



Adverse Effects of Ultra-Loose Monetary Policies on Investment, Growth and Income Distribution

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Abstract

The paper analyses adverse investment, growth and distributional effects of ultra-loose monetary policies based on the monetary overinvestment theories of Hayek and Mises. We argue that ultra-loose monetary policies create incentives to substitute real investment by financial investment. When interest rates are expected to fall in the long term, the marginal and average efficiency of investments fall along, dampening GDP growth. We further show that the prolonged period of very low interest rates tended to distribute income towards higher income classes. This helps explain why consumer price inflation in most advanced economies does not pick up despite unprecedented monetary expansions.

Keywords: Hayek, Mises, monetary overinvestment theory, asymmetric monetary policy, financial crisis, marginal productivity of investment, secular stagnation.

JEL-Codes: E52, E58, F42, E63.

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1 Introduction

Following the recent waves of financial crises in the advanced economies and a prolonged period of low interest rates, major parts of the world economy are experiencing low growth, a rise in financial volatility but relatively low rates of inflation. Specifically, in Japan and in large parts of the euro area the crises persist. In large parts of the world, ultra-loose monetary policies seem to have become an important determinant of employment and growth since 2008 (or even earlier). The announced exit from unconventional and zero-interest rate monetary policy in the US, where growth seems more robust, have clouded the growth perspectives of many emerging market countries: The Chinese growth engine, which was a main driver of world growth during the 2000s, began to stutter. Emerging market corporate bond debt markets seem to come under pressure.

Macroeconomists have identified several reasons for the recent wave of financial crises in the advanced economies. One strand of literature explains financial crises as result of a random or exogenous shock, amplified by the irrationality of human action (Keynes 1936, De Grauwe 2010), asymmetric information and financial constraints (Bernanke and Gertler 1996). Another strand of literature suggests that a savings glut – e. g., caused by a higher saving propensity of the aging populations in Germany, China and Japan, – has contributed to a fall in (natural) interest rates in advanced economies (Bernanke 2005, Summers 2014, von Weizsäcker 2014).

On the contrary, assessments (implicitly) based on the Taylor Rule suggest that too expansionary monetary policies during the 2000s sowed the seeds for financial exuberance and therefore the current crisis (Taylor 2007, Jorda et al. 2015). Adrian and Shin (2008), Brunnermeier and Schnabel (2014) as well as Hoffmann and Schnabl (2008, 2011, 2014) show that too expansionary monetary policy can contribute to financial market bubbles that lead into crisis. Selgin (2014), Selgin, Lastrapes and White (2012) as well as Salerno and Howden (2015) see public central banks at the root of macroeconomic instability.

Depending on the view of the very roots of the crisis, policy recommendations point into different directions. One side emphasizes the need for expansionary monetary policy to stabilize the financial system, e.g., by easing collateral constraints to maintain growth and employment (Draghi 2014, Bernanke 2014). In contrast, the other side identifying

expansionary monetary policy as a main source of distortions and bubbles demands a timely and consequent exit from the ultra-low interest rate policies to prevent further distortions caused by boom and bust in the financial markets. This paper contributes to the second strand of literature. Discussing the developments during the last three decades against the backdrop of the monetary overinvestment theories by Wicksell (1898), Mises (1912) and Hayek (1929, 1931) we elaborate on channels through which ultra-low interest rate-policies have contributed to a decline in investments and growth in the world economy.

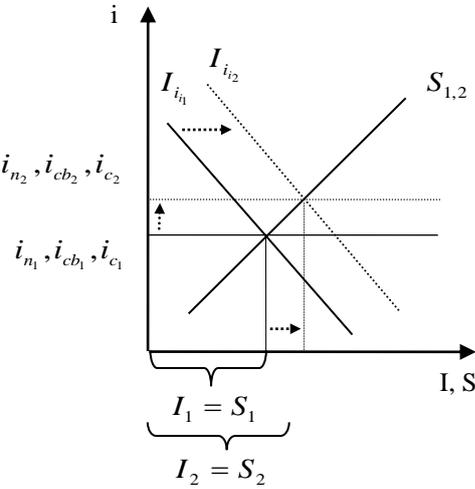
2 Monetary Overinvestment Theories and Boom-and-Bust in Financial Markets

Based on the overinvestment theories of Wicksell, Mises and Hayek we distinguish between four types of interest rates: First, the internal interest rate i_i reflects the (expected) returns of (planned) investment projects. Second, Wicksell's (1898) natural interest rate i_n is the interest rate that balances the supply (saving) and demand (investment) of capital.¹ Third, the central bank interest rate i_{cb} is the policy interest rate set by the central bank. It represents the interest rate which commercial banks are charged by the central bank for refinancing operations. Fourth, the capital market interest rate i_c is defined as the interest rate set by the private banking (financial) sector for credit provided to private enterprises. For simplification we shall assume that the capital market interest rate equals the policy interest rate (see Hoffmann and Schnabl, 2011).

¹ Wicksell and Hayek have different concepts of the natural interest rate. According to Wicksell's work, the deviation of the central bank interest rate / capital market interest rate from the natural rate of interest (which guarantees goods market equilibrium) disturbs the equilibrium between ex-ante saving and investment plans, bringing about inflationary ($I>S$) or deflationary processes ($S>I$). During an inflationary credit boom, the supply of goods cannot satisfy the additional demand for goods at given prices. Therefore, Wicksell's natural rate of interest is the interest rate at which inflation is zero (or at the target level). In contrast to Say, in Wicksell's framework money is not neutral, but additional money supply affects decisions of economic agents. Wicksell also interpreted the natural rate of interest as real rate of return or marginal efficiency of new investment projects. Building on Wicksell's inflation theory, Mises and Hayek aimed to explain business cycles caused by the deviation of the central bank interest rate / capital market interest rate from the natural rate of interest. They attribute the main role in the creation of cycles to central banks and the private banking sector. In contrast to Wicksell, Hayek emphasized the importance of the intertemporal alignments of plans of producers and consumers, explaining mal- or overinvestment phenomena as mismatch between the production structure and consumer preferences. The natural interest rate is the interest rate that aligns saving and consumption preferences with the production structure over time. A fall in the central bank interest rate / capital market interest rate below the natural interest rate causes a cumulative inflationary process, creating distortions in the production structure that later make an adjustment necessary (unless the central bank keeps on inflating credit at an ever-increasing pace and artificially prolongs the credit boom).

According to the monetary overinvestment theories, an economy is in equilibrium when the natural rate of interest equals the policy interest rate, i.e. planned saving equals investment. An economic upswing starts when positive expectations due to an important innovation raise the internal interest rate of investment, bringing about a rise in investment demand at given interest rates. In Figure 1 this corresponds to a right shift of the investment curve from I_{i_1} to I_{i_2} . The natural rate of interest rises along from i_{n_1} to i_{n_2} . Credit demand in the economy rises.

Figure 1: Equilibrium



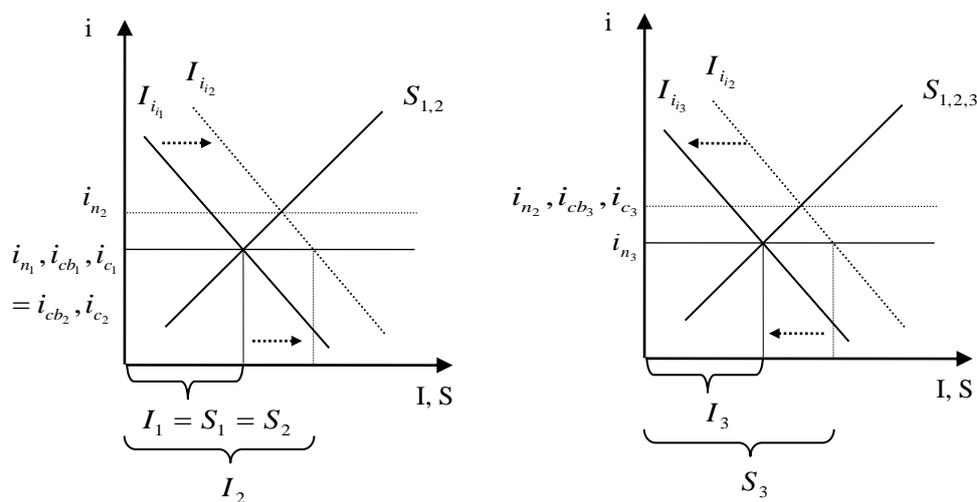
If the central bank increases the policy rate from i_{cb_1} to i_{cb_2} , assuming a perfect interest rate transmission to credit markets, planned saving and investment in the economy will stay in equilibrium ($S_2 = I_2$). If, however, the central bank does not raise the policy interest rate, ($i_{n_1} = i_{cb_1} = i_{cb_2} < i_{n_2}$) as shown in Figure 2, relatively low interest rates will give rise to an unsustainable monetary overinvestment boom. Holding policy rates too low (for too long) will be referred to as monetary policy mistake of type I.

To market participants a rise in credit to the private sector at constant interest rates signals that saving activity of households increased. Additional investment projects aim to satisfy the expected rise in future consumption. As planned household saving did not actually increase, an unsustainable disequilibrium between ex-ante saving and investment $S_2 < I_2$ at $i_{c_2} < i_{n_2}$ arises. In the following, additional investments of some enterprises trigger additional

investments of other enterprises (cumulative upward process). As soon as capacity limits are reached and employment is high, wages and prices rise.

At first, rising prices signal additional profits and therefore trigger a further increase in investment. There may be spill-overs to financial markets. On stock markets increases in expected profits of companies are typically associated with rising stock prices. Given relatively low interest rates on deposits, shares are attractive. When stock prices move upward, trend-followers will provide extra momentum such that “*the symptoms of prosperity themselves finally become [...] a factor of prosperity*” (Schumpeter 1912, p. 226). Consumption is fuelled by rising stock prices via the wealth channel, which leads, with a lag, to an increasing price level.

Figure 2: Boom and Bust



The boom turns bust when the central bank increases the central bank interest rate to stem inflation (Mises, 1912; Hayek, 1929; 1935). Then investment projects with an internal interest rate below the risen natural interest rate turn out unprofitable. The fall in investment of some firms will depress investment of other firms as expected returns fall. When stock (and other asset prices) burst, balance sheets of firms and banks worsen, bringing about further disinvestment (cumulative downward process). Wages fall and unemployment rises. The investment curve shifts back from I_{i_2} to I_{i_3} .

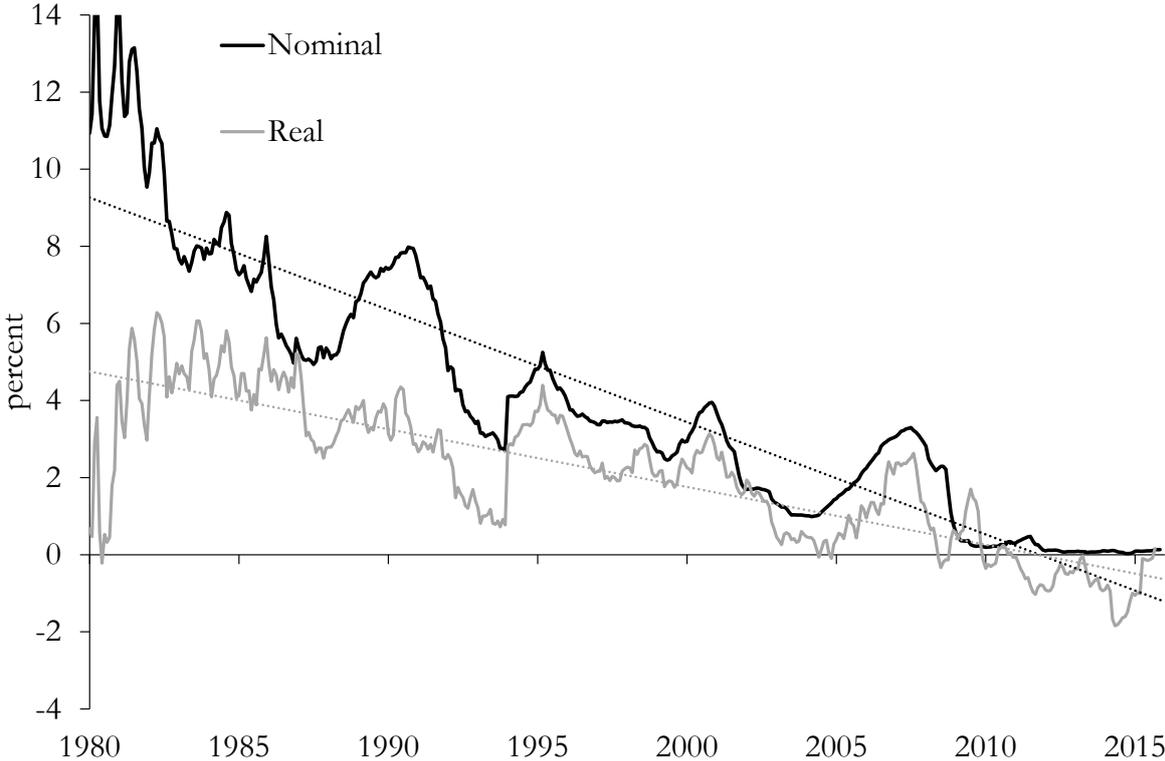
In this situation, the central bank should cut the central bank interest rate to contain the downward-spiral. Based on the monetary overinvestment theories, we consider holding policy interest rates at a high plateau during the downturn a monetary policy mistake of type II.

Figure 2 shows that when the policy interest rate is above the natural interest rate ($i_{cb_3} = i_{c_3} > i_{n_3}$), credit supply is restricted further such that ex-ante saving is higher than investment ($S_3 > I_3$).

According to Mises, “[t]he wavelike movement effecting the economic system, the recurrence of periods of boom which are followed by periods of depression is the unavoidable outcome of the attempts, repeated again and again, to lower the gross market rate of interest by means of credit expansion“ (von Mises 1949: 572). Hoffmann and Schnabl (2008, 2011, 2014) outline that the spate of boom and bust cycles in different parts of the world since the 1980s can be understood based on the monetary overinvestment theories. They make, however, one clear distinction: Central banks have tended to hold policy interest rates too low during periods of economic upswing, fueling booms in financial markets (i.e. seem to have made monetary policy mistakes of type I). During financial crises, however, they have slashed interest rates decisively to stabilize the economy and prevent type II monetary policy mistakes. Specifically, in the so-called ‘Jackson Hole consensus’, US central bankers agreed that central banks do not have sufficient information to spot bubbles, but should react swiftly in times of financial turmoil (Blinder and Reis 2005). As a consequence, we observe – in cycles – a downward-trend in nominal and real interest rates in the large economies (Figure 3).

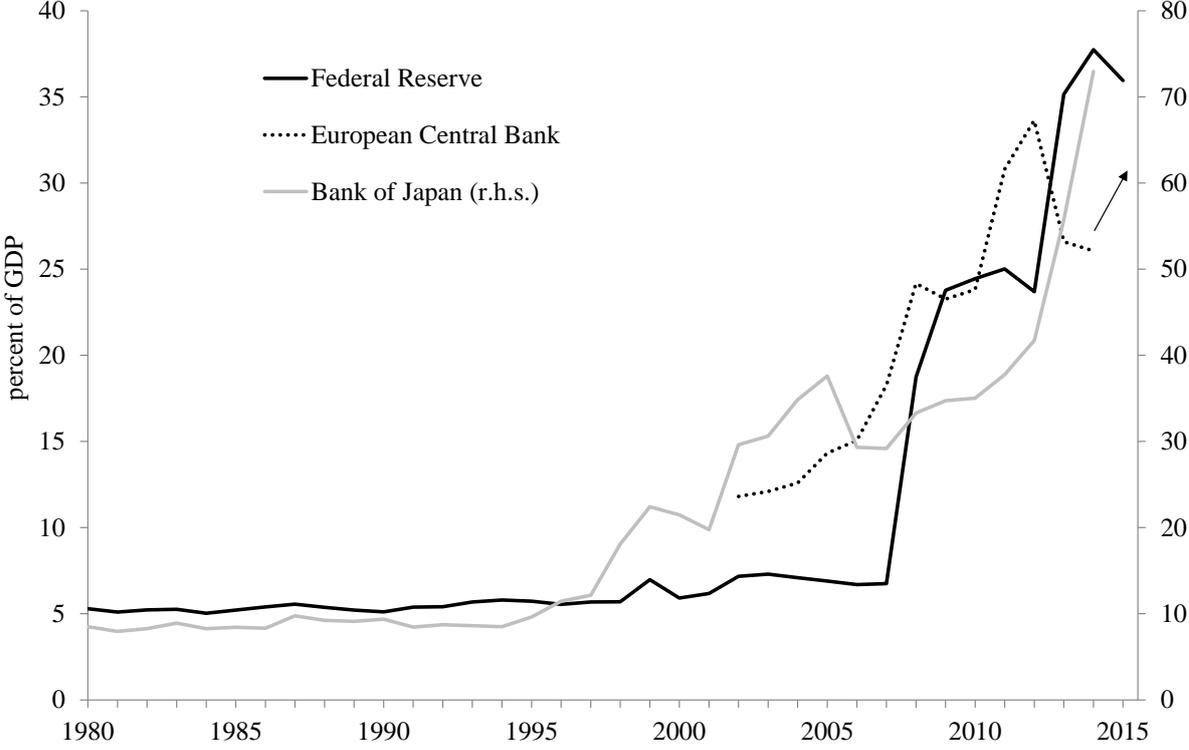
Once interest rates have reached the zero-bound (in Japan since 1999 and the US and Europe since 2008), central bank balance sheets have been inflated more aggressively to prevent a meltdown of the financial sector by pushing down the interest rate on the long end of the yield curve (Figure 4). The discussions on tapering and the long-delayed increase in interest rates (for the first time after nine years) by the Federal Reserve, signal that an exit from such low interest rate policies is a difficult endeavor because large distortions have emerged.

Figure 3: G3 Short-Term Interest Rates



G3=US, Japan and Germany (up to 1998)/euro area; arithmetic averages.
 Source: International Monetary Fund (IMF), via Datastream, 2016.

Figure 4: G3 Central Bank Assets as Percentage of Gross Domestic Product

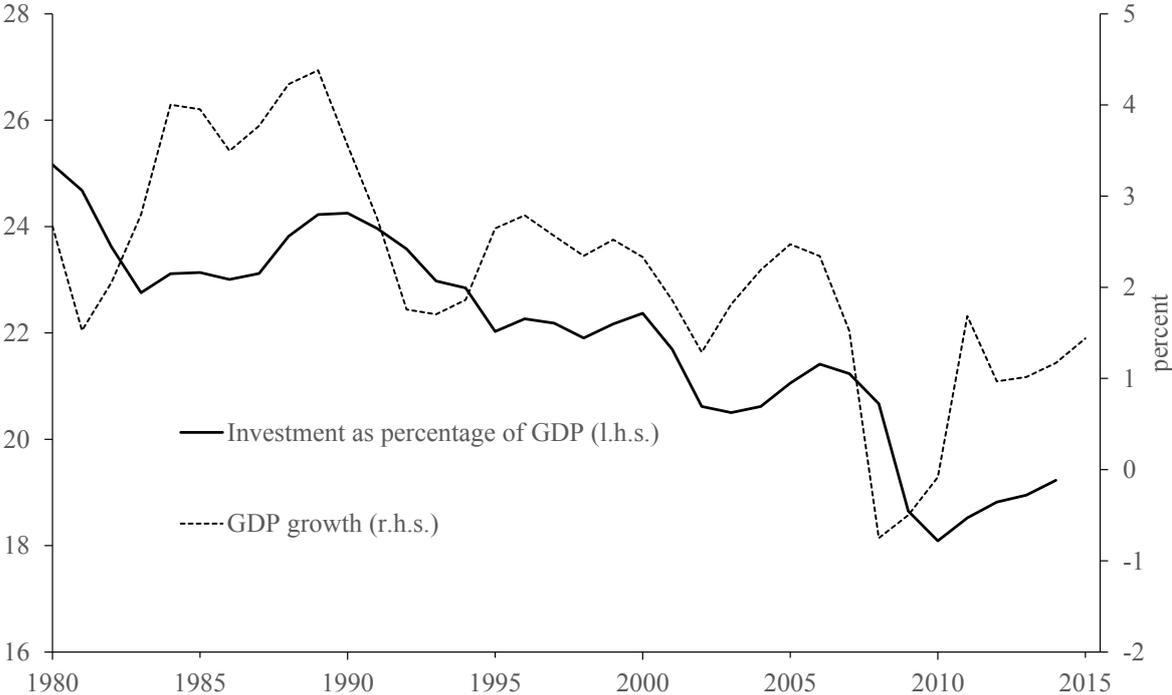


Sources: World Economic Outlook (WEO), European Central Bank and Eurostat, 2016.

3 Negative Growth Effects of Low Interest Rate Policies

Although the drop in interest rates and the dramatic expansion of central bank balance sheets had a stabilizing effect on financial markets and employment, investment and growth may be dampened in the medium and long term. This is most evident in Japan, where an exuberant financial market boom (the so-called Bubble Economy from 1985 until 1989) and the following crisis (2.5 decades now lost) set in around 15 years earlier than in Europe and the US. But along with investments, real growth is also declining on average for all three G3 countries (Japan, US and Germany) (Fig. 5). In the following, the cause of the decline in growth dynamics is identified as the creeping nationalization of lending, declining (marginal efficiency of) investments as well as financial and real wage repression promoted by the redistributive effects of monetary expansion.

Figure 5: G3 Real Growth and Investment as Share of GDP



Source: IMF. Arithmetic three-country averages.

All three effects can be linked to the highly expansionary monetary policies in the major industrialized countries.² This can be understood as a counter-hypothesis to theoretical constructs that assume that nominal and real interest rates have fallen to or below zero due to exogenous factors. According to Weizsäcker (2014), Bernanke (2005) and Summers (2014), ageing societies in individual industrialized countries (including China) and growing retirement savings are causing a savings glut (particularly in Japan, China and Germany). This coincides with declining investment activity due to weak technological progress. The result is a declining (what they call) natural real interest rate, which involves an increasing probability of financial market bubbles, while product markets remain in equilibrium with $I(r)=S(r)$. Similarly, Laubach and Williams (2015) suggest that the fall in trend GDP growth rates triggered a decline in the natural rate of interest (in the US). Therefore, this literature suggests that central bank interest rates have to further decline to match the ever-falling natural rate and guarantee goods market equilibrium. In contrast, we maintain that ultra-loose monetary policies are responsible for the decline in investment and growth and therefore the decline of the natural interest rate as for instance defined by Laubach and Williams (2015).

3.1 Creeping Nationalization of Lending

Asymmetric monetary policy and, since the major crises, the (almost) free and quasi-unlimited provision of central bank liquidity to commercial banks have incentive effects. First, new excesses are encouraged on the financial markets (see Adrian and Shin 2008, Brunnermeier and Schnabel 2014). The bursting of these asset price bubbles causes more banks to record book losses on assets. The portfolio of bad loans increases sharply. Entire financial sectors run into trouble, which threatens to lead to a credit crunch (Ishikawa and Tsutsui 2005):³ Since the banks suffer high book losses on their balance sheets, their equity shrinks. This forces them to restrict lending to (high-risk) companies or for new investment projects. The crisis in the banking sector sparks a crisis in the corporate sector, in turn leading to a rise in unemployment.

² The link between monetary policies and the stylized facts of macroeconomic trends is based on the selective choice of particularly significant links. Empirical studies of causal relationships between monetary policy and, for example, developments in financial markets usually work on the assumption that national monetary policies affect national financial markets. This is obvious, although not necessarily true in globalized financial markets (Hoffmann and Schnabl 2014): An expansionary monetary policy in one country can – depending on the difficult-to-comprehend dynamics of financial markets, national specifics and national regulatory arrangements – also affect any other segment of the international capital markets.

³ Since the low interest-rate policy in Japan has continued the longest, the effects on the financial sector are most evident there, as reflected in research on the impact of a zero interest-rate policy on the financial and corporate sectors. This is why Japan in particular is used as a case study.

In order to counteract a credit crunch originating from the supply side of the lending market, Posen (2000) proposes interest rate reductions and extensions of a central bank's balance sheet. Banks receive "fresh money" from the central bank, which aims to enable them to extend corporate loans. A spill-over of the crisis from the financial to the corporate sector should thus be prevented, facilitating the economic recovery. By cutting interest rates and purchasing assets, the central banks contribute to minimizing book losses on assets, or even bringing about a significant shift into positive territory. The portfolio of bad loans (as a proportion of the balance sheet total) does not continue to grow, or it diminishes. This curbs contagion effects in the financial markets.

However, a highly expansionary monetary policy during a crisis can lead to an implicit nationalization of money and credit markets. In money markets, market structures change during a crisis because of rising distrust among banks. Interbank lending of commercial banks is substituted by borrowing from the central bank. A zero interest-rate policy perpetuates this situation, because it drives profit margins in the money markets down to a minimum (McKinnon 2012): Banks with excess liquidity no longer have any incentive to act as a supplier in the money markets. Even if banks requiring liquidity were to offer higher interest rates in order to create a supply, offering high interest rates signals higher risk. The requested loan is not granted.⁴ As a result, the private supply of money is also substituted in the long term by the money supplied by the central bank. Banks with excess liquidity invest with the central bank.

In the lending markets supported by the banks, too, a zero interest-rate policy contributes to market shrinkage (Schnabl 2015a). A zero interest-rate policy amounts to a subsidy for companies that are traditionally aggregated demanders on the lending market. Especially for large companies that can issue their own securities, in many cases borrowing costs drop. The demand and willingness to pay for shares (equity) rise because alternative forms of investment such as bank deposits and government bonds bear low interest. Then the prices of shares and securities rise. The low cost of obtaining capital gives rise to additional profit for large companies, which becomes visible in the form of increasing corporate savings.⁵ The demand for loans declines, and companies tend to purchase more of their own shares.⁶

⁴ This represents a market failure according to Akerlof (1970).

⁵ It is therefore difficult to provide sound empirical evidence for the hypothesis of the global liquidity glut (e.g. Bernanke 2005), because the assumed structural increase in household savings cannot be observed in any of

The banks, which are more strictly regulated as a result of a banking crisis and need to amass more equity, have an incentive to restrict lending to higher-risk companies.⁷ If the larger, less risky companies withdraw from the loan portfolios of commercial banks, then the average risk in the banks' loan portfolios increases. Loans to comparatively high-risk small and medium-sized enterprises have to be restricted. Then loans to the private sector can be substituted by loans to the public sector, because national debt increases during the crisis. Unlike companies' investment risks, the default risks of the state are implicitly guaranteed by the central bank if it signals additional purchases of government bonds. This process is favoured by the Basel capital adequacy rules, which do not set out equity reserves for the purchase of government bonds.⁸

Under the constraint of a zero interest-rate policy, the hope that a rapid recapitalization of banks will prevent a credit crunch – and thus also the creeping nationalization of banks – may be in vain. The reason is that incentive structures for substituting loans to non-financial corporations by providing loans to the public sector remain unchanged as long as public debt rises. Since the state has no savings, it must obtain the capital needed to recapitalize the banks by issuing government bonds. The banks can use the additional lending potential generated by their recapitalization to purchase these government bonds, which are issued to finance recapitalization. In such cases, lending is not extended to companies.

A further reason of why lending does not increase during the crisis is tighter regulation and capital requirements as response to the crisis. In general, the banks' requirements of loan collateral are pro-cyclical.⁹ They decrease during times of prosperity and increase in a downturn. Although the central bank lowers the interest rate during a downturn and provides additional funds, the banks increase their requirements for loan collateral. New loans are not

the countries with surplus savings (over investments). The increase in aggregate savings surpluses in these countries (relative to investments) is rather due to the increase in corporate savings (especially resulting from declining financing costs) and the fall in investments.

⁶ This increases the profit per share and therefore – in many cases – the bonus payments of the upper management.

⁷ In Japan, these are mainly the relatively economically weak SMEs, and in Europe primarily companies in the Southern European crisis states.

⁸ A prerequisite for this process is that government debt increases as it happened in Japan and the US. In Europe, the more or less effective restrictions on government debt constitute an impediment to the substitution of credit to private sector by credit to the public sector.

⁹ Following Kiyotaki and Moore (1997), two criteria apply to lending: the expected return r and the security z . For a given central bank interest rate i_{cb} , all projects where $r < i_{cb}$ or $z < Z$ is true are ruled out, where Z is the required minimum loan collateral.

awarded, despite cuts in the interest rate, if the value of the collateral falls. Tighter regulation enhances this effect in the downswing. In contrast, existing (possible bad) loans are extended, because banks fear that defaulting enterprises erodes their (reported) capital base. This provides an incentive for commercial banks to clandestinely relax their requirements of loan collateral for already outstanding credit during a crisis.

In this way, banks become dependent on the state via two channels. Firstly, if returns in the traditional banking business shrink,¹⁰ banks depend on the supply of free liquidity from the central bank. Any major hike in the key interest rate would cause the banking sector to falter. In Japan's case, Caballero, Hoshi and Kashyap (2008) coined the term "zombie banks". Secondly, the banking sector tends to replace loans to the private sector by loans to the public sector.

3.2 Drop in Investments and their Marginal Efficiency

Traditional banking involves accepting deposits with a positive rate of return and lending that capital, in the form of loans, to businesses and households at higher interest rates. Banks fulfil an intermediary function, in which they examine the future returns on investments. Projects with higher expected returns are financed at a given interest rate. By contrast, projects with lower expected returns (where the probability of default is high) are (in the best case) rejected. The banking sector thus plays a crucial role in the allocation function of interest, separating investment projects with higher expected returns from those with lower expected returns.

If the banking system is no longer subject to strict budget constraints, then the allocation function of interest is undermined. In this case, rescue measures implemented during the crisis through ultra-loose monetary policy prevent or delay the structural adjustment process during crisis as stressed by Schumpeter (1912): To remain in the market banks in trouble disguise their difficult situations by prolonging loans for investment projects with low or negative returns. In Japan's case Sekine, Kobayashi and Saita (2003) talk of forbearance lending: Banks continue to provide irrecoverable loans, thus keeping themselves and (potentially) insolvent companies alive. Peek and Rosengren (2005) also associate Japan's zero interest-rate policy with a misallocation of capital in the credit sector, which keeps companies with poor profit prospects alive ("evergreening").

¹⁰ In Japan, for example, during the crisis the lending-deposit rate spread fell from approximately 3.5 percentage points to approximately 0.5 percentage points (Schnabl 2015a).

Thus, the constant supply of cheap liquidity by the central bank can affect the quality of the loan portfolio. Investments which would not have been financed at Wicksell's (1898) natural rate of interest continue to be financed.¹¹ Tying capital up in traditional structures restricts the financing possibilities for innovative new investments. The average productivity of investments decreases. In the sense of Leibenstein (1966), this results in X-inefficiency: If enterprises can expect that cheap credit will be provided without tight conditions with respect to profitability, this discourages the pursuit of innovation and cost savings.

Kornai (1993) spoke of "Soft Budget Constraints" in the case of companies in Central and Eastern European planned economies: Since unemployment was politically undesirable, non-profitable companies were kept alive by supplying liquidity via a state-controlled banking system. This put a drag on the endeavour to create profits via innovation. Caballero, Hoshi and Kashyap (2008) showed for Japanese companies that under zero interest rate policies their economic viability became dependent on cheap loans. Although the expansionary Japanese monetary policy has successfully protected jobs, on average the companies' productivity has dropped considerably ever since.

Similar developments seem to take place in other industrialized countries, in particular since the advent of zero interest rate policies. Barnett et al. (2014) demonstrate that since 2007 the United Kingdom has seen a significant drop in productivity growth among businesses. Cardarelli and Lusinyan (2015) show for the US that total-factor productivity has dropped significantly since the turn of the millennium. Gopinath et al. (2015) provide empirical evidence for the Southern European countries since the outbreak of the European debt and financial crisis.

In Figure 6 we model the relationship – derived from monetary overinvestment theories – between the central bank interest rate and the average internal interest rate, which can also be interpreted as the marginal efficiency of investments. In the monetary overinvestment theories of Wicksell (1898) and Hayek (1929), the central bank interest rate fluctuates around the natural rate of interest. During times of prosperity, refinancing conditions being too favourable causes additional investment projects with low expected returns to be financed.

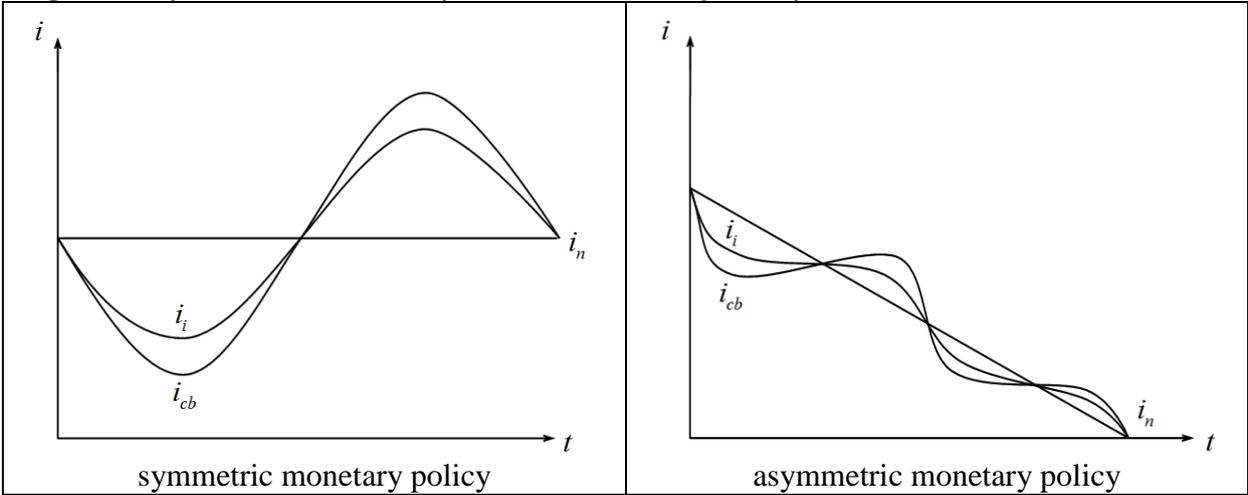
¹¹ In contrast to von Weizsäcker (2013) and Summers (2014), we do not attribute the fall in growth rates to exogenous increases in saving rates but to monetary policy mistakes. Therefore, we do not assume that the natural rate of interest fell structurally toward or below zero due to preference shifts.

The marginal and average efficiency of investments decreases. During a downturn and crises, investment projects with low internal rates of return are cancelled. The marginal and average efficiency of investments increases (left side of Figure 6).

However, if the markets expect a gradually declining interest rate level due to an established asymmetric monetary policy path (like in Figure 3), then the average internal rate of interest necessary to ensure the repayment of loans will also drop. The declining trend in central bank interest rates leads on the one hand to a partial or total absence of the structural adjustment process during the crisis. The marginal efficiency of investments falls during the boom before the crisis, and remains largely constant during the crisis. If during the crisis the interest rate is lowered again to below the pre-crisis level, then the average and marginal efficiency of investments continue to decrease (see right part of Figure 6).

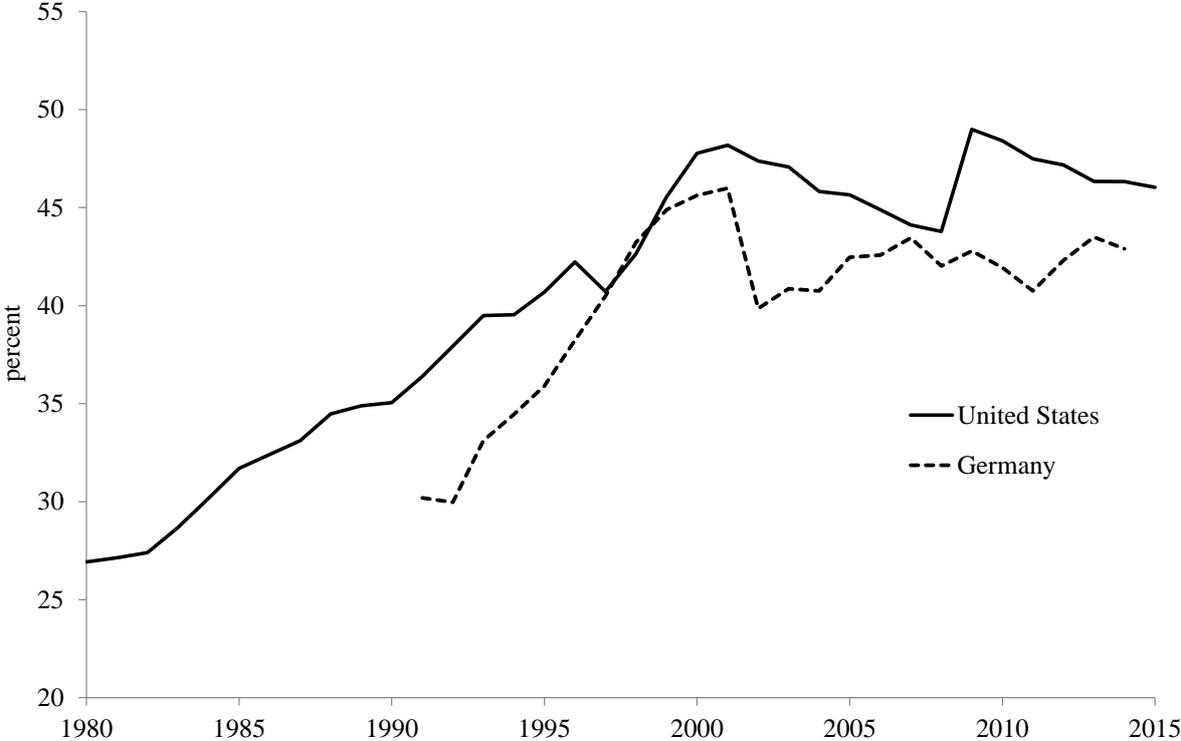
We explain the reduction in investments in fixed assets (as shown in Figure 5) by incentive effects of an asymmetric monetary policy on different types of investments. During financial crises, an asymmetric monetary policy constitutes an implicit insurance mechanism, because an abundance of central bank liquidity is quickly provided to stabilize the financial markets (Jackson Hole Consensus). Interest rate cuts and an unconventional monetary policy stop or even reverse the fall in asset prices. Even if prices fall in some assets classes (for instance Japanese stock prices), prices are driven upwards in other asset classes (for instance US stock prices), making it possible to compensate for the losses in the asset classes affected by the crisis.

Figure 6: Symmetric versus Asymmetric Monetary Policy



In contrast, returns on real investments fall relative to the investments in the financial markets due to at least three reasons. (1) As discussed above the marginal efficiency of investment is likely to decline. (2) In contrast to financial investment, there is no public insurance mechanism for the risks of individual innovations, product lines or new production processes. (3) In addition, uncertainty grows. With growing amplitudes of boom-and-crisis cycles in the financial markets, long-term investment decisions in the real sector tend to be associated with growing uncertainty. The growing uncertainty/risk reduces the expected return of real investments.

Figure 7: Financial Assets Relative to Non-Financial Corporate Assets

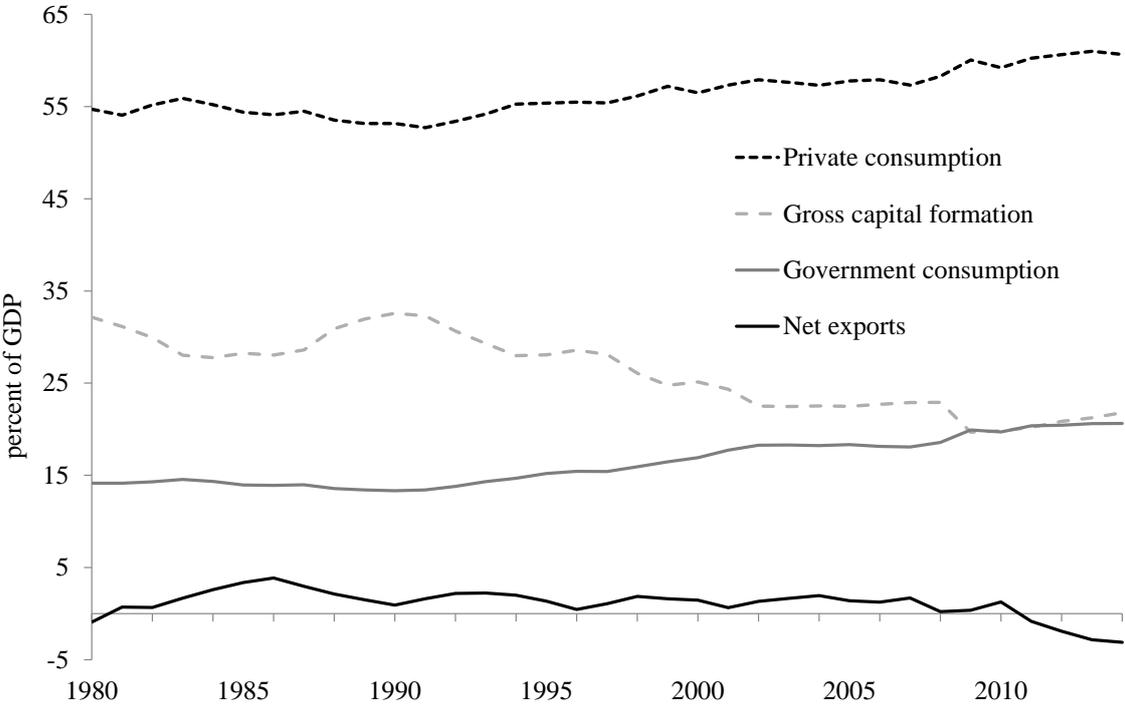


Source : Deutsche Bundesbank, Federal Reserve Bank of St. Louis.

Different expected returns on investments in fixed assets and financial investments create an incentive for companies to substitute real investments with speculative financial investments. In the original monetary overinvestment theories, ultra-low interest rate policies contribute to unsustainable changes in the structure of the economy. The durable consumer goods and capital goods sectors expand at the expense of non-durable consumer goods sectors, signaling an intertemporal reallocation of funds in favour of projects with higher expected returns in later periods (vertical malinvestments). In recent boom-and-crisis cycles, the economy's

structure saw further shifts from the real goods sector to the financial sector, which sees disproportionately high growth during the boom (horizontal or sectorial malinvestments). The boundary between the real goods sector and the financial sector is blurred. For example, in the course of a speculative boom in the real estate markets, the real estate sector (construction) might be attributed to either the real or the financial sector.¹² If monetary policy behaves asymmetrically, then during the crisis there will be no structural adjustment of the financial sector which is too large.

Figure 8: Demand Components of Japanese GDP (1980 – 2014)



Source: Cabinet Office, Government of Japan, 2016.

This contributes to the fact that investments in physical capital become less significant for companies in relation to (speculative) investments in the financial markets. Accordingly, the proportion of financial assets in relation to non-financial corporate assets has risen steadily since the 1980s. Figure 7 shows this trend for Germany and the US, where it can be observed until the turn of the millennium.¹³ From a private sector perspective, it is true that the average return on financial investments will seem relatively high if potential losses are counteracted by the central bank. In aggregate, however, the *ex post* returns need to be adjusted for possible

¹² Real estate is created as a speculative investment. Once the bubble bursts, many properties are left vacant.
¹³ Since then, there is a tendency to use cash holdings for stock purchases.

state subsidies. This is for example the case when banks are recapitalized using public money, or the costs of bailouts implemented under monetary policy become visible e.g. in the form of higher inflation or the recapitalization of the central bank. From a macroeconomic perspective, returns on speculative investments in the financial markets are therefore significantly lower, or even negative.

If the financial crisis is transformed into a sustained, creeping crisis in which there is no limit to the central bank's government bond purchases, this may result in the substitution of private investments with public investments and/or government consumption. After the Japanese bubble burst in December 1989, numerous Keynesian economic stimulus programs were implemented. The construction of highways, bridges, high-speed railway lines and public buildings bolstered growth particularly in Japan's low-growth provinces outside of Tokyo, Kansai and Aichi (Yoshino and Mizoguchi 2010). Figure 8 shows that since the Japanese bubble burst, gross investment in Japan as a share of GDP declined from 32% in the year 1990 to 20% in the year 2011. In the same period, government spending as a share of GDP rose from 13% to 21%. If we assume that public investments have a lower marginal efficiency than private investments, then the average efficiency of investments further decreases.

3.3 Redistributive Effects and Real Wage Repression

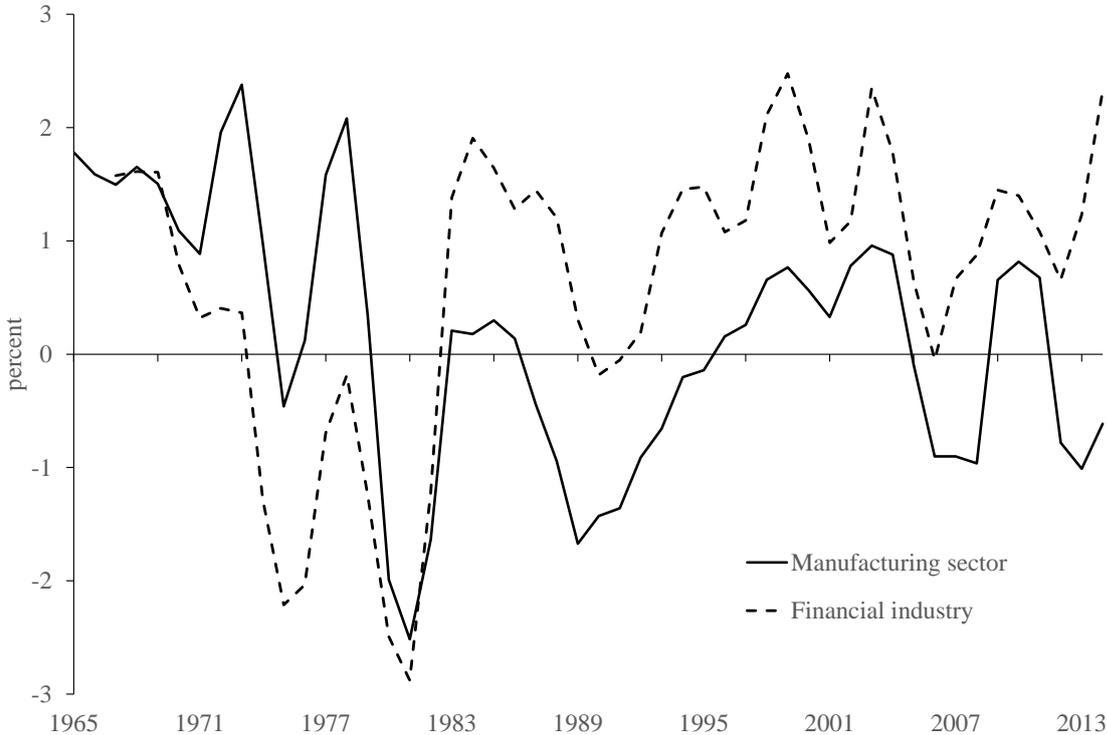
The prolonged periods of low interest rates in Japan and in the US have had *in addition* a negative impact on consumption, because they have lowered the income of broad sections of the population. Such distributional effect have an absolute and a relative aspect. In absolute terms, with the marginal efficiency of investment declining also productivity gains gradually decline. Therefore, the scope for real wage increases is gradually becoming smaller. This implies that in a scenario of zero productivity gains a growing real income of one social group has to come along with a declining real income another social group.

Low interest rate policies can, for instance, favour highest income groups, because the extra liquidity created by the central banks is initially available to the banks and other financial institutions (the so-called primary dealers) (Cantillon Effect). Following Cantillon (1931), banks benefit not only from an increase in the lending business under favourable refinancing conditions. They can also acquire stocks, real estate and securities etc. at lower prices. If via purchases of stocks, real estate and securities etc. the additional financial means provided by the central bank make its way further into other areas of the economy, then real estate, stock

and security prices etc. increase for the next buyers. This results in redistributive effects in favour of the financial institutions, in the form of valuation gains and/or additional lending volumes. Alternatively, the financial sector intermediates a growing volume of capital market transactions, for which they obtain rising commissions due to rising asset prices.

Such redistribution effects in favor of the financial sector are for instance visible in the United States.¹⁴ Figure 9 shows that until the mid-1980s the income of industrial sector workers grew faster than in the financial sector. However, since the mid-1980s employees in the financial sector benefitted from higher wage increases. This even applies to periods of financial market crises, during which industrial workers’ wages declined more sharply than salaries in the financial sector. It is likely that financial sector executives tend to benefit more than other employees from financial institutions’ windfall profits, because one-off dividends due to exceptional performance (bonuses) are more common at this level.

Figure 9: Wage Development in the US Financial and Manufacturing Sectors



Source: IMF.

¹⁴ The world’s largest financial market is in the US, which is why the data can be assumed to be particularly significant.

Figure 10 shows the potential redistributive effects between individual income groups for the US. It is based on the assumption that monetary policy has more of an effect on asset prices than on goods prices. The left axis shows price trends on the US and Japanese stock markets (NYSE and Nikkei respectively), while the right axis plots the share of the top 1% of incomes as a proportion of the total income of the US economy (including income from capital). There has been a clear correlation between the two variables since the mid-1990s. The development of the Japanese stock index suggests that the redistributive effects of speculative waves on globalised financial markets do not necessarily stop at national borders.

The highest income groups in the US appear to have already benefitted from the speculative bubble in the Japanese stock market in the late 1980s. Since 1987, when Alan Greenspan took office as Chairman of the Federal Reserve and initiated a monetary policy aimed primarily at stabilizing the financial markets, the share of the top 1% of incomes in the US has risen from around 13% to almost 22% of total income. Similar developments can be observed in other industrialized countries.

Hayek (1944) argued that *“with every grant of complete security to one group the insecurity of the rest necessarily increases. If you guarantee to some a fixed part of a variable cake, the share left to the rest is bound to fluctuate proportionally more than the size of the whole.”* In recent years, the increasing concentration of income at higher income levels has mainly worked through the following channels to the (relative) lower income of the middle or lower classes.

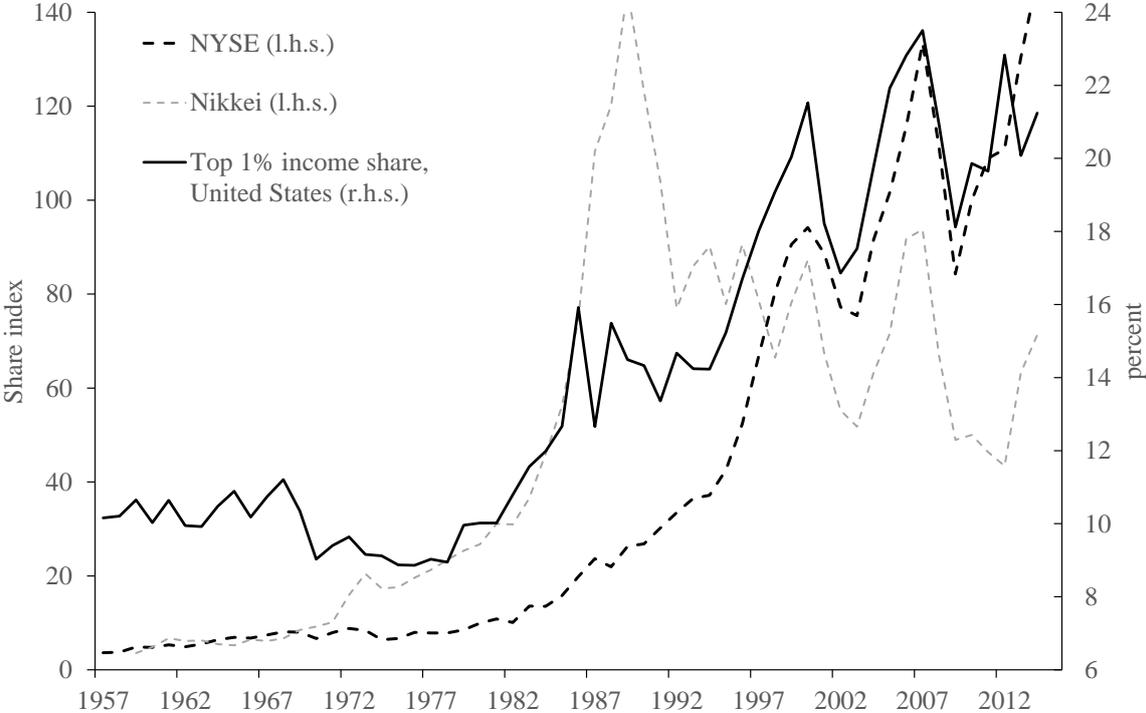
An asymmetric monetary policy that is geared towards a stabilization of asset prices, amounts to a guarantee of security for high-income groups if they hold disproportionately large shares in the total assets. In this scenario, middle¹⁵ and lower-income groups have to bear the risk of boom-and-crisis cycles in the financial markets. If average growth is low, zero or negative (see section 4.3), then the absolute income gains of privileged income groups must be associated with absolute income losses among middle and lower-income groups. The redistributive channels are manifold and often arbitrary. Among other things, the returns on low-risk investments such as fixed-income savings, which are often held by the middle class, are lowered towards zero nominally – and into negative territory in real terms.¹⁶ Figure 11 shows for Japan how, following the implementation of a zero interest-rate policy, domestic

¹⁵ Under certain circumstances, middle-income groups tend to hold more low-risk financial assets, because they perceive investments in the asset markets to be high-risk.

¹⁶ For more on financial repression see Hoffmann and Zemanek (2012).

incomes from capital gains, rentals and dividends dropped sharply after the Japanese bubbles burst at the end of 1989, which indicates financial repression.¹⁷

Figure 10: Stock Prices (US, Japan) and US Income Distribution



Source: OECD, Main Economic Indicators, The World Top Incomes Database. NYSE index: 2010=100, Nikkei: 2010=50.

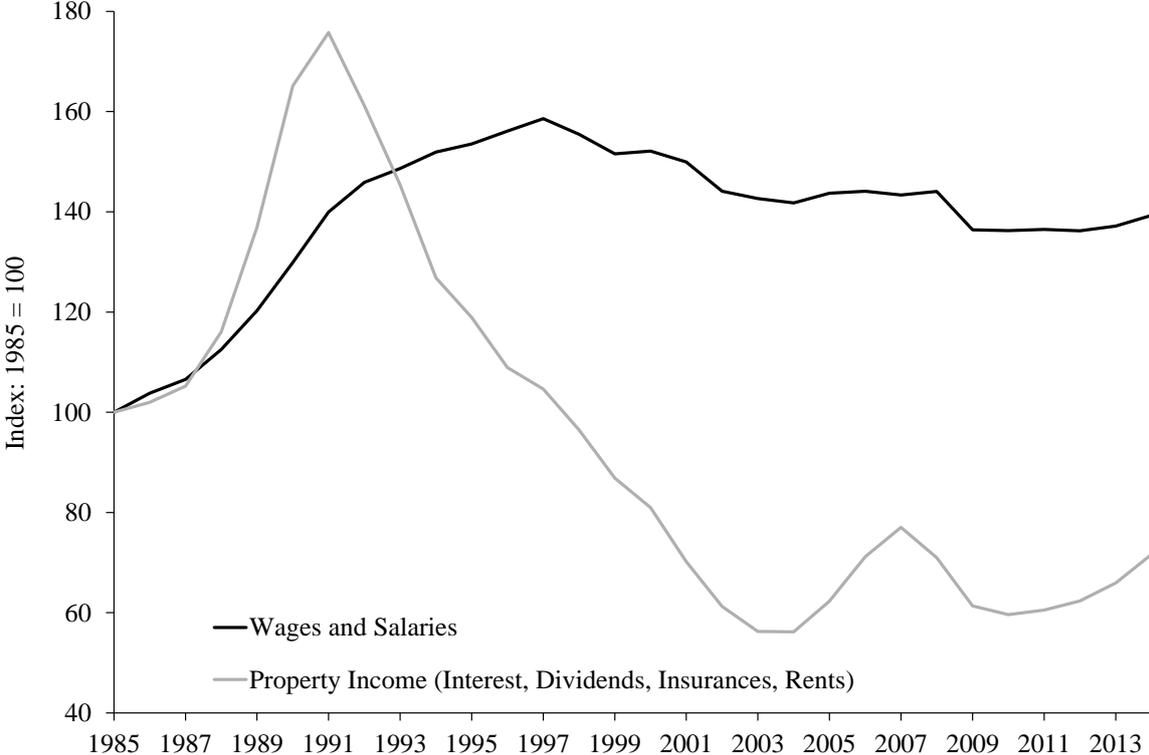
In addition, real wage repression can occur when a crisis undermines the bargaining power of employees. Since the financial crises (and growing public expenditure triggered by exuberant boom phases in the financial markets) drive national debt upwards, reduced spending flexibility during a crisis puts pressure on wages in the public sector. The signalling effects of public wage agreements and gloomy business expectations cause public austerity to be followed by wage moderation in the private sector. Wages are driven down especially in those segments of the labour market where qualifications and bargaining power are low.

As shown in Figure 11 the average real wage level has fallen steadily since the Japanese financial market crisis (1998). In Europe, too, financial repression and real wage repression – the latter currently with the exception of Germany, where real wages have up to the outbreak

¹⁷ Income refers to domestic variables, and as such this does not include comparatively high-risk investments abroad (which are more risky due to exchange rate risks for example), such as in the US stock market. As a result, some Japanese investors may have generated high returns through financial investments abroad.

of the European financial and debt crisis stagnated – are increasingly becoming a reality for large parts of their societies. Real wage repression *cum* financial repression can in turn be seen as important determinants of weak private demand among a large proportion of the population, which is anticipated by enterprise by lower investment.¹⁸ As a result, the negative redistributive and real wage effects widely ascribed to consumer price inflation are also achieved, indirectly, without consumer price inflation – via boom-and-crisis cycles in the financial markets.

Figure 11: Real Wage and Factor Income in Japan



Source: Economic and Social Research Institute, Cabinet Office, Government of Japan.

4 Hysteresis and Growth Effects

An asymmetric monetary policy has self-reinforcing effects when it favours an increase in government debt, thereby undermining the independence of monetary policy. In addition, inflation targets become less effective if additionally created central bank liquidity flows mainly into the financial sector. This may in turn further promote the creeping nationalization

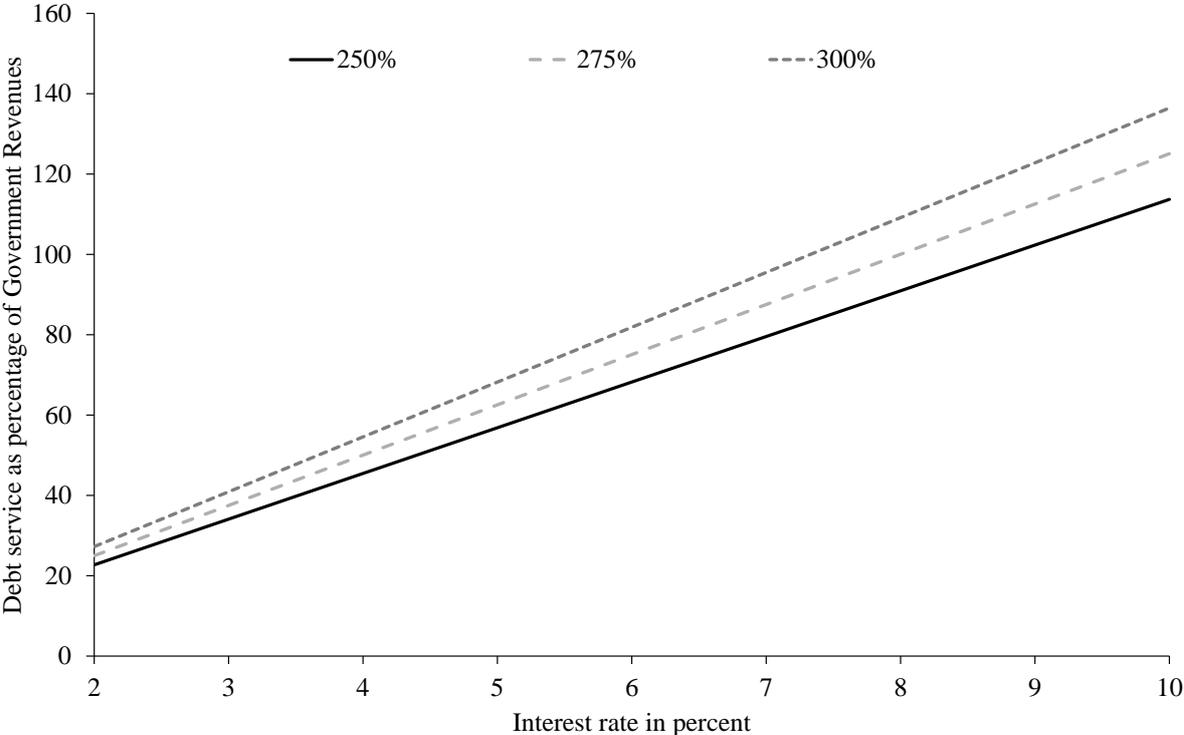
¹⁸ The negative demand effect of declining real incomes is partially offset by declining saving of the household sector, in particular of the younger generations.

of the banking and corporate sector, which can dampen productivity and growth in the long term.

4.1 Hysteresis Effects Due to Rising National Debt

An asymmetric monetary policy can be self-reinforcing if it encourages an increase in national debt. There are two transmission channels. Firstly, an increase in tax revenues during boom periods in the financial markets can encourage increased public spending, for example on more social benefits, higher wages for workers in the public sector or ambitious construction projects. If the bubble bursts, these additional expenditure commitments are difficult to revise – despite falling tax revenues. Furthermore, additional costs usually arise during a crisis as a result of the recapitalization of financial institutions and countercyclical stimulus packages. Structurally declining interest rates on government bonds make a higher debt level possible, because the burden of interest for any given stock of government debt shrinks.

Figure 12: Simulation of Interest Rate Payments of the Japanese Central Government



Source: IWF, via Datastream, Author’s calculations.

However, the more national debt has grown, the stronger the pressure is on central banks to keep interest rates low. This can result in persistence of the low-interest rate policy and quantitative easing, because of high government debt levels: Once an interest rate of (almost) zero has been reached and government debt is at a record level, it is politically difficult to raise the central bank interest rate. Indeed, the restrictive monetary policy stance would potentiate the burden of interest on the revolving debt stocks for three reasons: Firstly, the negative economic impact of a tightening of monetary policy would lead to further tax revenue losses. Secondly, new stimulus packages would be needed to counteract a rise in unemployment. Thirdly, new instability in the financial sector would force further recapitalizations or the nationalization of banks. All the effects together would drive up even further not only the level of government debt, but also the risk premiums on government bonds.

Figure 12 shows a simulation of the interest burdens of a tightening of monetary policy for the Japanese government budget. Since the Japanese bubble burst in 1989, national debt as a share of GDP has risen from 60% to roughly 250%. The simulation assumes a current average interest rate of two per cent on Japanese government bonds. At this level of interest, a good 20 per cent of Japanese government income is spent on interest payments. The simulation is based on the assumption that an end to the unconventional monetary policy would lead to an increase in interest rates on government bonds.

If the returns on government bonds were to rise to an average of four per cent, then 40 per cent of the national budget would need to be spent on debt service. This would severely restrict the Japanese state's financial clout. If they were to rise to more than five per cent, which was far from unheard of in the 1980s, the Japanese government would be financially incapacitated. If a tightening of monetary policy were to cause national debt to rise further still, this would also result in a further multiplication of interest burdens. A scenario where the government would have to spend 80 per cent of its budget on interest burdens (debt levels at 300 per cent of gross domestic product and an average interest rate of six per cent on government bonds) is not unrealistic. It is therefore not surprising that Japan's Abe administration has kept a tight rein on the once independent central bank under Governor Kuroda.

But even an independent central bank may have little incentive to raise interest rates with no pressure coming from the government. Many central banks have accumulated risky assets on their balance sheets as a result of unconventional monetary policy (e.g. by purchasing asset backed securities and government bonds). If interest rate increases meant that value adjustments became necessary on the securities held on their balance sheets, this would deplete their own equity. The central bank would have to rely on recapitalization by the state, in turn undermining its financial independence. This is currently most obvious in Japan, where the bubble burst earlier and national debt has risen to the highest level among industrialized countries.

4.2 Hysteresis Effects Due to Interrupted Monetary Policy Transmission

The established model generations assume that monetary policy affects the price level by changing interest rates and steering expectations (Taylor 1993, Woodford 2003).¹⁹ Following Woodford (2003), by applying a rule-based monetary policy in a fiat money system it is possible to achieve a specific inflation target without paying particular attention to monetary aggregates. With this in mind, an increasing number of central banks have established specific inflation targets, communicated their monetary policy decisions to the financial markets and paid ever-decreasing attention to monetary aggregates. One key assumption for this model is that in the medium term monetary policy decisions are reflected in changes in the measured rates of inflation.²⁰

However, the relationship between short-term interest rates and inflation and, once rates have reached zero, the relationship between (the communication of) long-term low interest rates and an expansion of central bank balance sheets by purchasing (long-term) assets, does not have the assumed stability. The policy of low interest rates also persists because, given the changing monetary policy transmission, interest rate cuts and the expansion of central bank balance sheets through the purchase of assets no longer go along with an increase in consumer price inflation.

¹⁹ Monetary policy according to Woodford (2003) is similar to Wicksell (1898) in that interest rates are used to control inflation. Woodford (2003) calls his models “neo-Wicksellian”. However, one considerable difference is that the model framework by Woodford (2003) does not require monetary aggregates, whereas according to Wicksell (1898) these play an important role in the transmission of changes in interest rates to inflation via credit creation. For a detailed analysis of the similarities and differences between Wicksell (1898) and Woodford (2003) see Barbaroux (1997).

²⁰ This is based on the Taylor rule (Taylor 1993).

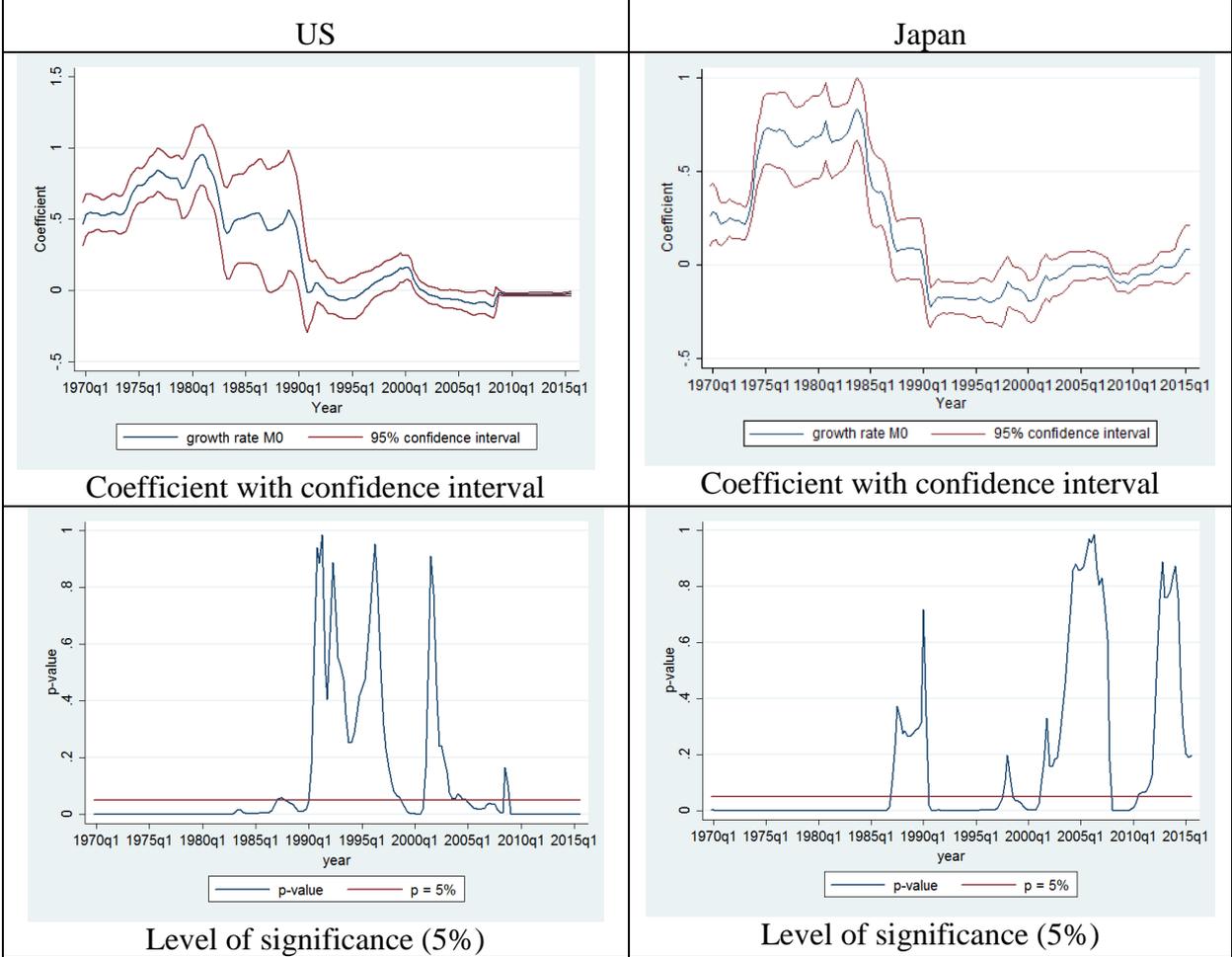
The theoretical basis of Figure 13 is the quantity equation which links an increase in the monetary base beyond growth in the quantity of goods with an increase in the price level.²¹ Based on backward-looking ten-year windows, it estimates rolling coefficients which model the effect of growth in the monetary base (minus real growth) on inflation. Sufficiently long time series are available for the US and Japan. For the US it can be observed that in the 1970s the assumed relationship between the monetary base and consumer price inflation is positive and statistically significant. This relationship becomes less pronounced in the course of the 1980s and is no longer detectable from the 1990s. By contrast, a statistically significant negative relationship seems to emerge from the turn of the millennium. This could mean that the expansion of the Federal Reserve's balance sheet leads to a drop in the inflation rate. For Japan too, there is a positive statistically significant relationship between growth in the monetary base and inflation during the 1960s and 1970s. This relationship collapses in the 1980s. After that, the correlation between the monetary base and inflation is negative, sometimes even at a statistically significant level.

Expansions of the monetary base may dampen inflation via the following channels. If the unconventional monetary policy initially causes a rise not in consumer, but in asset prices, then wealth effects can cause the demand for consumer goods to rise because some people feel richer. But there is a delay in the increase in consumer prices, meaning there is a time lag before the inflation upper limit is reached. If redistributive effects initially cause a rise in demand for mainly luxury goods, which are not included or are highly underrepresented in the predefined consumer basket, then substitutions between the various groups of products result

²¹ According to Friedman (1970: 24), "inflation is always and everywhere monetary phenomenon." He assumes a stable long-term negative relationship between the key interest rate and the monetary base. If the central bank extends its monetary base by purchasing assets at a money market interest rate above zero, the volume of central bank money offered to the banking sector increases. From a theoretical perspective, if there is a constant demand for money the interest rate must fall in order to meet the condition of equilibrium in the money market. In monetary policy practice, the monetary base consists of several components (autonomous factors, standing facilities and open market operations), of which only open market operations are controlled directly by the central bank. The reserves of commercial banks at the central bank are largely independent of interest rates in the short term. What are decisive are the demand from banks for minimum reserves and the holding of excess reserves, which depend on factors such as the uncertainty of payment flows or characteristics of the payment system. However, in the medium term the economic cycle plays a role in the development of the monetary base, if it is associated with a change in bank lending. If for example the central bank lowers the interest rate (as an operational objective of monetary policy), which leads to increased bank lending under normal conditions, then the demand for the monetary base provided by the central bank increases. Since the money market interest rate has reached zero in many industrialized nations, the monetary base, or the size of a central bank's balance sheet, has become a direct instrument of monetary policy. Monetary policy is based on expanding the central bank balance sheet by purchasing (all kind of) assets. The money market interest rate is close to zero, or even below zero, while the purchase of assets as part of the unconventional monetary policy puts pressure on interest rates for long-term investments, including government bonds.

in more inflation. Even so, the monetary policy transmission towards higher inflation is delayed even further.

Figure 13: Rolling Coefficients for the Effect of the Monetary Base on Inflation



Source: IMF, quarterly data. First row: coefficients of rolling regression of inflation (backward weighted ten-year window) on the growth rate of the monetary base (minus real growth); second row: p-value of the rolling regression.

It is possible that the relationship between the monetary base and inflation is delayed to an extent that inflation will not rise noticeably until a considerable bubble has already built up in one or another segment of the asset markets. If the central bank then raises its interest rate in an effort to curb the looming inflation, the bubble will burst. The outbreak of the crisis dampens the risks of inflation once more, while this expansionary monetary policy crisis therapy sows the seeds of new asset price bubbles.

Even more, an ultra-loose monetary policy can lead to inflation – as measured in the usual consumer price indices – actually falling instead of rising. There are at least four reasons for this. Firstly, in many countries central bank interest rate cuts and the expansion of the

monetary base were/are often associated with excesses in real estate markets. Boom periods in real estate markets are usually accompanied by booms in the construction industry, as the demand for real estate increases. The impacts on consumer price indices are low. Although prices for new rentals rise, housing market regulations dampen any transmission from rising real estate prices to average rental rates. The construction boom does however create additional capacity, which dampens rental rates in the long term after the bubble bursts.

Secondly, the additional cheap liquidity triggers a drop in borrowing costs for enterprises. What is more, low interest rates are in many cases paired with boom phases in the stock markets. Bearing in mind the significant increase in global competition following the entry of China and many Central and Eastern European countries into the world economy, the declining cost of capital may have contributed to price reductions in the product markets. This has contributed to low consumer price inflation.

Thirdly, financial institutions can use the additional liquidity to purchase government bonds, meaning government spending will continue to grow. A shift in demand from private to public is not reflected by the established consumer price indices. Fourthly, the distributional effects of boom-and-crisis cycles in the financial markets indirectly bring about income repression, which dampens consumption among those sections of the population whose consumption habits are modelled in the consumer price indices of central banks (see section 3.3).

4.3 Growth Effects of Persistently Expansionary Monetary Policy

According to the neoclassical growth theory, growth is explained by the accumulation of capital towards a long-term equilibrium between investment and depreciation (steady-state economy). The steady state is based on the assumption of a declining marginal efficiency of capital when the stock of capital increases (Solow 1956, Swan 1956). Only through innovation and technological progress, which can also be interpreted as increasing productivity, can growth be positive in the long term (Solow 1957). In this context, an asymmetric monetary policy can affect growth dynamics if it has a negative impact on innovation and productivity.

The implicit nationalization of the banking sector causes productivity gains to fall in the corporate sector (zombie firms as described by Caballero, Hoshi and Kashyap (2008), “evergreening” according to Peek and Rosengren (2005) and “Soft Budget Constraints” according to Kornai (1993)) (see also 3.2). Leibenstein (1966) regards incentives and motivation as major factors in a concept of efficiency which goes beyond allocative efficiency (assuming constant production costs in different types of markets such as polypolies and monopolies) (X-(in)efficiency). He assumes that businesses do not realize all possible efficiency gains and that production costs rise when competition is limited. According to Hayek’s (1968) *Competition as a Discovery Procedure*, declining intensity of competition slows innovation.

A form of Leibensteins (1966) X-inefficiency can arise when asymmetrical monetary policy results in the creation and cementation of structural distortions.²² Liquidity and loans are provided independently of efficiency criteria, causing the average productivity of zombie firms supported by zombie banks to decline. A reduced pace of innovation, which according to Hayek (1968) is triggered by lower competition, may have an equally negative impact on productivity.

By shifting and tying resources to sectors with low or negative productivity gains, in the context of the Solow-Swan model a negative allocative effect is created which results from declining average productivity (defined as output per unit of labour). From the perspective of companies, average costs will rise *ceteris paribus*. At the macroeconomic level, fewer goods and services are produced with a constant amount of labor. Since declining output also entails a decrease in savings per worker, this results in an additional negative growth effect because households make fewer savings available for investment.

Another determinant favouring lower growth is declining household savings and, coupled with this, declining investments, which result from reduced incentives for people to save. The transmission channel from monetary policy towards reduced savings activity is financial repression, which drives down returns on low-risk investments.²³ Real household savings fall, meaning real investments also fall and in turn production opportunities increase less – or they

²² On the impact of credit booms on the allocation of labor and productivity dynamics see also Borio et al. (2016).

²³ Following Rothbard (2009), the monetary marginal returns of capital, which are defined as a discounted monetary product of capital, decline.

even decrease, depending on the level of depreciation.²⁴ Once depreciations exceed gross investment, the result is a downward spiral of declining returns on capital, households saving less, declining investments and a declining output. The foundation of prosperity dwindles.

5 Economic Policy Implications

We have argued that ultra-loose monetary policies originating in the large advanced countries can discourage investment and lead to adverse distributional effects. Both factors are reflected in declining growth and political dissatisfaction of increasing shares of the societies. In many countries this process has led to growing political polarization. As a consequence, policies which aim at curtailing the negative side effects of ultra-loose monetary policies such as minimum wages, financial regulation, rent controls, taxation of higher income classes etc. add further distortions and an additional drag on growth.

Our interpretation of the current secular stagnation as the outcome – and not the origin – of the ultra-low interest rate-policies is in line with Hayek (1929, 1931, 1944). He described the events leading up to the Great Depression and the following stagnation as an outcome of too loose monetary policies, intervention spirals and creeping nationalisation in response to the crisis. To stop the resulting vicious circle of policy interventions and declining growth a timely exit from the ultra-low monetary policy is necessary to reconstitute the allocation and signalling function of the interest rate as well as the principle of liability in financial markets. By gradually and irrevocably raising interest rates, growth could be restored via – at least – five transmission channels.

First, risk would be priced again based on market forces and the incentives for financial market speculation would be reduced. The resulting cleansing process would set free capital and labour for real investment which was previously bound in sectors with low productivity. The increasing interest rates would provide an incentive for more household saving to finance growing investment. The marginal and average productivity of investments would increase again. Aggregated saving and investments as well as innovation would be strengthened.

²⁴ Similar reasoning can be found in McKinnon (1973) and Shaw (1973), who identify financial repression as a major obstacle to growth in developing countries.

Second, growing debt-servicing costs would force governments to consolidate their spending by pushing forward structural reforms. Parts of the public economic activity would have to be privatized, which would contribute to an increasing average productivity of previously public expenditure. By substituting public consumption and investment by private investment, the average productivity of investment would increase.

Third, rising interest rates and fiscal consolidation would force banks to restore their traditional business model. The banking sector would return to its very task to finance investment projects with the highest expected returns (instead of buying government bonds). This would lead to pressure on enterprises to come up with innovative investment projects. A higher degree of X-Efficiency would be reached. Productivity gains would, fourthly, allow real wages to grow again. This would be even more the case for the middle and low income classes if the redistribution effects of boom and bust in financial markets would be eliminated. A growing purchasing power of broad parts of the society would help fully use the newly created capacities. Growing income levels would contribute to higher tax revenues for the state, which could be used to reduce debt.

Fifthly and probably most importantly, political polarization would be contained. The political pressure towards regulation, price and rent controls and redistribution of wealth etc. would be eased. A higher degree of economic freedom would help – in the spirit of Hayek (1944, 1968) – to create sustainable growth and to secure welfare for all parts of the society. To which extent the exit from ultra-low monetary policies is politically feasible or desirable hinges on the awareness of the electorate about the negative implications of this very policy. This paper suggests that an end of ultra-low interest rate-policies is a prerequisite for a return to a sustainable growth path.

References

- Adrian, Tobias / Shin, Hyun Song (2008): Liquidity, Monetary Policy and Financial Cycles. *Current Issues in Economics and Finance* 14, 1.
- Akerlof, George (1970): The Market for Lemons: Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics* 84, 3, 488–500.

- Barbaroux, Nicolas (1997): Woodford and Wicksell: a Cashless Economy or a Moneyless Economy Framework? *History of Economics Society 2007 Annual Conference*, June 2007, Fairfax/Virginia, United States.
- Barnett, Alina / Chiu, Adrian / Franklin, Jeremy / Sebastián-Barriel, María (2014): The Productivity Puzzle: a Firm-Level Investigation into Employment Behaviour and Ressource Allocation over the Crisis. *Bank of England Working Paper* 495.
- Blinder, Alan / Reis, Ricardo (2005): Understanding the Greenspan Standard. *Princeton University Department of Economics Working Papers* 88.
- Brunnermeier, Markus / Schnabel, Isabel (2014): Bubbles and Central Banks: Historical Perspectives. *Mimeo*.
- Bernanke, Ben (2005): *The Global Saving Glut and the U.S. Current Account Deficit*. Remarks at the Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia.
- Bernanke, Ben (2014): *The Federal Reserve: Looking Back, Looking Forward*. Speech at the Annual Meeting of the American Economic Association, Philadelphia, 3 January 2014.
- Caballero, Ricardo / Hoshi, Takeo, / Kashyap, Anil (2008): Zombie Lending and Depressed Restructuring in Japan. *American Economic Review* 98, 5, 1943–1977.
- Cantillon, Richard (1931): *Abhandlung über die Natur des Handels im allgemeinen*, Jena.
- Cardarelli, Roberto / Lusinyan, Lusine (2015): U.S. Total Factor Productivity Slowdown: Evidence from the U.S.. *IMF Working Paper* 15/116.
- De Grauwe, Paul (2011): Monetary Policy and Animal Spirits. *Economic Theory* 47, 2-3, 423–457.
- Draghi, Mario (2014): *The Path to Recovery and the ECB's Role*. Speech by Mario Draghi, President of the ECB, at the Symposium on Financial Stability and the Role of Central Banks organised by the Deutsche Bundesbank, Frankfurt am Main, 27 February 2014
- Friedman, Milton (1970): *Counter-Revolution in Monetary Theory*. Wincott Memorial Lecture, *Institute of Economic Affairs Occasional Paper* 33.
- Gopinath, Gita / Kalemli-Özkan, Şebnem / Karabarbounis, Loukas / Villegas-Sanchez, Carolina (2015): Capital Allocation and Productivity in South Europe. *Mimeo*.
- Hayek, Friedrich August von (1929 [1976]): *Geldtheorie und Konjunkturtheorie*, Salzburg, Philosophia Verlag.
- Hayek, Friedrich August von (1937 [1989]): *Monetary Nationalism and International Stability*, Augustus Kelley Publishers, Fairfield, New Jersey.
- Hayek, Friedrich August von (1944): *The Road to Serfdom*, Routledge, London.

- Hayek, Friedrich August von (1968): Der Wettbewerb als Entdeckungsverfahren. In: Internationales Institut „Österreichische Schule der Nationalökonomie“ (Hrsg.): Die Österreichische Schule der Nationalökonomie. Texte - Band II von Hayek bis White. Wien: Manz'sche Verlags- und Universitätsbuchhandlung, 119-137.
- Hoffmann, Andreas / Schnabl, Gunther (2008): Monetary Policy, Vagabonding Liquidity and Bursting Bubbles in New and Emerging Markets – An Overinvestment View. *The World Economy* 31, 1226–1252.
- Hoffmann, Andreas / Schnabl, Gunther (2011): A Vicious Cycle of Manias, Crises and Asymmetric Policy Responses – An Overinvestment View. *The World Economy* 34, 382–403.
- Hoffmann, Andreas / Schnabl, Gunther (2014): Monetary Policy in Large Industrialized Countries, Emerging Market Credit Cycles, and Feedback Effects. *CESifo Working Paper* 4723.
- Hoffmann, Andreas / Zemanek, Holger (2012): Financial Repression and Debt Liquidation in the US and the Euro Area. *Intereconomics: Review of European Economic Policy* 47, 6, 344-351.
- Howden, David / Salerno, Joseph (eds.) (2014): The Fed at One Hundred: a Critical View on the Federal Reserve System. Springer: Berlin.
- Ishikawa, Daisuke / Tsutsui, Yoshiro (2005): Has a Credit Crunch Occurred in Japan? *RIETI Discussion Paper* 06-E-012.
- Jorda, Oskar / Schularick, Moritz / Taylor Alan (2015): Betting the House. *Journal of International Economics* 96, 1, 2–18.
- Keynes, John Maynard (1936): *The General Theory of Employment, Interest, and Money*, London.
- Kiyotaki, Nobuhiro / Moore, John (1997): Credit Cycles. *Journal of Political Economy* 105, 2, 211–248.
- Koo, Richard (2003): *Balance Sheet Recession: Japan's Struggle with Uncharted Economics and its Global Implications*, Wiley and Sons.
- Kornai, János (1986): The Soft Budget Constraint. *Kyklos* 39 1, 3–30.
- Laubach, Thomas / Williams, John (2015): Measuring the Natural Rate of Interest Redux. *Federal Reserve Bank of San Francisco Working Paper* 2015-16.
- McKinnon, Ronald (1973): *Money and Capital in Economic Development*. Washington: The Brookings Institution.
- McKinnon, Ronald (2012): Zero Interest Rates in the United States Provoke World Monetary Instability and Constrict the U.S. Economy. *SIEPR Policy Brief*, Stanford, August 2012.

- Mises, Ludwig von (1912): *Die Theorie des Geldes und der Umlaufmittel*, Duncker und Humblot, Leipzig.
- Mises, Ludwig von (1949 [1998]): *Human Action*, 4th ed., FEE, New York.
- Peek, Joe / Rosengren, Eric (2005): Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan. *American Economic Review* 95, 4, 1144–1166.
- Posen, Adam (2000): The Political Economy of Deflationary Monetary Policy. In: Mikitani, Ryoichi and Posen, Adam (eds.), *Japan's Financial Crisis and Its Parallels to U.S. Experience*, Institute for International Economics, Washington D.C., 194–208.
- Rothbard, Murray 1962 [2009]): *Man, Economy and State*. Second Edition. Ludwig von Mises Institute, Auburn, Alabama.
- Schnabl, Gunther (2015a): Monetary Policy and Structural Decline: Lessons from Japan for the European Crisis. *Asian Economic Papers* 14, 1, 124–150.
- Schnabl, Gunther (2015b): Die gefährliche Missachtung der Vermögenspreisinflation. Zur Wirkungslosigkeit von Inflationszielen als geldpolitische Regelmechanismen. *Leviathan* 43, 2, 139–162.
- Schumpeter, Joseph (1912): *The Theory of Economic Development*, Cambridge, Massachusetts.
- Selgin, George (2014): Operation Twist-the-Truth: How the Federal Reserve Misrepresents Its History and Performance. *Cato Journal* 34, 2, 229–263.
- Selgin, George / Lastrapes, William / White, Lawrence (2012): Has the Fed been a Failure? *Journal of Macroeconomics* 34, 3, 569–596.
- Sekine, Toshitaka / Kobayashi, Keiichiro / Saita, Yumi (2003): Forbearance Lending: The Case of Japanese Firms. *Bank of Japan Institute for Monetary and Economic Studies* 21, 2, 69–92.
- Shaw, Edward (1973): *Financial Deepening in Economic Development*. New York: Oxford University Press.
- Shimizu, Yoshinori (2000): Convoy Regulation, Bank Management and the Financial Crisis in Japan. In: Mikitani, Ryoichi and Posen, Adam (eds.), *Japan's Financial Crisis and Its Parallels to U.S. Experience*, Institute for International Economics, Washington D.C., 57–99.
- Solow, Robert (1956): A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics* 70, 1, 65–94.
- Solow, Robert (1957): Technical Change and the Aggregate Production Function. *Review of Economics and Statistics* 39, 2, 312–320.
- Summers, Larry (2014): U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound. *Business Economics* 49, 2, 65–73.

- Swan, Trevor (1956): Economic Growth and Capital Accumulation. *Economic Record* 32, 2, 334–361.
- Taylor, John (1993): Discretion versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy* 39, 195–214.
- Taylor, John (2007): Housing and Monetary Policy, *NBER Working Paper* 13682.
- Yoshino, Naoyuki / Mizoguchi, Tetsuro (2010): The Role of Public Works in the Political Business Cycle and the Instability of the Budget Deficits in Japan. *Asian Economic Papers* 9, 1, 94–112.
- von Weizsäcker, Christian (2013): Public Debt and Price Stability. *German Economic Review* 15, 1, 42–61
- Wicksell, Knut (1898 [2005]): *Geldzins und Güterpreise*, FinanzBuch Verlag, München.
- Woodford, Michael (2003): Interest and Prices. Foundations of a Theory of Monetary Policy, Princeton University Press, Princeton.