Does Saving Increase the Supply of Credit? A Critique of Loanable Funds Theory

Fabian Lindner[1]
Macroeconomic Policy Institute (IMK), Dusseldorf, Germany

Abstract

The paper presents a critique of loanable funds theory by using simple accounting relationships and standard excess demand analysis. It is shown that many economists identify saving and the credit supply by interpreting the macroeconomic saving-investment identity as a budget constraint. According to that interpretation, more saving through lower consumption (and government spending) leads to a higher supply of credit, lower interest rates and thus more funds to be used by firms for investment. The paper shows that proponents of this theory confuse quite different economic phenomena and commit serious fallacies of composition. In the first step, the concepts of "saving" and "credit" will be clearly distinguished using simple accounting. It will be shown that credit is not limited by anybody's saving and that no one has to abstain from consumption in order for a credit to be provided. Also, it will be shown that financial saving (an increase in net financial assets) through a reduction in expenditures reduces other economic units' revenues and thus their ability to spend and save. Using the concept of excess demand and supply, it will be shown that excess saving does not lead to an excess supply of credit − which would lower interest rates − but to an excess supply of goods, services and/or labor which will lower prices and production. How interest rates change is not determined by excess saving: They could increase, stay the same or decrease. Finally, it will be argued that the identification of saving with the provision of credit is likely to stem from the invalid application of neoclassical growth models to a monetary economy.

Key words: saving, wealth, investment, production, financial markets

JEL-Classification: E210, E220, E230, E440, E500

Introduction

> "According to traditional theory, [...] the amount of credit is strictly limited by the amount of saving. The amount of saving determines the quantity of investment, i.e. the amount of goods production that cannot be directly and immediately consumed. [...] [But] the volume of credit does not at all depend on the quantity of money savings. It depends on banks' ability and willingness to provide credit and on borrowers' willingness to increase their debts" (Gestrich, 1947, pp. 23-24; p.27).[2]

Many economists hold the position that "saving finances investment". They argue that saving − a reduction of consumption relative to income − is necessary for the provision of loans and the financing of investment. This view has been influential both to explain the global economic crisis that began in 2007 and in proposing policies to combat the crisis.

For instance, Bernanke (2005) argues that East Asian and commodity exporting economies exported their scarce savings to the United States, limiting their domestic credit supply and increasing credit to the US. This contributed to reduce US interest rates and led to high housing prices andinvestment. For the Euro Area, Sinn (2010) argues that Germany exported its scarce savings to today's crisis countries, thereby

[1] Contact address: fabian-lindner@boeckler.de. The author thanks Jan Behringer, Dirk Bezemer, Irwin Collier, Sebastian Gechert, Norbert Häring, John Harvey, Erik Klär, Uwe Richter, Alexandros Tokhi, Claudio Zeitz and Rudolf Zwiener for valuable comments. All remaining errors are of course the author's.

[2] The German original reads: "Die Menge des Kredits ist nach der traditionallen Auffassung durch die Menge der ersparten Geldbeträge eindeutig bestimmt. [. . .] Das Kreditvolumen ist demnach durch das Esparnisvolumen starr begrenzt. Die Menge der Ersparnisse bestimmt die Höhe der Investitionen, d.h. den Umfang an Erzeugung von nicht direkt und sofort konsumierbaren Gütern. [. . .] [Aber] das Kreditvolumen ist in keiner Weise abhängig von der Menge der Geldersparnisse. Es hängt von der Fähigkeit und Bereitwilligkeit der Banken ab, Kredit zu gewähren, der andererseits auch eine Bereitwilligkeit zur Kreditverschuldung gegenüberstehen muss."

reducing domestic German credit and investment. Cochrane (2009), Fama (2009) and Ball and Mankiw (1995) argue that higher government spending "absorbs" household savings that would otherwise be available to finance investment.

The present paper shows that the underlying view of the "saving finances investment" doctrine implies that the amount of loans that can be lent in a period is limited by the amount of saving in the same period and that, consequently, an abstention from consumption (and other spending) is necessary for more credit to be available for investors. This view is the basis of loanable funds theory (Robertson, 1936; Ohlin, 1937a, c, b; Tsiang, 1956).

It will be argued that this view is deeply flawed. Using simple accounting rules in the vein of Stützel (1978; 1979) and Lavoie and Godley (2012), the paper will first clarify the difference between saving and the provision of credit: saving changes an economic unit's net worth which the provision of credit does not. The provision of a credit only changes either the composition of a unit's financial assets or the length of its balance sheet, but not its net worth. Second, it will be shown that loanable funds theorists commit a fallacy of composition when they claim that *household financial* saving increases *aggregate* investment in *tangible assets*.

While the debate about loanable funds theory goes back at least to the discussion of Keynes' General Theory (1936/1997), the problem and critique of a limited saving fund has not figured prominently in the Anglo-Saxon debate. The discussion was mainly about whether the supply and demand of the *flow* of credit − identified with loanable funds theory (Patinkin, 1958, 1969; Snippe, 1985; Tsiang, 1956) − or the *stock* of money − identified with Keynesian liquidity preference theory (Keynes, 1937; Lerner, 1944) − determine interest rates.

Hicks (1939) and Patinkin (1958) showed that the implications for interest rate theory are the same whether one uses an analysis of the stocks or flows of credit or money. The loanable funds theorist Tsiang (1956) accepted that view and it is now common to see both theories as being identical (Blanchard, 2000).

But while Patinkin and Hicks are right in their analysis, the question is *not* whether stocks or flows of money or credit determine interest rates, but whether one sees *saving* as the limiting factor for the provision of loans. This issue has hardly been discussed, with a short interchange on the matter between Ohlin (1937a, p. 425) and Keynes (1937, pp. 243-245) being an exception. Recent critiques of loanable funds theory (Bibow, 2001; Hayes, 2010; Keen, 2014) also did not stress this aspect.

However, this fallacy was central to the thinking of the now largely forgotten German economists Wilhelm Lautenbach (1952) and Hans Gestrich (1940; 1947) (see Kindleberger (1999) and Garvey (1975) on some discussion). Both were economists in the 1920s and 1930s in Weimar Germany and closely followed the world economic depression. They were early critics of confusing saving and the credit supply, especially because they were familiar with the workings of financial markets and witnessed the disastrous economic and social consequences of applying the loanable funds doctrine to fiscal policy in Weimar Germany.

The present article will use Lautenbach's and Gestrich's insights and embed them in the analytical framework developed by Lautenbach's pupil Wolfgang Stützel (1978; 1979) (see Schmidt (2009; 2012) for introductions into Stützel's work). In his book "Volkswirtschaftliche Saldenmechanik" ("Financial balance mechanics") (1978) Stützel already in the 1950s developed a stock-flow-consistent (SFC) framework similar to Godley and Lavoies' (2012) later work.

In contrast to Godley and Lavoie, Stützel was not interested in model building, but in using his SFC framework as an analytical tool for the critique of traditional Walrasian theory and the neoclassical synthesis. By clearly defining accounting concepts and their interaction, he often found economists to commit serious "problem entanglements", i.e. confusing quite different economic phenomena and committing fallacies of composition. Most of the analytical framework of this paper builds on Stützel's work. The confusion of the concept of saving which changes units' net worth and the concept of credit provision which only changes the composition or length of units' balance sheets but not their net worth is just such a problem entanglement.

Borio and Disyatat (2011) came to the same conclusions as Lautenbach and Gestrich, using simple accounting as a starting point for their analysis. However, they limit themselves to a critique of Bernanke's "Saving Glut" hypothesis and do not draw the wider implications for the whole of loanable funds theory.

The present paper is close to Post-Keynesian thought, as were Lautenbach, Gestrich and Stützel.

But some of the traditional Post-Keynesian answers to the issues raised by loan able funds theory are not sufficient to counter this theory. It will be shown that neither the endogeneity of money (Moore, 1988; Fontana, 2003; Lavoie, 2013; Keen, 2014) nor the assertion that "investment creates saving" (Palley, 1996; de Carvalho, 2012) are sufficient to counter loanable funds theory.

The article is structured as follows. In the first section, it will be shown that many contemporary economists hold the view that saving is the limiting factor for the provision of credit and that consumption thus has to be reduced to increase credit. In the second section, standard business and national accounting concepts are used to show that saving, finance and investment are different concepts that have to be clearly kept apart. In the third section, the accounting relations between saving, finance and investment in the *aggregate* economy will be clarified. In section four, it will be argued that excess saving is likely to lead to a fall in aggregate income while interest rates might increase, decrease or stay the same. That means that none of the claims of loanable funds theorists is likely to hold in reality. In section five, the implicit assumptions of loanable funds theory will be discussed and how they are related to neo-classical growth models. A final section draws some implications and concludes.

1. The loanable funds theory or: the saving-fund theory of credit

Loanable funds theorists believe that the amount of credit available to finance investment is constrained by saving, and that the identity of saving (income minus consumption) and investment of the national accounts represents a budget constraint. This "saving finances investment" view leads loanable funds theorists to believe that higher saving through lower consumption and lower government deficits (or, ideally, surpluses) leads to a higher credit supply, lower interest rates, more investment and thus a higher capital stock and higher future income.

Unfortunately, it is difficult to find an academic paper that clearly and systematically develops this theory, something Keynes already observed (1936/1997, pp. 175-193). For this reason, I will draw from Gregory Mankiw's intermediate textbook version of the loanable funds theory (1995) (Paul Krugman, too, gives the same account in his introductory economics textbook (2009, ch. 26)). One may object that this could bias the argument since what an author writes for undergraduate audience will likely be oversimplified. But, Mankiw himself says otherwise in an article with Ball (1995):

> "The analysis [consistent with Mankiw's textbook treatment, F.L.] follows the conventional wisdom as captured, for example, in most undergraduate textbooks. In our view, the conventional wisdom in this area is mostly on the right track" (1995, p. 95).

Furthermore, this has the advantage that, for pedagogical reasons, many otherwise implicit assumptions are made explicit (Naples and Aslanbeigui, 1996).

In his textbook, Mankiw starts from the accounting identity of a closed economy with a government:

(1) $$Y = C + I + G$$

Y is income, *C* is consumption, *I* is investment and *G* are government expenditures. Then he introduces taxes, *T*, in order to derive the economy's saving:

(2) $$S = (Y - T - C) + (T - G) = I$$

He goes on to call the first term "private saving" and the second "government saving". According to Mankiw, the sum of private and government savings are the "flows into the financial markets" and investment the flows "out of the financial markets" (Mankiw, 1997, p. 67). That means that he interprets the national accounting identity between saving and investment as a budget constraint: no flows of loanable funds would be available to investors without prior saving.

Mankiw further assumes investment to be a negative function of interest rates, so that both private and government saving determine the interest rate and thus equilibrium investment and saving. Mankiw writes:

> "In fact, saving and investment can be interpreted in terms of supply and demand. In this case, the "good" is loanable funds, and its "price" is the interest rate. *Saving is the supply of loans* [emphasis added, F.L.] − individuals lend their saving to investors, or they deposit their saving in a bank that makes the loan for them. Investment is the demand for loanable funds − investors borrow from the public directly by selling bonds or indirectly by borrowing from banks. [. . .] *At the equilibrium interest rate, saving equals investment, and the supply of loans equals the demand* [author's emphasis]" (1997, p. 63).

Mankiw introduces the loanable funds mechanism in his chapter about "The Economy in the Long Run" but also uses it to derive the short run IS curve of the IS/LM model (1997, p. 260).

From this follows that an increase in saving brought about by a cut in expenditures (less consumption relative to income for households and less government expenditures relative to government revenues) increases the supply of loans. If households and the government (by government surpluses) did not save, not enough finance needed by firms would be forthcoming. Thus, the maximum amount of credit for investment (loanable funds) in a (closed) economy is limited by the fund of current household and government saving.

The whole view is not Mankiw's idiosyncrasy but reflects the opinion of many economists. That credit is constrained by saving in the loanable funds literature is also made clear by D. H. Robertson (1934):

> "And we have a curve SS' representing the rate of new available savings per atom of time − available that is, after deducting new savings absorbed in financing consumption by Governments or individuals" (Robertson, 1934, p. 651).

Woodford (2010) is very explicit in stating that it is a restriction of expenditures that is necessary for credit to be created:

> "The loan supply curve *LS* shows the amount of lending *L* that ultimate savers are willing to finance (*by refraining from expenditure themselves* [emphasis added, F.L.]) for each possible value of the interest rate received by savers [...]" (Woodford, 2010, p. 26).

Bernanke (2005) in his speech on the "global saving glut" also makes the "saving finances investment"-view explicit:

> "All investment in new capital goods must be financed in some manner. In a closed economy without trade or international capital flows, the funding for investment would be provided entirely by the country's national saving. By definition, national saving is the sum of saving done by households [...] and saving done by businesses [...] less any budget deficit run by the government."

One can also open the economy and derive saving by adding net exports, *NX* (exports minus imports):

$$S = (Y - T - C) + (T - G) = I + NX \tag{3}$$

Bernanke (2005) applies the "saving finances investment" view explicitly to the open economy:

> "[...] in fact, virtually all economies today are open economies, and well-developed international capital markets allow savers to lend to those who wish to make capital investments in any country, not just their own. Because saving can cross international

> borders, a country's domestic investment in new capital and its domestic saving need not be equal in each period. If a country's saving exceeds its investment during a particular year, the difference represents *excess saving that can be lent on international capital markets* [emphasis added, F.L.]. By the same token, if a country's saving is less than the amount required to finance domestic investment, the country can close the gap by borrowing from abroad."

In the view of the "saving-fund theory of credit", a trade surplus leads to an export of saving so that loans cannot be used any more in the country realising the surpluses. For instance, this view has been applied to Germany's export surpluses by Hans-Werner Sinn (2010). Sinn argues, consistent with loanable funds theory, that saving which is exported cannot be used to finance domestic investment (see, for an analysis of this point, Horn and Lindner (2011)). Consequently, he claims that there is a direct trade-off between domestic loans and investment and export surpluses:

> "Germany exported its savings instead of using them as loans for investment in the domestic economy. [...] Germany lost a huge amount of capital under the euro even though it urgently needed the capital to rebuild its ex-communist east" (Sinn, 2010, p. 7).

The policy implications of the loanable funds model are straight forward: policies that lead to lower consumption relative to income (higher household saving) and lower government deficits (even surpluses) provide more saving, lower the interest rate and lead to higher investment. Naturally, the reduction of fiscal deficits would be a way to increase national saving:

> "Budget deficits have many effects. But they all follow from a single initial effect: deficits reduce national saving.[...] When budget deficits reduce national saving, they must reduce investment, reduce net exports, or both.[...] A decline in national saving reduces the supply of loans available to private borrowers, which pushes up the interest rate (the price of a loan)" (Ball and Mankiw, 1995, pp. 96-98).

To summarize: According to loanable funds theory, credit is provided by saving. The higher saving is, the more credit will be supplied which ceteris paribus lowers interest rates. Higher saving through lower consumption (relative to income), lower government deficits, and/or lower export surpluses would then induce firms to invest more which would increase long run income through a higher capital stock. But as will be shown in the remainder of this article, this view is untenable.

2. Accounting rules, saving, investment and finance

In the following section, saving, investment and finance will be clearly defined using common business and national accounting concepts and rules (European Communitites, 1996; Lequiller and Blades, 2006; Brümmerhoff, 2007; Möller et al., 2011). A first step in order to clearly distinguish between saving and financing is to understand the concept of income, production, the current account and the financial account. Those concepts are often used for national economies. However, they apply to every economic unit or group of economic units, be it an individual, a household, a firm, the firm sector, the household sector etc. Both Eurostat (1996) and the US Integrated Macroeconomic Accounts (Bond et al., 2007) use the same accounting concepts developed for national economies for every domestic economic sector.

2.1 Balance sheets

First, different balance sheet items will be defined and then the flows that change those items. The balance sheet of an economic unit or group of economic units consists of its assets, its liabilities and its net worth, nw. Its assets are tangible assets, *ta*, like machines, houses, etc. and *gross* financial assets, gfa, like

money, bonds, stocks etc. Its liabilities, *l*, are its debts and equity in the form of stocks held by other economic units:

(4) $$ta + gfa - l = nw$$

Note that we also use stocks as a liability. This is done in accordance with international accounting practice (European Communitites, 1996; Bond et al., 2007) although equity gives rise to a contingent claim (dividends) in contrast to contractual claims (interest) (Dos Santos and Macedo e Silva, 2010).[3]
Net financial assets, nfa, are *gross* financial assets minus liabilities:

(5) $$gfa - l = nfa$$

Gross financial assets can be further split into means of payment − money, m − and all other financial assets, ofa:

(6) $$gfa = m + ofa$$

This distinction is crucial for any financial analysis: all other financial assets – ofa − are promises to receive means of payment. Since some unit's financial asset is another unit's financial liability, financial liabilities are promises to make payments. A payment is defined as the act of servicing a contractual debt (Kaiser, 2008, p. 25). The medium to do that − money − has thus to be clearly distinguished from all assets that only give a right to receive money but are not money as such.

What exactly constitutes money depends on the context (Stützel, 1978, pp. 65-66). For instance, a euro is not accepted to service dollar debts; a deposit at a commercial bank is normally accepted by non-banks as a means of payment but not so among commercial banks themselves.

They only accept central bank money (notes and deposits at the central bank) to service their debts among each other, not their respective liabilities. On the other hand, if somebody accepts a bond or a stock as a means of payment, such financial assets become means of payment etc.

The context-dependence of what constitutes a means of payment makes it so hard to exactly define what kind of financial asset can be called "money". But the distinction between means of payment and other financial assets is at the heart of every financial crisis: in a crisis, debtors have difficulties to make good on their promises to pay money. Even if they held other financial assets but would not be able to convert them into money, they would risk default and creditors had to write down their financial assets.

All balance sheet items are shown in table 1. Depending on the type of economic unit, the balance sheet's composition is different. For instance, non-financial firms normally hold mainly tangible assets and much less gross financial assets. They often have a high net worth and low debts. Private households typically hold both tangible assets (mainly houses) and gross financial assets (deposits, bonds, stocks) and have high net worth. Banks' tangible assets are mostly negligible. They mainly hold loans, bonds, derivatives and other gross financial assets, have very high debts and very low net worth.

[3] If stock options would not be a liability, they would not constitute financial assets for their holders but tangible assets, i.e. assets to which no liability corresponds. Then, the trade of stocks would not be a purely financial transaction but constitute an expenditure or revenue which would change units' net financial asset position.

Table 1: Balance sheet

Assets	**Liabilities and Net Worth**
Gross financial assets, gfa Money, m Other financial assets, ofa Loans Bonds Stocks, etc	Liabilities, *l* Debts Stocks
Tangible assets, ta Machines Houses, etc.	Net worth, nw

2.2 Flows

Given those balance sheet items, three flows have to be clearly distinguished: Flows that change a units' overall net worth (income, y, and consumption, c), flows that change a unit's *net* financial assets (revenues, r, and expenditures, e) and flows that change a unit's stock of money (payments and receipts), i.e. its cash flow.

When units consume less than their income, they change their net worth and thus save:

(7) $$y - c = \Delta nw = s$$

Since net worth consists of net financial assets and tangible assets, saving is equal to changes in net financial assets, Δnfa, and changes in tangible assets − i.e. investment ($\Delta ta \equiv i$):

(8) $$s = \Delta nfa + i$$

As this equation clearly shows, investment is just a subcategory of saving. Saving does not "lead" to investment, or investment to saving but investment *is* saving and saving *is* investment. This will be discussed in more detail below.

Units can change their net financial assets (save financially) by spending less than their revenues (and dis-save by spending more than their revenues):

(9) $$r - e = \Delta nfa = \Delta m + \Delta ofa - \Delta l$$

Revenues and expenditures are purchases and sales of goods and services, (exports and imports between countries), wages, capital income (dividends and interest) or taxes and transfers (taxes, subsidies etc.).

Finally, receipts and payments change a unit's stock of money:

(10) $$\textit{receipts} - \textit{payments} = \Delta m$$

Equation (9) is a unit's *balance of payments*. It contains its *current account* which is on the left hand side of equation (9), and its *financial account* which is on the right hand side. On the current account, all revenues and expenditures are booked. On the financial account, all financial transactions are booked, i.e. changes in gross financial assets and gross liabilities (see IMF for details on the balance of payment (2009, p. 9)). Receipts and payments are also recorded in the financial account since they change one category of financial assets, i.e. money. Income/revenues/receipts and consumption/expenditures/payments have to be clearly distinguished:

- **Income but no revenue**: a unit produces a good or service. This constitutes income since a new good can be either consumed or invested but no revenue since the production as such does not change a unit's net financial assets.
- **Consumption but no expenditure**: A self-produced good or service that is consumed does not constitute an expenditure. Also, depreciation decreases a unit's net worth but is no expenditure since it does not reduce a unit's net financial assets. This is why depreciation is also called "consumption of fixed capital".
- **Revenue but no receipt / expenditure but no payment**: If a unit sells goods or services but the purchaser can pay later, the seller increases her other financial assets (the direct credit she provides), but not her money stock. The purchaser decreases her net financial assets by decreasing her liabilities, but not her stock of money.
- **Receipt but no revenue / payment but no expenditure**: If a unit buys a financial asset (for instance, a bond), it reduces its money stock (a payment) but increases its stock of other financial assets. *Net* financial assets do not change so that no expenditure takes place. The same applies to the seller of a financial assets who increase her stock of money (a receipt, but no revenue).

In the Anglo-Saxon literature, the terms *receipts* and *revenues* or *expenditures* and *payments* are often used as synonyms and there is no clear distinction of exactly what economic transaction is meant. For instance, this is the case in Bond et al. (2007) in their presentation of the "U.S. Integrated Macroeconomic Accounts". This makes it sometimes hard to clearly distinguish between different economic phenomena − changes in money holdings and changes in net financial assets − which might also explain some of the confusions of loanable funds theory.

Table 2 summarizes the different possible transactions. It is similar to Godley and Lavoie's transaction flow matrix (2012, p. 37) but differentiates more clearly between production and current account transactions. Lines 1) to 3) capture a unit's production, lines 4) to 7) its current account transactions, lines 8) to 10) its financial account transactions, 11) to 14) captures its income and line 15) its saving.

2.3 Saving

The difference between the types of transactions just enumerated has important implications for the different types of saving as well as for the difference between saving and credit.

Generally, equation (8) shows that there are at least three meanings of saving which have always to be clearly kept apart if one wants to avoid confusion (Stützel and Grass, 1988, p. 365):

> a) Consumption is lower than income: Every economic unit increases its *overall* net worth by consuming less than its income. This definition of saving does not say in what *form* a unit increases its net worth.
> b) An increase in tangible assets: When an economic unit increases its net worth by increasing its tangible assets (invests), it saves. Investment is just one subcategory of the broader concept of saving. A unit can invest by either producing itself a new tangible asset or by purchasing one.
> c) An increase in net financial assets: When a unit spends less than it earns (realizes an expenditure surplus), it increases its gross financial assets relative to its gross liabilities.

To make the differences between those different types of saving clear, three examples are given, illustrated in table 2 (case *a)* to *c)*). First, a restraint in consumption relative to income is not necessarily the same thing as a restraint in consumption *expenditures*: When Robinson, being alone on his island, picks (=produces) coconuts, he can eat (=consume) them or plant (=invest) them. The amount of coconuts he picks is his income (case *a)* in table 2, lines 1) to 3) where the superscript *p* means production).

The more he consumes of his given income (=picked coconuts), the less he can invest and thus save. This is basically the world of neo-classical growth models (discussed in more detail in section 5). No

expenditures, revenues, receipts or payments take place even though there is income, consumption, investment and saving.

Second, if households spend less on their consumption goods than they receive in wage revenues – wages *w* times employment *emp* –, they increase their net financial assets (case *b)* in table 2). Which *form* the increase in net financial assets takes is however a different matter. Households can either hold their higher net financial assets in the form or higher money holdings, higher holdings of other financial assets or they can decrease their liabilities. They do *not* however provide any credit when they spend less than their wage revenues.

Third, when firms buy machines (investment goods) and realize an expenditure surplus of the same amount, they increase their holdings of tangible assets but reduce their net financial assets by the same amount so that they do not save at all since their overall net worth stays the same (case *c)* in table 2).

Table 2: Production and transactions matrix

		a)	*b)*	*c)*	*d)*
Production	1) Consumption goods 2) Investment goods 3) Sum of production 1)+2)	c^P i^P $c^P + i^p$			
Current account	4) Trade in goods and services 5) Wages 6) Interest and dividends 7) Taxes and transfers		-*c* +$w \times emp$	-*i*	
Financial account	8) Means of payment 9) Other financial assets 10) Liabilities		+Δ*m* +Δ*ofa* +Δ*l*	-Δ*m*	 +Δ*ofa* +Δ*l*
Income	11) Δ*nfa* = 4) + 5) + 6) + 7) = 8) + 9) - 10) 12) Consumption 13) Investment (tangible assets + inventories) 14) Sum of income= 11) + 12) + 13)	 *c* i^P $c^P + i^P$	$w \times emp - c$ *c* $w \times emp$	-*i* +*i*	
Saving	15) = 14) - 12) = 11) + 13)	i^P	$w \times emp - c$	0	0

But the provision of money via a credit does not change a unit's net worth. Credit creation is a pure financial transaction that is only counted in the financial account and does not show up in either the production, the income or the current account.

2.4 Credit creation

Lenders that cannot create money exchange money for other financial assets (asset exchange). Lenders that are able to create money extend their balance sheets, i.e. they increase both their *gross* financial assets and *gross* liabilities. In neither of those two cases do lenders (and borrowers) change their *net* financial assets, i.e. save.

When a lender cannot create money himself, he decreases his money holdings and increase his holdings of other financial assets (the loan or the bond):

(11) $$0 = +\Delta ofa - \Delta m$$

A lender who is able to create money himself (like a central or commercial bank) increases both its gross financial assets (the new loan that it creates) and its gross financial liabilities (which is the borrower's deposit):

(12) $$0 = +\Delta ofa - (+\Delta l)$$

This is shown in case *d)* in table 2. A borrower always increases his money holdings (be it central bank money or a deposit at the lending bank) but also his liabilities:

(13) $$0 = +\Delta m - (+\Delta l)$$

A lender does not need to abstain from consumption or any expenditures in order to provide a loan. But he needs to abstain from holding his financial assets in the form of money. If he can create money himself, he does not even have to abstain from holding money.

An important caveat is in order here: it is true that commercial banks can create deposits which are normally accepted as means of payment by non-banks. Thus, a bank creates money. However, once the borrower wants to withdraw his money from the bank, the bank has to pay *central bank money* which it can by definition not produce itself – only the central bank can do that. Commercial bank money – deposits – are thus a promise to pay in the form of central bank money. If that promise is no longer believed by depositors, a bank run is likely to follow and banks are likely to go bankrupt if they cannot get enough central bank money to honor their commitments. Or, as Hyman Minsky (2008, p. 255) nicely put it:

> "[. . .] everyone can create money; the problem is to get it accepted."

3. Aggregate income, saving and finance

Until now, only individual economic units and groups of economic units have been analyzed in order to clearly define and distinguish between the economic phenomena "saving" and "credit". However, loanable funds theory is a theory about the interaction of groups within the aggregate economy and aims at deriving statements valid for aggregate variables like aggregate saving, aggregate investment and aggregate credit.

In this section, accounting relations will be presented that are valid for the aggregate economy. Based on this, the fallacy can be tackled that financial saving adds to some fund out of which investment can be financed. This idea is mainly a fallacy of composition.

3.1 Financial saving and investment

Stützel (1978, p. 20-23) developed a formal schema to analyze the relations between single economic units and the aggregate economy. The aggregate economy, which is composed of all economic units – the sum of all firms, households, governments etc. – can be split into a group, *g*, and its complementary group, *cg*. When a group is defined, its complementary group is the rest of the economy. For instance, the complementary group to all households are all non-households, the complementary group to the domestic economy is the rest of the world, the complementary group to lenders are borrowers etc.

Statements valid for the aggregate economy are *global statements*, statements valid for groups are *partial statements*. Very often, the application of a partial statements to the aggregate economy is a fallacy of composition. The link between global and partial statements are *relational statements*. They show how partial statements for a group depend on its complementary group's behavior. This schema can be easily applied to saving and investment for groups and for the aggregate economy.

We have already shown that any individual economic unit or group of economic units can increase (decrease) its net financial assets by realizing a current account surplus (deficit) (equation (9)). This is the partial statement of financial saving. However, since to every expenditure of some unit or group *j* corresponds a revenue of its complementary group (wages are revenues for workers and expenditures for firms, interest are revenues of debtors and expenditures of creditors etc.), the sum of all expenditures of all *N* economic units is necessarily equal to the sum of all revenues (aggregates are written with capital letters):

(14)

$$0 = \sum_{j=1}^{N} \left(r_j - e_j \right) = R - E$$

Note that this is not true for receipts and payments. If a bank creates new money (new deposits), a borrower increases his stock of money and thus realizes a receipt but the bank does not decreases its stock of money and does consequently not realize a payment (until the moment when the bank has to pay central bank money).

Also, every financial asset fa_k is a financial liability l_k so that both the stock of and change in financial assets and financial liabilities is always equal:

$$0 = \sum_{k=1}^{K}(fa_k - l_k) = \sum_{k=1}^{K}(\Delta fa_k - \Delta l_k) = \tag{15}$$

$$FA - L = \Delta FA - \Delta L$$

Combining (14) and (15) means that the aggregate economy's net *financial* assets are *always* zero. The aggregate economy cannot save or dis-save in the form of net financial assets (global statement):

(16)

$$0 = \sum_{j=1}^{N}(r_j - e_j) = \sum_{j=1}^{N}\Delta nfa_j = \sum_{k=1}^{K}(\Delta fa_k - \Delta l_k)$$

This means that groups (*g*) can only increase their net financial assets to the extent that their complementary group (*cg*) accepts to decrease theirs (relational statement):

$$r_g - e_g = -(r_{cg} - e_{cg}) = \tag{17}$$

$$\Delta nfa_g = -\Delta nfa_{cg}$$

For instance, when firms reduce their wage expenditures, workers' wage revenues will necessarily fall by the same amount. When workers react by cutting their consumption expenditures, firm revenues will necessarily fall, etc. Financial saving is *always* a zero-sum game. When groups cut their expenditures, they cut their complementary group's revenues. No fund is in any way increased by anyone's act of financial saving.

But if the aggregate economy cannot save financially, how is aggregate saving possible? The only way the aggregate economy can save is in the form of the *production* of new tangible assets, i.e. investment (global statement):

$$\sum_{j=1}^{N} s_j \equiv \sum_{j=1}^{N}(\Delta nfa_j + i_j) \equiv \tag{18}$$

$$S \equiv \Delta NFA + I \equiv 0 - I \equiv$$

$$S \equiv I$$

The trade of existing tangible assets cancels out in the aggregate since it means the dis-saving of the investment good's seller and the buyer's saving.

This is just a reformulation of equation (14), according to which the sum of all expenditures is equal to the sum of all revenues:

$$S - I = \Delta NFA = R - E = 0 \tag{19}$$

$$\Rightarrow R = E$$

Equations (18) and (14) hold for a closed economy or for the world economy. Open economies are groups which can save both in the form of higher tangible assets and higher net financial assets by realizing current account surpluses.

Furthermore, equation (18) shows that the opposition between the statements "saving creates investment" – attributed to neoclassical economists – and "investment creates saving" – attributed to Keynesian economists (Palley, 1996; de Carvalho, 2012) – is no opposition at all. Both statements express the tautology that *aggregate* saving *is* investment.

However, the accounting identity $S \equiv I$ says *nothing* about a) *how* investment is financed and b) about the size of any group's financial saving. All of investment could be 100 % internally financed by businesses if they had enough liquidity at hand or it could be 100 % externally financed.

Further, there is no necessary relation between the amount of aggregate investment in a period and the amount of financial saving by any group in the economy. Groups could have a current account surplus approaching infinity, provided that their complementary group has the matching deficit, but investment could be zero or even negative (with depreciation being high enough).

On the other hand, investment could approach infinity but financial saving be zero for each group. Thus, there is no necessary relation between financial saving of any one group and aggregate saving. Aggregate saving always is only as high as aggregate investment is, whatever any group's financial saving or dis-saving amounts to.

3.2 Some illustration

A simple example can illustrate the statements made before. Assume an economy consisting only of a firm and a household. The firm wants to build a machine (= invest, I^p) and consumption goods (C^p). In order to produce, it needs workers (it already holds the materials needed itself)[4] but we assume that the firm does not have the money to pay wages. It thus has to borrow money from a bank.

If the bank creates the money anew, the firm increases its money holdings and its liabilities; the bank increases its loan holdings and its liabilities (= the borrower's deposit). This is illustrated in table 3 in which only units' financial accounts are shown since the process is a pure financial transaction. In the aggregate economy (column *d)*), one can see that the amount of money and the amount of loans has increased by the same amount. Since both the bank and the firm have lengthened their balance sheets but not changed their net worth, no saving has taken place, neither for the bank, the firm nor the aggregate economy.

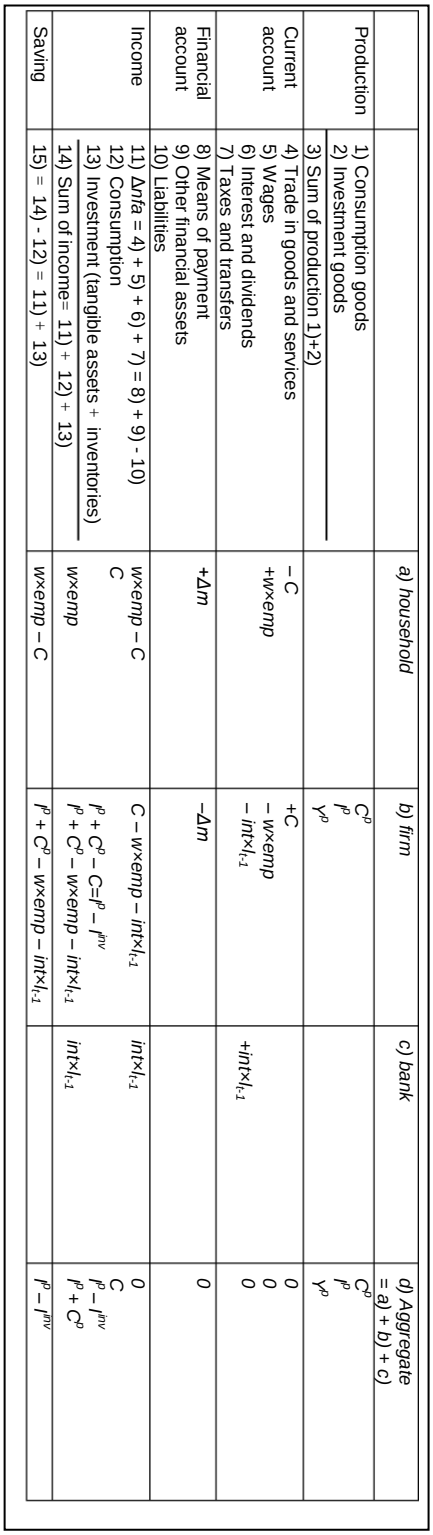
Table 3: Bank credit

		a) household	*b) firm*	*c) bank*	*d) Aggregate = a) + b) + c)*
Financial account	1) Means of payment 2) Other financial assets 3) Liabilities		$+\Delta m$ $+\Delta l$	 $+\Delta ofa$ $+\Delta l$	$+\Delta m$ $+\Delta ofa$ $2\ x\ \Delta l$
Saving	4) = 1) + 2) – 3)		$+\Delta m - (+\Delta l) = 0$	$+\Delta ofa - (+\Delta l) = 0$	0

The newly built machine adds to the aggregate economy's net worth so that the aggregate economy has saved exactly by the amount of the machine. This would of course also hold if the firm had not borrowed but had held enough money itself and used it to hire workers. Produced but unsold consumption goods would also add to the economy's saving since those are inventories ($I^{inv} = C^p - C$ where *C* are sold consumption goods). Table 4 shows all the relations between the different actors.

[4] If we assume a whole business sector with different firms, materials would be traded within the sector so that expenditures and revenues would only take place within the sector and not affect the aggregate sector's or its complementary group's net financial assets.

Table 4: Group saving and aggregate saving



		a) household	*b) firm*	*c) bank*	*d) Aggregate = a) + b) + c)*
Production	1) Consumption goods		C^p		C^p
	2) Investment goods		I^p		I^p
	3) Sum of production 1)+2)		Y^p		Y^p
Current account	4) Trade in goods and services	− *C*	+*C*		*0*
	5) Wages	+*w*×*emp*	− *w*×*emp*		*0*
	6) Interest and dividends		− *int*×l_{t-1}	+*int*×l_{t-1}	*0*
	7) Taxes and transfers				
Financial account	8) Means of payment	+*Δm*	−*Δm*		*0*
	9) Other financial assets				
	10) Liabilities				
Income	11) *Δnfa* = 4) + 5) + 6) + 7) = 8) + 9) - 10)	*w*×*emp* − *C*	*C* − *w*×*emp* − *int*×l_{t-1}	*int*×l_{t-1}	*0*
	12) Consumption	*C*	$I^p + C^p - C = I^p - I^{inv}$		*C*
	13) Investment (tangible assets + inventories)	*w*×*emp*	$I^p + C^p$ − *w*×*emp* − *int*×l_{t-1}	*int*×l_{t-1}	$I^p - I^{inv}$
	14) Sum of income= 11) + 12) + 13)				$I^p + C^p$
Saving	15) = 14) - 12) = 11) + 13)	*w*×*emp* − *C*	$I^p + C^p$ − *w*×*emp* − *int*×l_{t-1}		$I^p - I^{inv}$

In order to illustrate the relation between household financial saving and aggregate saving, we will now discuss three cases of the household's saving behavior and the consequences for the firm sector: first, the household saves financially and buys less from the firm than it had received in wage revenues; second, the household spends the same amount on the firm's products than it had received in wages; and third, the household spends more on the firms' products than it had received in wages (For simplicity, we assume that all of the bank's interest income, $int \times l_{t-1}$, is spent on consumption goods by the bankers, where int is the interest rate and l_{t-1}, is the amount of debts the firm owes from the previous period).

First, if households save financially, the firm's revenues in the period will be lower than its expenditures ($C - w \times emp - int \times l_{t-1} < 0$) so that its net financial assets decrease and its complementary group's - the household's - net financial assets increase. It is immediately clear that household's saving has *reduced* the investing firm's financial means. This is quite in contrast to loanable funds theory. The firm would now have to borrow (and accept a higher debt service), *if* it wanted to maintain its initial liquidity position.

Second, if the household did not save financially ($C - w \times emp - int \times l_{t-1} = 0$), exactly the same amount of revenues would flow into the firm that had previously left it in the form of expenditures. Its liquidity position would *not* change (if we assume that revenues and expenditures are equal to receipts and payments) and the firm would not have to borrow if it wanted to maintain its liquidity.

Third, if the household had dis-saved financially, i.e. spent *more* than it received in revenues from the firm ($C - w \times emp - int \times l_{t-1} > 0$), the firm could even repay a part of its initial loan out of its revenues and would have *more* financial means than it started with.

The lesson from this simple example is clear: household's financial saving *extracts* financial means from the firm and does *not* – as loanable funds theorists claim – add to those means. Since net financial assets are zero in the aggregate, financial saving is a zero-sum game: some group's increase in net financial assets always and necessarily is another group's decrease. No fund is filled or emptied by the act of financial saving.

Also, one can clearly see that the credit provision was the *condition* for aggregate and household saving, not vice versa as loanable funds theorists claim. The loan allowed the firm to produce and to invest and thus to save in the aggregate; it also allowed the firm to realize expenditure surpluses which was the necessary condition for the household's revenue surpluses and thus its financial saving (if it realized any).

Now note that in all three cases - i.e. whatever the amount of household saving is – *aggregate* saving is always exactly equal to the newly produced machine, I^p, plus the unsold consumption goods, $C - C^p = I^{inv}$. This illustrates the point that groups' financial saving and aggregate saving are not necessarily correlated. They are rather likely to be negatively related: the more households save, the less financial means the firm has and the less likely is it to invest. Firms are not likely to invest if nobody is willing to buy the products they build with the new machines.

Note that the example also shows that the claim held by some Keynesians that "investment creates *household* financial saving" (Asimakopulos (1983) seems to hold that view) is not valid. In the second case we discussed, household financial saving was zero but investment equal to the newly produced machine.

3.3 Exogenous money and endogenous credit

In the previous example, we had assumed the bank to create money ex nihilo, i.e. that money was endogenous. Keen (2014) argues that endogenous money theory is indeed the opposite to loanable funds theory (Moore, 1988; Fontana, 2003; Lavoie, 2013). According to him, banks' ability to endogenously create new money is an effective counterargument against the exogenous money view of loanable funds theorists. However, that money is endogenously created by banks is neither a necessary nor sufficient condition for countering loanable funds theory.

The inventor of loanable funds theory, Robertson (1934) as well as his follower Tsiang (1956) explicitly acknowledged the endogeneity of money. They argue that interest rates could fall even when no "new saving" would be forthcoming but money would be *newly*, i.e. endogenously, created.

However, analytically, one does not have to resort to endogenous money to show that loanable funds theory is invalid. Even if the stock of money was fixed ex ante and thus exogenous – M –, credit could be infinite since *credit* is always endogenous, even if money is not. This argument was made in 1898 by Knut Wicksell (1936, p. 60-65). This section presents his argument.

With a fixed money stock, a unit's (or group's) payment is necessarily its complementary group's receipt[5]:

(20) $$\Delta m_g = \Delta m_{cg}$$

When lenders, ln, provide a credit in the form of money, they decrease their money holdings and increase their other financial assets. The corresponding borrowers, br, increase their money holdings and their liabilities by the same amount:

(21) $$\Delta m_{ln,br} = \Delta of a_{ln} = \Delta l_{br}$$

On the other hand, if debtors decreased their liabilities by paying off their creditors, creditors' money holdings would increase and debtors' money holdings decrease. With each credit given or debt paid off, money changes hands and other financial assets as well as liabilities change.

If we sum every transaction *s* over all transactions T in one period, we see that a given stock of money does not limit the number of total transactions. Total transactions are only limited by the frequency in which the stock of money changes hands:

(22)
$$\sum_{s=1}^{T} \Delta\overline{M_s} = \sum_{s=1}^{T} \Delta of a_s = \sum_{s=1}^{T} \Delta l_s$$

Then, the total stock of other financial assets, OFA_t, and liabilities, L_t, at the beginning of the period, t, changes by the frequency by which money has changed hands:

(23)
$$\sum_{s=1}^{T} \Delta\overline{M_s} = OFA_t = L_t + \Delta L_t =$$
$$OFA_{t+1} = L_{t+1}$$

In principle, when the number of transactions *T* approaches infinity, the stock of other financial assets (and thus necessarily also of liabilities) could also approach infinity (if debt is not reduced). If debts are reduced, money only has to change hands often enough and all liabilities and thus other financial assets could become zero.

The amount of debts and financial assets at any point does *not* depend on the stock of money, $\overline{M}$, but on the frequency of its changing hands, $\sum_{s=1}^{T} \Delta\overline{M_s}$. Thus, in principle, the amount of money in the economy could approach zero while the amount of debts and financial assets could approach infinity.[6]

[5] Receipts and payments are only equal if the money stock would not change, i.e. if no new money would be created. However, when money is endogenous, there are receipts to which no payments correspond. If a bank creates a new deposit by making a loan, the deposit holder has a receipt (his money holdings increase) but the bank does not decrease its money, i.e. it does not have to make payments.

[6] The same reasoning is also valid (and more frequently discussed in the form of the quantity theory of money) for expenditures. What we have derived so far for financial account transactions can also be applied to all current account transactions. The amount of expenditures (and in consequence also revenues) in a period do not depend on the stock of money but on the frequency at which it changes hands. This is the velocity of money. Expenditures and revenues have just to be added to equation (22):

(24)
$$\sum_{s=1}^{T} \Delta\overline{M_s} = \sum_{s=1}^{T} (\Delta l_s - e_s) = \sum_{s=1}^{T} (\Delta of a_s - r_s)$$

The amount of lending (and thus borrowing) does not depend on the stock of money but on the willingness of those holding money to lend it, i.e. their liquidity preference. There is no inherent limit to the expansion of credit even when the stock of money is fixed.

In this sense, Keynes' assumption of a fixed money stock in his General Theory (1936/1997) can be defended (against, for instance, Moore (1988, p. 171-208)) on analytical grounds because it is the best way to show the fallacies of loanable funds theory (Lautenbach, 1937).

The section's finding does not only have theoretical importance, but also practical implications. The liabilities of pure investment banks, insurance companies, investment funds and other nonbank financial institutions (so called "shadow banks") are normally not used and accepted as means of payment. In that sense, non-bank financial institutions are pure intermediaries. But by transferring money between economic units, they create credit. Since those kinds of non-bank financial institutions have become ever more important in recent decades, stressing the ability of commercial banks to create monetary liabilities is not sufficient to explain modern financial markets.

4. Inconsistent plans and changes in interest rates and aggregate income

It is true, as Ohlin (1937a) remarked in his discussion with Keynes, that one needs behavioural assumptions to understand the dynamics of the economy and that accounting – while necessary – will not be sufficient. One has to make explicit the *ex ante* plans that economic units have and how those plans interact. This will be done here by transforming all the variables defined so far into planned variables. Central to the analysis will be excess supply and demand functions for goods, labor and financial assets. The analysis is inspired by Patinkin (1958) with two important exceptions, namely that it is not assumed that full employment holds or that all debt commitments will be honored. That means that default is possible.

With the help of excess supply and demand functions, the loanable funds hypothesis can be summarized as follows: If households decrease their consumption expenditures, there will be an excess supply for consumption goods. Since households supply their savings on financial markets, an excess demand for other financial assets (bonds, loans) will lead to a decrease in interest rates. This will incite firms to increase their borrowing and investment, leading to an excess demand for investment goods which compensates the initial excess supply of consumption goods.

On labor markets, the excess supply of consumption goods will also lead to an excess supply of workers in the consumption goods industry. This will be compensated by an excess demand for workers in the investment industry so that the loanable funds mechanism not only brings goods but also labor markets into equilibrium.

The next analysis will however show that with perfectly flexible prices, an initial excess supply of consumption goods is not likely to lead to an excess demand for investment goods but quite to the contrary to an excess supply of investment goods – even if interest rates decrease. Further, the analysis will show that interest rates are not determined by excess saving.

4.1 Excess supply on the markets for goods, labor and financial assets

Ex ante plans can obviously differ from ex post identities. We can take all the variables defined so far and transform them into planned transactions. Thus, planned expenditures on goods, services and labor can be transformed into demand functions; planned revenues can be transformed into supply functions.

When the demanded and supplied quantity of some good, q^d, q^s, depends on its price, p_q and the demanded and supplied quantity of labor, emp^d, emp^s, depends on wages, w, planned expenditures and revenues on the goods, services and labor market for a given price and wage can be written:

(25)
$$e^{pl} = p_q q^d + w \times emp^d;$$
$$r^{pl} = p_q q^s + w \times emp^s$$

I will use the standard assumption that demand of labor and goods is decreasing in prices/wages, and supply of labor and goods is increasing in prices/wages. Further, all prices are perfectly flexible.

Combining planned expenditures and revenues on the goods, services and labor markets for the entire economy yields excess supply functions, with P_Q being a price index and W average wages:

(26) $$R^{pl} - E^{pl} = P_Q(Q^s - Q^d) + W(EMP^s - EMP^d)$$

One can distinguish between consumption goods, $C \equiv P_C Q_C$, and investment goods, $I \equiv P_I Q_I$, so that:

(27) $$R^{pl} - E^{pl} = (C^s - C^d) + (I^s - I^d) + W(EMP^s - EMP^d)$$

C^s and I^s roughly correspond to the production of consumption and investment goods. Supply and production do not have to be the same because firms may want to decrease their inventories and then supply more goods in a period than they produce. When they want to increase their inventories, they might supply less of their goods than they produce. If firms or households produce goods for themselves, the demanded and supplied quantities are equal.

Further, economic units also plan to pay and receive capital income when they have liabilities and financial assets. This amount is given by the product of the interest rate, int and the face value, fv, of a financial asset/liability so that one can add to equation (27):

(28) $$R^{pl} - E^{pl} = (C^s - C^d) + (I^s - I^d) + W(EMP^s - EMP^d) + INT \times (FV^{pl}_{FA,t-1} - FV^{pl}_{L,t-1})$$

Turning to other financial assets – plans for financial account transactions –, one can formulate supply and demand plans for other financial assets thus, where P_{OFA} is a price index for financial assets[7]:

(31) $$\Delta OFA^{pl} - \Delta L^{pl} = P_{OFA}(\Delta FV^d - \Delta FV^s)$$

Planned changes of liabilities are contained in the supply function of other financial assets: Since a unit's liability is another unit's financial asset ($ofa \equiv l$), the plan to change liabilities is a plan to increase or decrease the supply of other financial assets. If units want to decrease their liabilities, for instance by paying back their debt or buying back equity, their supply of other financial assets (=liabilities) is negative.

[7] Note that planned *changes* of financial assets and liabilities have been used here. As has been discussed in the introduction, much of the debate between Keynesians and loanable funds theorists has circled around the question whether it is *changes* in credit and money or the *stock* of credit and money which matters for interest rates. But as Patinkin (1958) has rightly shown, the implications for interest rate determination are the same whether stocks or flows are used. Differences between loanable funds theory and liquidity preference theory do not stem from this distinction.
This can be easily shown: in terms of *stocks*, an economic unit can make plans about the allocation of its portfolio, i.e. about how much of its financial assets it wants to hold in the form of money or in the form of other financial assets and how much debt it plans to owe:

(29) $$m^{pl} = -ofa^{pl} + l^{pl}$$

When its *actual* holdings of money, other financial assets or liabilities and its *planned* holdings diverge at time *t*, units supply or demand one of those items in order to hold at $t + 1$ the planned amount of assets and liabilities:

(30) $$m^{pl}_t - m_t = m^{pl}_{t+1} - m_t = \Delta m^{pl}$$

$$ofa^{pl}_t - ofa_t = ofa^{pl}_{t+1} - ofa_t = \Delta ofa^{pl} = p_{fa} \times \Delta fv^{pl}$$

$$l^{pl}_t - l_t = l^{pl}_{t+1} - l_t = \Delta l^{pl} = p_{fa} \times \Delta fv^{pl}$$

If the difference between planned and actual holdings is positive, units demand one of the items (Δm^d; $p_{fa} \times \Delta fv^d$); if it is negative, units supply them (Δm^s; $p_{fa} \times \Delta fv^s$). So, expressing plans to hold a certain composition of a portfolio in terms of stocks (equation (29)) or flows (equation (30)) is equivalent. The distinction between stocks and flows should thus not lead to any difference in analysis between loanable funds theorists and liquidity preference theorists.

An excess supply of other financial assets leads to a decrease of financial asset prices and an *increase* in interest rates. And vice versa, an excess demand for other financial assets leads to an increase in financial prices and a *decrease* in interest rates.

Finally, planned receipts and payments can also be expressed as an excess demand for money:

(32) $$\Delta M^{pl} = \Delta M^{d} - \Delta M^{s}$$

An excess supply (demand) for money can be directed both to financial markets and goods/labor markets. All the excess demand functions in the financial and the current account can then be combined thus:

(33) $$\begin{aligned} &\Delta NFA^{pl} = R^{pl} - E^{pl} = \\ &(C^{s} - C^{d}) + (I^{s} - I^{d}) + W(EMP^{s} - EMP^{d}) + INT \times (FV^{pl}_{FA,t-1} - FV^{pl}_{L,t-1}) = \\ &P_{OFA}(\Delta FV^{d} - \Delta FV^{s}) + \Delta M^{d} - \Delta M^{s} \end{aligned}$$

This equation gives the financial saving plans. Expressing aggregate saving (equation (18)) in terms of plans yields:

(34) $$\begin{aligned} &S^{pl} \equiv \Delta NFA^{pl} + I^{pl} = \\ &\Delta NFA^{pl} \equiv S^{pl} - I^{pl} \end{aligned}$$

I^{pl} is the sum of economic units' plans to change their tangible assets. Excess saving takes place when saving plans are higher than investment plans ($S^{pl} - I^{pl} > 0$) which means that the sum of units' plans to change their net financial assets is higher than zero ($\Delta NFA^{pl} > 0$).

From this framework one can already derive a general conclusion: excess saving *necessarily* leads to an excess supply on the goods markets ($(C^{s} - C^{d}) + (I^{s} - I^{d}) > 0$) and/or labor markets ($W(EMP^{s} - EMP^{d}) > 0$) and/or to default and/or lower than expected dividend payments ($INT \times (FV^{pl}_{FA,t-1} - FV^{pl}_{L,t-1}) > 0$). With excess supplies on goods and labor markets, excess saving tends to be deflationary.

Excess saving does however *not* determine how interest rates change. A decrease in interest rates would necessitate an excess demand of other financial assets, i.e. $P_{OFA}(\Delta FV^{d} - \Delta FV^{s}) > 0$. But excess saving only implies that the sum of excess demand for other financial assets *and* money be higher than zero: $P_{OFA}(\Delta FV^{d} - \Delta FV^{s}) + \Delta M^{d} - \Delta M^{s} > 0$. This expression could be higher than zero with an excess supply of other financial assets, with an excess demand of other financial assets or even when there is equilibrium on financial markets.

In order to state that excess saving always leads to an excess demand for other financial assets and thus a decrease in interest rates, one would have to assume that the excess demand for money is always lower than the excess demand for other financial assets.

This is still somewhat abstract. The next section will use a simple example to show that one cannot generally assume that interest rates fall when there is excess saving.

4.2 Consequences of a saving shock

For an illustration of the principles just explained and the fallacies of loanable funds theory, let us play through the case in which households unexpectedly reduce their consumption expenditures in order to increase their net financial assets (this has also been described by Bibow (2001), Schmidt (2012), Lautenbach (1952) and Keynes (1963)). Let us assume that there are only two sectors, a household sector, hs, and a business sector, bs. Let us further assume that there is initially full employment, no government or

central bank and that prices are perfectly flexible. Thus, the following discussion takes place in as perfect a market economy as one can imagine.

In the first instance, households' higher saving leads to an excess supply on consumption goods since the amount of actually purchased consumption goods C is lower than planned sales,C^s.

The excess supply on goods markets has four consequences:

a) businesses' actual revenues fall short of their planned revenues: $r_{bs}^{pl} - r_{bs} > 0$;

b) their actual receipts (cash flow) fall short of their planned receipts: $\Delta m_{bs}^{pl} - \Delta m_{bs} > 0$;

c) their actual net financial saving is lower than their planned net financial saving: $\Delta nfa_{bs}^{pl} - \Delta nfa_{bs} > 0$;

d) and their actual investment is higher than their planned investment due to the accumulation of higher unplanned inventories (unsold consumption goods): $i - i^{pl} > 0$.

At this point, loanable funds theorists assume that households supply their saved money to businesses via financial markets. This would lead to an excess demand for other financial assets and a decrease in interest rates.

By this, however, they assume away risk. By the lower than expected revenues and cash receipts businesses' risk necessarily increases since businesses now have less money to service their debts:

(35) $$\frac{\Delta m}{int \times fv_{bs,t-1}} < 0$$

If businesses would borrow more in order to compensate their lower liquidity, they would further increase their risk since they would increase their future debt service.

How interest rates change in this situation depends on the relative changes in the demand for other financial assets (loans, bonds) by households and the supply of those assets by firms. Both supply and demand are likely to decrease because lenders are less willing to lend and borrowers less likely to borrow when default risk increases – if debtors have not defaulted right away when they were hit by the revenue shock. How interest rates change depends on the relative decline in supply and demand:

a) **Interest rates increase:** Households that increase their net financial assets by reducing their expenditures are more likely to hold their additional net financial assets in the form of money and *not* lend this money to the units whose default risk has increased. This is not an irrational act of "hoarding", but a rational "flight to quality", i.e. the demand for financial assets with lower default risk. Without a government that issues government bonds, money would be the riskless asset. If the units hit by the revenue shock maintained their initial borrowing plans, there would be an excess *supply* of other financial assets and thus an *increase* in interest rates (Bernanke et al., 1996; Kalecki, 1937; Stiglitz and Greenwald, 2003):

(36) $$P_{fa}(FV^d - FV^s) < 0 \text{ and } |\Delta M^d - \Delta M^s| > \left|P_{fa}(FV^d - FV^s)\right|$$

(b) **Interest rates stay the same:** In order to avoid a higher future debt service, potential borrowers could reduce their borrowing plans once their revenues and cash flows fall. If businesses' supply of liabilities fell by the same amount as households' demand, excess demand for other financial assets would be zero and interest rates would not change at all:

(37) $$P_{fa}(FV^d - FV^s) = 0 \text{ and thus } \Delta M^d - \Delta M^s > 0$$

(c) **Interest rates decrease:** Debtors might even be willing to reduce their debts – to deleverage – in order to decrease their debt service. When the supply of liabilities declines more than lenders' demand, interest rates would fall:

(38) $$P_{fa}(FV^d - FV^s) > 0 \text{ and } \Delta M^d - \Delta M^s < P_{fa}(FV^d - FV^s)$$

While this fall in interest rates is in line with the prediction of loanable funds theorists, it stems from an altogether different factor, namely the decline in the willingness to borrow, not an increase in the willingness to lend.

None of the above discussions of interest rates is affected if banks and endogenous money were introduced. While banks can create deposits (normally accepted as money by non-banks) when they make loans, they are still bankrupt when their debtors cannot repay. This is due to the fact that banks can create deposits but no central bank money (or gold under the gold standard). Since debtors and depositors ask for central bank money at some stage (for instance when they withdraw money from their bank), commercial banks have a default risk.

We have framed the discussion in terms of interest rates. However, more generally, one could also frame the discussion in terms of credit conditions. Even if lenders would not want to change interest rates when risk increases, they could tighten non-interest conditions or ration loans (Stiglitz and Weiss, 1981).

In the face of lower revenues, how are firms *likely* to behave? Producers of consumption goods are likely to cut prices, production, employment and/or wages and spending on new investment goods. They will do so for two reasons: first, with lower actual than expected sales, firms have accumulated unplanned inventories. They will thus need less labor, less production and lower production capacities – if they expect household consumption expenditures not to increase again in the next period. Thus, quite in contrast to loanable funds theory, firms are more likely to decrease their investment spending than to increase it. Second, the higher default risk means that they will try to cut their non-interest expenditures – wages – in order to keep honouring their interest payments and avoid default.

The cut in the wage bill (wages and/or employment) will lead to a fall in household income and an excess supply on labor markets. The initial excess supply on consumption goods markets is then likely to spill over to the labor market. Further, households' initial plan to increase their net financial assets has been thwarted due to the reaction of its complementary group. This is the *paradox of thrift* in which higher desired saving does not lead to higher saving but lower income.

If households maintained their initial saving plans, they would again cut their consumption expenditures when their income has fallen. Even if prices for consumption goods have fallen, the further decrease in consumption expenditures will again lead to an excess supply of consumption goods with the same effects as the initial excess supply.

The cut in consumption goods' producers investment spending will lead to an excess supply of investment goods which leads to a decrease in revenues and an increase in default risk of investment goods producers. They are thus also likely to lay off workers and / or reduce wages, their production etc. The excess supply in consumption goods is thus likely to spill over to investment goods.

As long as each group – households, consumption goods producers and investment goods producers – are cutting their expenditures in the face of revenue falls, production and income are likely to fall, in extremis to zero. Only if some group is willing and able to maintain or expand its own expenditures in the face of falling revenues will production and the sum of revenues be stabilized.

But why should groups maintain cutting their expenditures? Some group could just accept to save less than desired and adjust its plans. But remember that financial saving also means that units decrease their debts, i.e. deleverage. The vicious cycle of falling revenues and expenditures is especially likely when households and/or firms have to reduce their debts in order to avoid default. Households might wish to maintain their consumption expenditures but are not able to because they have to repay debt; the same goes for firms which might want to maintain employment but risk default if they do.

One could argue that creditors who receive interest revenues from debtors might not be forced to reduce their expenditures even if debtors are. However, given that the risk of debtors' default increases

when their revenues decrease, creditors' risk of not receiving their planned interest revenues also increases. In case of default, they might also have to reduce their expenditures.

This case is what Koo has termed a "Balance Sheet Recession" (2008) and what Fisher has termed a "debt deflation" (1933). Both approaches – while they differ in detail (see Koo, pages 180-184) – constitute theories of why financial saving plans become inconsistent due to units' need to deleverage and why the paradox of thrift is especially likely to bite in such a situation.

To sum up, none of the predictions of loanable funds theory is likely to hold: lower consumption expenditures are not likely to be compensated by higher investment expenditures when there is excess saving, but both are likely to decline in tandem; interest rates might move in every direction but do not necessarily have to fall; and it is not likely that additional loans are provided when there is excess saving.

5. The likely root of the loanable funds fallacy: the mis-interpretation of neo-classical growth models

The fallacies loanable funds theory commits might be explainable by the mis-application of some ideas and concepts of neoclassical growth models – especially the Ramsey (1928), Solow (1956) and Diamond (1965) models – to the sphere of money and finance. Those models are routinely taught in contemporary graduate economics classes (Blanchard and Fischer, 1989; Romer, 1996).

The Ramsey and Solow models are models of real investment only. Financial markets, financial assets and financial saving do not play any role in those models. There is only one good which, for simplicity, will be called "corn". Corn has three functions: it can be consumed, invested and used as a means of payment since wages and interest payments are made with it. Full employment is assumed.

Without money and other financial assets, the only way units can save is to increase their tangible assets, i.e. to invest. Given that full employment is assumed, corn production is always at its maximum in each period. If the corn is consumed, it cannot be invested; if it is invested, it cannot be consumed. There is thus a real trade-off between consumption and investment. *Only* under this assumption does it indeed make sense to talk about a limited saving fund which is increased when it is not consumed.

However, this trade-off between consumption and investment is not a *finance* constraint, but a *resource* constraint (see Kornai (1979) for this distinction). The fixed fund is no fund of *money* that can be lent and borrowed, but a fund of *newly produced goods* that can be consumed or invested. It is obvious that such a model cannot be used to analyze any aspect of finance, money and other financial assets since none exist in the model.

An indication that the loanable funds fallacy might come from a confusion of the two meanings of saving (financial saving and increases in tangible assets) is Blanchard's (2008) following text in his introductory macroeconomics textbook:

> "As we grow up, we are told about the virtues of thrift. Those who spend all their income are condemned to end up poor. [. . .] The model we have seen in this chapter, however, tells a different and surprising story. [. . .] As people save more at their initial level of income, they decrease their consumption. But this decreased consumption decreases demand, which decreases production. [. . .] This means that as people attempt to save more, the result is both a decline in output and unchanged saving. This surprising result is known as the paradox of saving (or the paradox of thrift). So should you forget the old wisdom? Should the government tell people to be less thrifty? No. the results of this simple model are of much relevance in the short run. The desire of consumers to save more led to the 1990 to 1991 recession. [. . .] But, as we will see later in this book when we look at the medium run and the long run, other mechanisms come into play over time, and an increase in the saving rate is likely to lead over time to higher saving and higher income" (2008, p. 58).

To show that higher saving leads to higher investment in the medium to long run, Blanchard uses Solow's neoclassical growth model (Blanchard, 2008, p. 206-247). But this is not a matter of the short or the long run,

but whether economic units save in the form of higher *net financial assets* or in the form of higher *tangible assets*, i.e. investment.

Since the problems of different *financial* saving plans are not dealt with in Solow's model, the model cannot be used to make any predictions about economic units' financial saving behavior, its inconsistencies and thus about the paradox of thrift – neither in the short, medium or long run. There is no miraculous way of short-run financial saving somehow being transformed into long run investment in tangible assets. The two are simply quite different phenomena that Blanchard confuses with each other.

In contrast to Solow's and Ramsey's model, Diamond's (1965) full employment corn economy allows units to lend and borrow. However, they do not borrow and lend money but again the one good, corn. They face a triple trade-off: they can eat (=consume), plant (=invest) or lend their corn. Here, consumption are not consumption *expenditures* but the actual eating of the corn. When a unit wants to lend its corn, it can of course not eat it so that it has to restrain from consumption to be able to lend it.

How pervasive this approach is, is shown by Eggertsson and Krugman (2012) who add some features of Irving Fisher's, Richard Koo's and Hyman Minsky's theories to a basic neoclassical model. Again, no money but goods are borrowed and lent. Naturally, potential lenders have to save some of their goods before they can lend them to borrowers. But since in the real world money is normally not eaten or planted and keeps circulating in the economy when it is spent or lent, those models cannot be any guide for the analysis of a monetary economy. Specifically, what is true in a one good economy – units have to consume less to lend and invest more – is fundamentally wrong in a monetary economy.

Some implications and concluding remarks

The paper has shown that saving does not finance investment. No saving and abstention of consumption is needed for any lending to take place since lending and borrowing money are pure financial transactions that only affect *gross* financial assets and liabilities.

This result has both important analytical as well as political implications. For instance, Bernanke (2005) argued in his "Global Saving Glut" hypothesis that south-east Asian and oil-exporting current account surplus countries financed US housing investment, i.e. that their increase in *net* financial assets was equal to lending money to the US.

This thesis is again likely to stem from a mis-application of the corn economy to the real world: in a corn economy, China would have to abstain from eating (=from consumption) and planting (=investing) corn in order to lend and export more corn to the US than it borrowed and imported (=net lending = current account surplus) from the US. If it lent corn to the US in the hope of receiving more corn in the future (perhaps due to the US' better technology), but then Americans ate and did not plant the corn, the US would default on its corn payment commitments and the Chinese would suffer.

Reality was different, however. The US did not borrow corn, but money, and more specifically *US dollars* from foreigners. But the US also did not mainly borrow from countries that realized current account surpluses vis-à-vis the US, but from European banks, especially from Germany, France, the UK and Switzerland (Acharya and Schnabl, 2010; Shin, 2012; Borio and Disyatat, 2011). They provided the *gross* means which are not visible in current account *balances*. Acharya and Schnabl (2010) show that there is no systematic relation between a country's current account surplus vis-à-vis the US and its banks' lending to the US.

Since European banks cannot produce dollars, every dollar they lent had to be borrowed beforehand – from Americans. The main lenders to European Banks were US money market mutual funds (Shin, 2012). Since European banks borrowed short and lent long in dollars, they depended on steady refinancing from the US. When the financial crisis hit and mutual funds cut their funding of European banks, the Federal Reserve stepped in and provided the needed short-term dollar funding to European banks (Acharya and Schnabl, 2010; Shin, 2012). Ultimately, the US borrowed from and lent to itself. No "Global/Asian Saving Glut" financed US investment but American and European banks did. It is somewhat strange that Bernanke as the former head of the ultimate dollar producer – the Federal Reserve – believes the US to depend on foreign financing when its liabilities are denominated in US dollars.

Further, China's current account surpluses vis-à-vis the US exist because the US buys more from China than China from the US. The US current account deficits *allow* China to increase its income and saving beyond its own investment. But the US as a whole does not have to borrow money from China or anybody else because China – and many other countries – accept the dollar as a means of payment (McKinnon, 2001). Americans do not need Yuan to build their houses, but dollars.

Because believers in the "Global Saving Glut" variant of loanable funds theory identify lending with current account surpluses (financial saving), they could not anticipate that *European* banks were the first banks to be hit by problematic mortgages, while Chinese banks were hardly hit at all. They could also not anticipate that the Federal Reserve would be the ultimate lender to US households in a financial crisis – not the Chinese government or oil exporters on which loanable funds theorists believe the US to depend on.

Similarly, Sinn's (2010) thesis that Germans exported their savings and could not use them at home stems from the wrong application of the corn economy to the real world. While German banks were indeed among the largest creditors of today's crisis countries, the second biggest creditors were French banks although France had a roughly balanced current account balance since 1999 and then a deficit (Waysand et al., 2010; Lindner, 2012).

The banks in today's crisis countries created deposits anew when they lent to their governments, households and companies. Those in turn used the money to buy German goods which increased German income. This was a much needed stimulus for the otherwise stagnant German economy (Lindner, 2013). Since banks do not accept each others' liabilities as means of payments, the banks in today's crisis countries had to borrow central bank money on interbank markets to transfer its residents' payments to German banks. French and German banks were the biggest interbank lenders (Lindner, 2012).

The money lent by German banks to foreign banks most often came back to Germany in the form of sales revenues for German exporters. This money was again relent on interbank markets and gave foreign banks the means to increase their credit supply so that foreigners could purchase even more German goods etc. Sinn argues that Germany lost liquidity when it increased its current account surpluses. The exact opposite was (and is) however the case (Horn and Lindner, 2011; Bindseil and K¨onig, 2012).

As far as policy is concerned, the doctrine of austerity is related to the doctrine that government saving has to be reduced for private investment to increase. However, this is not likely to be the case. When governments reduce their expenditures, firms' revenues are necessarily reduced and their default risk increases. This will lead to less investment and less borrowing. Loanable funds theorists hold – contrary to all real-world experience – the reverse belief.

Overall, the present paper has not only criticized a core belief held by many economists but also tried to sketch an alternative on the basis of common accounting rules and widely accepted behavioral assumptions. The hope is that such a kind of reasoning will be more widely used in future economic research and inform economic policy.

References

Acharya, Viral V. and Philipp Schnabl, "Do Global Banks Spread Global Imbalances? Asset-Backed Commercial paper during the Financial Crisis of 2007-09," *IMF Economic Review*, 2010, *58* (1), 37–73.

Asimakopulos, Athanasios, "Kalecki and Keynes on Finance, Investment, and Saving," *Cambridge Journal of Economics*, 1983, *7* (2/4), 221–233.

Ball, Laurence and Gregory N. Mankiw, "What Do Budget Deficits Do?," in "Budget Deficits and Debt: Issues and Options," Kansas City: Federal Reserve Bank of Kansas City, 1995, pp. 95–119.

Bernanke, Ben, "The Global Saving Glut and the U.S. Current Account Deficit," in "in" TheFederal Reserve Board 2005.

Bernanke, Ben, Mark Gertler, and Simon Gilchrist, "The Financial Accelerator and the Flight to Quality," *The Review of Economics and Statistics*, 1996, *78* (1), 1–15.

Bibow, Jörg, "The Loanable Funds Fallacy: Exercises in the Analysis of Disequilibrium," *Cambridge Journal of Economics*, 2001, *25* (5), 591–616.

Bindseil, Ulrich and Philipp J. König, "TARGET2 and the European Sovereign Debt Crisis," *Kredit und Kapital*, 2012, *45* (2), 135–174.

Blanchard, Olivier, "What Do We Know about Macroeconomics that Fisher and Wicksell did Not?," *The Quarterly Journal of Economics*, 2000, *4* (115), 1375–1409.,

Blanchard, Olivier, *Macroeconomics (5th edition)*, New Jersey: Prentice Hall, 2008.

Blanchard, Olivier, and Stanley Fischer, *Lectures on Macroeconomics*, Cambdridge, Massachusetts: The MIT Press, 1989.

Bond, Charlotte Anne, Teran Martin, Susan Hume McIntosh, and Charles Ian Mead, "Integrated Macroeconomic Accounts for the United States," *Bureau of Economic Analysis, Survey of Current Business*, 2007, (February), 14–31.

Borio, Claudio and Piti Disyatat, "Global Imbalances and the Financial Crisis: Link or no Link?," *BIS Working Paper*, 2011, (346).

Brümmerhoff, Dieter, *Volkswirtschaftliche Gesamtrechnung, 8. Auflage*, München: Oldenbourg Verlag, 2007.

Cochrane, John H., "Fiscal Stimulus, Fiscal Inflation, or Fiscal Fallacies?," *Working Paper*, 2009.

de Carvalho, Fernando J. Cardim, "Aggregate savings, finance and investment," *Intervention*, 2012, *9* (2), 197–213.

Diamond, Peter, "National Debt in a Neoclassical Growth Model," *The American Economic Review*, 1965, *55* (5), 1126–1150.

Eggertsson, Gauti B. and Paul Krugman, "Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach," *The Quarterly Journal of Economics*, 2012, *127* (3), 1469–1513.

European Communitites, "European System of Accounts. ESA 1995," *Official Journal of the European Communities*, 1996, (30.11.96), 5–469.

Fama, Eugene F., "Bailouts and Stimulus Plans," *Fama/French Forum*, 2009.

Fisher, Irving, "The Debt-Deflation Theory of Great Depressions," *Econometrica*, 1933, *1* (4), 337–357.

Fontana, Giuseppe, "Post Keynesian Approaches to Endogenous Money: A Time Framework Explanation," *Review of Political Economy*, 2003, *15* (3), 291–314.

Garvey, George, "Keynes and the Economic Activists of Pre-Hitler Germany," *Journal of Political Economy*, 1975, *83* (2), 397–405.

Gestrich, Hans, "Kredittheorie und Wirklichkeit," *Weltwirtschaftliches Archiv*, 1940, *52* (2), 277–300.

Gestrich, Hans, *Kredit und Sparen*, Helmut Küpper, 1947.

Godley, Wynne and Marc Lavoie, *Monetary Economics. An Integrated Approach to Credit, Money, Income, Production and Wealth. Second Edition*, Palgrave Macmillan, 2012.

Hayes, M. G., "The Loanable Funds Fallacy: Saving, Finance and Equilibrium," *Cambridge Journal of Economics*, 2010, *34* (4), 807–820.

Hicks, J. R., *Value and Capital*, Oxford: Clarendon Press, 1939.

Horn, Gustav and Fabian Lindner, "Kein Kapitalabfluss aus Deutschland," *IMK Policy Brief*, 2011, (May).

IMF, *Balance of Payments and International Investment Position Manual*, Washington D.C.: IMF, 2009.

Kaiser, Dirk, *Treasury Management. Betriebswirtschaftliche Grundlagen der Finanzierung und Investition*, Gabler, 2008.

Kalecki, Michal, "The Principle of Increasing Risk," *Economica*, 1937, *5* (November), 441–447.

Keen, Steve, "Modeling Financial Instability," *Working Paper*, 2014.

Keynes, John Maynard, *The General Theory of Employment, Interest and Money*, New York: Prometheus Books, 1936/1997.

Keynes, John Maynard, "Alternative Theories of the Rate of Interest," *The Economic Journal*, 1937, *47* (186), 241–252.

Keynes, John Maynard, "The Great Slump of 1930," in "Essays in Persuasion," W.W. Norton, 1963, pp. 135-147.

Kindleberger, Charles, "The Manichaean Character of Economics," *Challenge*, 1999, *42* (5), 21–28.

Koo, Richard C., *The Holy Grail of Macroeconomics. Lessons from Japan's Great Recession*, Hoboken, New Jersey: Wiley & Son, 2008.

Kornai, Janos, "Resource-Constrained versus Demand-Constrained Systems," *Econometrica*, 1979, *47* (4), 801–819.

Krugman, Paul and Robin Wells, *Economics. Second Edition*, Worth Publishers, 2009.

Lautenbach, Wilhelm, "Zur Zinstheorie von John Maynard Keynes," *Weltwirtschaftliches Archiv*, 1937, *45*, 493–525.

Lautenbach, Wilhelm, *Zins, Kredit und Produktion*, T¨ubingen: J.C.B Mohr (Paul Siebeck), 1952.

Lavoie, Marc, *Post-Keynesian Monetary Economics, Godley-Like*, Oxford University Press,

Lequiller, Francois and Derek Blades, *Understanding National Accounts*, Paris: OECD, 2006.

Lerner, Abba P., "Interest Theory - Supply and Demand for Loans or Supply and Demand for Cash," *The Review of Economics and Statistics*, 1944, *26* (2), 88–91.

Lindner, Fabian, "Banken treiben Eurokrise," *IMK Report*, 2012, (82).

Lindner, Fabian,, "Can Germany be an Example for the Crisis Countries?," *Economia & Lavoro*, 2013, *47* (3), 151–162.

Mankiw, Gregory N., *Macroeconomics, Third Edition*, New York: Worth Publishers, 1997.

McKinnon, Ronald I., "The International Dollar Standard and the Sustainability of the U.S. Current Account Deficit," *Brookings Paper on Economic Activities*, 2001, (1), 227–239.

Minsky, Hyman, *Stabilizing an Unstable Economy*, New York: McGraw Hill, 2008.

Möller, Peter, Bernd Hüfner, and Holger Ketteniß, *Internes Rechnungswesen*, Heidelberg: Springer, 2011.

Moore, Basil J., *Horizontalists and Verticalists. The Macroeconomics of Credit Money*, Cambridge: Cambridge University Press, 1988.

Naples, Michele I. and Nahid Aslanbeigui, "What does Determine the Profit Rate? The Neoclassical Theories Presented in Introductory Textbooks," *Cambridge Journal of Economics*, 1996, *20* (1), 53–71.

Ohlin, Bertil, "Alternative Theories of the Rate of Interest: Three Rejoinders," *The Economic Journal*, 1937, *47* (187), 423–427.

Ohlin, Bertil, "Some Notes on the Stockholm Theory of Savings and Investment I," *The Economic Journal*, 1937, *47* (185), 53–69.

Ohlin, Bertil, "Some Notes on the Stockholm Theory of Savings and Investment II," *The Economic Journal*, 1937, *47* (186), 221–240.

Palley, Thomas I., "The Saving-Investment Nexus: Why it Matters and How it Works," *CEPA Working Paper*, 1996, (1).

Patinkin, Don, "Liquidity Preference and Loanable Funds," *Economica*, 1958, *25* (100), 300–318.

Patinkin, Don, *Money, Interest, and Prices*, New York: Harper International, 1969.

Ramsey, F. P., "A Mathematical Theory of Saving," *The Economic Journal*, 1928, *38* (152), 543–559.

Robertson, Dennis H., "Industrial Fluctuations and the Natural Rate of Interest," *The Economic Journal*, 1934, *44* (176), 650–656.

Robertson, Dennis H., "Some Notes on Mr. Keynes' General Theory of Employment," *The Quarterly Journal of Economics*, 1936, *51* (1), 168–191.

Romer, David, *Advanced Macroeconomics*, McGraw Hill, 1996.

Santos, Claudio H. Dos and Antonio C. Macedo e Silva, "Revising "New Cambridge": The Three Financial Balances in a General Stock-Flow Consistent Applied Modelling Strategy," *Levy Institute Working Paper*, 2010, (594).

Schmidt, Johannes, "Die Bedeutung der Saldenmechanik für die makroökonomische Theoriebildung," in Harald Hagemann and Hagen Krämer, eds., *Keynes 2.0 - Perspektiven einer modernen keynesianischen Wirtschaftstheorie und Wirtschaftspolitik*, Marburg: Metropolis, 2009, pp. 111–148.

Schmidt, Johannes, "Sparen - Fluch oder Segen? Anmerkungen zu einem alten Problem aus Sicht der Saldenmechanik," in Martin Held, Gisela Kubon-Gilke, and Richard Sturn, eds., *Normative und institutionelle Grundfragen der Ökonomik*, Marburg: Metropolis, 2012, pp. 61–85.

Shin, Hyun Song, "Global Banking Glut and Loan Risk Premium," *IMF Economic Review*, 2012, *60* (2), 155–192.

Sinn, Hans-Werner, "Euro-Krise," *Ifo-Schnelldienst*, 2010, *63* (10).

Snippe, Jan, "Loanable Funds Theory Versus Liquidity Preference Theory," *De Economist*, 1985, *133* (2), 129–150.

Solow, Robert, "A Contribution to the Theory of Economic Growth," *The Quarterly Journal of Economics*, 1956, *70* (1), 65–94.

Stiglitz, Joseph E. and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, 1981, *71* (3), 393–410.

Stiglitz, Joseph E and Bruce C. Greenwald, *Towards a New Paradigm in Monetary Economics* Raffaele Mattioli Lectures, Cambridge: Cambridge University Press, 2003.

Stützel, Wolfgang, *Volkswirtschaftliche Saldenmechanik*, Tübingen: J.C.B. Mohr (Paul Siebeck), 1978.

Stützel, Wolfgang, *Paradoxa der Konkurrenz- und Kreditwirtschaft*, Aalen: Scientia Verlag, 1979.

Stützel, Wolfgang and Wolf-Dieter Grass, *Volkswirtschaftslehre. Eine Einführung für Fachfremde, 2. Auflage*, München: Franz Vahlen, 1988.

Tsiang, S.C., "Liquidity Preference and Loanable Funds Theories, Multiplier and Velocity Analysis," *The American Economic Review*, 1956, *46* (4), 539–564.

Waysand, Claire, Kevin Ross, and John de Guzman, "European Financial Linkages: A New Look at Imbalances," *IMF Working Paper*, 2010, (295).

Wicksell, Knut, *Interest and Prices*, London: MacMillan, 1936.

Woodford, Michael, "Financial Intermediation and Macroeconomic Analysis," *Journal of Economic Perspectives*, 2010, *24* (4), 21–44.