ADVERSE EFFECTS OF UNCONVENTIONAL MONETARY POLICY

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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, and low rates of inflation. Specifically, in Japan and in large parts of the eurozone the crises persist. In large parts of the world, unconventional monetary policies—that is, ultra-low interest rates and large-scale asset purchases, also known as "quantitative easing" (QE)—are seen as important determinants of employment and growth. The announced exit from unconventional monetary policy in the United States, where growth appears more robust, has clouded the growth perspectives of many emerging market countries. The Chinese growth engine, which was a main driver of world growth during the 2000s, has begun to stutter—and emerging market corporate bond markets have 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 2011), asymmetric information and financial constraints

(Bernanke, Gertler, and Gilchrest 1996). Another strand of literature suggests that a savings glut—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 overly expansionary monetary policies during the 2000s sowed the seeds for financial exuberance and therefore the current crisis (Taylor 2007; Jorda, Schularick, and Taylor 2015). Adrian and Shin (2008), Brunnermeier and Schnabel (2014), as well as Hoffmann and Schnabl (2008, 2011, 2014), have shown that overly expansionary monetary policy can contribute to financial market bubbles that lead to crisis. Selgin (2014), Selgin, Lastrapes, and White (2012), as well as Howden and Salerno (2014), see public central banks at the root of macroeconomic instability.

Depending on the view of the very roots of the crisis, policy recommendations point in different directions. One side emphasizes the need for unconventional monetary policy to stabilize the financial system—for example, by easing collateral constraints to maintain growth and employment (Draghi 2014, Bernanke 2014). In contrast, the other side sees ultra-low interest rate policy and QE as major sources of distortions and bubbles. These critics demand a timely exit from unconventional monetary policy to prevent further distortions caused by boom and bust in the financial markets.

This article contributes to the second strand of literature. We discuss the developments during the last three decades against the backdrop of the monetary overinvestment theories of Wicksell (1898), Mises (1912), and Hayek (1929, 1937). In particular, we elaborate on channels through which ultra-low interest rate policies can contribute to a decline in investments and growth in the world economy.

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

In order to model boom-and-bust cycles 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 natural interest rate i_n is the interest rate that balances the

supply (saving) and demand (investment) of capital.[1] Third, the central bank's policy interest rate i_{cb} shall represent the interest rate that commercial banks are charged by the central bank for refinancing operations. Fourth, we define the capital market interest rate i_c as the interest rate set by the private banking (financial) sector for credit provided to private enterprises. For simplicity, we shall assume that central banks simply set a policy interest rate and that the capital market interest rate equals this policy interest rate (see Hoffmann and Schnabl 2011).

According to the monetary overinvestment theories, an economy is in equilibrium when the natural rate of interest equals the policy interest rate—that is, planned saving (S) equals planned investment (I). 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 rightward shift of the investment curve from $I_{i_{i1}}$ to $I_{i_{i2}}$. The natural rate of interest rises along from i_{n1} to i_{n2}. Credit demand in the economy rises.

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[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 (S) and investment (I) plans, bringing about inflationary ($I > S$) or deflationary ($S > I$) processes. 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; additional money 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 malinvestment or overinvestment phenomena as mismatches 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).

FIGURE 1
EQUILIBRIUM
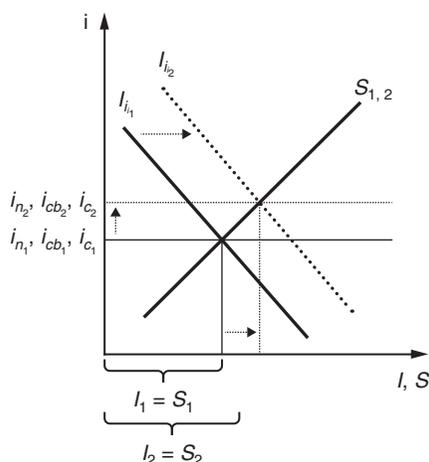
If the central bank increases the policy interest rate from i_{cb_1} to i_{cb_2}, assuming a perfect interest rate transmission to credit markets, planned saving and investment in the economy will stay in equilibrium ($S_2 = I_2$). If, however, the central bank does not raise the policy interest rate, ($i_{n_1} = i_{cb_1} = i_{cb_2} < i_{n_2}$) 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 a Type 1 error in monetary policy.

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 spillovers to financial 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

FIGURE 2
BOOM AND BUST
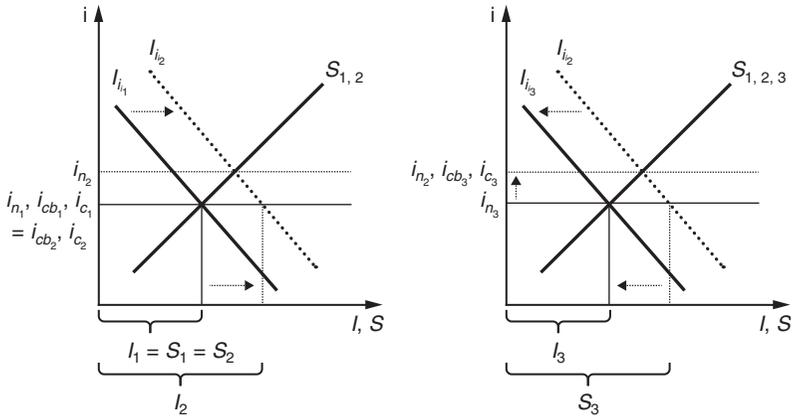
move upward, trend-followers will provide extra momentum such that "the symptoms of prosperity themselves finally become . . . a factor of prosperity" (Schumpeter 1911: 226). Consumption is fuelled by rising stock prices via the wealth channel, which leads, with a lag, to an increasing price level.

The boom turns bust when the central bank increases the central bank interest rate to stem inflation (Mises 1912; Hayek 1929, 1937). 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 $I_{i_{i_2}}$ to $I_{i_{i_3}}$.

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 Type 2 monetary policy error. 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 (1949: 572), "The wavelike movement affecting the economic system, the recurrence of periods of boom which are followed by periods of depression is the unavoidable outcome of

FIGURE 3
SHORT-TERM INTEREST RATES IN G3 ECONOMIES
(ARITHMETIC AVERAGES)
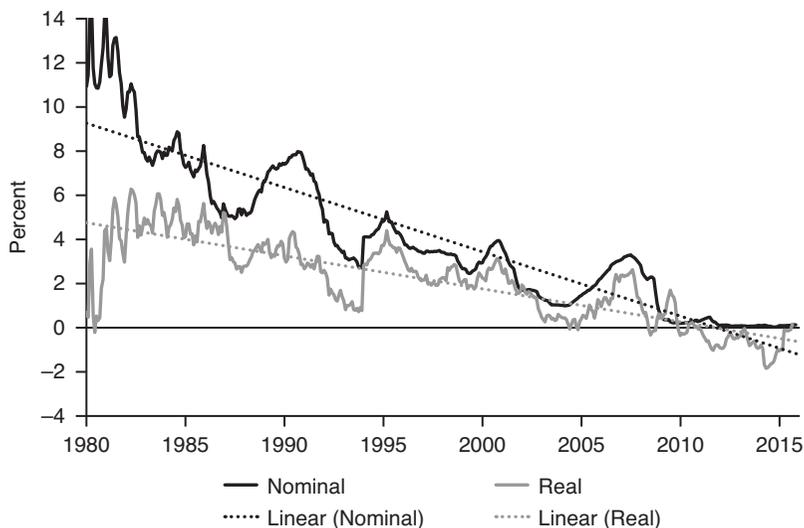
NOTE: The graph shows the arithmetic average of interest rates of the G3 economies, namely the United States, Japan, and Germany up to 1998; later dates include the interest rate of the eurozone.
SOURCE: International Monetary Fund via Datastream, 2016.

the attempts, repeated again and again, to lower the gross market rate of interest by means of credit expansion." 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 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., Type 1 errors in monetary policy). During financial crises, however, central banks have slashed interest rates decisively to stabilize the economy and prevent Type 2 errors in monetary policy. Specifically, in the so-called Jackson Hole consensus, U.S. 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). Consequently, we observe (in cycles) a downward trend in nominal and real interest rates in the large economies (Figure 3).

FIGURE 4
G3 CENTRAL BANK ASSETS AS PERCENTAGE OF GDP
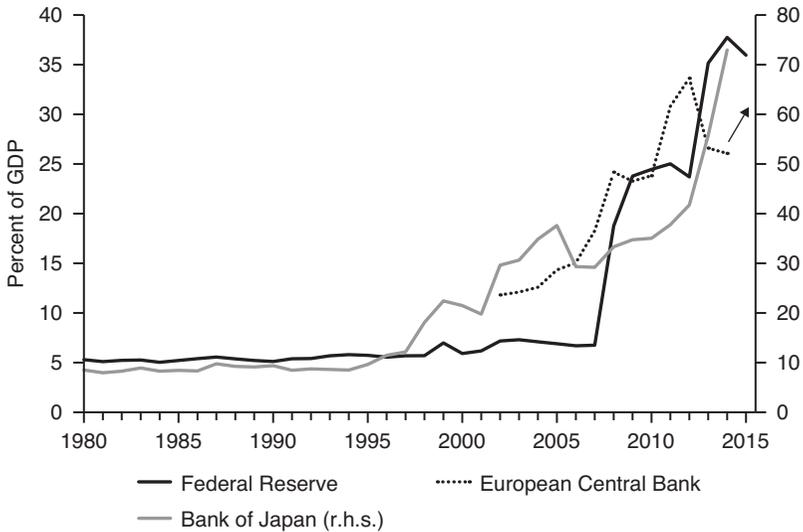
SOURCES: World Economic Outlook, European Central Bank, and Eurostat, 2016.

Once interest rates have reached the zero-bound (in Japan since 1999 and the United States 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 and politically it is difficult to end ultra-low rates on government debt (see Buiter 2010).

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 can 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

FIGURE 5
G3 REAL GROWTH AND INVESTMENT AS SHARE OF GDP
(ARITHMETIC AVERAGES)
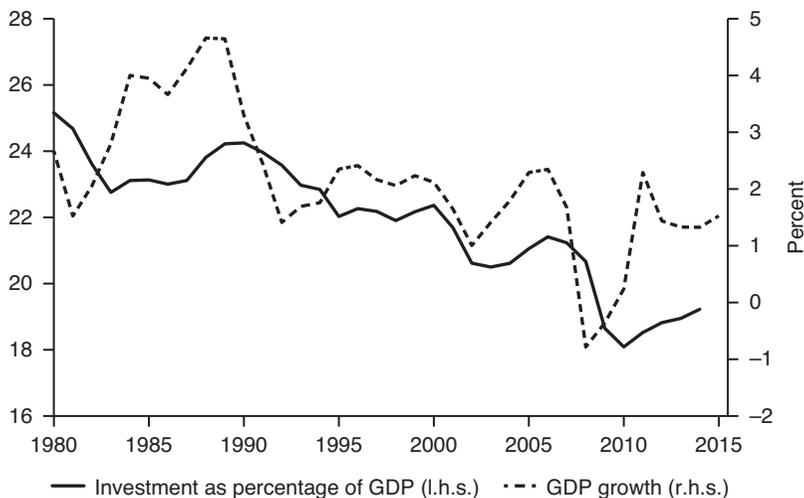
SOURCE: International Monetary Fund via Datastream, 2016.

from 1985 until 1989) and the following crisis (2.5 decades now lost) set in around 15 years earlier than in Europe and the United States. But along with investments, real growth is also declining on average for all three G3 countries (Figure 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.

All three effects can be linked to the unconventional monetary policies in the major industrialized countries.[2] In this sense, we

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[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, Hoffmann 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.

present 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), aging 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 (r), 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 United States). Therefore, this literature suggests that central bank interest rates have to decline further to match the ever-falling natural rate and guarantee goods market equilibrium. In contrast, we maintain that unconventional monetary policies—especially the ultra-low interest rates—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).

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 and threaten 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.

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[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 (ZIRP) 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 spillover of the crisis from the financial to the corporate sector should 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, unconventional 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 (ZIRP) 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.[5]

In the lending markets supported by the banks, too, ZIRP contributes to market shrinkage (Schnabl 2015). ZIRP 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,

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

[5]In line with our article, David Malpass (2015) argues that "the zero interest rate freezes interbank markets and allocates credit away from the economy's growth engines–new businesses."

which becomes visible in the form of increasing corporate savings.[6] The demand for loans declines, and companies tend to purchase more of their own shares, which increases the profit per share and therefore, in many cases, the bonus payments of the upper management.

The banks, which are more strictly regulated and need to amass more equity following the banking crisis, 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, if 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 favored by the Basel capital adequacy rules, which do not set out equity reserves for the purchase of government bonds.[8]

Under the constraint of ZIRP, 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 nonfinancial 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.

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[6]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 countries with surplus savings (overinvestments). 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.

[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 United States. 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.

A further reason lending does not increase during the crisis is that banks face tighter regulation and capital requirements as a 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 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 erode banks' (reported) capital base. Commercial banks tend 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. First, 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." Second, the banking sector tends to replace loans to the private sector by loans to the public sector.

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.

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[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.

[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 2015).

If the banking system is no longer subject to strict budget constraints, then the allocation function of interest rates is undermined. In this case, rescue measures implemented during the crisis through ultra-low rates prevent or delay the structural adjustment process during crisis as stressed by Schumpeter (1911). 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 ZIRP with a misallocation of capital in the credit sector, which keeps companies with poor profit prospects alive ("evergreening").

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 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 efficiency of investments decreases. In the sense of Leibenstein (1966), "X-inefficiency" emerges. If enterprises can expect that cheap credit will be provided without tight conditions with respect to profitability, this expectation discourages the pursuit of innovation and cost savings.

János Kornai (1986) spoke of "soft budget constraints" in the case of companies in Central and Eastern European planned economies. Since unemployment was politically undesirable, nonprofitable companies were kept alive by supplying liquidity via a state-controlled banking system. Quian and Xu (1998) showed that such soft-budget constraints made it harder to select profitable from unprofitable projects as the ex post competition-driven selection mechanism is undermined. Instead, banks rely on ex ante screening, which is costly and less effective, putting a drag on innovative potential of the economy.[12] Indeed, Caballero, Hoshi, and Kashyap (2008) showed for

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[11]In contrast to 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.

[12]See Maskin and Xu (2001) on a discussion of soft-budget constraint theories related to the transition process of planned economies toward market economies.

Japanese companies that under ZIRP company profits became dependent on cheap loans. Although the expansionary Japanese monetary policy has successfully protected jobs, the average productivity of firms has dropped considerably.

Similar developments seem to take place in other industrialized countries, in particular since the advent of ZIRP. 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 United States 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 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 favorable causes additional investment projects with low expected returns to be financed. 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).

FIGURE 6
SYMMETRIC VERSUS ASYMMETRIC MONETARY POLICY

Symmetric Monetary Policy   Asymmetric Monetary Policy
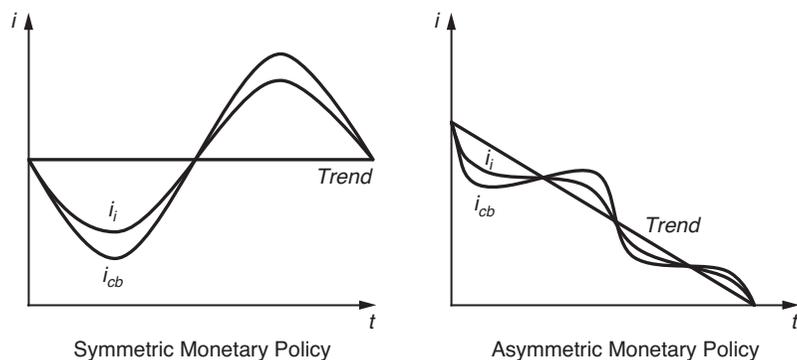
However, if the markets expect a gradually declining interest rate level due to an established asymmetric monetary policy path (like in Figure 3), then the average internal rate of interest necessary to ensure the repayment of loans will also drop. The declining trend in central bank interest rates leads 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 precrisis level, then the average and marginal efficiency of investments continue to decrease (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 stocks), prices are driven upward in other asset classes (for instance, U.S. stocks), making it possible to compensate for the losses in the asset classes affected by the crisis.

In contrast, returns on real investments fall relative to the investments in the financial markets due to at least three reasons. (1) As discussed earlier, 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.

Different expected returns on investments in fixed assets and financial investments create an incentive for companies to substitute speculative financial investments for real investments. In the original monetary overinvestment theories, too 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 nondurable consumer goods sectors, signaling an intertemporal reallocation of funds in favor of projects with higher expected

FIGURE 7
FINANCIAL ASSETS RELATIVE TO NONFINANCIAL
CORPORATE ASSETS
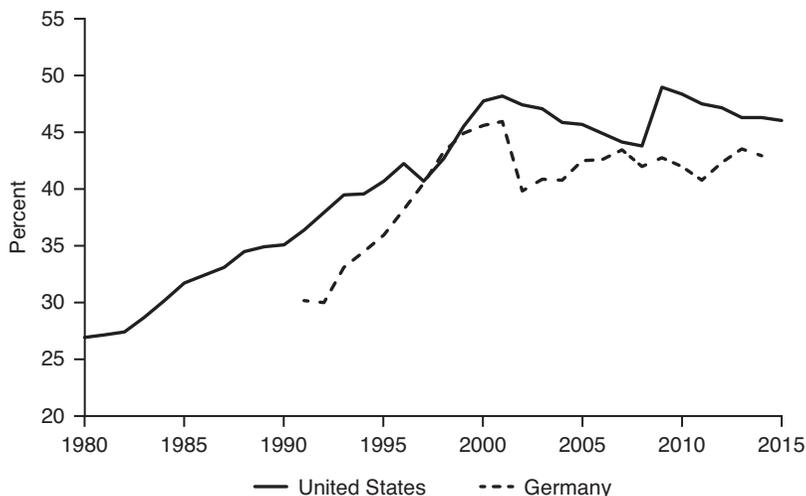
SOURCES: Deutsche Bundesbank and Federal Reserve Bank of St. Louis, 2016.

returns in later periods (vertical malinvestments). In recent boom-and-crisis cycles, the economy's structure saw further shifts from the goods market sector to the financial sector, which sees disproportionately high growth during the boom (horizontal or sectorial malinvestments) (see White 2012). The boundary between the goods market sector and the financial sector is blurred. For example, in the course of a speculative boom in real estate, growth in the real estate sector (construction) may be attributed to either the real or financial sector.[13] If monetary policy behaves asymmetrically, then during the crisis there will be no structural adjustments in the expanded financial sector.

This blurring 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 nonfinancial corporate assets has risen steadily since the 1980s. Figure 7 shows this trend for Germany and the United States, where it can be observed until the turn of the millennium.[14] From a private-sector perspective, it is

[13]Real estate is created as a speculative investment. Once the bubble bursts, many properties are left vacant.

[14]Since then, there is a tendency to use cash holdings for stock purchases.

FIGURE 8
DEMAND COMPONENTS OF JAPANESE GDP, 1980–2014
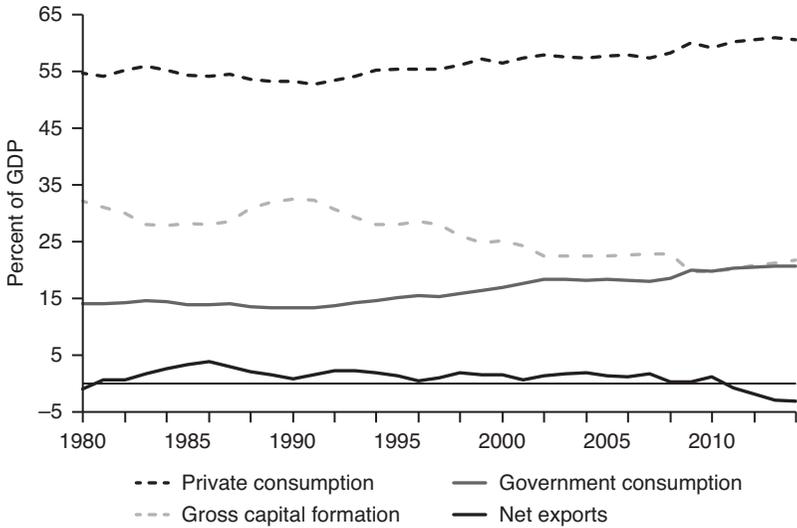
SOURCE: Cabinet Office, Government of Japan, 2016.

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 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—for example, 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 public investments and/or government consumption for private investment. 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 percent in 1990 to 20 percent in 2011. In the same period, government spending as a share of GDP rose from 13 percent to 21 percent. If we assume that public investments have a lower marginal efficiency than private investments, then the average efficiency of investments further decreases.

### Redistributive Effects and Real Wage Repression

The prolonged periods of low interest rates in Japan and in the United States have also had a negative impact on consumption, because they have lowered the income of broad sections of the population. Such distributional effect has an absolute and a relative aspect. In absolute terms, with the marginal efficiency of investment declining, productivity gains also 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 of another social group.

Low interest rate policies can, for instance, favor higher-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 favorable refinancing conditions. They can also acquire stocks, real estate, and securities at lower prices. If via purchases of stocks, real estate, and securities the additional financial means provided by the central bank make their way further into other areas of the economy, then real estate, stock, and security prices increase for the next buyers. This results in redistributive effects in favor of the financial institutions, in the form of valuation gains. Furthermore, the financial sector intermediates a growing volume of capital market transactions, for which firms 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.[15] 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

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[15]The world's largest financial market is in the United States, which is why the data can be assumed to be particularly telling.

FIGURE 9
Wage Development in the U.S. Financial and
Manufacturing Sectors
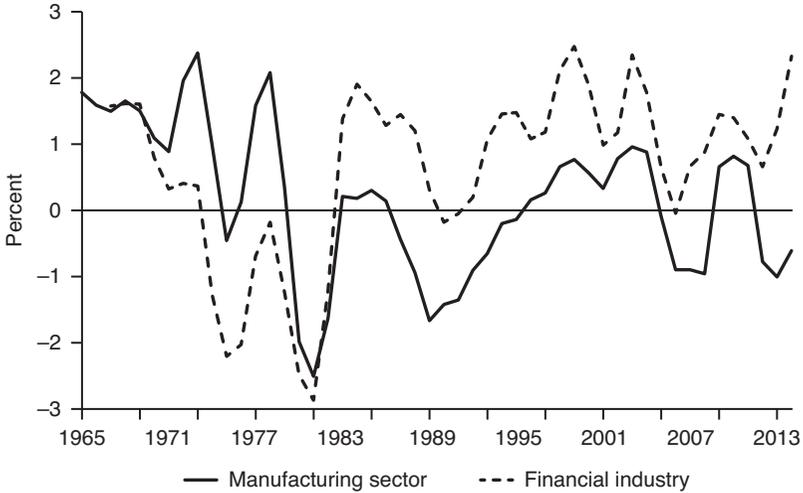
Source: International Monetary Fund via Datastream, 2016.

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 10 shows the potential redistributive effects between individual income groups for the United States. 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 U.S. and Japanese stock markets (NYSE and Nikkei, respectively), while the right axis plots the share of the top 1 percent of incomes as a proportion of the total income of the U.S. 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 globalized financial markets do not necessarily stop at national borders.

The highest income groups in the United States 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 percent of incomes in the United States has risen from around 13 percent to nearly 22 percent of total income. Similar developments can be observed in other industrialized countries.

Hayek (1944: 153) 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.

FIGURE 10
STOCK PRICES (U.S., JAPAN) AND U.S.
INCOME DISTRIBUTION
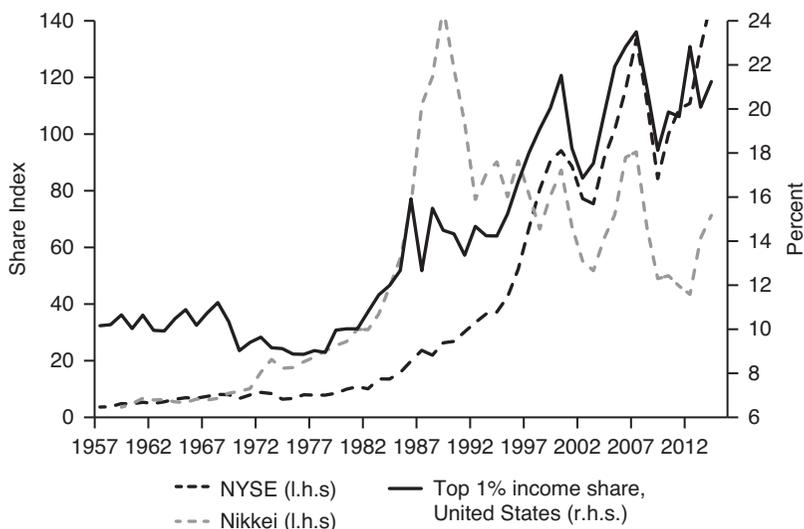
NOTES: NYSE index, 2010 = 100; Nikkei, 2010 = 50.
SOURCE: OECD, Main Economic Indicators, The World Top Incomes Database.

An asymmetric monetary policy geared toward stabilizing asset prices amounts to a guarantee of security for high-income groups if they hold disproportionately large shares of the total assets. In this scenario, middle- and lower-income groups have to bear the risk of boom-and-crisis cycles in the financial markets.[16] If average growth is low, zero, or negative, then the absolute income gains of higher-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 toward zero nominally—and into negative territory in real terms.[17] Figure 11 shows for Japan how, following the implementation of ZIRP, domestic incomes from capital gains, rentals, and dividends dropped sharply after the Japanese bubbles burst at the end of 1989, which indicates financial repression.[18]

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 upward, 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 labor 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

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[16]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.

[17]For more on financial repression, see Hoffmann and Zemanek (2012).

[18]Income components in Figure 11 refer to domestic variables, and as such this does not include comparatively high-risk investments abroad (which are riskier due to exchange rate risks for example), such as in the U.S. stock market. As a result, some Japanese investors may have generated high returns through financial investments abroad.

FIGURE 11
REAL WAGE AND FACTOR INCOME IN JAPAN
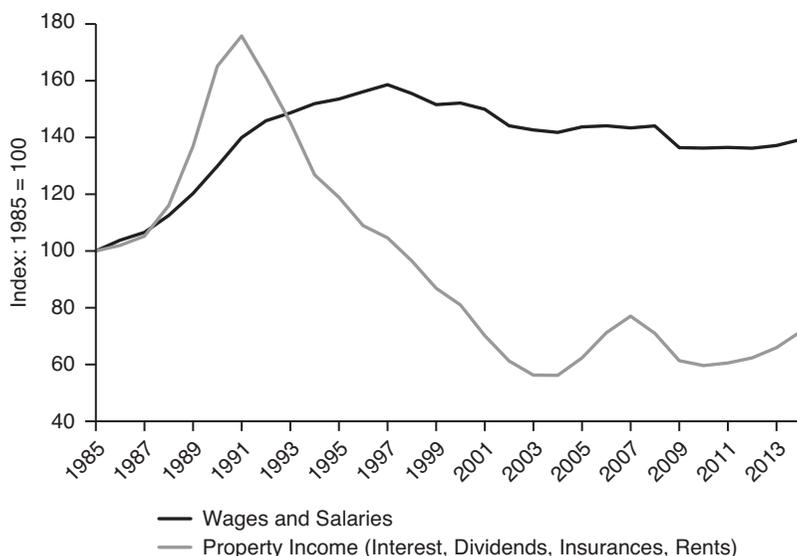
SOURCE: Economic and Social Research Institute, Cabinet Office, Government of Japan.

the outbreak of the European financial and debt crisis stagnated—are increasingly becoming a reality for large parts of their societies. Real wage repression and financial repression, in turn, can be seen as important determinants of weak private demand among a large proportion of the population, which is anticipated by enterprises by lower investment.[19] 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.

Hysteresis and Growth Effects

An asymmetric monetary policy has self-reinforcing effects when it favors an increase in government debt, thereby undermining the independence of monetary policy. In addition, inflation targets

[19]The negative demand effect of declining real incomes is partially offset by declining saving rates of households, particularly the younger generations.

become less effective if additionally created central bank liquidity flows mainly into the financial sector. This may in turn further promote the creeping nationalization of the banking and corporate sector, which can dampen productivity and growth in the long term.

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. First, 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. Second, 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.

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 ZIRP and QE, 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: (1) the negative economic impact of a tightening of monetary policy would lead to further tax revenue losses, (2) new stimulus packages would be needed to counteract a rise in unemployment, and (3) 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 percent to roughly 250 percent. The simulation assumes a current average interest rate of 2 percent on Japanese government bonds. At this level of interest, a good 20 percent of

FIGURE 12
SIMULATION OF INTEREST RATE PAYMENTS OF THE
JAPANESE CENTRAL GOVERNMENT
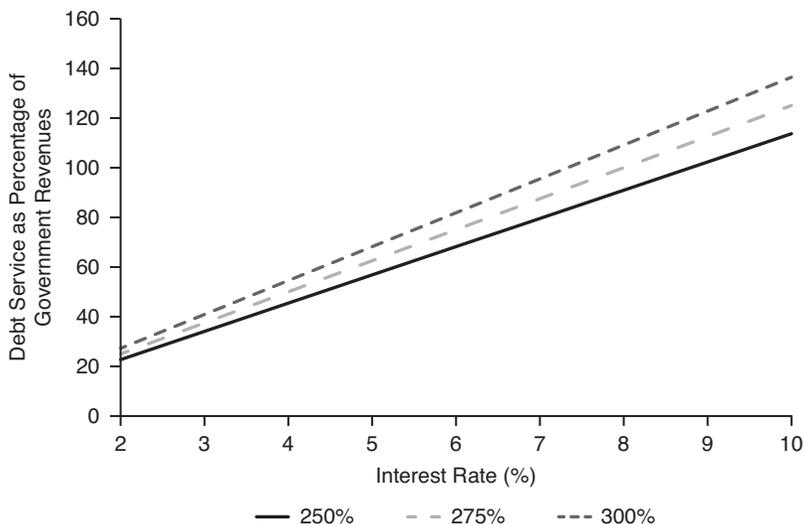
SOURCES: International Monetary Fund via Datastream; authors' calculations.

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 4 percent, then 40 percent 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 5 percent, 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 percent of its budget on interest burdens (debt levels at 300 percent of GDP and an average interest rate of 6 percent 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.

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).[20] 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.

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

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[20]Monetary policy according to Woodford (2003) is similar to Wicksell ([1898] 2005) 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] 2005) 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 and Woodford, see Barbaroux (2007).

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.

The theoretical basis of Figure 13 is the quantity equation that 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 10-year windows, it estimates rolling coefficients that model the effect of growth in the monetary base (minus real growth) on inflation. Sufficiently long time series are available for the United States and Japan. For the United States, 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 has become 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.

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[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.

FIGURE 13
ROLLING COEFFICIENTS FOR THE EFFECT OF THE
MONETARY BASE ON INFLATION
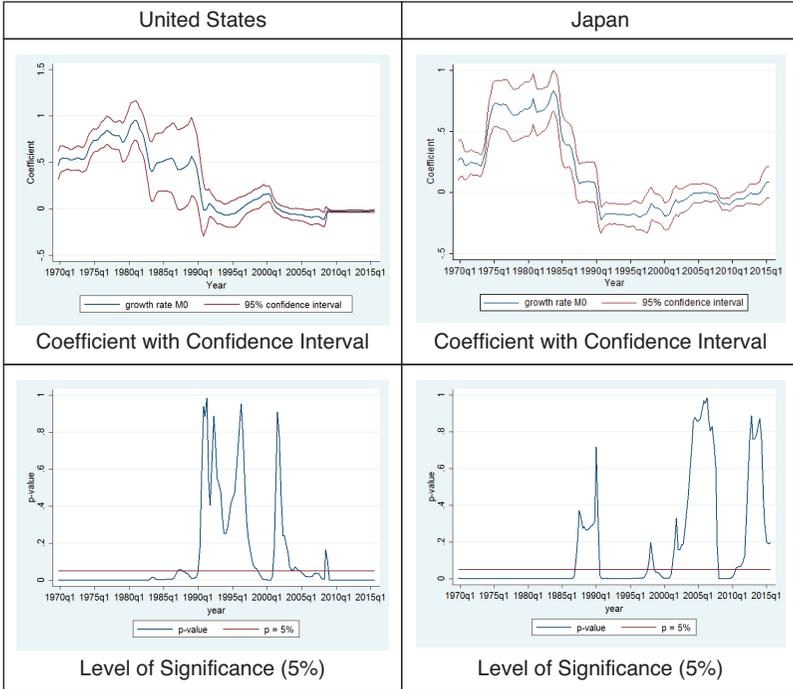
NOTES: First row: coefficients of rolling regression of inflation (backward weighted 10-year window) on the growth rate of the monetary base (minus real growth); second row: p-value of the rolling regression.
SOURCE: International Monetary Fund, quarterly data.

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.

Specifically, given the stark balance sheet expansions of the Fed since October 2008, we would have expected increases in bank lending and inflation. However, the Fed undermines its policy with interest on reserves held at the central bank (see Selgin 2015) as well as macroprudential regulation (Dorn 2015). When reserves are held at the central bank and do not increase M2, inflation is unlikely to

pick up. Further, if unconventional monetary policy causes a rise in asset prices, wealth effects can cause a rising demand for consumer goods because some people feel richer. However, there is a delay in the increase in consumer prices, meaning there is a time lag before the inflation target is reached. If redistributive effects mostly 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 in more inflation. The monetary policy transmission toward higher inflation is, however, delayed even further.

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, unconventional monetary policy can lead to disinflation—as measured in the usual consumer price indices. There are at least four reasons for this. First, 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.

Second, low interest rates are in many cases paired with boom phases in the stock markets, which makes it easier to raise capital. 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 is likely to have contributed to price reductions in the product markets. This has contributed to low consumer price inflation.

Third, 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.

Fourth, the distributional effects of boom-and-crisis cycles in the financial markets indirectly bring about income repression for major parts of the population. This dampens consumption among those sections of the population whose consumption habits are modelled in the consumer price indices of central banks.

Growth Effects of Persistently Expansionary Monetary Policy

According to the neoclassical growth theory, growth is explained by the accumulation of capital toward 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 1986). 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). He assumes that businesses do not realize all possible efficiency gains and that production costs rise when competition is limited.

A form of Leibenstein's (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. Loan provision to new dynamic enterprises becomes more restricted. A reduced pace of innovation, which according to Hayek (1968) is triggered by

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[22]On the impact of credit booms on the allocation of labor and productivity dynamics, see also Borio et al. (2015).

lower levels of 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 labor). 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 favoring 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 toward 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 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.

Economic Policy Implications

We have argued that unconventional monetary policies, especially ultra-low interest rates, in the large advanced countries can discourage investment and lead to adverse distributional effects. We suggest that both factors are reflected in declining economic growth and political dissatisfaction of increasing shares of the societies. In many countries, this process has led to growing political polarization. Consequently, policies that aim at curtailing the negative side-effects of unconventional monetary policy—such as minimum wages, financial regulation, rent controls, and taxation of

[23]Following Rothbard (1962), the monetary marginal returns of capital, which are defined as a discounted monetary product of capital, decline.
[24]Similar reasoning can be found in McKinnon (1973) and Shaw (1973), who identified financial repression as a major obstacle to growth in developing countries.

higher income classes—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 rates is in line with Hayek (1929, 1937, 1944). He described the events leading up to the Great Depression and the following stagnation as an outcome of ultra-low interest rates, intervention spirals, and creeping nationalization in response to the crisis. To stop the resulting vicious circle of policy interventions and declining growth a timely exit from the ultra-low interest rates 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 based on market forces, and incentives for financial market speculation would be reduced. The resulting cleansing process would free capital and labor for real investment, 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 efficiency of investments would increase again. Aggregated saving and investments as well as innovation would be strengthened.

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 likely contribute to an increasing average productivity of previously public expenditure. By substituting public consumption and investment by private investment, the average efficiency of investment should 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 provide incentives to (large) enterprises to come up with more innovative ideas and investment projects. A higher degree of X-efficiency would be reached.

Fourth, productivity gains would 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.

Fifth, and probably most important, political polarization would be contained. The political pressure toward regulation, price and rent controls, and redistribution of wealth 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 interest rates is politically feasible or desirable hinges on the awareness of the electorate about the negative implications of this very policy. This article suggests that an end of ultra-low interest rate policies is a prerequisite for a return to a sustainable growth path.

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