin of] both Euro-dollars and liabilities of U.S. banks is that their major source is a bookkeeper’s pen.”

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The key distinction between saving and financing was also emphasized by Borio and Disyatat (2011).

Note that at the level of the aggregate banking system it makes no difference that a new deposit (or a new loan, e.g. through securitization) might subsequently be transferred to another bank – so long as the loan remains outstanding at some bank, so does the deposit, at some other bank. While the original loan and deposit are in that case no longer linked, the aggregate supplies of credit and money have increased.
In the rest of this subsection, we will first cite other authorities who have acknowledged this fact, including recent publications of the world’s major central banks, and leading economists of the past. We then explain the process of private money creation in detail, using balance sheets. We first show the problems with the LF model, and then explain the actual money creation process.

A. Statements by Central Banks and Early 20th Century Economists

The fact that banks create their own funds through lending can be verified in descriptions of the money creation process by leading central banks and policymaking authorities. The oldest goes back to Graham Towers (1939), the former Governor of the central bank of Canada: “Each and every time a bank makes a loan, new bank credit is created – new deposits – brand new money.” Berry and others (2007), which was written by a team from the Monetary Analysis Division of the Bank of England: “When banks make loans, they create additional deposits for those that have borrowed the money.” Keister and McAndrews (2009), staff economists at the Federal Reserve Bank of New York: “Suppose that Bank A gives a new loan of $20 to Firm X ... Bank A does this by crediting Firm X’s account by $20. The bank now has a new asset (the loan to Firm X) and an offsetting liability (... Firm X’s deposit at the bank).” Bundesbank (2012) (translation by the authors): “How is deposit money created? The procedure is equivalent to the creation of central bank money: As a rule the commercial bank extends a loan to a customer and credits the corresponding amount to his deposit account. ... The creation of deposit money is therefore an accounting transaction.” Mervyn King (2012), former Governor of the Bank of England: “When banks extend loans to their customers, they create money by crediting their customers’ accounts.” Standard and Poor’s (2013): “Banks lend by simultaneously creating a loan asset and a deposit liability on their balance sheet. That is why it is called credit "creation" – credit is created literally out of thin air (or with the stroke of a keyboard).” Lord Adair Turner (2013), former head of the UK Financial Services Authority: “Banks do not, as many textbooks still suggest, take deposits of existing money from savers and lend it out to borrowers: they create credit and money ex nihilo – extending a loan to the borrower and simultaneously crediting the borrower’s money account.”

The fact that banks create their own funds through lending is also repeatedly emphasized in the older economics literature, particularly that of the first half of the twentieth century. One of the earliest statements is due to Wicksell (1906): “The lending operations of the bank will consist rather in its entering in its books a fictitious deposit equal to the amount of the loan...”. Rogers (1929): “… a large proportion of ... [deposits] under certain circumstances may be manufactured out of whole cloth by the banking institutions themselves.” The following passage from Schumpeter (1954) is highly illuminating (emphasis added): “But this ... makes it highly inadvisable to construe bank credit on the model of existing funds’ being withdrawn from previous uses by an entirely imaginary act of saving and then lent out by their owners. It is much more realistic to say that the banks ... create deposits in their act of lending, than to say that they lend the deposits that have been entrusted to them. ... The theory to which economists clung so tenaciously

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4Pozsar (2014), who provides a very detailed description of the institutional details of today’s financial system, also emphasizes that banks create money ex nihilo.
makes [depositors] out to be savers when they neither save nor intend to do so; it attributes to them an influence on the "supply of credit" which they do not have. Nevertheless, it proved extraordinarily difficult for economists to recognize that bank loans and bank investments do create deposits. In fact, throughout the period under review they refused with practical unanimity to do so. And even in 1930, when a large majority had been converted and accepted that doctrine as a matter of course, Keynes rightly felt it to be necessary to re-expound and to defend the doctrine at length ...". The first half of this statement is almost exactly identical to our earlier explanation of the role of banks. The second half is highly relevant at the present juncture, and in light of the recent literature, because it shows that a struggle to convince the economics profession, and policymakers, of this basic fact had already been won by 1930.

Unfortunately, the work of Gurley and Shaw (1955, 1956) brought a major step backwards in our understanding of banks and money. Gurley and Shaw replaced the critical distinction between banks, which can create money, and non-bank financial intermediaries, which cannot, with the far less important distinction between intermediated and direct debt. They treated banks as simply another form of intermediary, and bank liabilities as simply another form of debt. This work was heavily (and correctly) criticized by monetary theorists of that time, including Culbertson (1958, p. 121), who writes: "A change in the volume of demand deposits, in contrast, is initiated by banks when they change the volume of their debt holdings; the banks' creditors, as such, play no active role in the process. The banking system "creates credit" by acquiring debt and creating demand deposits to pay for it. The commercial banks do not need "to borrow loanable funds from spending units with surpluses" [as claimed by Gurley and Shaw] in order to extend credit...". Similarly, Smith (1959) writes: "Commercial bank credit creation makes funds available to finance expenditures in excess of the funds arising out of the current income flow. ... Commercial banks ... are distinctly not intermediaries. That is, the decision to save a portion of current income and to hold the savings in the form of a demand deposit does not make any more funds available to the capital market than would have been available had the decision been made to spend instead, and does no more than to restore to the commercial banking system the lending power that was lost when the original check was written to transmit income to the recipient."

This debate did however not continue in subsequent decades, as the macroeconomic and monetary functions of banks disappeared almost entirely from mainstream macroeconomic theory. As a result, many important insights of the past have been forgotten\(^5\), and need to be relearned today.

**B. Banks as Intermediaries of Loanable Funds: Deposits Come Before Loans**

The most basic, and also the most naïve, objection to a critique of the LF view is that, surely, when I make a check deposit in a bank, the bank will use that deposit to fund loans to other households or firms. In other words, the bank intermediates my savings. What else would it do with “my money”? This objection exhibits both a confusion of microeconomic with macroeconomic arguments, and confusion about the principles of

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\(^5\)One important exception is Werner (2005).
double-entry bookkeeping. Figure 1 illustrates this with an example. In the four steps shown in that figure, a check with a value of 4 is deposited in Bank A, whose balance sheet is shown in the left column. But the deposited check, if it has any value, must be drawn on a deposit that already exists elsewhere in the banking system. In our example, it is drawn on Bank B, whose balance sheet is shown in the middle column. The right column shows the consolidated banking system, which is for simplicity assumed to consist of just Banks A and B. Also for simplicity, banks are assumed to have no net worth, and to keep central bank reserves of 10 percent against their deposits, much more than they would keep in practice.

The confusion of microeconomic and macroeconomic arguments becomes immediately obvious by considering the balance sheets of the consolidated banking system rather than of Bank A. They are entirely unaffected by this transaction. Deposits have been moved within the banking system, but this does not mean that the banking system as a whole has any more aggregate deposits to “fund loans”. In a macroeconomic sense, this is clearly not what must be meant by the intermediation of savings.

But the fallacies go deeper than that. To begin, even Bank A does not have any additional funds to lend after it has received the deposit. At the moment the check is deposited, Bank A creates a new entry, the deposit, on the liabilities side of its balance sheet. But, by double-entry bookkeeping, there has to be a simultaneous matching entry elsewhere, which in this case is an accounts receivable entry on the asset side. This entry represents the liability of Bank B to deliver central bank reserves corresponding to the value of the check (this step is not shown in Figure 1). In other words, the funds are lent as soon as they are received – to Bank B. Bank A therefore has no additional funds to lend following the deposit. The next step in Figure 1 is that bank A sends the check for clearing, and clearing is settled using central bank reserves, with Bank B’s central bank reserves decreasing by 4 and Bank A’s reserves correspondingly increasing. One could now argue that Bank A can lend these additional central bank reserves to non-banks. But this is simply impossible, because central bank reserves cannot be lent to non-banks under the present split-circulation system, they are exclusively used to make payments between banks. However, it might be argued, Bank A now has more reserves than it needs to support its deposit base, so there will be more lending by Bank A, and thus also more lending in aggregate. Notice that now we are no longer discussing lending by the bank of the funds represented by the original check deposit, because this is impossible, we are rather discussing indirect effects. But even this is incorrect. First, even if it was true that the additional reserves in Bank A cause it to lend more, Bank B faces the opposite situation, so it would lend less. We care about the aggregate outcome, which is unlikely to change because the overall quantity of reserves has not changed. Second, if Bank A cannot lend central bank reserves, and if it cannot create deposits through lending (under the LF view of banking), how exactly can it lend more? Certainly not by attracting yet more deposits from Bank B, which will end up as yet more central bank reserves for Bank A, which cannot be lent. Bank A therefore, if it cannot create deposits through lending, has no ability to increase lending to non-banks after it receives the check deposit and the

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6 This is an excellent example of the critical importance of double-entry bookkeeping in the analysis of banking - it keeps track of the full structure of gross claims and counterclaims that arise from financial transactions.

7 The reason is that central bank reserves can only be held in accounts at the central bank, and the only organizations that can obtain such accounts are commercial banks and the central government.
corresponding central bank reserves.

In the real world only fairly small settlement transactions in central bank reserves are typically required, because incoming and outgoing checks approximately balance for Banks A and B. We nevertheless continue with our example. Given that Bank A does not need the additional central bank reserves to support its deposits with central bank liquidity, and because it cannot lend central bank reserves to non-banks, what it will do in the normal course of business is to lend them back to Bank A by way of an interbank loan. This is illustrated in the third row of Figure 1. Interbank loans are a way of reallocating central bank reserves to where they are most needed within the banking system. Once this transaction is complete, Bank A has therefore used the central bank reserves that came along with the additional deposit to make an interbank loan to Bank B. The deposit never enabled (or encouraged) it to lend more to non-banks, its only options were a loan of central bank reserves to Bank B or higher holdings of central bank reserves, which cannot be lent to non-banks.

A claim that a check deposit represents or leads to the intermediation of loanable funds is therefore a fallacy based on microeconomic or partial equilibrium arguments. But a number of macroeconomic models exist in which banks intermediate loanable funds in a general equilibrium setting. What do they have in mind? This is illustrated in Figure 2, which shows the story implicitly told by such models. Here we only need a single bank that represents the aggregate banking system. The story starts with the saver making a deposit. But we have just seen that this cannot be a check deposit.

It can also not be a cash deposit, for two reasons. First, cash is never “lent out”, in the sense of a pure exchange of assets, loan against cash, on the bank’s balance sheet. Cash can only be withdrawn against a pre-existing electronic deposit that has first been created in some other way. That other way is the subject of our inquiry here. Second, cash represents an extremely small fraction of the overall stock of money in modern economies, and banking transactions would proceed in exactly the way they proceed today if cash no longer existed at all. A model that would not be valid if this minor and non-constitutive element of our monetary system did not exist could therefore not be more than a theoretical exercise with no practical value.

It turns out that the only possible way to tell the story of LF banks is that the saver makes a deposit of neither checks nor cash but of *goods*. These goods must in turn have been accumulated through some combination of additional production and foregone consumption. A quick examination of the budget constraints used in modern general equilibrium models of banking shows that this is indeed, and to our knowledge almost without exception\(^8\), the implicit assumption.

It is very important to try to understand what this would mean in practice, and we do so in Figure 2 by way of a concrete example. In this figure an agent called Saver drives up to the bank with a truck and deposits a specific good, gravel. In return the bank records a new deposit for Saver. At the moment of recording this deposit, by double-entry bookkeeping, the bank needs to record a matching entry elsewhere. This entry, on the asset side of its balance sheet, is an addition to its inventory of gravel. We now assume

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\(^8\)The only exception that we are aware of is Goodfriend and McCallum (2007).
that an agent called Investor A\(^9\) has approached the bank for a loan for the purpose of buying a machine, and that the bank has considered his proposal and decided to approve the loan. Continuing with our example, this loan must take the form of the bank exchanging the gravel against a loan contract with Investor A, in other words the loan is a portfolio swap on the asset side of the bank’s balance sheet. Investor A drives away with gravel, and then negotiates a barter transaction with Investor B, whereby Investor B accepts the gravel in exchange for the new machine whose purchase Investor A wanted to finance. The bank is left with a deposit by Saver, and a loan to Investor A. It has intermediated loanable funds, in this example in the concrete form of gravel. These funds were the prerequisite for bank lending, and therefore for the physical investment of Investor A.

This story is fundamentally non-monetary, as the original bank deposit represents a receipt for goods, the loan represents a claim by the bank for future delivery of goods, and the ultimate purpose of the loan transaction can only be satisfied through barter of goods against goods. We are therefore left with a model where banks, who provide close to 100 percent of any modern economy’s monetary medium of exchange, are modeled as institutions of barter.\(^10\)

C. Banks as Money Creators: Loans Come Before Deposits

The FMC view of banks is illustrated in Figure 3. As in Figure 2, we only need a single bank that represents the aggregate banking system. This story does not start, but ends, with a saver making a deposit. It starts with a borrower, Investor A, approaching the bank for a loan - in the form of money, not goods. If the bank considers the credit risk of Investor A acceptable, it will enter into a loan contract. When the loan is entered into the bank’s books as a new asset, a matching deposit is simultaneously entered as a new liability. The bank has created new purchasing power, money, through lending. Both the loan and the deposit are in the name of Investor A, which means that this transaction involves no intermediation of loanable funds whatsoever. Investor A now uses this new deposit to acquire a machine from Investor B, by transferring the new money in his account to the account of Investor B, in exchange for the machine. We assume for simplicity that Investor B leaves these funds as a deposit in the banking system. At this moment, Investor B becomes a saver. More precisely, he becomes a gross saver in bank deposits, and this does not need to represent additional individual or macroeconomic (national accounts) saving at all, as we will explain below. But what we want to emphasize is that Investor B’s saving is a result, not a proximate cause, of the loan, and of the investment.\(^11\) As indicated in the passage from Schumpeter above, Investor B goes

\(\text{9To avoid misunderstandings, this agent is an entrepreneur, or an investor in real physical capital, rather than a financial asset investor.}\)

\(\text{10This is a point emphasized by Graziani (1989, p.3): “... an economy using as money a commodity coming out of a regular process of production, cannot be distinguished from a barter economy.”}\)

\(\text{11The result that saving is a consequence of investment applies much more broadly than in this example of bank financing. It can for example also be shown for bond financing. Lindner (2012, 2013) makes this case at the highest level of generality. His argument, like ours, is that macroeconomic (national accounts) saving does not finance investment, financing does. Financial saving is a zero-sum game, as aggregate financial saving cannot increase through individual financial saving decisions, only through additional financing transactions, typically loans. On the other hand, in a closed economy, macroeconomic (national accounts) saving is equal}\)
about his transaction with Investor A without any ex-ante intention of becoming a saver. His only intention is to sell machines, and to accept payment for his machines. In a modern economy checks or money orders drawn on bank accounts are not only acceptable legal tender, they are the dominant practical means of making such payments, and Investor B would not remain in business for long if he did not accept them. But that means that he, or someone else to whom he might pass his deposit to make some business payments, have to end up being a gross saver in the banking system.

In Figure 3, if the machine is not pre-existing but newly produced by Investor B, the loan transaction finances real physical investment. However, in the modern banking system, loans to finance investment in the real economy have become a fairly small part of overall bank lending, with another part financing consumption, and a third and much larger part financing the exchange of existing real or financial assets between different agents (Hudson (2012)). If Investor B sold a pre-existing machine to Investor A, then his new deposit does not represent net individual (or macroeconomic) saving at all, rather it represents a portfolio exchange of his existing real asset against a new bank deposit. The absence of saving does not however make the bank loan any less essential, as the reallocation of assets only becomes possible because the bank creates new purchasing power for the use of the purchaser of the real asset.

The final balance sheet of the banking system is shown at the bottom of Figure 3. We find that, ex-post, the identity of the borrower, Investor A, is different from that of the depositor, Investor B. But this is not because the bank has intermediated real loanable funds from B to A, it is because it has created new purchasing power, exclusively for A, that was later transferred through the use of the clearing system. This mechanism has very different macroeconomic implications from the LF view, because banks that create purchasing power face much less serious constraints on their ability to increase lending than (hypothetical) banks that intermediate real loanable funds, or savings. Savings need to be accumulated through a process of either producing additional resources or foregoing consumption of existing resources, a physical process that by its very nature is slow and continuous. On the other hand, banks that create purchasing power can in principle do so instantaneously and discontinuously, because the process does not involve physical resources, but rather accounting entries that lead to the creation of money. While money is essential to facilitating purchases and sales of real resources outside the banking system, it is not itself a physical resource, and can be created at near zero cost.

There is another way of stating this in terms of balance sheets. The LF model looks at banks as institutions that record nonzero net non-financial (goods) transactions, which by their nature require saving of real resources to take place before any transaction. The FMC model looks at banks as institutions that record nonzero gross, but zero net, financial (money) transactions, which clearly do not require prior saving of real resources, but which are nevertheless essential for the functioning of the economy because the bank liability side of this transaction creates the economy’s medium of exchange. This, the creation of gross positions with zero net principal value, but of course with a positive net interest flow to the bank over time, is precisely the meaning of bank financing, the main rationale for the existence of banks.

to investment by definition rather than as a result of equilibrium, and the quantity of that saving is unrelated to the quantity of financing.
The fact that banks *technically* face no limits to increasing the stocks of loans and deposits instantaneously and discontinuously does not, of course, mean that they do not face other limits to doing so. But the most important limit, especially during the boom periods of financial cycles when all banks simultaneously decide to lend more, is their own assessment of the implications of new lending for their profitability and solvency.\footnote{McLeay and others (2014b) also make this point. They add that, from the point of view of an individual bank that considers whether to deviate significantly from the behavior of its competitors, other important limits exist, especially increased credit risk when lending too fast to marginal borrowers, and increased liquidity risk when creating deposits so fast that too many of them are lost to competitors.}

Another potential limit is that the households and firms that receive the newly created money after it is spent may wish to use it to repay outstanding bank loans, thereby quickly destroying the money. This point was stressed by Tobin (1963). This, however, is a surprising argument, because it treats shocks to aggregate credit supply (or to aggregate credit demand) in an entirely different way from all other macroeconomic shocks. An analogy with shocks to aggregate consumption demand, in a New Keynesian economic model, will make this clearer. Assume that such a shock originates with higher consumption demand by one agent (or group of agents in an aggregative model with, say, two groups of agents). Applied to this shock, Tobin’s (1963) argument would say that aggregate output should not increase, because some other agent will reduce his consumption. The implicit assumption would be that aggregate output is fixed. But aggregate output is not fixed, because increased consumption demand will lead to a positive supply response (along with some inflation). Let us now instead assume a shock to credit supply, with some agent (or group of agents) initially receiving larger loans and therefore larger real money balances. The point is that aggregate output is not fixed here either, because higher real money balances stimulate additional economic activity by reducing transactions costs. This in turn increases the extent to which households want to keep the additional money to carry out spending transactions, rather than to repay existing loans. In other words, additional lending creates a virtuous cycle whereby an increased supply of money endogenously generates an increased demand for money. This phenomenon is prominent in the simulations of our model.\footnote{It would be even more prominent if the economy started not from a situation of full employment as in our model, but with significant unemployment and capacity underutilization.}

Some counterarguments claim that additional effective limits to increasing the stocks of loans and deposits exist, namely adequacy of central bank reserves (liquidity), and/or adequacy of equity capital (capital adequacy). In the next subsection we will show that the availability of central bank reserves does not represent an additional constraint. Capital adequacy is of course not really a counterargument, because a concern with the implications of lending for profitability and solvency implies a concern with capital adequacy. But adequate levels of equity capital, as a precondition for further expansions of bank balance sheets, are not a function of retained earnings alone, as equity capital can also be obtained through the issuance of new shares. If it is straightforward for banks to acquire new equity capital, capital adequacy considerations impose a much less serious additional constraint. We will now argue that, especially during boom phases of the credit cycle, there are indeed systemic reasons that make it easier for the banking sector as a whole to acquire new equity capital, and also to reduce the pressures of capital adequacy regulations in other ways. There are two such reasons, the ability of the banking system as a whole to create large amounts of additional funds that find their way back to
individual banks as equity investments, and the presence of unregulated shadow banks.

During boom phases of the credit cycle financial markets can obtain access to large quantities of bank-created money, and this money is fungible. If Bank A requires additional equity capital in order to continue growing, and if markets judge the future profitability of Bank A favorably, an investor can simply withdraw some of his newly created deposits from Bank B and use them to pay for an equity capital offering of Bank A. Crucially, as with deposits themselves, the money that is injected as equity capital does not need to represent any agent’s saving, meaning a real sacrifice such as reduced consumption. While of course no individual bank is legally allowed to create deposits in order for them to be converted into its own equity capital, the banking system as a whole can do so without ever intending to do so. This serves to reduce capital adequacy constraints, including through regulations, during an upturn. But that procedure has some drawbacks, most importantly the time and administrative cost of organizing a share offering. It turns out however that banks have another flexible option for relieving pressures on their capital, at least in the U.S. context. That option is shadow banks.

Shadow banks currently account for over half of the overall size of the U.S. financial system, and they are not subject to the capital adequacy regulations imposed by the Basel and national regimes on commercial banks. Therefore they can, if they choose, be much more highly leveraged than banks. We study the role of shadow banks in Figure 4. Shadow banks (and also finance companies) do fit the description of an intermediary of loanable funds, in that these institutions first need to attract bank deposits before using these funds to lend, or to purchase securities (or other assets). But notice that they intermediate bank-created money, not goods. They are therefore not intermediaries of loanable funds in the sense of any of the recent generation of macroeconomic models of banking. The fact that shadow banks intermediate money has two implications for the interactions between banks and shadow banks. First, shadow banks could not exist without banks, because in today’s financial system banks are almost exclusively in charge of creating the economy’s medium of exchange, and shadow banks depend on intermediating this medium of exchange. Second, shadow banks can increase money creation by banks, because they offer a way to reduce the pressures of capital adequacy regulations on banks.

This is what Figure 4 illustrates. It shows banks in the left column, shadow banks in the middle column, and the consolidated financial system in the right column. The implicit assumption is that all financial institutions are either banks or shadow banks. For the purpose of this illustration we assume that, due to capital adequacy regulations, banks need to back all of their assets with 10 percent of equity, while, for simplicity, shadow banks need to keep no equity at all. We also assume that shadow banks are initially inactive, with assets and liabilities of zero. Banks start with total assets of 100 and deposits of 90. Now, in the second row of Figure 4, a deposit is withdrawn from banks and deposited with shadow banks. Similar to our discussion of Figure 1 above, by double-entry bookkeeping this deposit has its counterpart in an immediate accounts receivable claim by shadow banks on banks. But differently from Figure 1, in this case the withdrawal is not settled by way of central bank reserves. Instead, shadow banks now own a deposit in banks, and this deposit can be used to purchase other financial assets. Crucially, given our

\[14\text{See Huber (2011).}\]
assumption that banks and shadow banks constitute the totality of the financial system, this asset purchase, which is illustrated in the third row of Figure 4, must be from banks. Specifically, we assume that shadow banks use their interbank deposit to purchase part of banks’ existing holdings of securities, or existing loans that have been securitized for this purpose by banks. In the final analysis, this transaction therefore leads to banks moving risky assets off their balance sheet, where they need to be backed with 10 percent of net worth, and onto the balance sheet of shadow banks, where they need to be backed with (for simplicity, in this illustration) no net worth at all. This of course means that banks are now free to re-deploy the capital that was previously used to back the sold assets. And because banks can create their own funding through lending, they can do this instantaneously, as long as they can identify suitable and willing borrowers. As illustrated in the final column of Figure 4, the final result is that the sum of deposits in banks and shadow banks increases. The deposits in shadow banks have similar monetary characteristics to large wholesale deposits in regular banks, and should therefore properly be counted as part of broad monetary aggregates. The existence of shadow banks with lower capital adequacy requirements therefore allows the financial system to increase the scale of credit and money creation, by reducing the ability of capital adequacy regulations to constrain total aggregate lending and money creation.

III. Deposit Multiplier? New Deposits (May) Lead to Reserve Creation, Not Vice Versa

A. The Deposit Multiplier View and Its Problems

In recent decades, the reserves held by banks at the world’s major central banks have generally been negligible in size, except of course after the onset of the 2008 financial crisis and of quantitative easing. But this quantitative point is far less important than the recognition that the availability of such reserves does not play any meaningful role in the determination of wider monetary aggregates. The reason is that the deposit multiplier model of the undergraduate economics textbook, where broad monetary aggregates are created at the initiative of the central bank, through an initial injection of high-powered money into the banking system that gets multiplied through repeated re-lending of the initial injection by banks, reverses the causal chain of the actual monetary transmission mechanism.

We begin with the observation that the deposit multiplier model simply could not operate as stated in the textbooks. The initial central bank injection can take only two forms, additional central bank reserves or additional cash. We already explained that central bank reserves cannot be lent to non-banks, only to other banks, so this cannot start a multiplier. We also mentioned that cash is a minor, non-constitutive part of today’s monetary system, and that furthermore cash is never lent out directly, but can only be withdrawn against a deposit that has previously been created through lending. A monetary model that is based on cash being continuously re-lent is therefore of no practical relevance.
But not only is the chain of causation in the deposit multiplier model not operative, the actual chain of causation is precisely the opposite of that model. This is very clear under inflation targeting, because in that case the central bank targets an interest rate, and must be willing to supply as many reserves (and cash) as banks demand at that rate, both to meet the interest rate target and to safeguard financial stability. In the 1970s and 1980s, the U.S. central bank did not practice inflation targeting, it officially targeted monetary aggregates. However, as shown by Kydland and Prescott (1990), the availability of central bank reserves did not even constrain banks during that period. Instead, they show that broad monetary aggregates, which are driven by banks’ lending decisions, led the economic cycle, while narrow monetary aggregates, most importantly central bank reserves, lagged the cycle. In other words, banks ask for reserves after they have decided to increase lending, and the central bank supplies the reserves on demand. Reserves therefore impose no direct quantitative constraint on bank lending and money creation, they are its consequence rather than its cause. The deposit multiplier is therefore, in the words of Kydland and Prescott (1990), a myth.

B. Statements by Central Banks

The fact that the creation of broad monetary aggregates by banks comes prior to and in fact may (if commercial banks need more reserves) cause the creation of narrow monetary aggregates by the central bank can again be verified in descriptions of the money creation process by central banks and other policymaking authorities. The oldest comes from Alan Holmes (1969), who at the time was vice president of the New York Federal Reserve: “In the real world, banks extend credit, creating deposits in the process, and look for the reserves later.” This is exactly the view put forward in this paper. Ulrich Bindseil (2004), at the time head of liquidity management at the European Central Bank: “It appears that with RPD [reserve position doctrine, i.e. the money multiplier theory] academic economists developed theories detached from reality, without resenting or even admitting this detachment.” Charles Goodhart (2007), the UK’s preeminent monetary economist: “... as long as the Central Bank sets interest rates, as is the generality, the money stock is a dependent, endogenous variable. This is exactly what the heterodox, Post-Keynesians ... have been correctly claiming for decades, and I have been in their party on this.” Borio and Disyatat (2009), in a Bank for International Settlements working paper: “In fact, the level of reserves hardly figures in banks’ lending decisions. The amount of credit outstanding is determined by banks’ willingness to supply loans, based on perceived risk-return trade-offs and by the demand for those loans.” Disyatat (2010), again from the BIS: “This paper contends that the emphasis on policy-induced changes in deposits is misplaced. If anything, the process actually works in reverse, with loans driving deposits. In particular, it is argued that the concept of the money multiplier is flawed and uninformative in terms of analyzing the dynamics of bank lending.” Carpenter and

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15 A shortage of reserves would imply that banks are unable to settle with each other, thereby causing the payments system to break down.
16 Of course, the required level and the remuneration of central bank reserves do affect the quantity of lending indirectly, through their effects on the profitability of lending.
17 This is of course the reason why quantitative easing, at least the kind that is intended to work by making greater reserves available to banks and not to the public, can be ineffective if banks decide that lending remains too risky.
Demiralp (2010), in a Federal Reserve Board working paper: “While the institutional facts alone provide compelling support for our view, we also demonstrate empirically that the relationships implied by the money multiplier do not exist in the data ... Changes in reserves are unrelated to changes in lending, and open market operations do not have a direct impact on lending. We conclude that the textbook treatment of money in the transmission mechanism can be rejected...”. William C. Dudley (2009), at the time president of the New York Federal Reserve Bank: “... the Federal Reserve has committed itself to supply sufficient reserves to keep the fed funds rate at its target. If banks want to expand credit and that drives up the demand for reserves, the Fed automatically meets that demand in its conduct of monetary policy.” European Central Bank (2012), May 2012 Monthly Bulletin (emphasis added): “The occurrence of significant excess central bank liquidity does not, in itself, necessarily imply an accelerated expansion of ... credit to the private sector. If credit institutions were constrained in their capacity to lend by their holdings of central bank reserves, then the easing of this constraint would result mechanically in an increase in the supply of credit. The Eurosystem, however, ... always provides the banking system with the liquidity required to meet the aggregate reserve requirement. In fact, the ECB’s reserve requirements are backward-looking, i.e. they depend on the stock of deposits (and other liabilities of credit institutions) subject to reserve requirements as it stood in the previous period, and thus after banks have extended the credit demanded by their customers.” Finally, academic critiques of the deposit multiplier model also exist (Brunner and Meltzer (1990), Lombra (1992)), although recently this issue has received much less attention due to the disappearance of monetary aggregates from modern monetary models.

IV. Summary and the Role of Policy

We conclude that a realistic macroeconomic model of the financial system has to, as a minimum, reflect two facts. First, banks provide financing, meaning the creation of purchasing power through the creation of offsetting gross financial positions on their balance sheets. They do not intermediate real loanable funds, or savings. Second, banks’ main constraint on the quantity of financing, given a sufficient demand for the medium of exchange on the part of non-banks, comes from parameters that enter their profit maximization problem, including most importantly shocks to their expectations of economic fundamentals. The availability of central bank reserves is not among these parameters. But the policy rate and regulatory requirements are.

In order for the policy rate, which affects the price of credit via arbitrage with other interest rates, to have a significant effect on the quantity of credit and money, it has to reach a point where the creditworthiness of borrowers is materially affected. McLeay and others (2014a,b) stress that the effects of the policy rate on credit tend to go in this desired direction. But because the policy rate is generally assigned to controlling inflation, control of credit and money growth through this instrument tends to be weak and incidental. Altunbas and others (2009) provide empirical evidence that confirms this for Europe. On the other hand, regulatory capital or liquidity requirements can potentially have very strong effects on credit growth, by affecting banks’ incentives to lend in a much more targeted fashion than the policy rate. See Benes and others (2014) for examples.
References


Bundesbank (2012), Geld und Geldpolitik, Frankfurt am Main: Deutsche Bundesbank.


King, M. (2012), Speech to the South Wales Chamber of Commerce at the Millenium Centre, Cardiff, October 23.


Figure 1. Loanable Funds Banks: The Naïve Partial Equilibrium View

Bank A

\[ L_A = 95 \]
\[ D_A = 100 \]
\[ \text{Res}_A = 5 \]
\[ \Delta \text{Res}_A = +4 \]
\[ \Delta D_A = +4 \]

Bank B

\[ L_B = 152 \]
\[ D_B = 160 \]
\[ \text{Res}_B = 8 \]
\[ \Delta \text{Res}_B = +4 \]
\[ \Delta D_B = +4 \]

Banking System

\[ L_{tot} = 247 \]
\[ D_{tot} = 260 \]
\[ \text{Res}_{tot} = 13 \]

Deposit and Exchange of Reserves

Bank A

\[ L_A = 95 \]
\[ D_A = 104 \]
\[ \text{Res}_A = 9 \]
\[ \Delta \text{Res}_A = +4 \]
\[ \Delta D_A = +4 \]

Bank B

\[ L_B = 152 \]
\[ D_B = 156 \]
\[ \text{Res}_B = 4 \]

Banking System

\[ L_{tot} = 247 \]
\[ D_{tot} = 260 \]
\[ \text{Res}_{tot} = 13 \]

Interbank Lending of Reserves

Bank A

\[ L_A = 95 \]
\[ D_A = 104 \]
\[ \text{Res}_A = 5 \]
\[ \Delta \text{Res}_A = +4 \]
\[ \Delta \text{IB}_A = +4 \]

Bank B

\[ L_B = 152 \]
\[ D_B = 156 \]
\[ \text{Res}_B = 8 \]
\[ \Delta \text{Res}_B = +4 \]
\[ \Delta \text{IB}_B = +4 \]

Banking System

\[ L_{tot} = 247 \]
\[ D_{tot} = 260 \]
\[ \text{Res}_{tot} = 13 \]

Final Balance Sheets

Bank A

\[ L_A = 95 \]
\[ D_A = 104 \]
\[ \text{Res}_A = 5 \]
\[ \text{IB}_A = 4 \]

Bank B

\[ L_B = 152 \]
\[ D_B = 156 \]
\[ \text{Res}_B = 8 \]
\[ \text{IB}_B = 4 \]

Banking System

\[ L_{tot} = 247 \]
\[ D_{tot} = 260 \]
\[ \text{Res}_{tot} = 13 \]

L = Loans; D = Deposits; Res = CB Reserves; IB = Interbank Loans
Figure 2. Loanable Funds Banks: The Implicit Conventional View

- **Initial Balance Sheet**
  - **Bank**
  - Previous Loans | Previous Deposits

- **Deposit of Savings in the Form of Goods**
  - **Bank**
  - Previous Loans | Previous Deposits
  - Inventory of Gravel | New Deposit of Saved **Goods** (Gravel)

- **Loan of Savings in the Form of Goods**
  - **Bank**
  - Previous Loans | Previous Deposits
  - New Loan of Saved **Goods** (Gravel) | New Deposit

- **Investment Through Exchange of Goods for Goods**
  - **Bank**
  - Previous Loans | Previous Deposits
  - Loan (to Investor A) | Deposit (by Saver)

Saving (in the form of gravel) here is the **prerequisite**
- for lending,
- for investment.
Figure 3. Financing and Money Creation Banks

**Initial Balance Sheet**

Bank

<table>
<thead>
<tr>
<th>Previous Loans</th>
<th>Previous Deposits</th>
</tr>
</thead>
</table>

**Simultaneous Loan and Deposit to Investor**

Bank

<table>
<thead>
<tr>
<th>Previous Loans</th>
<th>Previous Deposits</th>
</tr>
</thead>
</table>

| New Loan of **Money** (Dollars) to Investor A | New Deposit of **Money** (Dollars) for Investor A |

Investor A

IOU

Money

Investor A

**Investment Through Exchange of Money for Goods**

Bank

<table>
<thead>
<tr>
<th>Previous Loans</th>
<th>Previous Deposits</th>
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</table>

<table>
<thead>
<tr>
<th>Loan Investor A</th>
<th>Deposit Investor B</th>
</tr>
</thead>
</table>

Investor B

Money

Investor A

New Machine

Investor B

Money

Investor A

**Final Balance Sheet**

Bank

<table>
<thead>
<tr>
<th>Previous Loans</th>
<th>Previous Deposits</th>
</tr>
</thead>
</table>

| Loan Investor A | Deposit Investor B |

Saver

Saving (in the form of money) here is the **consequence** of lending, of investment.
Figure 4. Shadow Banks: Increasing the Scale of Money Creation

<table>
<thead>
<tr>
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<th>Shadow Banks</th>
<th>Financial System</th>
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</thead>
<tbody>
<tr>
<td>L = 50</td>
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<td>L = 50</td>
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<tr>
<td>S = 50</td>
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<td>S = 50</td>
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</table>

**Initial Balance Sheets**

<table>
<thead>
<tr>
<th>Banks</th>
<th>Shadow Banks</th>
<th>Financial System</th>
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<tbody>
<tr>
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<td>S = 50</td>
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<td>S = 50</td>
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**Deposit into Shadow Banks**

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<td>L = 50</td>
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<tr>
<td>S = 50</td>
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<td>S = 50</td>
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</tbody>
</table>

**Asset Purchase by Shadow Banks**

<table>
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<th>Shadow Banks</th>
<th>Financial System</th>
</tr>
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<td></td>
<td>L = 50</td>
</tr>
<tr>
<td>S = 30</td>
<td></td>
<td>S = 50</td>
</tr>
</tbody>
</table>

**Re-Deployment of Bank Capital Through New Loans**

<table>
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<th>Shadow Banks</th>
<th>Financial System</th>
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<td></td>
<td>L = 70</td>
</tr>
<tr>
<td>S = 30</td>
<td></td>
<td>S = 50</td>
</tr>
</tbody>
</table>

L=Loans; S=Securities; Eq=Equity; D=Deposits; IB=Interbank