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DP12111

EXCESS SAVING AND LOW INTEREST RATES: THEORY AND EMPIRICAL EVIDENCE

Peter Bofinger and Mathias Ries

**FINANCIAL ECONOMICS and
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EXCESS SAVING AND LOW INTEREST RATES: THEORY AND EMPIRICAL EVIDENCE

Abstract

The debate on low real long-term interest rates is dominated by the loanable funds theory (LFT). 'Excess saving', above all due to demographic factors, is regarded as a primary cause of low rates. In this paper, we show that LFT is not an appropriate theoretical framework. It is based on a commodity paradigm ('real analysis') which cannot represent a financial system with a flow of funds consisting of money. In a 'monetary analysis' saving is disconnected from the supply of funds. Funds are provided by banks, which create money, and investors that are willing to give up liquidity. A simple model which is based on 'monetary analysis' is the IS/LM-model. In this model, even at the zero lower bound 'excess saving' is not possible. The empirical evidence for 'excess saving' is weak. At the global level and for the United States the net saving rate and the gross household saving rate have declined significantly since the 1980s. In line with the monetary analysis, a 'financing glut' can be identified for the United States for the period preceding the Great Recession. It was followed by a 'borrowing dearth'. For the postwar period, the real rates of the early 1980s can be identified as an outlier, and thus the trend decline since this period can be regarded as a reversion to the mean.

JEL Classification: E43, E50, E52

Keywords: interest rates, Flow of Funds, monetary policy

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Excess saving and low interest rates: Theory and empirical evidence

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May, 2017

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The debate on low real long-term interest rates is dominated by the loanable funds theory (LFT). 'Excess saving', above all due to demographic factors, is regarded as a primary cause of low rates. In this paper, we show that LFT is not an appropriate theoretical framework. It is based on a commodity paradigm ('real analysis') which cannot represent a financial system with a flow of funds consisting of money. In a 'monetary analysis' saving is disconnected from the supply of funds. Funds are provided by banks, which create money, and investors that are willing to give up liquidity. A simple model which is based on 'monetary analysis' is the IS/LM-model. In this model, even at the zero lower bound 'excess saving' is not possible. The empirical evidence for 'excess saving' is weak. At the global level and for the United States the net saving rate and the gross household saving rate have declined significantly since the 1980s. In line with the monetary analysis, a 'financing glut' can be identified for the United States for the period preceding the Great Recession. It was followed by a 'borrowing dearth'. For the postwar period, the real rates of the early 1980s can be identified as an outlier, and thus the trend decline since this period can be regarded as a reversion to the mean.

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„The classical theorists resemble Euclidean geometers in a non-Euclidean world who, discovering that in experience straight lines apparently parallel often meet, rebuke the lines for not keeping straight -as the only remedy for the unfortunate collisions which are occurring. Yet, in truth, there is no remedy except to throw over the axiom of parallels and to work out a non-Euclidean geometry. Something similar is required today in economics.“
 (Keynes, 1936, p.16)

1 Introduction

In the debate on the causes of low real interest rates and on secular stagnation, the phenomenon of 'excess saving(s)¹' plays an important role. It has been identified by prominent economists like Summers (2015) and Draghi (2016). As early as 2005, Bernanke (2005) tried to explain low interest rates in the United States as resulting from a 'global saving glut'.

In this paper, we will argue that in a monetary economy the saving of households can never become a source of financial flows. The concept of 'excess saving' refers to the outflow of a commodity theory of finance as it is presented in the loanable funds theory (LFT). While this paradigm has already received criticism from several economists (Borio and Disyatat, 2011, 2015; Lindner, 2013; Bertocco, 2014; Terzi, 2016), it has never been systematically challenged by a monetary approach to the theory of finance. We will show that the '**real analysis**' (Schumpeter, 1954) of a commodity-based financial theory is incompatible with a '**monetary analysis**' in a world which uses a 'fiat money'.

Chapter 2 begins with a short presentation of the LFT. In this theory of finance a single commodity is used for consumption, investment and as a means of finance. Excess saving, i.e. an excess of planned saving over planned investment, is possible at the zero lower bound. As this is identical to an excess of aggregate supply over aggregate demand in the goods market, **excess saving implies an aggregate demand deficiency or a supply glut in the goods market**. But it is difficult to reconcile a disequilibrium in the goods market, which is related to the diagnosis of a secular stagnation with the fact that in the years 2012-2017 global growth was higher than in the 1980s and 1990s. In the years 2002 to 2007, for which Bernanke identified a 'global saving glut', the highest global growth rates for the whole period from 1980 to 2017 were recorded.

In chapter 3, the fundamental differences between a 'real analysis' and a 'monetary analysis' are addressed using the analytical framework of the flow of funds analysis. In the real analysis household saving is the main source of financial funds. In the monetary analysis household saving redistributes existing financial funds from firms to households. In **aggregate**, 'excess saving' that could depress interest rates cannot materialize, as saving has to be generated out of the period income. However, at a **sectoral level**, an 'excess saving' of the private sector can be identified for the period after the Great Recession. However, this was only made possible by an 'excess spending' of the public sector. According to the logic of the LFT, government deficits reduce national saving. Therefore, the combination of private excess saving and public excess spending cannot provide an explanation for low interest rates. Similarly, the diagnosis of 'global saving glut' in the years 2002-2008 is correct if it is applied to individual countries with a high

¹In the literature the words 'saving glut' and 'savings glut' are used synonymously. We will use the term 'saving glut' as 'saving' is a correct statistical concept in the system of national accounts. 'Savings' is a term in everyday language which has no sound basis in macroeconomic accounting systems or economic theory.

current account surplus, such as China, Germany, and Japan. But as this was made possible by an 'investment glut' in the United States and some member states of the Eurozone it cannot be the cause of low interest rates.

In the monetary analysis, the finding of low interest rates can be explained as the result of a '**financing glut**' or a '**borrowing dearth**'. The former requires an increase in the supply of funds which are provided by banks, bond market investors and central banks via bond purchases from the non-banks. The latter, i.e. a decline in the demand for funds, is not necessarily related to new investment. Many firms finance new investment projects using retained earnings and many borrowers use funds for the purchase of existing real assets (e.g. real estate and takeovers).

In Chapter 4, the findings of the flow of funds analysis are supported by a simple macroeconomic model which is based on the core of the monetary analysis: the canonical IS/LM-AS/AD model. The comparison with the LFT shows **diametrically opposed 'dominant causal mechanisms'** (Rodrik, 2015) of the 'real analysis' and the 'monetary analysis'. In the real analysis, additional saving reduces the interest rate and leads to higher investment. In the monetary analysis, additional saving reduces aggregate demand and has no direct impact on the financial sphere. In the real analysis, excess saving is possible at the zero lower bound. This is completely different in the monetary analysis: even at the zero lower bound a goods market equilibrium on the IS-curve can be realized. The fundamental differences between the real analysis and the monetary analysis do not depend on the degree of price flexibility or on a short-term versus a long-term perspective. There is nothing that would change the dominant causal mechanisms of the monetary analysis if prices are more flexible or if a long-term view is adopted. The two paradigms are mutually exclusive. An appendix discusses attempts of a flawed synthesis dating back to Knut Wicksell and his 'cumulative process'. Today, prominent economists (Krugman, 2009; Woodford, 2010) are also unaware of the incompatibility of the two paradigms.

Chapter 5 discusses the **empirical evidence for 'excess saving' at the global and G7 levels**. Even within the theoretical framework of the LFT the evidence is weak. Based on gross saving rates one can show that at the global level the saving rate of private households has declined dramatically since the 1980s. Thus, excess saving due to demographic factors can be ruled out. In addition, net saving rates, which are the relevant concept for intertemporal optimization, have declined steadily. Taken together with the fact that the nominal bond rates for the G7 have never reached the ZLB it is difficult to make the case for an increasing propensity to save.

Chapter 6 discusses the evidence for the United States. For this country, long-term data for real interest rates are available, as are detailed statistics for the bond market and for flow of funds. As for the G7, a pronounced trend decline of net investment and net saving can be identified, while the nominal bond interest rate never reached the ZLB. Again, this is difficult to reconcile with the hypothesis of a higher propensity to save. The **monetary analysis** focuses on the variations in the amount of outstanding bonds. This indicator shows an increase in financing activity together with declining real rates for the period preceding the financial crisis. This can be attributed to a '**financing glut**' but not to a '**savings glut**'. The financing glut is related to the financing of the US government by the Chinese central bank and to the financing of US mortgages by European banks. In the case of **China**, the causal chain did not run from a savings glut in China to low interest rates and higher investment in the United States. It started with a very low Federal Funds rate which initiated the real estate boom, a historically low personal saving rate, and sharply rising US imports from China. This led to high profits of Chinese firms (saving), which had to convert their dollar receipts at the central bank in exchange for

renminbi deposits. The financing occurred due to the willingness of the Peoples Bank of China (PBoC) to use these deposits for the purchase of US treasuries. The 'banking glut' was caused by European banks, which used the low US money market rates to fund the purchase of mortgage backed securities. While the PBoC only provided a maturity transformation, the European Banks additionally provided a risk transformation.

After 2008, a '**borrowing dearth**' can be identified as the financing activity declined together with the real interest rate. This development can be explained primarily by a shrinking mortgage demand, while the demand of the corporate sector has remained remarkably stable.

Finally, long-term data for the period from 1954 to 2017 shows that it is very problematic to use the early 1980s as a benchmark for an assessment of actual interest rates. While from this perspective actual rates can be regarded as historically low, the longer-term perspective leads to the conclusion that the nominal and real interest rates in the early 1980s were historically high. Thus, the implication is that the trend decline from this period can be at least partially regarded as a reversion to the mean.

The failure of the real analysis to provide a convincing explanation for low interest rates highlights the shortcomings of a model that tries to explain financial developments with a purely commodity based framework. This insight can be regarded as the **essence of the Keynesian revolution**. Unfortunately, most economists seem to believe that the difference between the monetary analysis and the real analysis vanishes if prices can adjust. But so far, none have tried to explain why this would affect the fundamentally different causal mechanisms of the two paradigms. If saving is not a source of funds in the short-term, how can it become a source of funds if prices adjust in the long-term? If banks can create deposits in the short-term, why do they depend on deposits for new lending if prices adjust in the long-term?

2 The commodity paradigm of the loanable funds theory

The loanable funds theory (LFT) provides the theoretical basis for all recent studies analyzing the decline in real interest rates. This is not surprising as the microeconomic theory of banking and financial markets (Freixas and Rochet, 2008) is built on this paradigm. This also applies for the modern theory of international macroeconomics (Obstfeld and Rogoff, 1996; Mankiw, 2013). So far the suitability of this theoretical framework for the analysis of low interest rates has not been questioned.

2.1 Basic mechanics of the LFT

The loanable funds theory describes a **flow equilibrium** for the financial market which equilibrates saving and investment. It assumes that

- saving is identical with the supply of funds (or loans), and
- investment is identical with the demand for funds (or loans).

The LFT assumes that the mechanism of banking and finance can be represented by a **model world without money**. Thus, the flow of funds that are traded on the financial market is made up of a single commodity.² This commodity can be used equally as a final product for consumption or input for investment. It is also the output of the investment activity.³ Freixas and Rochet (2008) speak of a model

„with a unique physical good, owned initially by the consumers. Some of it will be consumed at date 1, the rest being invested by the firms to produce consumption at date 2.“

Accordingly, investment requires that consumers are willing to **abandon consumption**, i.e. are willing to save. Krugman (2009) puts it as follows: „In normal times, we believe that more saving, private or public, leads to more investment, because it frees up funds.“⁴

The **financial flows** in a LFT world are presented in a diagram (see figure 1) that can be found in many textbooks. Funds are made available by households. Saving is the source of funds. The funds flow to investors where they are absorbed so that the flow of funds stops there. The transmission from savers to investors is facilitated by banks and financial markets. As they are unable to produce or to consume the single commodity their role is reduced to **pure intermediaries**. There is no fundamental difference between banks and other financial intermediaries. In the words of Gurley and Shaw (1955, p. 521): „Neither banks nor other intermediaries create loanable funds.“

²See Summers (2016): „Just as the price of wheat adjusts to balance the supply of and demand for wheat, it is natural to suppose that interest rates -the price of money-adjust to balance the supply of savings and the demand for investment in an economy. Excess savings tend to drive interest rates down, and excess investment demand tends to drive them up.“

³Myrdal and Meckenroth (1933, p. 392): „Die Vorstellung einer physischen Produktivität setzt jedoch voraus, dass es nur einen einzigen Produktionsfaktor gibt (neben dem Warten) und nur ein einziges Produkt und dass darüber hinaus beide von der gleichen physischen Qualität sind.“See also Siven et al. (2006).

⁴Bernanke (2005) puts it in the same way: „In a closed economy without trade or international capital flows, the funding for investment would be provided entirely by the country’s national saving.“

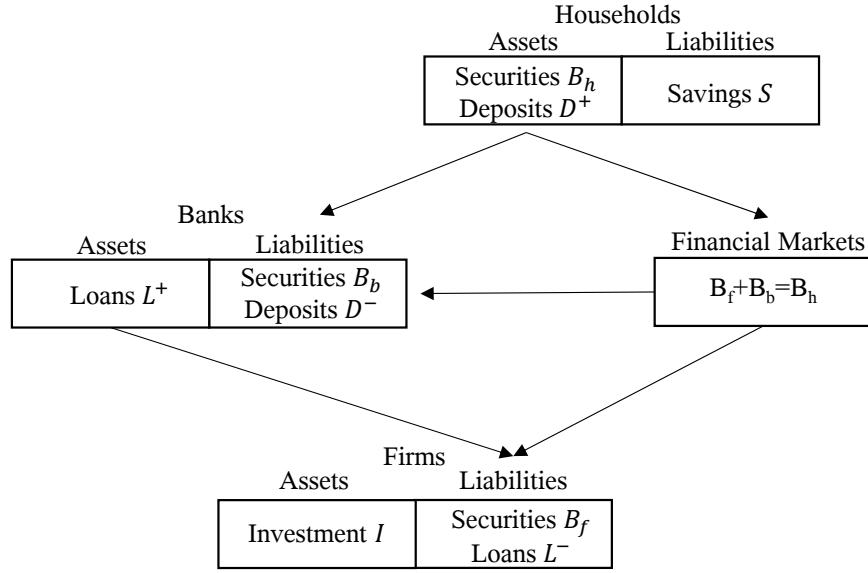


Figure 1: The flow of funds in the loanable funds theory

Source: Freixas and Rochet (2008, p.8).

The supply of funds or planned saving represents the supply of loanable funds for each possible value of the interest rate i received. It is assumed that the substitution effect of higher interest rates dominates the income effect so that the supply curve is upward sloping (Figure 2). The loan demand or planned investment shows the demand for funds for each possible value of the interest rate that must be paid by borrowers. Equilibrium between planned saving and planned investment is achieved by the interest rate which is a real interest rate: it expresses units of the single commodity tomorrow in relation to one unit of the single commodity today. This rate reflects the time preferences of the savers which must be willing to give up consumption and the productivity of investment.

In this model, a **higher propensity to save**, i.e. due to a lower time preference of the savers, increases the supply of funds. The supply schedule shifts to the right. The excess of saving over investment at the current interest rate leads to a decline of the interest rate.

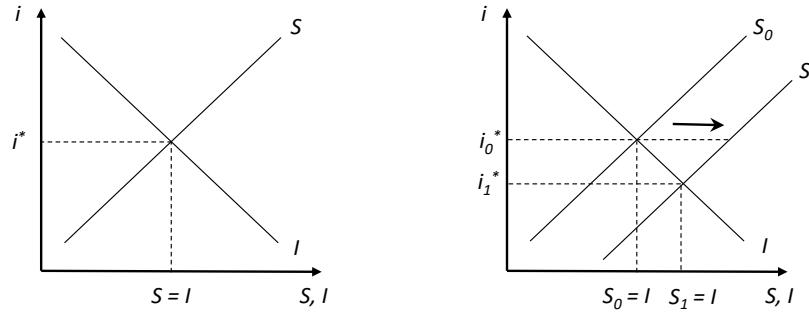


Figure 2: Supply and demand for funds

In the LFT, an increasing propensity to save can lead to a situation where only a negative interest rate is able to restore equilibrium between saving and investment plans (Figure 3). With the **zero lower-bound** a chronic disequilibrium between saving plans and investment plans is possible. Summers (2015) believes that such a disequilibrium can become permanent and defines such a situation as '**secular stagnation**': „The essence

of secular stagnation is a chronic excess of saving over investment.^{“5}

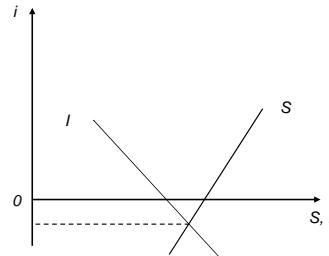


Figure 3: Excess saving at the zero lower bound

2.2 Goods market equilibrium and financial market equilibrium

The **commodity logic** of the LFT becomes obvious if one realizes that an excess of planned saving (S) over planned investment (I)

$$S > I \quad (1)$$

implies not only that the supply of 'funds' on the 'financial market' exceeds the demand for 'funds'. It also implies an excess of aggregate supply over aggregate demand. Adding consumption (C) on both sides of the inequality one gets

$$S + C > I + C \quad (2)$$

The left-hand side represents now **aggregate supply**, the right-hand side **aggregate demand**. Thus, in the LFT excess saving is identical with an excess supply at the goods market:

$$\text{Aggregate Supply} > \text{Aggregate Demand} \quad (3)$$

The saving and the investment schedule of the loanable funds diagram can be transformed into a diagram which shows aggregate supply and aggregate demand (Chart 4).⁶ The **aggregate supply curve** is vertical, as the LFT assumes that aggregate income has already been generated and is not affected by saving and investment decisions. The **aggregate demand curve** has a negative slope as investment and consumption increase with a lower interest rate. Equilibrium on the financial market is identical with equilibrium on the goods market. In the real analysis the financial sphere is a simple mirror image of the real sphere.⁷

⁵Krugman (2011a) uses almost the same wording: „A zero-lower-bound economy is, fundamentally, an economy with suffering from an excess of desired saving over desired investment.“

⁶That the equilibrium between saving and investment can be expressed as an equilibrium on the goods market was already detected by Myrdal and Lindahl in the 1930s and by Ohlin, see Siven et al. (2006).

⁷See also Mankiw (2013, p. 66-68).

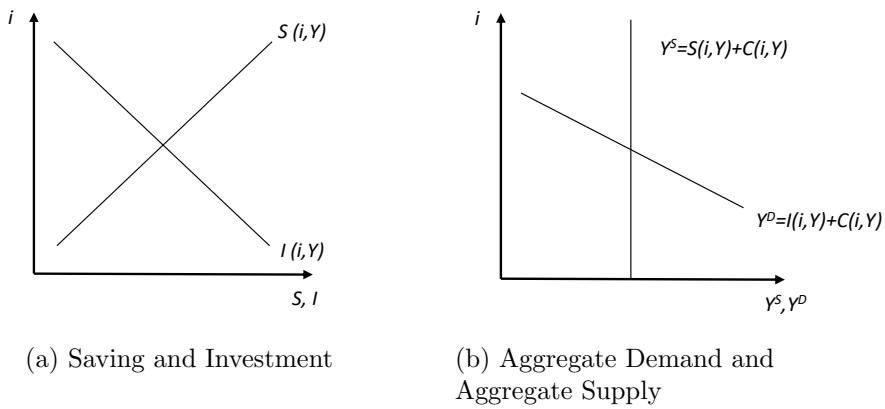


Figure 4: Financial market equilibrium and goods market equilibrium in the LFT

From the goods market side of the LFT the diagnosis of 'excess saving' is identical with the diagnosis of '**a demand deficiency**'. Accordingly the diagnosis of a 'global saving glut' made by Bernanke (2005) and of a 'chronic excess saving' made by Summers (2016) would imply a **severe global demand deficiency**. This is difficult to reconcile with the actual growth rates of global GDP (Chart 5). The years 2004 to 2007 were characterized by the highest growth rates in the whole period from 1980 to 2017. And even in the period from 2012 to 2017 for which 'chronic excess saving' and a 'secular stagnation' is diagnosed⁸ an average growth rate was realized that exceeds the averages of the 1980s and the 1990s.⁸

Thus, the goods market perspective of the LFT confronts the diagnosis of 'excess saving' or of a 'global saving glut' with **a serious empirical problem**.⁹ This raises the more fundamental question whether a model that is based on a barter logic is able to explain financial phenomena in the world of the 21st century.

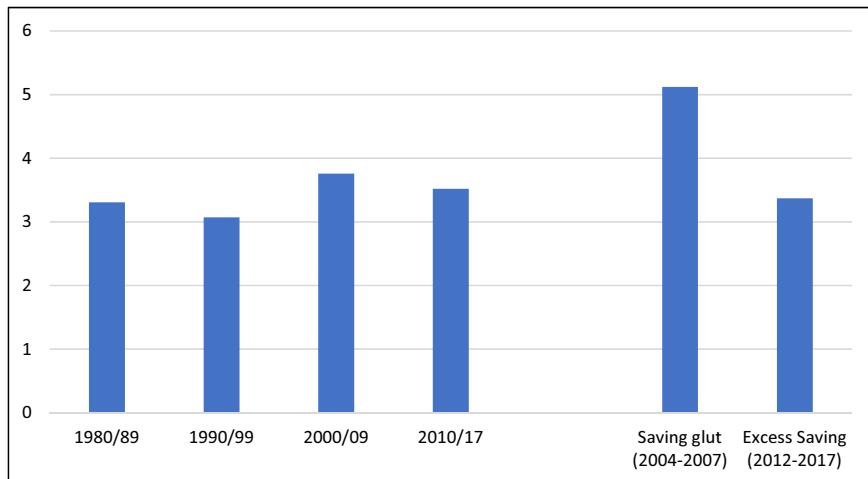


Figure 5: World GDP growth rates in periods for which excess saving is diagnosed

Source: IMF, World Economic Outlook Database.

⁸One could argue that the negative demand effects did not materialize because of the stabilizing effects of lower interest rates. But the loanable funds theory is normally presented as a theory for the long-run (Mankiw, 2013). Therefore, the interest rate response to such a demand deficiency would not be instantaneous.

⁹See also Borio (2017).

3 Real analysis versus monetary analysis: Does it make a difference?

Almost all economists regard the LFT as an adequate model for the financial system and more specifically as an adequate framework for discussing the causes of low interest rates. Only very few economists have criticized this approach above all because of its commodity logic (Borio and Disyatat, 2011; Lindner, 2013; Bertocco, 2014).

Even economists who are aware of monetary factors influencing interest rates argue that in spite of its simplifications the LFT provides insights in **long-term mechanics** of financial markets.

„In principle, these monetary factors might be less relevant in determining the long-run neutral real rate: to the extent that prices are flexible in the long-run, money is neutral, and only real factors have a lasting effect on long-run real rates.“ (Rachel and Smith, 2015, p. 54)

Borio and Disyatat (2011, p. 1) make a similar point. Although they criticize the view that the market interest rate is determined by saving and investment, they still believe „that the balance between ex-ante saving and ex-ante investment is best regarded as determining the natural (...) interest rate“.

3.1 The importance of critical assumptions

Following Rodrik (2015) one can argue that the usefulness of a model depends on its **critical assumptions** which have to track reality sufficiently clearly. Rodrik (2015, p. 27) defines a critical assumption as follows:

„We can say that an assumption is critical if its modification in an arguably more realistic way would produce a substantive difference in the conclusions produced by the model.“

The LFT is based on the critical assumption that the financial system in the real world can be approximated by a model without money. The decisive question is whether a model with more realistic assumptions, i.e. a model where the flow of funds consists of money, would produce a substantive difference in the conclusions.

This question was raised already by Joseph Schumpeter (1954, p. 264) who differentiated between a '**real analysis**' and a '**monetary analysis**'.

„Real Analysis proceeds from the principle that all the essential phenomena of economic life are capable of being described in terms of goods and services, of decisions about them, and of relations between them. Money enters the picture only in the modest role of a technical device that has been adopted in order to facilitate transactions. (...) But so long as it functions normally, it does not affect the economic process, which behaves in the same way as it would in a barter economy: this is essentially what the concept of Neutral Money implies. Thus, money has been called a 'garb' or 'veil' of the things that really matter, both to households or firms in their everyday practice and to the analyst who observes them. Not only can it be discarded whenever we are analyzing the fundamental features of the economic process but it must be discarded just as a veil must be drawn aside if we are to see the face behind it.“

Schumpeter (1954, p. 265) argues in favour of a **monetary analysis**:

„Monetary Analysis introduces the element of money on the very ground floor of our analytic structure and abandons the idea that all essential features of economic life can be represented by a barter-economy model. Money prices, money incomes, and saving and investment decisions bearing upon these money incomes, no longer appear as expressions-sometimes convenient, sometimes misleading, but always nonessential-of quantities of commodities and services and of exchange ratios between them: they acquire a life and an importance of their own, and it has to be recognized that essential features of the capitalist process may depend upon the 'veil' and that the 'face behind it' is incomplete without it.“¹⁰

In the following we will show that there are indeed **'substantive differences in the conclusions'** provided by models based on a real analysis and models based on a monetary analysis. Thus, the assumption of the LFT that the financial system can be represented by a real analysis can be regarded as a critical assumption in the definition of Rodrik.

A simple test of the conclusions of the two approaches is the **effect of saving** on the economy. In the LFT saving is the only source of financial funds. It was the scientific revolution of John Maynard Keynes to question this effect:

„An act of individual saving means - so to speak - a decision not to have dinner to-day. But it does not necessitate a decision to have dinner or to buy a pair of boots a week hence or a year hence or to consume any specified thing at any specified date. Thus, it depresses the business of preparing to-day's dinner without stimulating the business of making ready for some future act of consumption. It is not a substitution of future consumption-demand for present consumption-demand, - it is a net diminution of such demand.“(Keynes, 1973, p. 210).

3.2 The role of saving in a monetary economy: flow of funds analysis

The dominant causal effects of saving in a monetary economy can be demonstrated in more detail with the analytical framework of the **flow of funds analysis**. It was developed by Copeland (1952) and provides the financial counterpart of the system of national accounts.¹¹ The framework is based on a double entry system of accounting. This simple analytical tool allows to identify basic but at the same time **fundamental laws**¹² which normally cannot be observed in economics.¹³

¹⁰Keynes made almost the same statement: „Most treatises on the principles of economics are concerned mainly, if not entirely, with a real-exchange economy; and - which is more peculiar- the same thing is also true of most treatises on the theory of money. (...) The theory which I desiderate would deal, in contradistinction to this, with an economy in which money plays a part of its own and affects motives and decisions and is, in short, one of the operative factors in the situation, so that the course of events cannot be predicted, either in the long period or in the short, without a knowledge of the behaviour of money between the first state and the last. And it is this which we ought to mean when we speak of a monetary economy.“(Keynes, 1973, pp. 408-411).

¹¹The Federal Reserve and the European Central Bank publish flow of funds analyses on a quarterly basis.

¹²See also Lindner (2012): „The advantage of accounting rules, once defined, is that they can be used to derive logically strictly true deductions.“He refers to the German economist Wolfgang Stützel (1978) who showed how trivial and strictly true statements can be used to understand the interrelations between the real and the financial economy.

¹³Rodrik (2015, p. 45) sees this differently: „Economics is a social science and society does not have fundamental law, at least not quite in the same way as nature does.“

The flow of funds analysis helps to avoid logical pitfalls in the discussion of saving and investment. This becomes already evident by the confusion of leading scholars in the usage of the words 'saving' and 'savings' as synonyms. '**Saving**' is a **flow concept** with a clear definition in the system of national accounts. '**Savings**', however is not a technical term but a popular expression for liquid financial assets. It is obviously a **stock concept**.¹⁴

3.2.1 Basic concepts of the flow of funds analysis

The starting point for the flow of funds analysis is a simplified balance sheet (Table 1) which can be made up for an individual actor but also for sectors of the economy. In the most aggregate form it differentiates on the asset side only between non-financial assets and financial assets. On the right-hand side of the balance sheet are only liabilities and net worth.

Table 1: Simplified balance sheet

Assets	Liabilities
Non-Financial assets	Liabilities
Financial assets	Net worth

Subtracting liabilities from financial assets leads to **net financial assets**:

$$\text{Financial assets} - \text{liabilities} = \text{Net financial assets} \quad (4)$$

Net financial assets is a very useful concept for the understanding of aggregate financial processes, especially for understanding the phenomenon of 'excess saving'. However, it is not mentioned in macroeconomic textbooks.

Net worth (NW) can then be described as the sum of non-financial assets and net financial assets:

$$\text{NW} = \text{Non-financial assets} + \text{Net financial assets} \quad (5)$$

The flow of funds analysis can be presented for stocks but also for flows. **For flows** equation (5) can be written as

$$\Delta\text{NW} = \Delta\text{Non-financial assets} + \Delta\text{Net financial assets} \quad (6)$$

As the change in net worth is identical with saving (S) and the change in non-financial assets is identical with investment (I) we get

$$S = I + \Delta\text{Net financial assets} \quad (7)$$

Equations (4) to (7) apply to an individual as well as to sectors of an economy. From the double entry system of accounting each financial asset must be matched by a financial liability so that for a **closed economy** the sum of net financial assets of all sectors is always equal to zero. This implies that a global debt overhang must be matched by a global credit overhang. The requirement also applies to the flows so that for all sectors of a closed economy the change in net financial assets sums up to zero. A positive change

¹⁴The confusion of both terms gives the LFT a more plausible appearance. While 'savings', if they are understood as bank deposits, can be regarded as a source of funds, this does not apply to 'saving'.

in Δ NFA in one sector has to be matched by a negative change in another sector of an economy:

$$\Delta \sum \text{NFA} = 0 \quad (8)$$

For an **open economy**, the change in its aggregate net financial assets equals the current account balance (CAB):

$$\Delta \sum \text{NFA} = CAB \quad (9)$$

The flow of funds framework makes it possible to identify the **critical causal relationship between the saving decision of an individual household and the rest of the economy**. The point of reference is a situation where the household does not save, i.e. it consumes its whole income. What happens if the household decides to consume less in order to save? As the expenditure of an agent is always the revenue of another agent, the reduction in consumption expenditures implies the reduction of the revenues of the business sector.

Compared with the reference situation the saving decision has a direct impact on the household sector (HH) and the business sector (B). For the household sector net worth (net financial assets and financial assets) are higher and for the business sector, net worth (net financial assets and financial assets) are lower.

$$\Delta \text{NW}_{\text{HH}} = -\Delta \text{NW}_B \quad (10)$$

$$\Delta \text{NFA}_{\text{HH}} = -\Delta \text{NFA}_B \quad (11)$$

$$\Delta \text{Financial Assets}_{\text{HH}} = -\Delta \text{Financial Assets}_B \quad (12)$$

The simple accounting relations show that the saving decision does not release financial funds that could be used for additional investment. Instead household **saving redistributes existing (liquid) financial assets** from the business sector to the household sector. In addition, it has a negative effect on net worth of the business sector. Taking the direct effects of household saving into account depress the prospects for investment. This immediate cause and effect has a universal validity. It is based on the simple but fundamental logic that an individual decision to reduce expenditures necessarily implies the reduction in revenues of another actor.

A corollary of the **change in net financial assets** is a change in liquid financial assets (currency and deposits) of the two sectors. Compared to the reference situation the liquid financial assets of the household sector are higher and the liquid financial assets of the business sector are lower. In aggregate, household saving did not change the **total amount of liquid funds**, i.e. the money stock in the economy. Household saving is not a source for **additional funds**. It simply redistributes funds between the household sector and the business sector.

This redistribution would have an impact on the **capital market** if the households did not only decide to save but in addition to lend their liquid assets on the capital market to the business sector. This combines the genuine saving decision with an additional **financing decision**. But even in this case the business sector could only compensate its liquidity gap but not the reduction of its profits.

In sum, the flow of funds analysis shows that in a monetary economy household saving is not a source for additional funds for the corporate sector. On the contrary, it deprives this sector of profits and financial funds which makes it more difficult to invest. This causal mechanism of any monetary theory of the financial system implies that the saving

of households can never provide **additional funds** for the financial system.¹⁵ This causal relationship stands in a full contrast to LFT where household saving is the main source for investment.

3.2.2 'Excess saving' in the flow of funds analysis

For the phenomenon of '**excess saving**' the flow of funds analysis is a useful framework. In the **real analysis of the LFT** saving plans can permanently exceed investment plans if the ZLB is reached. In the flow of funds analysis excess saving is defined as:

$$S_{\text{ex ante}} > I_{\text{ex ante}} \quad (13)$$

For an individual agent, this implies that he plans to increase his net financial assets. Accordingly, the diagnosis of a 'global savings glut' would require that

$$\sum \Delta NFA_{\text{ex ante}} > 0 \quad (14)$$

But the sum of net financial assets in the world is zero and the change in the sum of net financial assets is also zero. Thus, a disequilibrium between global saving and investment plans could only be a very short-term phenomenon. It implies a global excess of aggregate supply over aggregate demand which would drive down global growth and income and thus global saving plans. In the monetary analysis, a 'chronic excess of saving over investment' (Summers, 2015) that would depress the global interest rate can never materialize. However, in the monetary analysis, '**excess saving**' is a useful concept if it is applied to **specific sectors of the economy**. For instance, the very high fiscal deficits in the global economy in the period after the financial crisis imply a corresponding excess saving of the private sector:

$$\sum \Delta NFA_{\text{private sector}} = - \sum \Delta NFA_{\text{government sector}} \quad (15)$$

Thus, it is correct to diagnose a massive '**excess saving** of the **private sector**' for the time after the financial crisis (Figure 6). However, it cannot be seen in isolation. From the double accounting principle of the flow of funds analysis it is only possible if there is at the same time an '**excess spending**' of the government sector.

¹⁵One of the few prominent economists who has realized this is William Vickrey (1998): „Saving does not create 'loanable funds' out of thin air. There is no presumption that the additional bank balance of the saver will increase the ability of his bank to extend credit by more than the credit supplying ability of the vendor's bank will be reduced. If anything, the vendor is more likely to be active in equities markets or to use credit enhanced by the sale to invest in his business, than a saver responding to inducements such as IRA's, exemption or deferral of taxes on pension fund accruals, and the like, so that the net effect of the saving inducement is to reduce the overall extension of bank loans. Attempted saving, with corresponding reduction in spending, does nothing to enhance the willingness of banks and other lenders to finance adequately promising investment projects. With unemployed resources available, saving is neither a prerequisite nor a stimulus to, but a consequence of capital formation, as the income generated by capital formation provides a source of additional savings.“

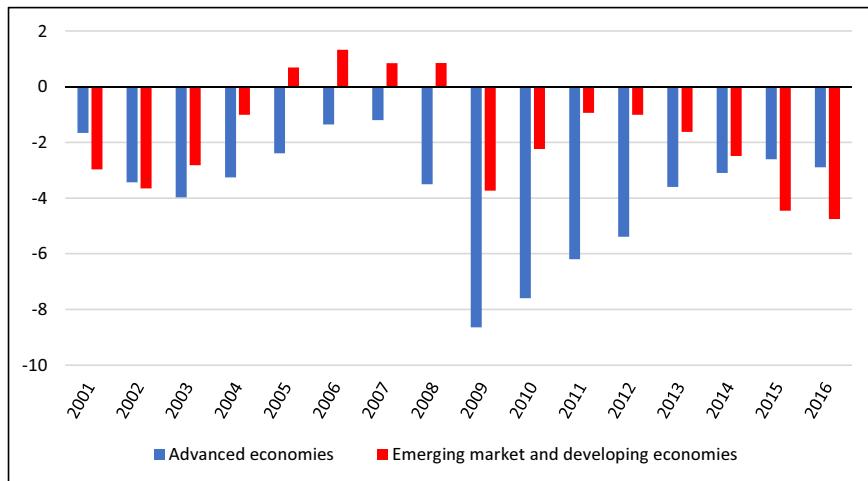


Figure 6: Fiscal balances (percent of GDP)

Source: IMF, World Economic Outlook Database.

In the same way, 'excess saving' can be diagnosed for countries or groups of countries with a current account surplus which is identical with an increase of a country's net financial assets. In the years 2005 to 2009 China experienced huge current account surpluses which can correctly be interpreted as 'excess saving'.

But the flow of funds analysis shows that the excess saving of one sector must be always accompanied by an excess investment of the complementary sector(s). The 'saving glut' of China was to a large degree the mirror image of an increasing 'spending glut or investment glut' in the United States (Figure 7).

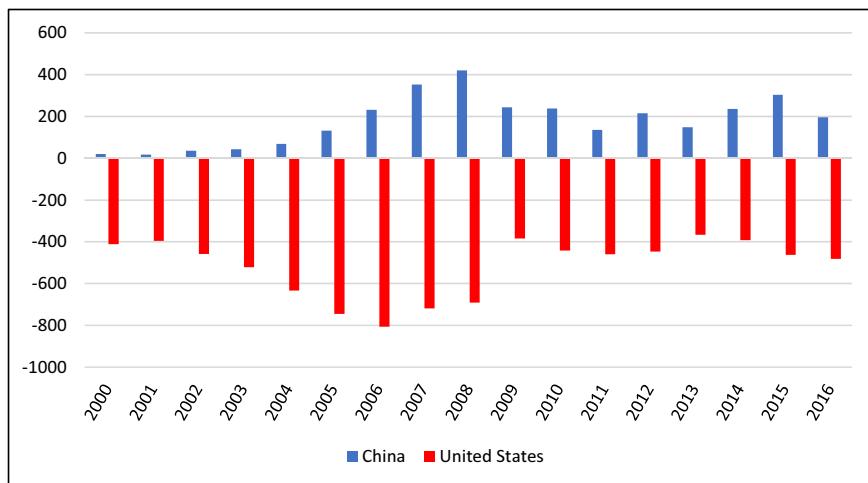


Figure 7: Saving glut in China and investment glut in the United States

Source: IMF, World Economic Outlook Database.

As the saving glut of one sector is necessarily related with the investment glut of another sector, even in the loanable funds framework its effect on interest rates is not obvious.

3.3 From 'saving glut' to 'financing glut': The role of finance in a monetary economy

In the real analysis, the supply of funds is generated by the saving of households. The demand for funds comes from investors for new investments. Demand and supply are therefore determined by purely real factors (time preference of consumers, productivity of investment). In the following we will show that in a monetary economy the supply of funds on the financial market is disconnected from saving and that the demand for funds is only partially related to new investment. Thus, real factors are not the main determinants of the demand and supply for funds.

Accordingly, for an explanation of low interest rates it is not a saving glut that matters but a **financing glut or a borrowing dearth**.

3.3.1 Supply of funds

In a monetary economy 'funds' are essentially demand deposits held with banks. This gives **banks** a pivotal role in the monetary analysis as they are the only institution that can create such funds.¹⁶ The **capital market** is also an important supplier of funds, but it is fundamentally different from banks. It distributes existing funds so that it can be regarded as a second-hand supplier of funds. The **central bank** can also act as supplier of new funds if it buys bonds from non-banks in quantitative easing programs.

In the literature, there is a long debate whether banks are **intermediaries or manufacturers of funds**.¹⁷ It reflects an ongoing confusion of the real and the monetary analysis which is normally not made explicit. In this paper, we will not describe the details of the mechanics of credit and money creation by banks in a monetary economy. They are discussed by Disyatat (2011), McLeay, Radia and Thomas (2014), Jakab and Kumhof (2015), Bundesbank (2017) and Bofinger and Ries ((forthcoming)).

The basic logic is simple: Whenever a bank offers a loan, a new deposit is created.¹⁸ In contrast to the real analysis banks do not need to collect deposits before they are able to lend. But this does not imply that money is endogenous, i.e. not under the control of the central bank.

From the perspective of an individual bank it is very likely that new deposits will be transferred to another bank.¹⁹ It is also possible that the customer uses the loan for a cash-withdrawal. In both cases the bank experiences a **loss of central banks reserves**. Thus financing always implies an **abandonment of liquidity**. The loss of liquidity must be refinanced by borrowing either directly from the central bank or from other banks on the money market. As the central bank can control the short-term money market rate (e.g. the Federal Funds rate or EONIA) perfectly with its instruments, it can determine the refinancing costs of banks. These costs are a decisive factor for the interest rate that banks charge for their loans. Thus, the central bank can indirectly control the process of credit creation by variations of the policy rate.²⁰

¹⁶The decisive role of banks is also emphasized by Keynes (1937, p. 668): „(...)in general, the banks hold the key position in the transition from a lower to a higher scale of activity.“

¹⁷Werner (2014) gives a comprehensive survey of this ongoing debate.

¹⁸In fact, that is the only way deposits can be created. One might argue that a bank deposit is created if currency is deposited with a commercial bank. But the creation of currency also requires a prior credit creation. In this case, the central bank provides a loan to the banking system.

¹⁹For the banking system, the liquidity restriction of transfers is not binding. In normal times when banks have mutual trust banks with excess liquidity are willing to lend to banks with a liquidity shortage. The money market acts as a system of communicating tubes.

²⁰This lever for the control of bank credit creation is overlooked in the paper by Jakab and Kumhof (2015,

In the monetary analysis, **capital markets** are distributors of money that has been created by banks. But the intermediation does not take place between savers and investors. It takes place between money holders that are willing to give up liquidity temporarily and borrowers that need liquidity, but not necessarily for new investments.

An important difference between the real analysis and the monetary analysis concerns the ability of capital markets to perform a **multiple credit creation**. In the real analysis funds are transferred to an investor and are no longer available for other investors. In the monetary analysis funds, i.e. money, that are transferred to an investor are spent immediately so that they are available for new lending (Biefang-Frisancho Mariscal and Howells, 2012). This potential has been emphasized already by Keynes:

„Credit, in the sense of ‘finance,’ looks after a flow of investment. It is a revolving fund which can be used over and over again. It does not absorb or exhaust any resources.“ (Keynes, 1937, p. 247)

There is very little theoretical analysis of this role of capital markets. Basic elements of a theory of the supply of funds on the capital market can be found in the theory of liquidity preference developed by Keynes (1973), especially the **speculative motive**. It concerns the decision of an investor to hold its financial assets either in short-term deposits (money) or in bonds, i.e. to supply liquid funds at the capital market. In this theory, the decision to hold bonds depends above all on expectations of changes in interest rates.

Thus, the supply of funds on the capital market can be regarded as the mirror image of the **demand for money**, which is essentially the decision to hold financial assets either in a liquid form or in bonds. Typical estimations of the demand for money use the difference between the long-term interest rate and the short-term interest rate as an important decisive explanatory variable (Dreger and Wolters, 2011). Accordingly, one can assume that the demand for bonds, which is the supply of funds on the capital market, can also be described by these two variables.

A similar message comes from **asset-pricing models** that incorporate risk. They suggest that the long-run nominal interest rate is the sum of expected future short-term real rates, expected future inflation rates, and a term premium (Council of Economic Advisors, 2015).

With its control over the short-term interest rate the **central bank** has a strong lever for influencing the supply on the capital market. It does not only influence the interest rate for holding short-term deposits it also can affect the expected interest rate with the strategy of '**forward guidance**'. This strategy was applied by the Federal Reserve and the ECB after the Great Recession.

Finally, the central bank can also **directly generate new funds**. This is the case if it buys bonds from non-banks in **quantitative easing** programs. The seller is credited the amount on its bank account so that the money stock increases. The central bank credits the central bank account of the seller's bank (Bundesbank, 2017).

This short presentation of supply side of funds in a monetary economy shows that financing is not only disconnected from saving, it is determined by completely different factors. Financing does not require an **abandonment of consumption**, it requires an **abandonment of liquidity**:

- a bank that is providing a loan experiences a reduction of its reserves,

p. 5): „Contrary to the deposit multiplier view of banking, the availability of central bank reserves is not among these limits (i.e. ‘the limits for increasing the stocks of loans and deposits instantaneously and discontinuously’).“ Therefore, the model of Jakab and Kumhof does not entail a central bank refinancing rate.

- an investor that buys bonds experiences a decline of his money balances.

In addition, the central bank which is an irrelevant player in the real analysis²¹ has a core role in the monetary analysis. It does not only directly control the short-term rate. It also exerts a strong indirect influence on the lending rate of banks and the interest rate for bonds. The central bank can also directly create new funds by purchasing bonds from non-banks.

3.3.2 Demand for funds

In the real analysis, funds are demanded by investors for financing new investments. In the monetary analysis, the demand for funds is only partially related to new investments. This applies above all to the capital market (Figure 8) but also to the demand for funds from banks. There are several reasons for this disconnection of the demand for funds and investment:

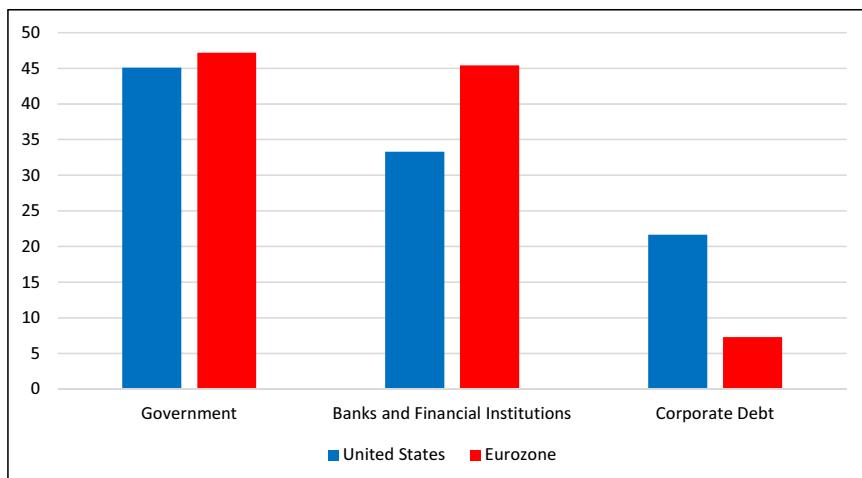


Figure 8: Outstanding Bond Market Debt (percent of total issues)

Source: ECB (February 2017) and SIFMA (December 2016). For the United States the items Mortgage Related, Federal Agency Securities, Money Markets and Asset-Backed are aggregated under Banks and Financial Institutions. For the Eurozone, the items Monetary Financial Institutions (MFI) and Financial Corporations other than MFI are aggregated under Banks and Financial Institutions.

First, new investments are often financed with **retained earnings**. In the 2012-2016 average, the S&P 500 firms financed 84 % of their investment with operating cash (International Monetary Fund, 2017). Therefore, the demand for external funds is much lower than the amount of new investment. Especially in the Eurozone, corporate debt is relatively unimportant for the bond market. The share of bank loans to the corporate sector is 29 percent of all bank loans to non-banks.

Second, many investors demand funds for the **purchase of existing assets**. In 2012-2016, on average the S&P 500 firms spent 52 % of the investment expenditures for the acquisition of financial assets, M&A, and share buybacks and dividends. Only 48 %

²¹See Reis (2016, p. 15): „(...) the central bank is not all that different from the parking tickets office, or the issuer of permits for boats: it collects a revenue and uses it to provide direct fiscal transfers that lower the fiscal burden of the government.“

were used for capital spending, including research and development (International Monetary Fund, 2017).

Third, especially in the Eurozone **banks** are an important issuer of bonds. The amount of outstanding bonds issued by monetary financial institutions is 25 % of the total amount. By issuing bonds banks can reduce the maturity transformation in their balance sheet.

Fourth, the **government** is almost everywhere the most important issuer of bonds. The amount it raises on capital markets is only partially related to new investments.

3.3.3 Demand and supply for funds in the monetary and the real analysis

The fundamental differences in the sources of the supply of funds and the usage of funds in the real and the monetary analysis are summarized in Table 2.

	Supply of funds	Demand for funds
Real analysis (LFT)	Saving: Consumers do not use the standard commodity for consumption.	New investment: Investors need the standard commodity for new investments.
Monetary analysis	Bank loans: Banks issue new deposits. Bond purchases: Non-banks purchase bonds. Quantitative easing: Central banks purchase bonds from non-banks.	New investment: Investors only demand funds if they cannot finance new investment with retained earnings. Existing real assets: Investors finance the purchase of existing real assets. Long-term financing of banks: Banks issue bonds to reduce the maturity transformation in their balance sheets. Financing of government deficits: Governments issue bonds to finance consumption and investment expenditures.

Table 2: Supply of funds and demand for funds in the real and the monetary analysis

3.4 The flow of funds in a monetary economy

The fundamental difference between the real and the monetary analysis becomes obvious if one compares the maps depicting the flow of funds (figure 1 and 9). In the monetary analysis, the source of new funds are not savers but banks which create new money. Investors typically use the new funds almost instantaneously for the purchase of real assets. This can be either a **new real asset** which must be produced in an income generating process or an **existing real or financial asset**. Thus, financing is not necessarily related to new investment. According to Turner et al. (2016, p. 66) lending against existing real estate represents majority of all bank lending in most advanced economies.

In both cases the net financial assets of the borrower decline ('deficit unit'), while the net financial assets of his counterparty increase ('surplus unit'). But in contrast to Gurley and Shaw (1955) and the logic of the LFT the surplus unit does not finance the deficit

unit. It is the willingness of banks to finance investments which makes realization of the surplus and the deficit possible.

If the investor buys a **new real asset** aggregate income increases according to the investment multiplier. Private households can consume and save more and the profits of the business sector increase. Thus, investment causes higher saving and the funds flow from investors to savers.

The savers can now either decide to hold the additional money balances. In this case the money flow stops. But they can use their money balances for buying bonds or shares on the capital market. In this case, the money flow starts to circulate as it becomes available for additional investment. The additional money can also be used for **deleveraging**, i.e. the down-payment of debt. In this case the money stock is reduced and the money creation is reversed.²² This outcome also happens if the saver uses its liquid financial assets for buying a bond issued by a bank.

If the investor buys **an existing real asset** no additional income is created. The money flows to the seller of the asset who has the same options of holding the money, buying assets on the capital market or reducing its debt or buying a bond issued by a bank.

In sum, the maps of the **flow of funds** in the real analysis and in the monetary analysis are completely different. In the real analysis additional funds flow from savers to investors via banks and financial markets. In the monetary economy additional funds flow from banks to investors and then to savers. Financial markets redistribute existing money stocks. In the real analysis, there is a **one-way flow** of funds. In the monetary economy, the flow of funds is **circular**.²³

²²This was the argument of James Tobin (1963, p. 8) against an unlimited ability of banks to create loans and money ('widow's curse'): „(...) there is an economic mechanism of extinction as well as creation, contraction as well as expansion.“

²³This reminds of the discovery of the circular flow of blood. The Greek philosopher Galen of Pergamos (AD 129-217) believed that both the bright and the dark blood was distributed to the periphery only once and was consumed by the peripheral tissue (Azizi, Nayernouri and Azizi, 2008). In 1628 William Harvey found out the blood flow was opposite to what was required by Galen's theory and that it was not a one-way flow but a circular flow (Cooper, 2016).

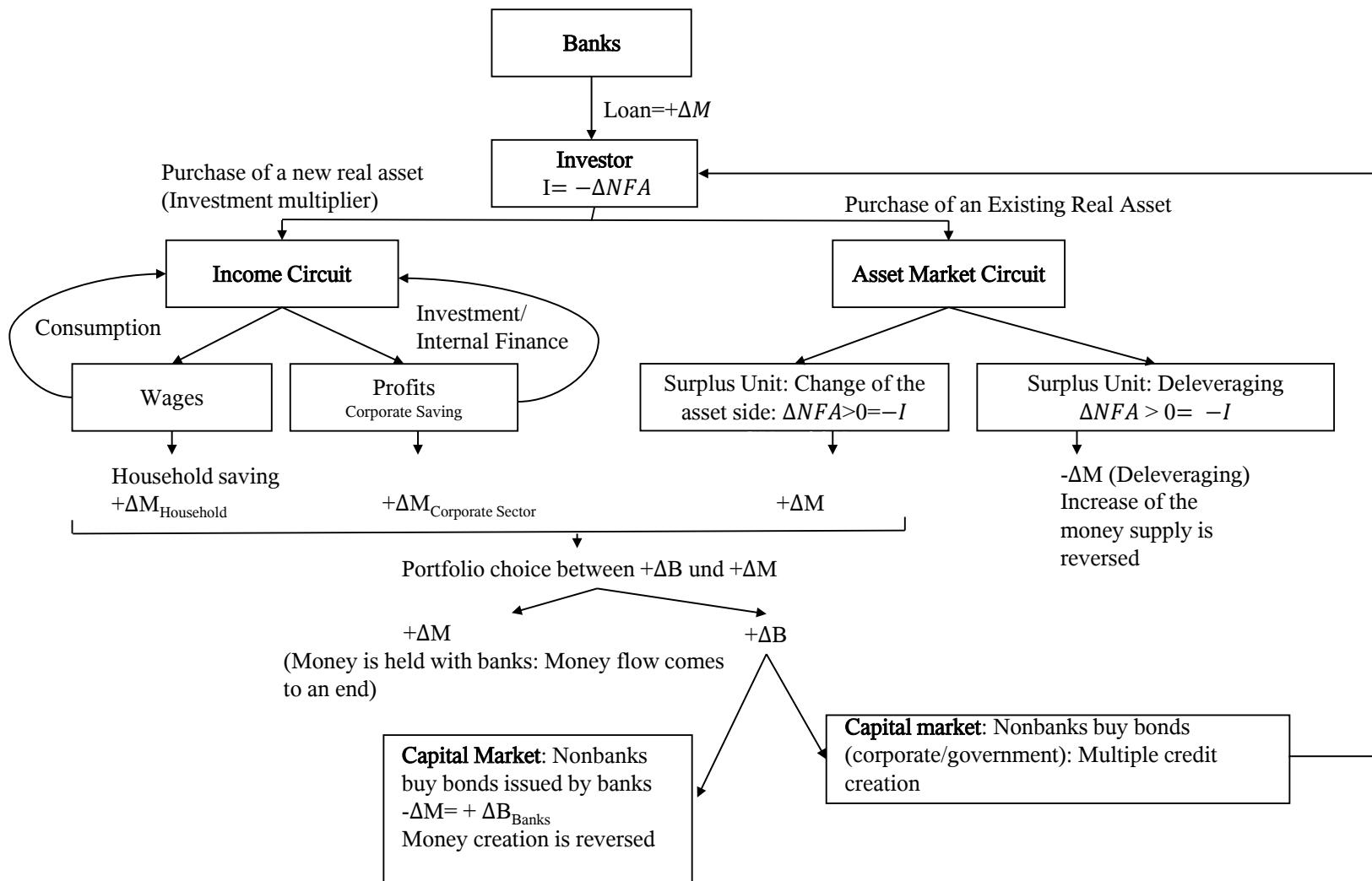


Figure 9: Flow of funds in the monetary analysis

4 A simple model for the monetary analysis: IS/LM-AS/AD model

The flow of funds analysis shows that fundamental causal relationships of the LFT are incompatible with a reality where financial funds are predominantly bank deposits. This can be made more explicit by using a macroeconomic model which is based on the principles of a monetary analysis. The standard **IS/LM-AS/AD model** is by its very nature a monetary model. In textbooks this is not explicitly mentioned and often the LFT and the IS/LM-AS/AD model are presented without highlighting the fundamental differences between the two paradigms.

The IS/LM-AS/AD model is still the workhorse of macroeconomic textbooks (Gärtner, Griesbach and Jung, 2013). Despite its simplicity, it is definitively more elaborate than the simple LFT. Krugman (2000), Blanchard (2009) and Romer (2016) emphasize the simplicity of the IS/LM-model as its positive feature.²⁴ We will use it in the following for clarifying the main differences between a monetary and a real analysis. As the model is well-known we only present its main features.

4.1 Main differences between LFT and IS/LM-AS/AD

In the LFT the goods market and the financial market are two sides of the same market – they are identical. A disequilibrium on the financial market ($S>I$) is nothing else than an excess supply on the goods market. In the IS/LM-AS/AD model the **goods market** is represented by the **IS-curve** and it is not identical with the **financial market**, which is represented by the **LM-curve**. Thus, the financial market equilibrium and the goods market equilibrium do not coincide.

In the LFT the process of income generation is not influenced by saving and investment decisions. The model only focuses on the distribution of income that has already been generated (i.e. corn that has already been harvested) on consumption and investment. The **single equilibrium** is determined by real factors like time preferences and productivity. In the IS/LM-AS/AD model aggregate income is the outcome of saving and investment decisions. **Multiple goods market equilibria**, represented by the IS-curve, are possible.

In the LFT the **financial market** is presented as a flow market equilibrating the saving flow with the investment flow. In the IS/LM-AS/AD model the financial market equilibrium is represented by the LM- curve. It is a stock equilibrium where the existing money stock is balanced with the money demand. Implicitly it also equilibrates the demand for bonds with the stock for bonds.

In the LFT banks are pure intermediaries. Embedded in the LM-curve is a **banking system** that is able to perform a multiple credit creation depending on the money-multiplier. This causality is questionable²⁵, but it is compatible with a monetary economy paradigm. The central bank is a powerful actor as it is able to change the money stock by changing the monetary base.

In the LFT the **interest rate** is a purely real phenomenon determined by preferences and productivity. In the IS/LM-AS/AD model it is a purely monetary phenomenon. The central bank can shift the LM-curve by variations of the monetary base, which gives it a perfect control over the interest rate.

²⁴See also Tanner (2017).

²⁵The logic of the money multiplier as it is presented in leading textbooks requires a disequilibrium on the credit market. The demand for loans must exceed the supply at a given interest rate so that an increase in the monetary base can lead to an increase in loans without a change in the interest rate.

4.2 Excess saving and low interest rates

The differences in the dominant causal mechanisms and transmission channels in the real and the monetary analysis become obvious when the phenomenon of excess saving and possible explanations for low interest rates are discussed.

As already discussed, in the LFT a **positive saving shock** shifts the saving schedule to the right (Figure 2), which leads to a lower equilibrium interest rate. Thus, low interest rates can be explained with a higher propensity to save.

In the **IS/LM-AS/AD model** a higher propensity to save reduces aggregate demand on the goods market. The IS-curve rotates to the left. The contraction of income re-establishes a new equilibrium between the saving plans and the unchanged investment plans.²⁶ Thus, no excess saving can materialize. Above all, the saving plans have no direct impact on the financial sphere, which is represented by the LM-curve. The effect on interest rates depends on the reaction function of the central bank. The standard IS/LM-model assumes that the central bank keeps the money supply constant, which leads to an upward sloping LM-curve. In this case interest rates would decline as an indirect effect of higher saving. But it is also possible that the central bank follows the strategy of a constant interest rate, which requires an adjustment of the money supply to a higher income. In this case, the LM-curve is horizontal and a higher propensity to save would have no effect on the interest rate.

Different causal mechanism can also be observed in the case of a **negative investment shock**. In the LFT a lower propensity to invest shifts the I-curve to the right and the interest rate declines. The S-curve remains constant. In other words, in the real analysis saving is independent of investment.

In the IS/LM-AS/AD model the negative investment shock reduces aggregate income according to the investment multiplier. In the monetary analysis investment determines actual saving so that saving declines. While the IS-curve shifts downwards, the LM-curve is not affected. The decline of the interest rate depends again on the reaction function of the central bank. In principle, the central bank can realize any point on the IS-curve.

For an **explanation of low interest rates** the monetary analysis does not require an increase in the propensity to save or any form of excess saving. It is sufficient that the propensity to invest declines, which reduces saving accordingly. But the outcome on interest rates cannot be determined without knowing the reaction function of the central bank. Interest rates are always a monetary phenomenon.

The separation of the goods market from the financial market has important implications for the situation of the **zero lower bound**. In the LFT a permanent disequilibrium between saving and investment is possible (Figure 10). In the IS/LM-AS/AD model saving and investment plans represented by the IS-curve remain always in equilibrium, even at the ZLB. Saving is not made out of commodities that have already been produced, it is made out of income that has yet to be generated. If saving plans exceed investment plans income contracts, so that the saving plans are adjusted to the lower investment plans. Thus a „chronic excess of saving over investment“ (Summers, 2015) cannot take place.

Of course, the fact that the goods market is in equilibrium does not imply that this equilibrium is a full employment equilibrium (Y_0).

²⁶These are exactly the dominant causal mechanisms Keynes had in mind: 'The novelty in my treatment of saving and investment consists, not in my maintaining their necessary aggregate equality, but in the proposition that it is, not the rate of interest, but the level of incomes which (in conjunction with certain other factors) ensures this equality.' Keynes (1936, p. 185)

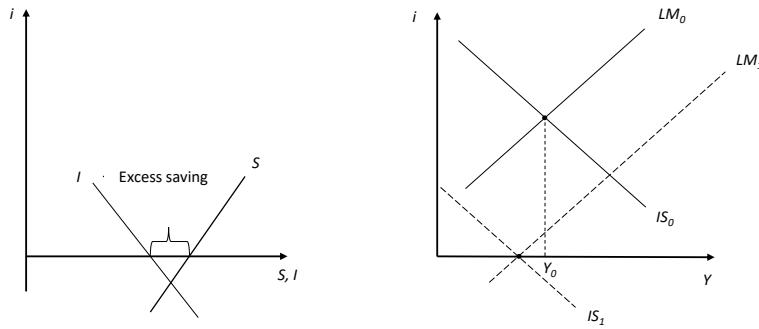


Figure 10: Zero-lower bound in the LFT and in the IS/LM model

4.3 Implications for the concept of an equilibrium interest rate

This leads to the debate on the level of the real equilibrium interest rate (Hamilton et al., 2016; Laubach and Williams, 2016). It is obvious that such a concept depends on the underlying model of the economy.

In the **LFT** there is only **one flow-equilibrium**, which is always a full employment equilibrium, and a simultaneous equilibrium on both the financial market and the goods market. The equilibrium interest rate is a real rate.

In the **IS/LM-AS/AD model** the situation is more complex as there are **five different equilibria**:

- A flow equilibrium on the **goods market** that is equivalent to an equilibrium between planned saving and planned investment. These multiple equilibria are represented by the IS-curve.
- A stock equilibrium on the **financial market**, i.e. an equivalence of the demand for money and the supply for money (which is identical with the equivalence of the demand for bonds and the supply for bonds). These multiple equilibria are represented by the LM-curve.
- A **simultaneous equilibrium** on the money market and the goods market that is determined by the intersection of the IS and the LM curve.
- A **full employment equilibrium**, which is a simultaneous equilibrium of the IS-curve and the LM-curve that is at the same time compatible with full employment and a zero output-gap. Laubach and Williams (2016) have this equilibrium in mind when they determine their '**natural rate of interest**'.
- On the **AS/AD-level**, which is derived from the IS/LM-schedules, not only the output gap but also the difference between a target price (P^*) level and the actual price (P) level have to be considered. This leads to the concept of an '**optimum interest rate**'. This rate optimizes a combination of the output gap (y) and the price level gap ($P - P^*$). The optimum can be derived with a loss function of the central bank,

$$L = (P - P^*)^2 + \lambda y^2$$

where λ describes the preferences for price level and output level stabilization.

The concept of an optimum rate instead of a neutral rate was already suggested by Keynes:

„I am no longer of the opinion that the concept of a 'natural rate' of interest, which previously seemed to me a most promising idea, has anything useful or significant to contribute to our analysis. (...) If there is any such rate of interest, which is unique and significant, it must be the rate which we might term 'neutral rate of interest', namely the natural rate in the above sense which is consistent with full employment, given the other parameters of the system; though this rate might better be described, perhaps, as the 'optimum rate'.“(Keynes, 1936, p. 243)

4.4 Dominant causal mechanisms of the real analysis and the monetary analysis

The comparison of the LFT with the IS/LM-AS/AD model shows that the real analysis and the monetary analysis are mutually exclusive as their dominant causal mechanisms and transmission channels are completely different and even go into opposite directions. This confronts the real analysis with the problem that it is based on critical assumptions that are obviously not tracking reality. In the words of Borio and Dysyatat:

„It is hard to see how an analysis ultimately rooted in the assumption that money and credit are veils of no consequence for economy activity can be adequate in understanding the pattern of global financial intermediation, determination of market interest rates and, a fortiori, financial instability.“(Borio and Disyatat, 2011, p. 2)

To highlight the fundamental differences between real analysis and the monetary analysis the dominant causal mechanisms of the approaches shall be shortly summarized (see table 3):

Real Analysis	Monetary Analysis
Saving and Investment	
Saving of households provides the source for funds and finances investment. Additional saving causes investment. It reduces the interest rate and induces additional investment.	Saving of households reduces aggregate income and redistributes funds from firms to households. Investment generates saving.
Banks	
Banks are pure intermediaries of funds as they are unable to manufacture the standard commodity that is used as deposit. Deposits generate loans.	Banks are manufacturers of funds and the only institution that is able to produce deposits. Loans generate deposits.
Financial Markets	
Financial markets channel funds from savers who abandon consumption to investors financing new investment. Financial markets are not fundamentally different from banks.	Financial markets channel funds from borrowers who abandon liquidity to borrowers who often do not finance new investment. Financial markets are fundamentally different from banks.
Central bank	
The central bank is a powerless institution. It can neither produce nor consume the single physical good.	The central bank is the most powerful institution. It can determine the short-term interest rate, which is decisive for the lending decisions of banks and of financial investors.
Interest rate determination	
The interest rate is determined by real factors, i.e. the time preference of savers and the productivity of investments.	The interest rate is determined by monetary factors, i.e. the money stock, the lending behaviour of banks, profit expectations of borrowers and the policy of the central bank.
Determination of aggregate income	
Saving and investment decisions have no effect on aggregate income .	Saving and investment are the main determinants of aggregate income .

Table 3: Mechanisms Real vs. Monetary Analysis

This enumeration of dominant causal mechanisms shows that the monetary analysis (i.e. the Keynesian model) and the real analysis (i.e. LFT) are characterized by completely **different and even contradicting dominant causal mechanisms**. It is important to note that the direct impact and the direction of these mechanisms are not affected by the **degree of price stability** prevailing in an economy.²⁷ This applies above all to the direct negative impact of household saving on the business sector as it has been described in the flow of funds analysis. Firms can react to the decline in demand with lower prices, but this does not compensate for the negative initial impulses of saving on the profits and their cash flows.

In other words, the difference between the real and monetary analysis is of very fundamental nature and does not vanish as soon as prices can adjust. Keynes (1973) made this very explicit:

„The divergence between the real-exchange economics and my desired monetary economics is, however, most marked and perhaps most important when we come to the discussion of the rate of interest and to the relation between the volume of output and the amount of expenditure.“

The **scientific revolution** of Keynes was not that he tried to analyze the effects of rigid prices in the classical model. His main discovery was the fundamental difference between the mechanics of what he calls 'real exchange economics' and monetary economics. As the appendix shows, until today most economists are not aware of these differences and even believe that the two paradigms are compatible. In this regard, the economics profession has stepped back and de facto reestablished the old paradigm instead of developing the Keynesian framework further.

²⁷See Ragot: „Le mcanisme du paradoxe de l'pargne (paradoxe of thrift chez Keynes) repose sur l'existence de rigidits nominales. Sans elles, la hausse de l'pargne et la chute de la consommation aboutissent une volution des prix qui stabilise l'économie. Avec des prix flexibles, la hausse du taux d'pargne se traduit par une baisse du taux d'intrt rel, ce qui permet aux entreprises d'investir et donc de relancer l'activité économique. En d'autres termes, sans rigidits nominales, le canal de la demande disparat au profit du canal de l'offre qui passe par l'augmentation de l'investissement et qui est très stabilisateur pour l'économie.“

5 The global evidence: Excess saving as an explanation for low real interest rates

The fundamental difference between the real and monetary analysis is of special relevance for the current debate about the causes for low real interest rates. In this discussion the LFT is widely regarded as the obvious theoretical framework. In the words of Bernanke (2015):

„(...) the global savings glut hypothesis remains a useful perspective for understanding recent developments, particularly the low level of global interest rates.“

Bernanke defines the 'global savings glut' as 'a global excess of desired saving over desired investment' and he sees a parallel to the phenomenon of 'secular stagnation':

„Both posit an excess of desired saving over desired capital investment at 'normal' interest rates, implying substantial downward pressure on market rates.“

A similar diagnosis is made by Draghi (2016) who attributes the low real yields *inter alia* to

„(...) a global imbalance of saving and investment, which has led real yields to fall even relative to growth prospects. On the saving side, a 'global saving glut', produced among other things by ageing populations, has bid up the price of safe assets at a time when the supply of those assets has been shrinking, thereby compressing real yields.“

Bean et al. (2015, p. 1) provide a specific explanation of this imbalance:

„(...) our analysis of the evidence suggests that an increase in the propensity to save, driven in particular by demographic developments, is likely to have been an important contributory factor. The integration of China into global financial markets has probably resulted in additional downward pressure on global real interest rates in recent years. We find less to support the idea that a fall-off in profitable investment opportunities - and thus in the demand for funds to invest - has been a contributory factor over the whole period, though a lower propensity to invest in the wake of the financial crisis is likely to have played some role.“

Empirical evidence for excess saving is presented in the analyses of Bean et al. (2015) and Rachel and Smith (2015). Bean et al. (2015) start with the observation of 'an extraordinary decline in both short- and long-term advanced economy interest rates, from levels of around 4-6% to close to zero.' Using the method of King and Low (2014) the authors calculate a 'ten-year risk free interest rate' for the 'world' represented by a simple average of G7 ex Italy (Figure 11). Rachel and Smith (2015) use the same data.

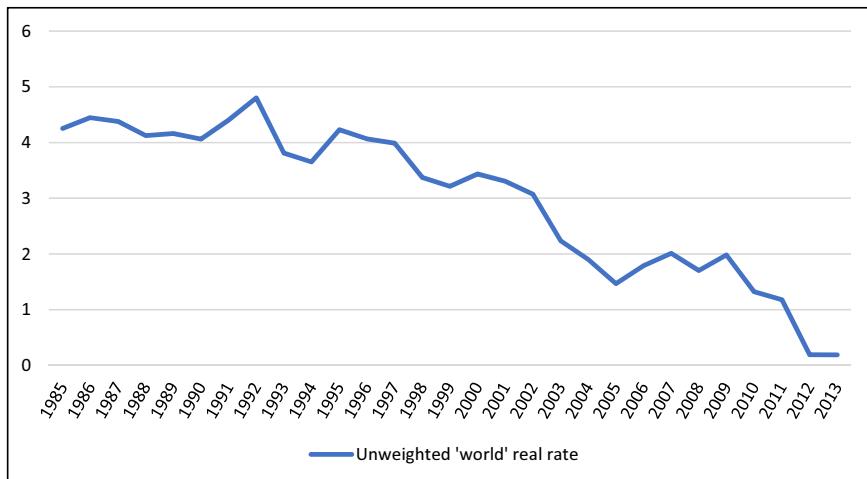


Figure 11: The decline in the global real interest rate

Source: Bean et al. (2015).

As an indicator for saving Bean et al. (2015) as well as Rachel and Smith (2015) use the **gross saving rate** at the global level. This rate shows a slight upward trend since the 1980s which is due to higher saving rates in emerging markets and developing economies (Figure 12). The saving rate for advanced economies and the G7-countries, for which the risk-free real rate is calculated, has declined since the end of the 1980s.

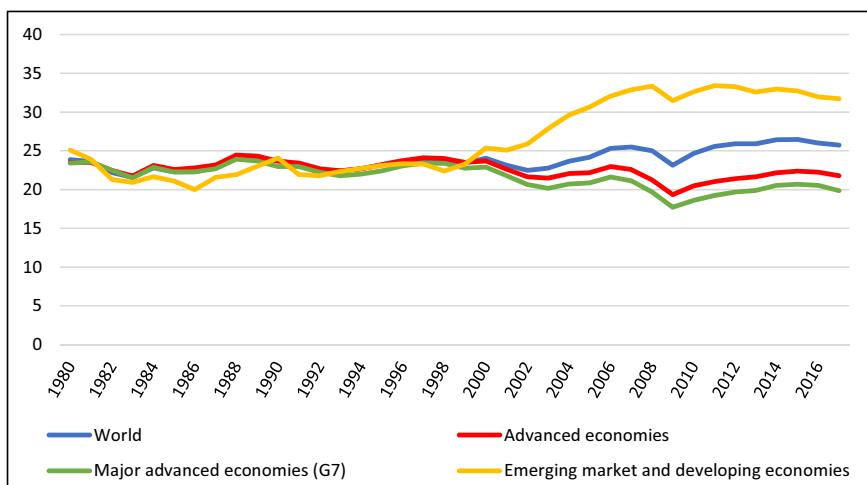


Figure 12: Global gross saving rates

Source: IMF, World Economic Outlook Database.

The **stability of the global saving rate** is not very supportive for the hypothesis of a higher propensity to save (Eichengreen, 2014). Bean et al. (2015) mention the possibility of a simultaneous downward shift of the saving and the investment schedule within the LFT diagram (Figure 13).²⁸ But they admit that 'it seems like a little bit too much of a

²⁸ As alternative explanation, the authors see the possibility that either the saving or the investment schedule is insensitive to moves in the interest rate. For the underlying hypothesis of a higher propensity to save only a vertical investment schedule would be compatible with a constant investment/saving share. With a vertical saving schedule, a higher propensity to save would shift the S-curve to the right which would lead to a investment share irrespective of the locus of the investment schedule.

coincidence that these two forces have balanced each other out in terms of their net impact on global savings/investment, especially given the length of the period in question.'

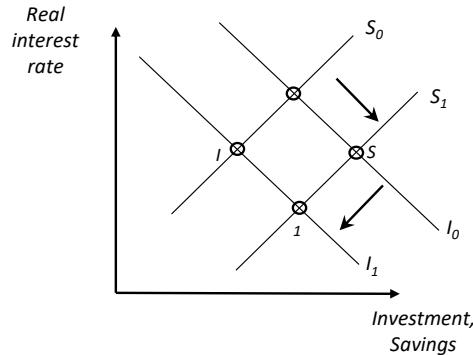


Figure 13: Parallel shift of the investment and saving schedule

5.1 Household saving versus corporate saving

The hypothesis of a higher propensity to save is at least partially based on the idea that demographic developments have led **private households to save more**. Rachel and Smith (2015) attribute 90 bps of the fall in the real interest rate to this factor. Yet the hypothesis is difficult to reconcile with data for the global **household gross saving rate**. Calculations by Grigoli et al. (2014) and Chen, Karabarounis and Neiman (2017) show a dramatic decline of this rate since the 1980s (Figure 14). At the same time a pronounced increase in the saving rate of the corporate sector – reflecting higher profits – can be observed. This part of private saving cannot be explained with the intertemporal optimization of private households, which serves as theoretical basis for the LFT. Instead corporate saving can be regarded as '**a mere residual**' (Keynes, 1936, p. 64).

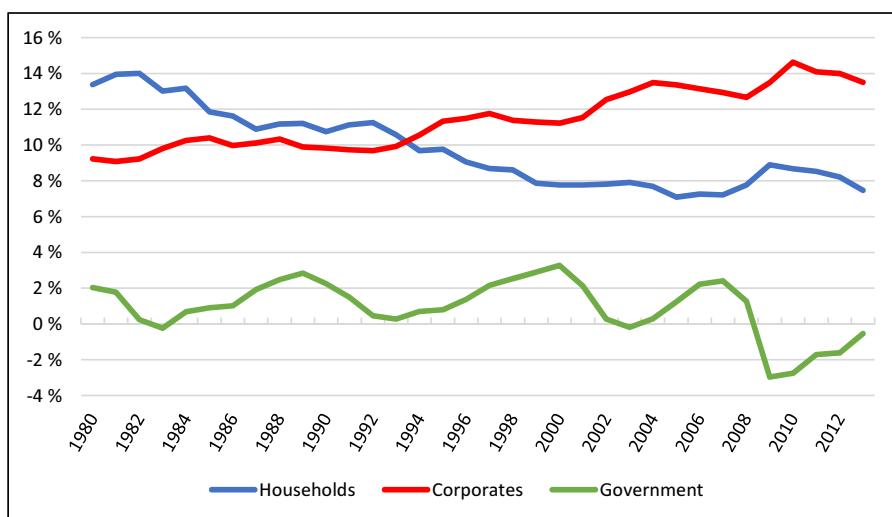


Figure 14: Global household saving and global corporate saving rate

Source: Chen, Karabarounis and Neiman (2017).

5.2 Net investment versus gross investment

Bean et al. (2015) and other analyses use gross saving and gross investment rates as indicators for saving and investment activity. But for the intertemporal calculus of savers and investors the relevant indicator are net saving and investment rates which take depreciation into account. If one focuses on the G7 countries for which the 'world' interest rate has been calculated by Bean et al. (2015), one can see a pronounced decline in the net investment rate from 1980 to 2015 (Figure 15).

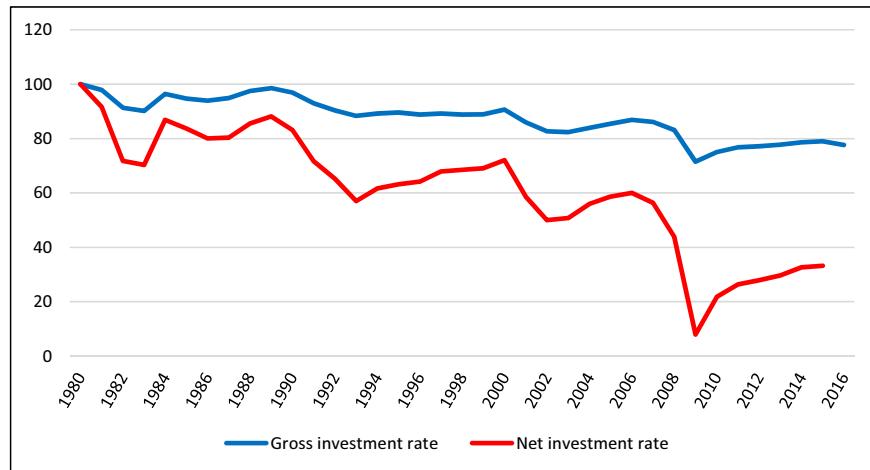


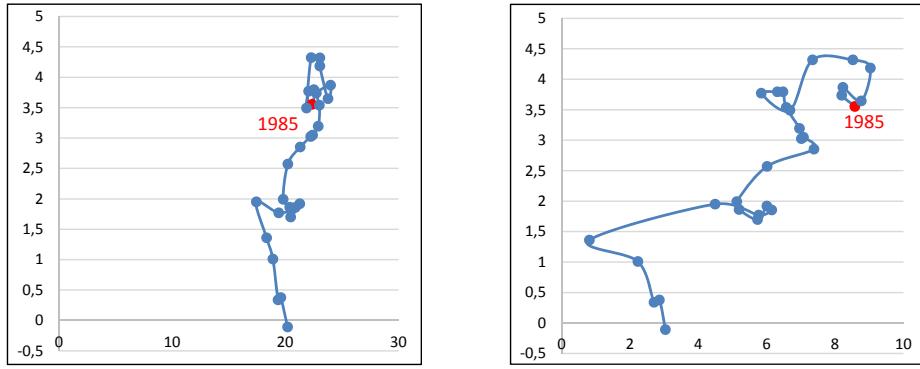
Figure 15: G7 gross and net investment rate (1980=100)

Source: IMF, World Economic Outlook Database, own calculations.

This development is even more difficult to explain with a higher propensity to save. In the words of Bean et al. (2015, p. 19):

„If overall savings and investment have fallen, it would seem natural to attribute the fall in interest rates primarily to a decline in the propensity to invest.“

Using the net investment rate for the G7 instead of the gross investment rate leads to a completely different picture of the interest rate/investment development than the one presented by Rachel and Smith (2015) for the period 1985 to 2014 (Figure 16). Instead of an almost vertical line one gets a line that moves from upper right to the lower left. This development is hardly compatible with a higher propensity to save.



(a) G7: Gross investment and unweighted real interest rate (b) G7: Net investment and unweighted real interest rate

Figure 16: Saving/investment equilibria and world real interest rate (1985-2014)

Source: IMF, World Economic Outlook Database, King and Low (2014), own calculations.

One might argue that this chart is still compatible with a higher propensity to save if one assumes an extreme decline in the propensity to invest. In the logic of the LFT this could be the case if the **zero lower bound** is reached. But while the short-term interest rates in the G7 countries reached the ZLB after the financial crisis, the nominal G7 bond market yield was always at least one percentage point above the ZLB (Figure 17).

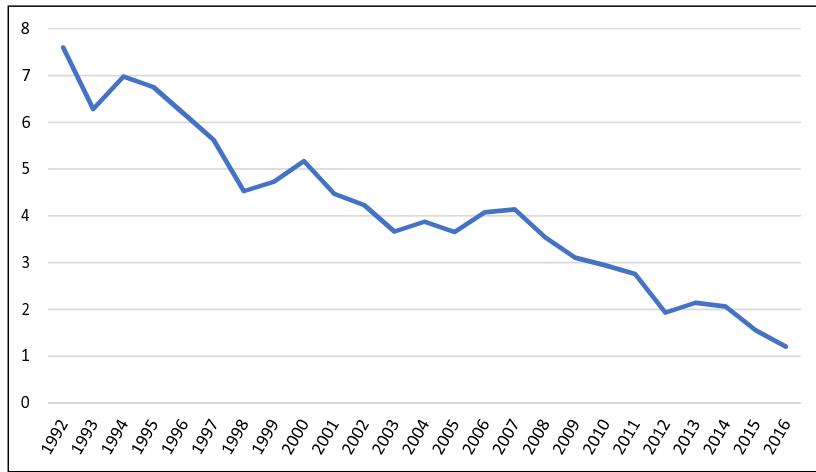


Figure 17: G7 weighted nominal long-term bond rate

Source: IMF, World Economic Outlook Database, own calculations.

Thus, the evidence for an 'increasing propensity to save' (Summers, 2016), which drives down interest rates, is very weak. For the **monetary analysis**, the simultaneous decline in investment and saving rates is relatively easy to explain. As investment is a main driver of saving the development can be attributed to a decline in the propensity to invest, which has depressed aggregate income and saving. The decline in interest rates is not caused by an excess of saving over investment but by the attempt of central banks to reach an equilibrium on the IS-curve that is compatible with full employment.

6 The evidence for the United States: Savings glut versus financing glut

For a monetary explanation of low real interest rates, it is useful to have closer look at the United States. For this country, longer time series for indexed bonds and for long-term inflation expectations are available together with comprehensive flow of funds and capital market data. This makes it possible to discuss the diagnosis of a 'savings glut' and to contrast it with the diagnosis of a 'financing glut'. In addition, the availability of long-term time series allows to analyze the development of real interest rates since the 1950s. With this longer-term perspective, the early 1980s can be identified as an outlier that should not be used as a benchmark for today's real interest rates.

6.1 Weak evidence for an increasing propensity to save

For the United States, at first sight a strong decline in the **personal saving rate** can be detected. With 5.8 percent in 2016 this rate is much lower than in the 1980s when it was above 10 percent (Figure 18). This finding is again difficult to reconcile with the hypothesis that the propensity to save has increased due to demographic reasons.

Due to the almost persistent US current account deficit in the entire period²⁹, the net investment rate can be regarded as the equilibrium rate for the loanable funds market. This assumes - in line with the LFT - that foreign saving in the form of the current account deficit has been available as funds for the financing of domestic investment. This net investment rate shows a downward trend since the 1980s albeit with major cyclical ups and downs.

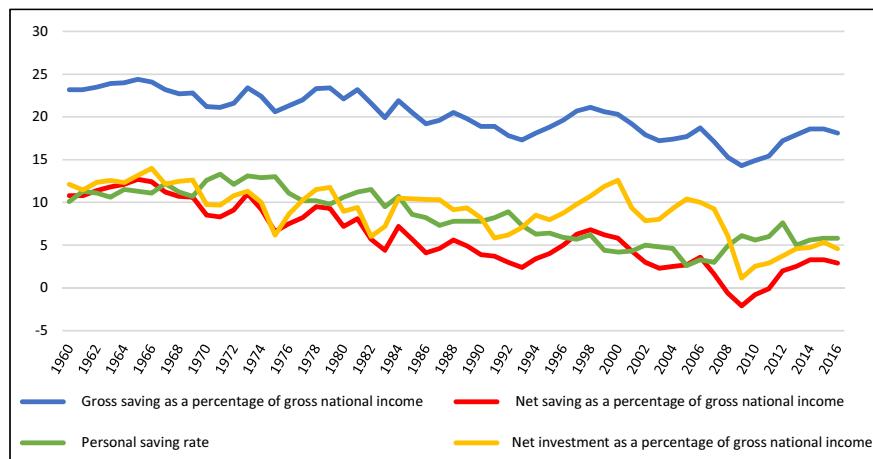


Figure 18: United States saving and investment

Source: Bureau of Economic Analysis.

The data for net investment can be combined with data for real interest rates to construct charts combining the real interest rate and the saving/investment rate (Figure 19). For the **real interest rate**, we use three different concepts:

- The interest rate for indexed treasury bonds, which is available since 1998.
- The 10-year nominal treasury rate deflated by the 10-year inflation expectations according to the Survey of Professional Forecasters which is available since 1991.

²⁹The current account showed a very small surplus in the years 1980, 1981 and 1991.

- The 10-year real interest rate that is calculated from the Federal Reserve Bank of Cleveland's inflation expectations model, which is available since 1985.

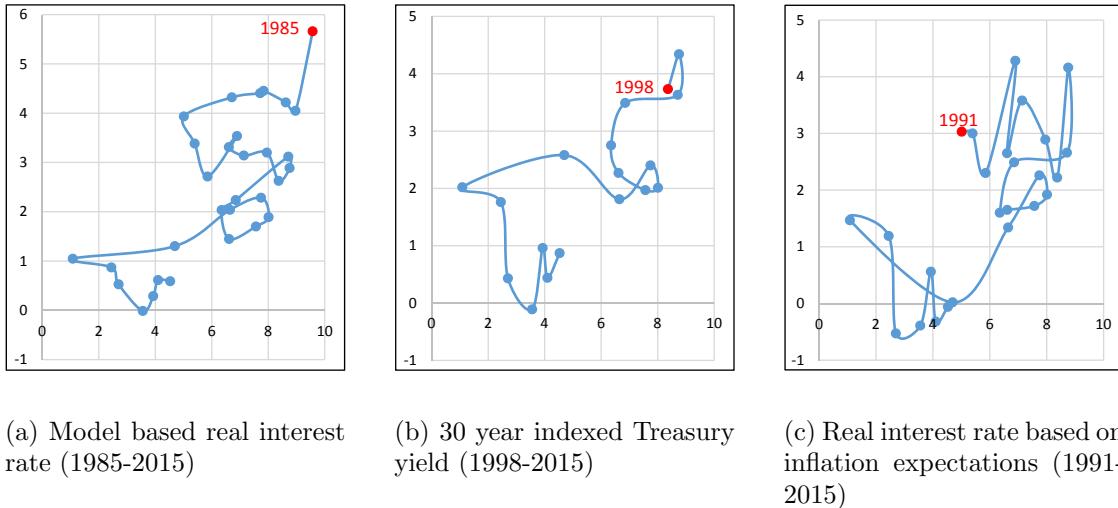


Figure 19: Saving/investment equilibria and real interest rates for the United States

Source: Federal Reserve Bank of St. Louis Database, Federal Reserve Bank of Cleveland Database, SIFMA, own calculations.

In all charts a movement from upper right to the lower left can be observed over time. As in the case of the G7 this development is very difficult to reconcile with the hypothesis that a saving glut or excess saving shifting the S-curve to the right is the main driver for the decline in the real interest rate. With the nominal long-term bond rate always above 1 percent, the zero lower bound cannot be used as an explanation for an excess supply of saving. In addition, the charts give no indication of a saving glut and they do not display any effect of the financial crisis.

An additional blow to the LFT explanation for the US interest rate comes from a recent analysis by Crews, Kliesen and Waller (2016). They come to the conclusion that

„(...) there has been no secular decline in the rate of return on capital- either before- or after-tax. This last piece of evidence suggests that there has been no decline in the productivity of capital, which conflicts with a key tenet of the secular stagnation hypothesis.“

6.2 Evidence from bonds market data shows effects of financial crisis

For a monetary analysis of the low interest rates a good starting point is the **demand and supply of funds on the bonds market**. For a flow equilibrium on the bond market we use the annual change in the volume of outstanding bonds in relation to nominal GDP. The data are provided by SIFMA (Securities Industry and Financial Markets Association).

With these data flow of funds/real interest rate scatter plots can be produced (Figure 20). They also show an overall trend from the upper right to the lower left. But in contrast to saving/investment based charts they show a pronounced outward shift to the right for the years 2004 to 2007. Thus, in these data a clear trace of the developments before and after the financial crisis can be detected.

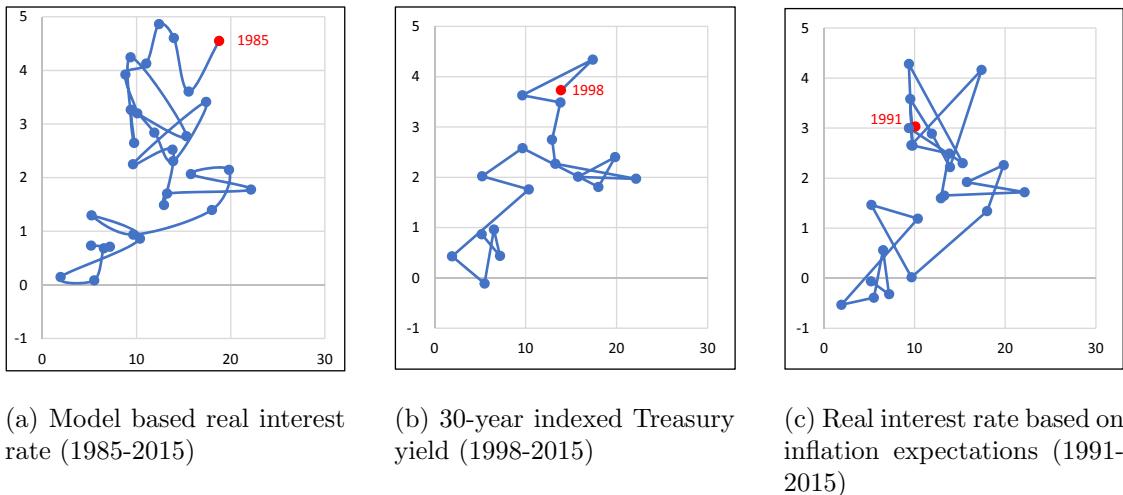


Figure 20: Bond market equilibria and real interest rates for the United States

Source: Federal Reserve Bank of St. Louis Database, Federal Reserve Bank of Cleveland Database, SIFMA, own calculations.

The charts indicate two different developments in the period before and after the financial crisis. In the years preceding the crisis a **positive supply shock** could have shifted the supply curve to the right. With an unchanged demand curve this could have produced the combination of higher lending volumes together with declining real bond rates. This could be attributed not to a 'saving glut' but to a '**financing glut**'. In the years after the crisis a negative demand shock could have occurred shifting the demand for bond finance downwards with falling real bond rates (Figure 21).

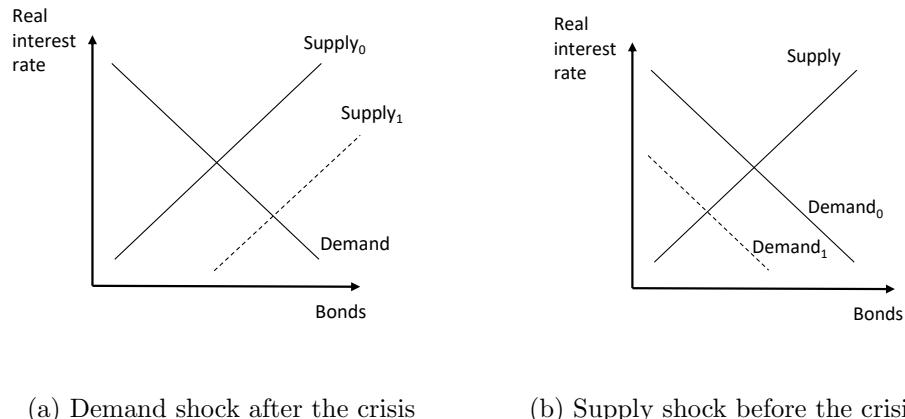


Figure 21: Supply and demand shocks explaining the development of the equilibria over time

A further advantage of the bond market data is the possibility to differentiate among different groups of borrowers (Figure 22):

- In the years before the financial crisis **mortgage related bond issues** - including Federal Agency Securities, asset backed and money market issues - played a predominant role. This is in line with the findings of Jordà, Schularick and Taylor (2016), stating that mortgage financing has become the main driver of financial de-

velopments. The increase in the mortgage related demand until 2008 contradicts the thesis that a trend decline in investment is the main reason for the trend decline in the real interest rate since the 1980s. In the period after the crisis bond market lending was negative, i.e. redemptions exceeded new issues. Thus, the negative demand shock can clearly be attributed to a breakdown in the financing demand for real estate.

- The break-up of the bond market data shows a relatively **stable bond demand of the corporate sector**. This is in line with the evidence provided by Crews, Kliesen and Waller (2016), implying that there has been no secular decline in the rate of return on capital. It contradicts the view of Rachel and Smith (2015) that a shift in the capital investment schedule explains a part of the decline in real rates.
- The data reveal the important role of the **government sector** as a borrower on the bond market, especially in the period after the financial crisis. This factor has been completely overlooked in the debate on the causes of low interest rates. Since the outbreak of the crisis fiscal deficits have been the main driver of the demand for funds on the US capital market. According to the logic of the LFT high deficits should have led to a crowding out of private investors. The bond market perspective shows that the demand of the government was at least partially compensating a shrinking mortgage related demand.

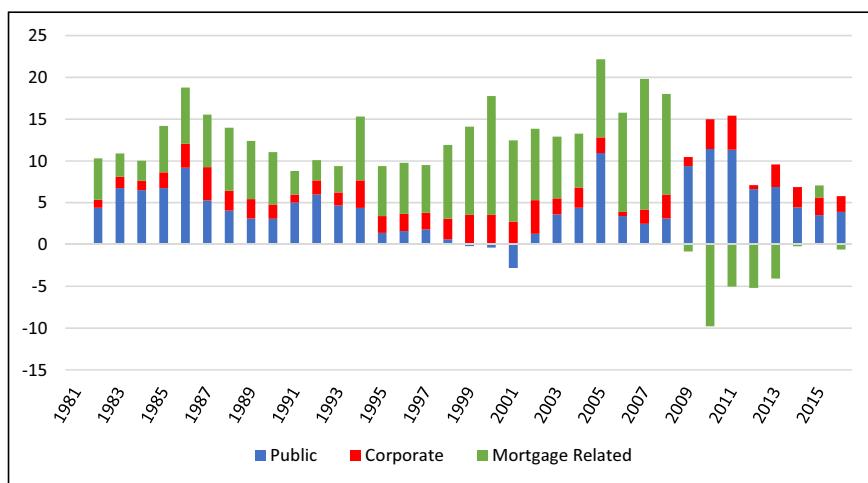


Figure 22: Change in outstanding bonds (percent of GDP)

Source: SIFMA.

6.3 The supply side of bond market financing: Financing glut versus saving glut

To identify the causes of the 'financing glut', that was prevalent until the breakout of the crisis, additional information on the supply side of the US bonds market has to be considered. The data for different sectors of the economy are provided by the flow of funds statistics of the Federal Reserve. We use the absolute changes in bond holdings of the major sectors in relation to GDP (Figure 23). In the years 2000 to 2006 bond purchases by foreign investors provided by far the most important source for funds on the US bond market.

- Foreign central banks were building up foreign exchange reserves that were held predominantly in US Treasuries.
- Foreign banks were buying mortgage backed securities (Shin, 2012).

This evidence can be interpreted in two different ways. The prevailing view is that the inflow of foreign capital is due to a saving glut emanating from emerging market economies, particularly China. The alternative view is based on the monetary analysis. Shin speaks of a 'banking glut', but in our view it seems more adequate to speak of a 'financing glut'.

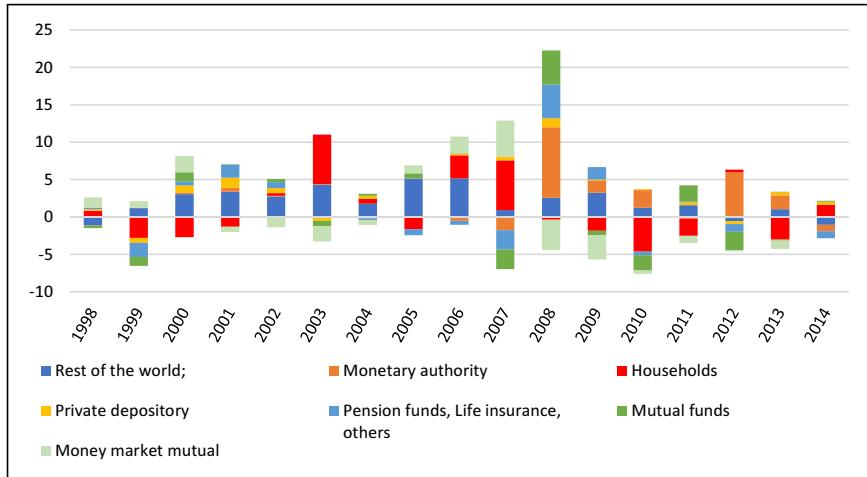


Figure 23: US financial accounts: Change in bond holdings of major sectors (percent of GDP)

Source: Federal Reserve, Financial Accounts of the United States.

6.3.1 Saving glut

The phenomenon of a global saving glut that was identified by Ben Bernanke in 2005:

„In the United States, national saving is currently quite low and falls considerably short of U.S. capital investment. Of necessity, this shortfall is made up by net foreign borrowing - essentially, by making use of foreigners' saving to finance part of domestic investment.“ (Bernanke, 2005)

In the logic of real analysis this makes perfect sense. If the amount of funds, i.e. of the standard commodity, required for financing investment in the United States is insufficient, they must be imported from abroad. This requires consumption abandonment, i.e. saving abroad. It is interesting how Bernanke describes this mechanism:

„In practice, these countries increased reserves through the expedient of issuing debt to their citizens, thereby mobilizing domestic saving, and then using the proceeds to buy U.S. Treasury securities and other assets. Effectively, governments have acted as financial intermediaries, channeling domestic saving away from local uses and into international capital markets.“ (Bernanke, 2005).

But within the logic of real analysis this raises the problem that 'capital' is flowing from developing to developed nations. Prasad, Rajan and Subramanian (2007) speak of a '**paradox of capital**':

„Standard economic theory tells us that financial capital should, on net, flow from richer to poorer countries. That is, it should flow from countries that have more physical capital per worker - and hence where the returns to capital are lower - to those that have relatively less capital - and hence greater unexploited investment opportunities.“

Since the real analysis regards 'capital' as a commodity it must assume that this commodity is used as investment good where its marginal productivity is the highest.

6.3.2 Financing glut

The monetary narrative of the inflow of foreign funds into the US capital market does not start from saving in China but from investment in the United States. It is based on the fundamental assumption that investment creates saving. In the years preceding the crisis investment activity in the United States was very high. This can be explained by very supportive monetary conditions independent of foreign capital inflows.

Above all the **interest rate policy of the Federal Reserve** was very expansionary. It clearly deviated from the Taylor Rule that the Fed had more or less followed in the years before (Taylor, 2012). This had a direct impact on mortgage rates. Rates for mortgages with a one-year adjustable rate reached a record low in 2004. In the years of the real estate boom such mortgages made up almost 50 % of all mortgages (Moench, Vickery and Aragon, 2010).

As it is well-known the financing of housing boom was very much driven by the **securitization of mortgages**. In the years before the crisis the increase in outstanding mortgage related bonds (in relation to GDP and to the money stock M1) was very strong (Figure 24). This shows the potential of financial markets to perform **multiple credit creation** if the funds raised by investors flow to agents that reinvest these funds at the capital market.

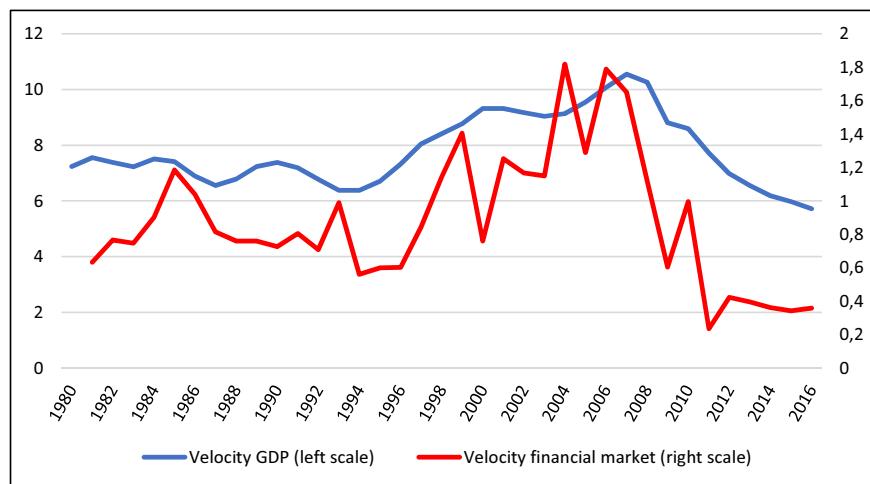


Figure 24: Velocity of money M1 in relation to GDP and bond issuance

Source: Federal Reserve Bank of St. Louis Database, SIFMA, own calculations.

With the very favorable financial conditions, house prices increased considerably. The housing wealth of private households in relation to disposable personal reached a record high in 2005. Therefore, the personal saving rate fell to a record low and private consumption was relatively strong. Together with increasing competitiveness of China this led

to strong imports from China and a deteriorating current account balance of the United States. High export revenues boosted the profits of Chinese companies and incomes of Chinese households. This enabled them to achieve high levels of saving. Thus, Chinese higher savings were not only generated domestically but also by growing revenues from abroad.

But the Chinese savers did not finance the United States. Chinese firms had to convert their Dollar denominated export revenues at the central bank into deposits denominated in the national currency. The **financing of the United States** current account was then achieved by the willingness of the Chinese central bank to use its dollar deposits to purchase US Treasuries. Thus, the People's Bank of China performed a maturity transformation for the US financial system, which contributed to low long-term interest rates. In contrast to the 'saving glut' narrative the glut was not generated by the savers, i.e. Chinese households and firms, but by the central bank that was willing to abandon liquidity.

Although a discussion of the different narratives in terms of 'the chicken and the egg' might be justified, financing is only possible in the monetary narrative. For the financing of borrowers in the United States foreign investors must already be in the possession of US-Dollar deposits. Bernanke's idea that the Chinese central bank has been 'mobilizing domestic saving, and then using the proceeds to buy U.S. Treasury securities and other assets' is only possible in a commodity world, where the standard commodity can be globally used. In a monetary world, the Chinese central bank would be unable to finance borrowers in the United States by providing them with Renminbi deposits.

In this narrative, there is also **no 'paradox of capital'**. The Chinese central bank is not transferring 'capital' (i.e. the standard commodity) to the United States but US-Dollar deposits. In exchange the United States did not receive 'capital' but consumer goods that are produced more cheaply in China. Thus, the paradox simply vanishes.

A second financing channel that contributed to the financing glut is working through foreign commercial banks. This channel is referred to the **'banking glut'**. As Shin (2012) describes in detail, many European banks were raising short-term funds in the United States in the years before the crisis, mainly by issuing short-term commercial paper. They used these funds to purchase mortgage backed securities. Similar to the bond purchases of foreign central banks this allowed the US financial system to perform a maturity transformation and contributed to lower interest rates. But as the foreign commercial banks were mainly purchasing mortgage related securities they were taking on additional credit risk.

A striking difference of the two narratives becomes evident in direct comparison: In the real exchange narrative, the economic momentum is generated by saving, i.e. the decision to abstain from spending. Whereas in the monetary narrative, the momentum comes from investment, i.e. the decision to increase spending.

The diagnosis of a global saving glut in the years before the crisis was simply wrong. This can be ultimately demonstrated by the simple logic that a global excess of saving plans over investment plans is identical with a global excess of aggregate supply over aggregate demand. If this was the case, the global economy would have shown clear signs of weakness. But the years from 2003 to 2007 experienced the highest growth rates of global GDP in the whole period from 1980 to 2016.

6.4 Which period is the outlier?

In the debate on 'historically low levels' of interest rates (Bean et al., 2015) the early 1980s are considered a suitable benchmark. This is far from obvious, when taking into account that in this period the Federal Reserve's policy rate was at historically high levels, reaching an all-time high of 22.36 percent on 22 July 1981. A true historical perspective requires an even longer-term view.

Data for the 10-Year Constant Maturity Treasury Rate and the Federal Funds Rate are available since July 1954. For calculating real interest rates, we simply use the actual inflation rate. From this perspective, the period of the early 1980s is obviously an outlier with short-term and long-term real interest rates far above the averages for the whole period from 1954 until 2017 (figure 25). The decline since the 1980s can therefore at least partially be understood as a return to 'normal' real interest rates or as a reversion to the mean.³⁰

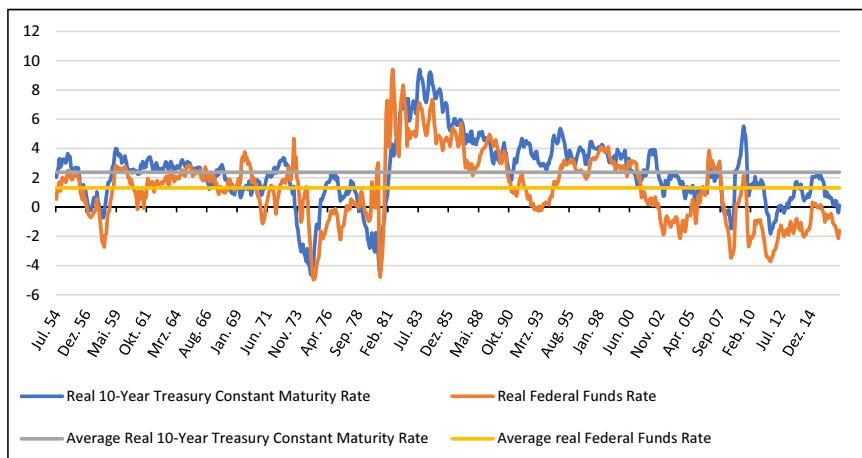


Figure 25: Real interest rates for US (1954-2017)

Source: Federal Reserve Bank of St. Louis Database, own calculations.

³⁰See also Eichengreen (2015) who presents a similar finding for the period from 1800 until today: „(...) the decline in real interest rates starting in the 1980s is mean reversion after the period of high interest rates and inflation that preceded it.“

7 Summary

The paper shows that the discussion of the causes for low interest rates suffers from an **inadequate theoretical basis**. The concept of 'excess saving' is derived from the loanable funds theory, which is a commodity based theory of financial markets. In this theory, a single commodity is used as a consumption good, an investment good and a means of finance. Financial funds are generated if private households decide to abandon consumption and thus make the single commodity available for investment. Banks and other financial institutions are mere conduits for channeling this commodity from savers to investors. Excess saving is possible since saving and investment decisions are made after the commodity has been produced.

The paper shows that the **real analysis**, on which the LFT is based, leads to dominant causal mechanisms that are completely different in a **monetary analysis**, i.e. models which use money. This applies above all to the role of saving. A simple flow of funds analysis shows that in a monetary analysis saving is not a source for financial funds. The saving of private households only redistributes the existing money stock. Compared with a reference situation characterized by no household saving, the money holdings of the business sector are lower and the money holdings of the household sector are higher. In addition, household saving has a negative effect on the profits of the business sector.

In the monetary analysis **saving is disconnected from financing**. Financing requires an abandonment of liquidity. The main source of finance are banks that are able to create deposits by providing loans. Capital markets are completely different from banks as they redistribute the money stocks that were created by banks earlier.

A simple macroeconomic model that is fully based on the principles of the monetary analysis is the standard **IS/LM-AS/AD model**. It allows to identify the main difference between the real analysis of the LFT and a monetary analysis. In the LFT saving and investment decisions leave the aggregate income unaffected, in the IS/LM-AS/AD model saving and investment decisions determine aggregate income. This has the effect that saving is no longer independent from investment. Higher investment increases aggregate income and thus the amount of saving in the economy. The IS curve shows that many equilibria of saving and investment are possible and that even at the Zero Lower Bound no excess saving takes place.

The inadequate theoretical framework of the 'excess saving' explanation for low interest rates is reflected in a **weak empirical basis**. At the global level **household savings** have not increased since the 1980s. In contrast, they show a dramatic decline. At the same time a pronounced **decline of the net saving rate** can be shown for the G7 countries. This is difficult to reconcile with the hypothesis of a higher propensity to save, mainly because the nominal zero lower bound for the average G7 nominal rate has never been reached.

A detailed analysis for the **United States** shows a similar development. Using data for the US bond markets and for the US financial accounts for the period from 1980 to 2015 two different developments can be identified. Until the financial crisis increases in bond market financing combined with declining real rates have indicated a shift of the supply curve for funds. This shift which can be regarded as a '**financing glut**' is related to the

willingness of the Chinese central bank to invest a large part of its US-dollar deposits into US Treasury bonds. In addition, it reflects a '**banking glut**', i.e. the maturity and risk transformation by European banks, which have raised short-term funds on the US money market and invested the proceeds in US mortgage-backed securities until the outbreak of the crisis. After the crisis a pronounced '**borrowing dearth**' can be observed for the mortgage-related bond market financing has virtually collapsed. This decline in the demand for funds has only partially been compensated by a strong demand by the Federal Government for the financing of its huge fiscal deficit.

Appendix I: Flawed attempts of a synthesis of the two worlds

With the obvious differences between the real and the monetary analysis it is surprising that prominent economists are treating the two approaches as compatible and even identical. Three versions of a synthesis can be found:

- Time frame: The monetary analysis is for the short-term, the real analysis is for the long-term.
- Equilibrium versus disequilibrium: The monetary analysis applies in disequilibrium, the real analysis applies in equilibrium.
- Identity misperception: Real and monetary analysis are treated as identical.

Different time frames

Rachel and Smith (2015, p. 54) try to reconcile the two paradigms by referring to different time frames:

„The choice of framework used to analyze the drivers of real interest rates can in part be guided by the timeframe of interest. For example, a monetary model is well suited to short-run analysis over the business cycle. In such a model, the interest rate represents the price of finance and depends on the liquidity preferences of banks and other economic agents. (...). In principle, these monetary factors might be less relevant in determining the long-run neutral real rate: to the extent that prices are flexible in the long-run, money is neutral, and only real factors have a lasting effect on long-run real rates.“

This raises the questions of why the short-run is governed by other causal mechanisms than the long-run and why price flexibility should change these laws of motion.

Equilibrium versus Disequilibrium

Borio and Disyatat (2011, p. 21) refer to the difference between disequilibrium and equilibrium situations:

„The two sharply contrasting conceptual approaches point to a tension between real factors, on the one hand, and monetary and financial factors, on the other. One way to reconcile them is to conjecture, as most economists do, that real factors determine at least the steady state equilibrium level of real interest rates. Monetary and financial factors, together with economic agents' expectations, can then be left to determine the actual interest rates that prevail at any given point in time. This is part and parcel of the distinction between the natural and the market interest rate.“

This raises the question of why equilibrium is characterized by different axioms than disequilibrium. Borio and Dysyatat refer to **Knut Wicksell**. He was the first who tried to combine the two paradigms in his book 'Geldzins und Güterpreise' (published in 1898). He used the LFT as a model for an equilibrium situation:

„There is a certain rate of interest on loans which is neutral in respect to commodity prices, and tends neither to raise or lower them. This is necessarily the same as the rate of interest which would be determined by supply and

demand if no use were made of money and all lending were effected in the form of capital goods. It comes to much the same thing to describe it as the current value of the natural rate of interest on capital.“(Wicksell, 1898, p. 102)

In equilibrium, he regarded banks as pure intermediaries between savers and investors. The condition for equilibrium is a market rate, i.e. a monetary interest rate, which is in line with the natural rate, i.e. real interest rate:

„Now if money is loaned at this same rate of interest, it serves as nothing more than a cloak to cover a procedure which, from the purely formal point of view, could have been carried on equally well without it. The conditions of economic equilibrium are fulfilled in precisely the same manner.“(Wicksell, 1898, p. 104)

In disequilibrium, i.e. if the market rate is higher or lower than the neutral rate the mechanisms of the monetary analysis start to operate:

„No matter what amount of money may be demanded from the banks, that is the amount which they are in a position to lend (so long as the security of the borrower is adequate). The banks have merely to enter a figure in the borrower’s account to represent a credit granted or a deposit created. When a cheque is then drawn and subsequently presented to the banks, they credit the account of the owner of the cheque with a deposit of the appropriate amount (or reduce his debit by that amount). The ‘supply of money’ is thus furnished by the demand Itself. (...) it follows that the banks, or rather the aggregate of banks taken as a whole, can within limits to be stipulated in a moment lend any desired amount of money for any desired period of time at any desired rate of interest, no matter how low, without affecting their solvency, even though their deposits may be falling due all the time. It follows that if the rest of our theory is correct the banks can raise the general level of prices to any desired height.“(Wicksell, 1898, p. 110)

Wicksell’s confusion between two incompatible paradigms was already criticized by Palander (1941):

„A concept which is used for a monetary economy cannot be given a definition which makes it necessary to disregard the existence of money. Neither can the ‘real’ rate be thought of as a simple expression for the current physical marginal productivity in a certain position. This can be determined only in the special case where there is a single factor of production and a single product of the same sort as the factor of production.“

Identity misperception

Many economists are not aware of the dichotomy between the two approaches or even believe that they are identical. Identity illusion characterizes hybrid versions of the LFT where the supply of funds emanates not only from saving but also from an increase in the money stock ΔM . The demand for funds is not only used for investment but also for net hoarding (H). Equilibrium on the financial market is then characterized by

$$S + \Delta M = I + H$$

Prominent proponents of this version of the LTF were Robertson and Ohlin (Bibow, 2001). But the synthesis of the two model worlds is bound to fail as it confounds different

and even contradicting causal mechanisms. In the commodity world 'funds' are made up of the single commodity. In the monetary world 'funds' are bank deposits. It is difficult to imagine a flow of funds where commodities and money are flowing together. This would also raise the problem that the interest rate in the real analysis is a real rate, i.e. it is expressed as the relation of goods units tomorrow to goods units today. In the monetary analysis, it is a monetary rate, i.e. it is expressed as money units tomorrow in relation to money units today.

A lot of confusion is created by attempts to derive the IS-curve from the S-curve and the I-curve of the LFT. This attempt goes back to **Hicks**. It can be found in publications by Woodford (2010) and Krugman (2011b). The starting point is the LFT cross. The authors then assume an increase in income which in their view shifts the saving-schedule and the investment-schedule downward. They also assume that the downward shift of the S-curve is stronger than the shift of the I-curve so that there is a decline in the equilibrium interest rate at a higher level of saving and investment. The outcome of this exercise is an IS-curve with a negative slope.

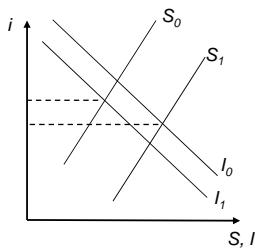


Figure 26: Flawed derivation of the IS-curve from the loanable funds diagram

This approach raises several questions. First, it is not clear why the shift of saving curve exceeds the shift of the investment curve. If this is not the case the exercise would lead to an upward-sloping IS-curve. Second, the increase of income cannot fall from heaven. It is incompatible with LFT which assumes full employment. Third, the lower equilibrium interest rate in the LFT model is incompatible with its real economy logic where the equilibrium interest rate is determined by real factors that are not affected by a higher income. Forth, the LFT equilibrium is a unique goods market equilibrium in the real analysis. Therefore, it cannot be used for deriving an IS-curve which multiple equilibria. Fifth from the perspective of the monetary paradigm the increase in income requires a change in the propensity to save or in the propensity to investment. With unchanged saving and investment schedules an increase in income cannot take place.

Woodford (2010) does not only hesitate to derive a goods market equilibrium (IS-curve) out of what he regards as financial market equilibrium (LFT). He is also not frightened by the inconsistency of combining this IS-cure with an LM-curve which in the monetary paradigm reflects the financial market equilibrium. As a consequence, he analyses the financial crisis within the goods market context of an IS-curve instead of using the LM-curve which encompasses banks and the financial market.

Krugman (2011b) is another prominent example for this derivation of the IS-curve. In a contribution at the occasion of 75th anniversary of the General Theory he wrote:

„(...) the distinction between the loanable funds and the liquidity preference theories of the rate of interest - or rather, the ability how both can be

true at once, and the implications of that insight - seem to have been utterly forgotten by a large fraction of economists and those commenting on economics.“(Krugman, 2011b, p. 4)

A similar confusion is presented by Krugman (2011a):

„My favorite of these approaches is to think of IS-LM as a way to reconcile two seemingly incompatible views about what determines interest rates. One view says that the interest rate is determined by the supply of and demand for savings - the 'loanable funds' approach. The other says that the interest rate is determined by the tradeoff between bonds, which pay interest, and money, which doesn't, but which you can use for transactions and therefore has special value due to its liquidity - the 'liquidity preference' approach. (...) How can both views be true? Because we are at minimum talking about two variables, not one - GDP as well as the interest rate. And the adjustment of GDP is what makes both loanable funds and liquidity preference hold at the same time. Start with the loanable funds side. Suppose that desired savings and desired investment spending are currently equal, and that something causes the interest rate to fall. Must it rise back to its original level? Not necessarily. An excess of desired investment over desired savings can lead to economic expansion, which drives up income. And since some of the rise in income will be saved - and assuming that investment demand doesn't rise by as much - a sufficiently large rise in GDP can restore equality between desired savings and desired investment at the new interest rate. That means that loanable funds doesn't determine the interest rate per se; it determines a set of possible combinations of the interest rate and GDP, with lower rates corresponding to higher GDP. And that's the IS curve.“

It is amazing that Krugman is unaware of the fundamental difference between the two paradigms. He correctly describes the effects of lower interest rates on investment and saving (not savings!) for the monetary paradigm. But this process is incompatible with the LFT where the interest rate cannot fall out of the blue as it is firmly anchored by real factors. With constant preferences and productivity an exogenous decline of the interest rate creates an imbalance of planned saving over planned investment which would drive up the interest rate to its original level.

The confusion of a pure commodity world with a world where money and credit play a decisive role goes beyond the basic macroeconomic models that are discussed in this paper. It concerns all complex models, like the **real business cycle model**, the **new Keynesian models** and **DSGE models** that are based on the Walras-Arrow-Debreu (WAD) general equilibrium. Rogers (2014, p. 312) summarizes his analysis of these models as follows:

„A time-0 auction is necessary to construct any WAD general equilibrium system, but, as Hahn and others warned, that precludes any sensible role for money and banking. Proceeding despite warnings about this limitation on the grounds that the WAD core is 'scientific' or provides the microeconomic foundations for monetary theory is simply unscientific by any standard. The GFC of 2007-2008 is a timely reminder that this approach to monetary theory should be abandoned.“

The ongoing confusion of the two paradigms sheds a bad light on the science of economics. In physics in the late 16th century Tycho Brahe tried to combine what he saw as

the mathematical benefits of the Copernican system with the philosophical and physical benefits of the Ptolemaic system. But by the early 18th century the **Tychonic system** fell out of use among scientists.³¹

How relevant is the distinction between the two paradigm?

One might ask whether the difference between the two paradigms has a deeper relevance for economics. A simple answer is the financial crisis in 2008. When the Queen visited the London School of Economics on 5 November 2008 she put a remarkable question: 'If these things were so large, how come everyone missed them?'

The British Academy (2009) wrote the following answer to the question of the Queen:

„Your Majesty, the failure to foresee the timing, extent and severity of the crisis and to head it off, while it had many causes, was principally a failure of the collective imagination of many bright people, both in this country and internationally, to understand the risks to the system as a whole.“

The answer missed the point. The correct answer should have been:

„The failure to foresee the crisis is a failure of the economic model which we use for the financial sphere. It is based on a hypothetical world where a commodity (e.g. 'corn') is used as money and not for a world in which we are living.“

How the real economy paradigm has shaped macroeconomic thinking before the crisis becomes manifest in a paper by Michael Woodford (2009):

„It is now widely accepted that real disturbances are an important source of economic fluctuations; the hypothesis that business fluctuations can largely be attributed to exogenous random variations in monetary policy has few if any remaining adherent.“

Several years later Jordà, Schularick and Taylor (2016) have presented a comprehensive historical analysis in which they emphasize the importance of money and credit:

„Contemporary business cycles seem to be increasingly shaped by the dynamics of mortgage credit, with non-mortgage lending playing only a minor role.“

For the real analysis, such dynamics are difficult to explain. Investments must be financed by saving(s) made from the period income. As saving is determined by relatively stable preferences, abrupt changes in the financial sphere are not very likely. In the words of Jakab and Kumhof (2015):

„The fundamental reason for these differences is that savings in the ILF (intermediation of loanable funds; P.B.) model of banking need to be accumulated through a process of either producing additional goods or foregoing consumption of existing goods, a physical process that by its very nature is slow and continuous. On the other hand, FMC (financing through money creation; P.B.) banks that create purchasing power can technically do so instantaneously and discontinuously, because the process does not involve (physical) goods, but rather the creation of (digital) money through the simultaneous expansion of both sides of banks' balance sheets.“

³¹Wikipedia on 'Tychonicstem'.

Spain and Ireland provide impressive examples of the strong momentum of financial cycles. In the years preceding the bank loans to private non-bank sector virtually exploded. From January 1998 until summer 2008 the loan volume increased by a factor of six in Ireland and a factor of five in Spain.

Appendix II: The effects of household saving on corporate investment (Kalecki equation)

The negative effect of household saving on the profits is described by the so-called Kalecki equation (Laski, Walther et al., 2013). Assuming that there is no consumption of the firm owners and no dividends are paid, profits (P) are identical with the increase of the firm's net worth (ΔNW_B).

$$P = \Delta\text{NW}_B \quad (16)$$

ΔNW_B equals the increase of non-financial assets of the business sector (I) and its net financial assets (ΔNFA_B).

$$P = I + \Delta\text{NFA}_B \quad (17)$$

The flow of funds logic implies that the increase of net financial assets of the corporate sector is identical with the decline in net financial assets of all other sectors of the economy (OS), i.e the government, private households, and the rest of the world.

$$\Delta\text{NFA}_B = -\Delta\text{NFA}_{OS}P = I + \Delta\text{NFA}_{OS} \quad (18)$$

This shows a negative relationship between profits and the change in net financial assets of the other sectors in the economy: the budget surplus, i.e. the difference between taxes (T) and government expenditures (G), the saving of private households, i.e. the difference between income (Y_{HH}) and consumption (C_{HH}), and the current account surplus of the rest of the world, i.e. the difference between imports of the domestic economy and its exports.

$$P = I - [(T - G) + (Y_{HH} - C_{HH}) + (M - X)] \quad (19)$$

Thus, in a monetary economy, the saving of private households has a negative impact on the profits of the corporate sector. This interconnectedness of financial saving and financial dissaving of the different sectors is a key feature of a monetary economy. For the business sector the best of all worlds would be a world where the household sector saving is zero. In this case – assuming a balanced budget and a balanced current account – the corporate sector is able to finance its investments fully with its profits.

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