

Latsos, Sophia

**Working Paper**

## The low interest policy and the household saving behavior in Japan

Working Paper, No. 159

**Provided in Cooperation with:**

University of Leipzig, Faculty of Economics and Management Science

*Suggested Citation:* Latsos, Sophia (2019) : The low interest policy and the household saving behavior in Japan, Working Paper, No. 159, Universität Leipzig, Wirtschaftswissenschaftliche Fakultät, Leipzig

This Version is available at:

<https://hdl.handle.net/10419/195770>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



UNIVERSITÄT  
LEIPZIG

Wirtschaftswissenschaftliche  
Fakultät  
Faculty of Economics and  
Management Science

Working Paper, No. 159

Sophia Latsos

**The Low Interest Policy and the  
Household Saving Behavior in Japan**

März 2019

ISSN 1437-9384

# The Low Interest Policy and the Household Saving Behavior in Japan

Sophia Latsos\*

University of Leipzig  
Institute for Economic Policy  
Grimmaische Straße 12  
04109 Leipzig  
latsos@wifa.uni-leipzig.de

## Abstract

This paper scrutinizes the role of prolonged, expansionary monetary policy on the savings behavior of Japanese households, focusing on the dramatic change of the household savings behavior since 1998, from high to low savings. Existing literature generally attributes this behavioral change to the country's shift from a high-growth to a low-growth economy and its demographic change. In contrast, this paper empirically examines changes in the incentives for saving and the ability to save connected to monetary policy. It finds that monetary policy has had a significant impact on Japan's household behavior via three channels: the interest rate channel, the redistribution channel, and the wealth channel.

JEL-Code: E210, E520.

Keywords: Household saving, interest-rate elasticity of saving, Japanese household savings, Bank of Japan, low interest rate policy.

## **Table of Contents**

1. Introduction	2
2. Theoretical determinants of household saving	3
2.1 Classical, Keynesian and neoclassical determinants of household saving	3
2.2 Savings in business cycles, under financial repression and during secular stagnation	7
3. Household saving in Japan	10
3.1 Empirical determinants of Japanese household saving in the past and now	10
3.2 Monetary effects on Japanese household saving	16
4. Empirical estimation framework and results	20
4.1 Data and estimation framework	21
4.2 Estimation results	27
5. Outlook	31
Bibliography	33

## 1. Introduction

The Japanese household saving behavior has undergone a dramatic change over the past 60 years. Until 1975, Japanese household savings have been among the highest in the industrialized world, when households saved nearly one quarter of their disposable incomes (OECD, 2018). Since 1990, however, household savings have dropped significantly. In December 2014, net household savings as percent of GDP and of disposable income turned negative, reaching -0.2% and -0.4%, respectively. In 2017, Japanese household savings were amongst the lowest within the OECD, with 1.8% of GDP and 3.1% of disposable income.

Empirical research shows that the main determinants of the initially high household savings until the 1980s were Japan's rapid post-war economic growth, the subsequently increasing household incomes, and institutional factors (Komiya, 1966; Mizoguchi, 1970; Modigliani and Sterling, 1983; Hayashi, 1986). Moreover, owing to an under-developed social security and welfare system, young Japanese households saved for their retirement, instead of relying on institutional retirement benefits (Komiya, 1966; Hayashi, 1986). Tax alleviations (*maruyū*) also incentivized private precaution (Komiya, 1966; Horioka, 2009). As private credit provision was constrained, households relied on savings to increase current and future consumption (Modigliani and Sterling, 1983).

Since 1998, Japanese household savings as share of GDP and of disposable income have fallen significantly. To explain this phenomenon, the literature focuses on the country's aging society and the effect of such demographic change on the household saving behavior. As the large group of elderly households has begun dissaving, the aggregate household saving rate has started to decline (Koga, 2006; Horioka et al., 2007; Braun et al., 2007; Horioka, 2009; Sheng and Mu, 2012). Owing to demographic change, the mounting pressure on the sustainability of the country's social security system has aggravated the negative trend of household savings (Koga, 2006; Horioka, 2007, 2009; Saito, 2015).

The decline in Japanese household savings has come along with a fall of the main interest rate set by the Bank of Japan towards zero since 1998. Monetary policy makers admit that prolonged expansionary monetary policy, particularly a low nominal and real interest rate, may have a negative impact on savings (Cœuré, 2012; Mersch, 2014; Draghi, 2015). Cœuré (2012) stresses that an unexpected fall in the nominal interest rate and the simultaneous increase in inflation hurts savers, but benefits borrowers. Draghi (2015) is concerned that "very low rates

for a prolonged period might penalize savers to the benefit of debtors”. Nevertheless, the literature has not yet explained the impact of prolonged expansionary monetary policy on the household saving behavior in a systematic way.

Therefore, this research aims to further scrutinize the role of prolonged, increasingly expansionary monetary policy on the savings behavior of Japanese households, including the impact of monetary policy on real incomes. In contribution to the existing literature, the paper distinguishes changes in the incentives for saving and the ability to save. On the one hand, low nominal and real interest rates are a disincentive for saving (interest rate channel). On the other hand, expansionary monetary policy influences real income negatively (labor income channel) and has potential distributional wealth effects, hampering the ability of many households to save (redistribution channel).

## **2. Theoretical determinants of household saving**

Net household savings constitute that portion of the disposable income of households which is not used for final consumption, including the change in net equity of households in pension funds (OECD, 2018). Household saving behavior depends on a household’s preference and ability to save. Theoretical models diverge with respect to the factors that alter both savings preference and ability, and hence determine changes in household savings.

### **2.1 Classical, Keynesian and neoclassical determinants of household saving**

Classical economic theory postulates that households save a portion of their disposable income according to their preference for private profit – a gradual increase of income over time – and their time preference (Smith, 1789). In order to maximize their total profit, households save in time  $t$  in order to consume more in  $t + 1$ . The main determinant of their saving behavior is the real interest rate. Given a rising real interest rate, the opportunity cost of current consumption rises and households save more (Smith, 1789; Ricardo, 1821). As household savings depend positively on the real interest rate it holds that

$$S = S(r), \tag{1}$$

where  $S$  represents household savings,  $r$  represents the real rate of interest, and  $\frac{\partial S}{\partial r} > 0$  so that  $S$  is an increasing function of  $r$ .

Keynesian economic theory suggests that a household's propensity to save depends on one or multiple saving motives. Keynes (1936) identifies eight motives, including the classical preference for private profit (*improvement motive*) and time preference (*intertemporal substitution motive*). Moreover, households safeguard themselves against expected labor income decreases after retirement (*life-cycle motive*), or unexpected future income losses (*precautionary motive*). They may strive for (financial) independence (*independence motive*) or participation in potential business projects (*enterprise motive*), leave bequests (*bequest motive*), or save out of greed (*avarice motive*). Keynes (1936) assumes that saving motives change only slowly so that the propensity to save is relatively stable over time.

Keynes (1936) suggests that a household's ability to save depends positively on the level of current disposable income. Thus, the impact of saving ability and saving motive on total household savings can be approximated by the linear relationship

$$S_t = a + bY_t + \varepsilon, \quad (2)$$

where  $a < 0$ ,  $0 < b < 1$ , and  $\varepsilon$  is the residual.  $S_t$  represents the saving level in period  $t$ , and  $Y_t$  represents the disposable income in the same period. The negative intercept  $a$  indicates that households dissave when their level of disposable income is zero. The marginal propensity to save ( $b$ ) represents a household's motivation to save, indicating that an increasing income corresponds to increasing household savings. The average propensity to save ( $\frac{a}{Y_t} + b$ ) indicates that household savings rise with the level of disposable income.

A household's preference for liquidity affects the way that households save (Keynes, 1936). Households with a high preference for liquidity hoard cash, those with a low preference deposit their savings at a bank. The liquidity preference depends on the degree of precaution and preference for private profit (Keynes, 1936). At times of great economic uncertainty, precautionary households may have a high liquidity preference. At times of economic certainty, rising real interest rates encourage households to deposit their savings at a bank due to the interest profit. Thus, Keynes (1936) acknowledges that household savings also depend on the real rate of interest as households strive for private profit (*improvement motive*).

Neoclassical economic models treat household savings exogenously or endogenously. In the Solow growth model, households save a portion of their disposable income according to an exogenously imposed, fixed saving rate  $s$  (Solow, 1956 and 1957; Swan, 1956). Lacking a behavioral component to household savings, the model does not permit conclusions regarding

a household's savings motives and ability. Economic policies, such as tax policies, are the only possible determinant of  $s$ . If policy makers know that there is a saving rate  $s^*$  ( $0 < s^* < 1$ ) that maximizes steady-state consumption (golden rule savings), they may introduce tax incentives for household savings at  $s^*$  to maximize savings and investment.<sup>1</sup>

In neoclassical models that endogenize household savings, households face an intertemporal optimization problem. Households save to maximize their lifetime utility, subject to their constraints (Ramsey, 1928; Cass, 1965; Koopmans, 1965). Their savings preferences correspond to the life-cycle and permanent income hypotheses (Modigliani and Brumberg, 1954; Friedman, 1957). Both resemble Keynes' (1936) life-cycle motive of saving, according to which households bridge income differences over their life-cycles. In contrast to Keynes, however, the hypotheses postulate that households also consider their expected life-time income growth for their savings decisions.

When households know their point of retirement, they save according to their finite life-cycle so that consumption is stable, but not smooth (Modigliani and Brumberg, 1954). Assuming a constant real interest rate, individual household savings depend on the current life stage, the initial wealth endowment, and lifetime income. Households borrow when young (given their initially low income), repay their debts and save during their working age, but dissave and run down their assets after retirement (Ando and Modigliani, 1963). Thus, population growth pushes the aggregate saving rate up if there are relatively more working-age households than retired households in society. However, households may also save to leave bequests, so that retired households may still have a high saving rate (Modigliani, 1970, 1986). An initially low wealth endowment also affects the household saving rate positively as households save more to accumulate wealth for their retirement (Ando and Modigliani, 1963).

The effect of lifetime income on household savings is twofold since total household income consists of two observable components: labor income and the value of assets. On the one hand, household savings depend positively on the life-time labor income, defined as the current level and the expected growth rate of labor income (Ando and Modigliani, 1963). A household's labor income rises with growing labor productivity. Owing to the wage bargaining involved in this increase, the household anticipates the rising income and expects future consumption to

---

<sup>1</sup> Yet, as savings are exogenous, it is unclear whether households value present or future consumption so that  $s^*$  may not be optimal from a welfare perspective.



rise along with it. In order to accommodate for this, household savings increase (Ando and Modigliani, 1963). On the other hand, household savings depend on the value of assets. Similar to an initially low level of wealth endowment, a currently low asset value encourages households to increase their savings for retirement (Ando and Modigliani, 1963).

However, the effect of lifetime income on household saving is ambiguous if the real interest rate changes. For example, a falling interest rate decreases the opportunity cost of current consumption relative to future consumption so that current saving is less profitable than future saving. Thus, households would want to save less at a given labor income (*substitution effect*). In contrast, the present discounted value of expected future consumption rises, making future consumption more expensive and encouraging households to save more (*income effect*). An interest-rate decrease also changes the present discounted value of assets. Accordingly, future income, such as pension earnings or capital income, rises, encouraging households to currently save less (*wealth effect*) (Ando and Modigliani, 1963; Elmendorf, 1996).

In contrast to the life-cycle hypothesis, the permanent income hypothesis suggests that households save according to an infinite life-cycle (Friedman, 1957). Since they do not know their time of death, households wish to smooth their consumption pattern in a stable manner over time. Assuming a constant real interest rate, they consume according to their average lifetime income, which is based on the moving average of their previous income (permanent income). One-off income fluctuations (transitory income), such as bonus payments, are saved (Friedman, 1957). Changes in the real interest rate alter the permanent part of household lifetime income and thus do not affect household saving behavior (Friedman, 1957).

In the presence of uncertainty, neoclassical models predict that household savings diverge from the predictions of the life-cycle as well as permanent income hypotheses, and that households save out of precaution. If inflation in an economy is unstable, rational households become uncertain about their job security and future income. This induces precautionary household saving against unexpected income losses (Leland, 1968).

Precautious households do not borrow when faced with income uncertainty (Carroll, 1997). Instead, they match their consumption and savings with their current incomes, even if they expect their income to grow over time. Thus, savings of precautionary households depend on current income, similar to the Keynesian (1936) model. The same applies to households that are severely liquidity or credit constraint, and hence cannot borrow (Deaton, 1991; Carroll,

1997).<sup>2</sup> Changes in household saving behavior may only materialize gradually, suggesting the presence of inertia due to habits or customs.<sup>3</sup>

## 2.2 Savings in business cycles, under financial repression and during secular stagnation

According to Austrian theory, a household's time preference determines their savings. Therefore, similar to classical theory, households save according to the interest paid on savings. Household savings depend on the central bank and capital market interest rates vis-à-vis the natural interest rate, which is the equilibrium interest rate balancing supply (savings) and demand (investment) on capital markets. If the central bank and capital market interest rates equal the natural interest rate, savings equal investment ( $I = S$ ) (Hayek (1976 [1929]), Wicksell (2005 [1898]) and Mises (1998, [1949])).

If the central bank and capital market interest rates fall below the natural interest rate, a business cycle emerges and household savings evolve in an anti-cyclical way (Hayek (1976 [1929]), Wicksell (2005 [1898]) and Mises (1998, [1949])). The fall of the central bank interest rate below the natural interest rate triggers an overinvestment boom. Previously risky investments appear more profitable as their financing costs have decreased. Bank credit grows and firms channel capital and labor into these investments, causing a misallocation of resources. They bid up nominal wages to attract additional labor. Aggregate demand and prices rise.

Owing to the deviation of the capital market interest rates from the natural interest rate, households reduce their savings and increase their current consumption (Hayek (1976 [1929]), Wicksell (2005 [1898]) and Mises (1998, [1949])). They may also increase their credit-financed consumption and purchase capital goods, such as mortgage-financed real estate. Given that resources are moved to the investment goods sector and consumption increases, prices have to rise. Since nominal wages increase faster than prices, real wages increase so that consumption rises further.

As inflation accelerates, the central bank has to increase its policy rate. The misallocation of resources becomes apparent and investment projects with low returns have to be dismantled.

---

<sup>2</sup> Gourinchas and Parker (2002) show that precautionary household saving can be consistent with the life-cycle hypothesis. Households that do not wish to borrow may prefer to postpone their consumption as they expect little income growth. Young households that are not able to borrow, may still be able to accrue savings in the course of their working age.

<sup>3</sup> This so-called habit persistence may increase precautionary savings as households with persistent habits tend to dislike income fluctuations (Brown, 1952).

At the turning point of the investment boom, a ‘cleansing effect’ sets in (Schumpeter, 1983 [1912]). Investments fall until the excess stock of physical capital is worked off. Firms release capital and labor from investments that are no longer profitable, and prices decline. Workers accept lower wages in return for job security. This allows nominal wages to decline faster than prices so that real wages fall (Hayek, 1976 [1931]).

The rising interest rate during a recession is an incentive for households to increase their savings. Moreover, households save now in order to repay the debt accrued during the investment boom, such as their previously credit-financed consumption. Real estate owners suffer from falling property prices during the bust as their mortgage debt grows relative to the underlying value of the asset. In this case, they curtail current consumption and increase savings to redeem their high debt. Moreover, falling real incomes impede savings for the purpose of future consumption.

McKinnon (1973) and Shaw (1973) postulate that households save according to their time preference so that their savings depend positively on the real interest rate. Under financial repression, the real interest rate falls below its market equilibrium, affecting the quantity and quality of household savings (Gemech and Struthers, 2003). On the one hand, a government may keep interest rates artificially low to allow cheap refinancing of government debt. This discourages household savings, with a negative impact on the household saving rate, investment and economic growth (Stulz, 1999; Mishkin, 2001). On the other hand, if a government prevents the interest rate from clearing the market, non-market-based forms of saving will emerge, such as the rationing of available credit via auctions or quantitative restrictions on the credit volume by the government. This fosters the rise of investment projects with low profitability, resulting in an inefficient allocation of household savings (Obstfeld, 1998; Gemech and Struthers, 2003; Galindo et al., 2007).

While Shaw (1973) and McKinnon (1973) originally analyzed the effects of financial repression in developing economies, their conclusions may also apply to advanced economies. Reinhart and Tokatlidis (2005) show that advanced economies under a repressed financial system, characterized by government interventions to lower the interest rate, have relatively low household savings. Schnabl (2018) shows that prolonged expansionary monetary policies in advanced economies are equivalent in their effect to that of financial repression in emerging

economies since such policies undermine the allocation function of interest rates and the incentive for household savings.

Despite theoretical grounds for a positive interest rate elasticity of savings, Komiya (1966) points out that a household may have multiple savings motives so that the interest elasticity of household saving must not necessarily be positive. A higher rate of real interest would not necessarily induce higher savings if the household had a strong preference for current consumption, or if the household were content with the interest paid on the principal. Giovannini (1983) and Elmendorf (1996) review empirical evidence for a positive interest elasticity of savings (in developing economies) and find that the sign and magnitude of this elasticity may differ for each country case.

The concept of ‘secular stagnation’ abandons the idea of the interest rate elasticity of saving, arguing that long-run structural changes, particularly demographic change, determine household savings in industrialized economies (Hansen, 1939; Bernanke, 2005; Summers, 2014; von Weizsäcker, 2014; Laubach and Williams, 2015). In line with the life-cycle model, households in aging societies are more prone to save for retirement than to consume during their working-age stage of life.

Accordingly, households in the aging industrialized economies have high saving rates, causing a ‘savings glut’ (Summers, 2014; von Weizsäcker, 2014). As household savings rise, they drag down expected aggregate demand and corporate investments. Owing to slowing technological progress over time, the propensity of enterprises to invest further decreases, which pushes up corporate savings (Hansen, 1939; Bernanke, 2005). Given this household and corporate savings glut, the capital stock declines and the cutback on investments weakens labor productivity. Over time, this causes real wages to fall, which in turn diminishes the ability of households to save.

Visco (2002) suggests that demographic change may have an impact on the structure of a household savings portfolio. As a household’s risk aversion depends negatively on their age, they are expected to shift away from risky assets, such as equity. This change in household’s savings portfolio structures ultimately depends on institutional factors that influence the provision of retirement income flows (Visco 2005).

In contrast, Chen (2016) argues that globalization can affect household saving behavior in the long run. The globalization of social interactions induces changes in historically grown cultural values, although the direction of such changes would remain an empirical question. The growth of global trade gives households easier access to status goods, thus stimulating consumption instead of saving. Financial globalization reduces credit constraints and thus allows households to save less.

### **3. Household saving in Japan**

Research on Japanese household savings dates back to the 1960s, and assesses determinants of the absolutely and relatively high saving rate since 1955. Empirical studies until the 1990s mainly test whether households saved according to their life-cycle or due to precaution. Recent research analyzes the significant drop in the saving rate, focusing on the impact of demographic change on life-cycle savings ('secular stagnation') and the impact of institutional changes on precautionary savings. The effect of monetary policy on household savings via the policy interest rate and via the monetary impact on household income has remained under-researched.

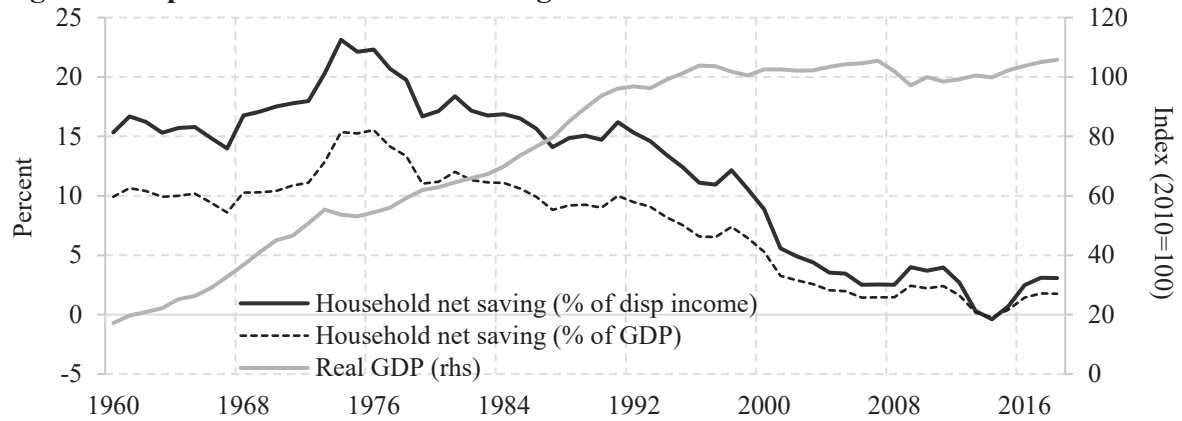
#### **3.1 Empirical determinants of Japanese household saving in the past and now**

In post-war Japan, high net household saving rates coincided with rapid economic growth until the 1990s (*Figure 1*). In line with the Solow-Sawm growth model, the literature generally agrees that economic growth pushed up aggregate household savings as households continued saving a high portion of their rising disposable incomes (Komiya, 1966; Mizoguchi, 1970; Hayashi, 1986, 1989a,b; Shibuya, 1987). Accordingly, policy shocks affected the household saving behavior. Komiya (1966), for example, shows that tax breaks for private savings (*maruyū*) introduced in 1963 encouraged household savings to avoid higher income taxation ("tax evasion effect").<sup>4</sup>

---

<sup>4</sup> The *maruyū* system exempted a limited amount of private savings from taxation, including the interest income on bank and postal deposits or on government bonds.

**Figure 1: Japanese net household saving rates and real GDP**



Source: OECD Economic Outlook, DG ECFIN Ameco, IMF – International Financial Statistics, 2018.

Literature that follows the life-cycle and permanent income hypotheses argues that Japan's continuously high economic growth increased current and expected household income, and thus raised the household saving rate (Komiya, 1966; Mizoguchi, 1970; Hayashi, 1986, 1989a,b; Shibuya, 1987; Horioka, 1990). In line with the life-cycle model, the literature finds that Japan's post-war working-age population growth pushed the aggregate saving rate up (Okita, 1957; Shibuya, 1987; Modigliani and Sterling, 1983; Horioka, 1990). Hayashi (1989) shows that the initially low level of household wealth also incentivized households to save. In line with the permanent income hypothesis, Komiya (1966) and Mizoguchi (1970) find that the saving rate rose due to the growth of bonus payments (transitory income).

While Japanese household savings and economic growth remained high, the empirical literature since the 1970s re-examines the explanatory power of the two hypotheses. However, few studies go beyond the neo-classical explanations (Shinohara, 1968, 1970; Williamson and de Bever, 1978). While Shinohara (1968, 1970) also relates high household savings to bonus income growth, he finds that this positive relationship is only enabled by investment booms. Similarly, Williamson and de Bever (1978) argue that monetary expansions lower the price of capital for enterprises significantly, which promotes a capital investment boom that in turn pushes up bonus incomes and leads to a household savings boom.

A large strain of the literature considers precautionary savings as a determinant of high Japanese household savings, additionally to life-cycle and permanent income saving motives (Yoshihara, 1972; Odaka, 1974; Hayashi, 1986; Tachibanaki, 1986; Sato, 1987). Yoshihara (1972) finds increasing precautionary savings due to habit persistence in the saving behavior. Tachibanaki (1986) argues that households complemented their life-cycle savings with

additional precautionary savings as life-cycle wealth accumulation was not high enough to maintain high consumption after retirement. Sato (1987) proposes that the Japanese economy had transitioned from a neoclassical to a Keynesian model economy by the mid-1970s. Thus, the level of current household income would have determined household savings, in line with a precautionary saving motive (instead of saving motives in line with the life-cycle and permanent income hypotheses).

Institutional and structural factors may potentially have increased precautionary savings and suspended dissaving of elderly households. The relatively underdeveloped post-war social security system as well as limited consumer and mortgage finance may have encouraged precautionary household savings (Shinohara, 1959; Komiya, 1966; Mizoguchi, 1970; Hayashi, 1989; Anderson, 1990).<sup>5</sup> Given the increase in average life expectancy in Japan as well as the lack of institutional retirement provision, elderly households increased their labor force participation and continued saving (Modigliani and Sterling, 1983; Shibuya, 1987; Ishikawa, 1988). Moreover, Ogawa (1991) argues that income uncertainty during the first oil crisis (1974-1976) was a significant driver for precautionary savings.

Despite institutional changes over time, such as a strengthened social security system including improved public pension schemes, Japanese precautionary household savings remained relatively high throughout the 1980s and 1990s (*Figure 2*).<sup>6</sup> During the 1980s, elderly households maintained a high saving rate despite their slowly decreasing labor force participation (Ishikawa, 1988; Ito, 1992). This lack of dissaving may also suggest saving for bequests at the time (Hayashi, 1986; Dekle, 1990; Ito, 1992). Barthold and Ito (1991) find that the magnitude of intergenerational, (un)intentional transfers between households were large in Japan (see also Hayashi et al., 1988; Ito and Kitamura, 1994).<sup>7</sup>

---

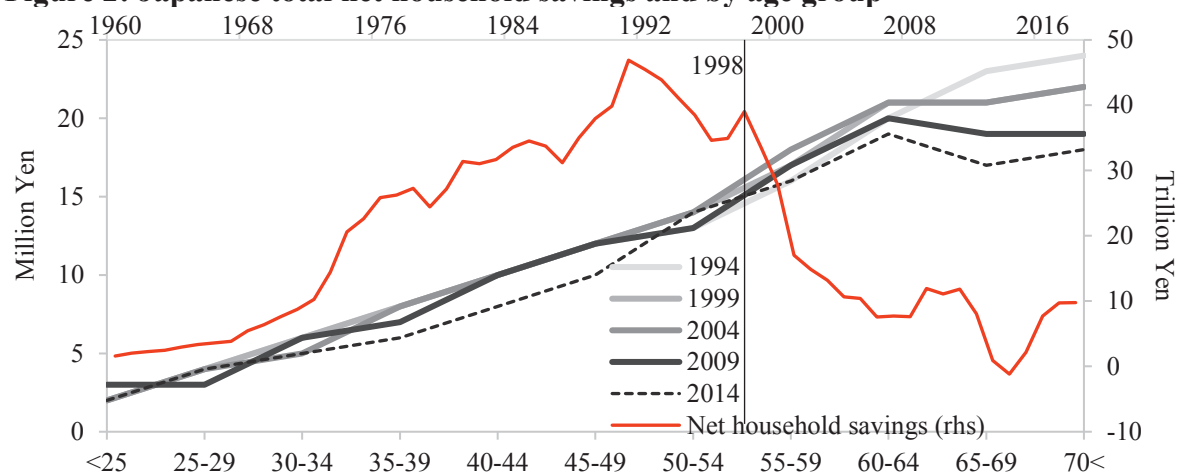
<sup>5</sup> Shinohara (1959) argues that the early high aggregate saving rate in Japan was due to precautionary saving of the high portion of self-employed, who could not rely on public pension benefits. Mizoguchi (1970) shows that self-employment had an increasingly marginal effect on Japanese household savings over time (see also Horioka, 1990); instead, he stresses that precautionary savings rose for all households due to the lack of institutional social security provision.

<sup>6</sup> Hayashi (1986, 1989a,b) finds that Japanese household savings were exceptionally high between 1965 and 1975, but that measurement errors biased them upward later on. Christiano (1989) shows that savings in Hayashi's model do not correspond to the Japan's actual saving path. Dekle and Summers (1991) argue that measurement adjustments were exaggerated. Horioka (1995) confirms measurement errors in the data, but shows that they were mutually offsetting (also Campbell, 2004). Iwamoto (1996) reaffirms Hayashi's view, arguing that the saving rate was even lower when correcting for measurement errors.

<sup>7</sup> Some studies on Japan's high household savings in the 1980s also link savings to slumping investment and balance of payments surpluses at the time, but without considering determinants of savings (Feldstein and Horioka, 1980; Schnabl, 2001).



**Figure 2: Japanese total net household savings and by age group**



*Source:* Ministry of Internal Affairs and Communications (MIC), OECD Economic Outlook, 2018.

*Note:* Household savings by age group are for workers' households, defined as households whose heads are employed as clerks or wage earners by public or private enterprises.

In the early 1990s, shortly after the burst of Japan's bubble economy, economic uncertainty (including income uncertainty and uncertainty about future government expenditure) may still have evoked a brief period of precautionary savings, although not equally across income and age groups (Zhou, 2003; Murata, 2003). Anderson (1990) suggests that, according to the Ricardian equivalence, the rising fiscal deficit triggered precautionary savings of all households as they expected higher taxes and lower government expenditure in the future.<sup>8</sup> Contrary to the life-cycle model, Takayama and Kitamura (1994) show that precautionary savings rose with income and age, as affluent elderly households saved in anticipation of a strained social security system. Nakagawa (1999) finds that income uncertainty motivated precautionary savings of low- and middle-income households and confirms that elderly households saved to accommodate for their increased life-expectancy and economic uncertainty, but not bequests.

However, increasing economic uncertainty in the 1990s appears to have affected household portfolio choices. Precautious households tended to choose physical assets, particularly houses, instead of financial assets in their early stage of wealth accumulation (Noguchi, 1990; Hayashi, 1992; Ito and Kitamura, 1994; Tachibanaki, 1994). Such house purchases were potentially linked to the desire to leave them as bequests in the future (Ito and Kitamura, 1994; Tachibanaki, 1994). However, owing to the high house prices, young households needed to accumulate

<sup>8</sup> As households anticipate future tax increases they save if the government deficit rises or taxes are cut (Ricardo, 1821)



relatively more savings to buy real estate, which pushed up the saving rate and increased the average age of first-time house buyers to around 40 (Moriizumi, 2003; Tokuoka, 2010).

Since 1998, Japan's net household savings have significantly decreased in absolute and relative terms (*Figure 1* and *Figure 2*). In comparison to their peak at 46.9 trillion yen in 1991, net household savings declined by 80% to 9.7 trillion yen in 2017.<sup>9</sup> The household saving rate fell from 16.2% to 3.1% of disposable income (10.0% to 1.8% of GDP) during the same time, reaching its peak at 23.1% (15.4%) in 1974 and its trough at -0.4% (-0.2%) in 2014. While Japanese household savings were amongst the highest in the industrialized world in the 1970s, they have been amongst the lowest within the OECD since 2010 (OECD, 2018).

In line with the life-cycle and permanent income hypotheses, demographic change, a high wealth accumulation, and decreasing (bonus) income growth may have driven the decline of household savings over time (Horioka, 2009; Braun et al., 2007; Sheng and Mu, 2012; Saito, 2015). Literature in line with the life-cycle model argues that the fall of the productive population (ages 15-64) and the rising number of retired households since 1993 has had a negative impact on the household saving rate (Koga, 2006; Braun et al., 2007; Horioka, 2009; Sheng and Mu, 2012; Saito, 2015; Curtis et. al, 2017). Moreover, the rapid increase of household wealth until 1990 and the decreasing labor income growth since 1992 possibly discouraged household savings (Koga, 2006; Horioka, 2006, 2009). In line with the permanent income hypothesis, Horioka (2009) suggests that the decline of the ratio of bonus payments to labor income (for regular employees) since 1992 has lowered household savings.

Institutional factors, including changes to the tax system as well as consumer and mortgage finance options may have decreased household savings over time. Horioka (2009a) argues that household savings decreased due to the abolition of the *maruyū* tax breaks for saving in 1988 as well as the dwindling saving promotion activities of the government. Moreover, improvements in consumer credit options since 1990 may have led households to reduce their precautionary savings as this would have allowed households to cover unexpected income losses with credit instead of private savings (Horioka, 2006, 2009a).

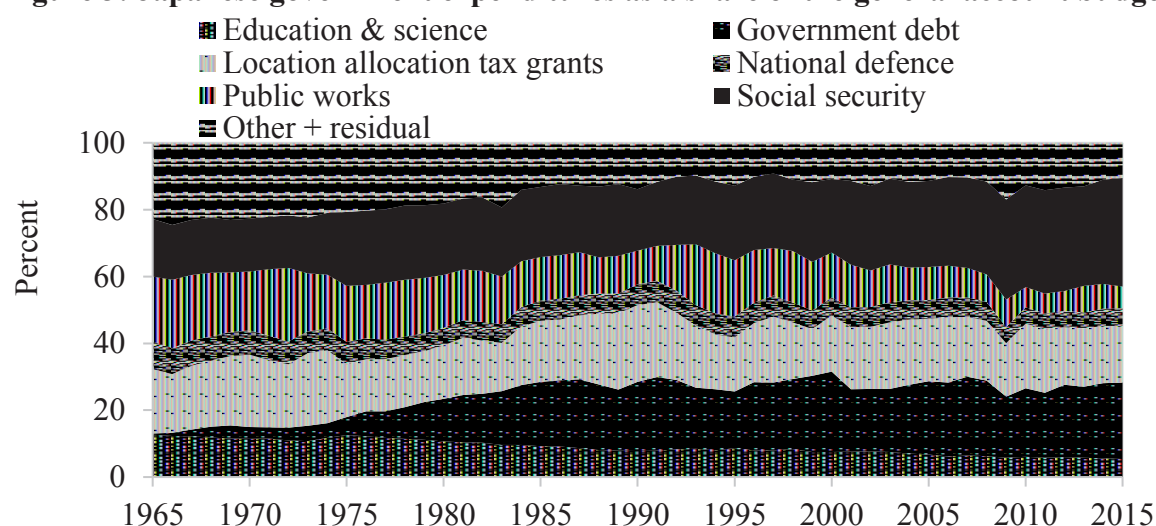
Lastly, savings may have sharply decreased due to significant improvements of public pension benefits (Horioka et al., 2007; Horioka, 2009a). Due to Japan's intergenerational

---

<sup>9</sup> Note that net household savings are a flow variable.

transfer system, a pay-as-you-go public pension system, young households bear the immediate costs of the transfer system. Given an aging population, the burden on young households increases. Accordingly, Horioka et al. (2007) illustrate that post-baby-boom households (born after 1960) maintained their precautionary savings until the early 2000s, anticipating a strain on the system. However, the introduction of a public long-term care insurance program in 2000 and the 2004 public pension reform, which essentially increased the expected net benefits of households born after 1970 (see *Figure 3*), decreased household savings of the working-aged (Takayama, 2003; Horioka et al., 2007; Horioka, 2009a,b). Thus, household saving behavior may have become less Ricardian, as household savings declined despite increasing government expenditures and debt (Saito, 2016).

**Figure 3: Japanese government expenditures as a share of the general account budget**



Source: Ministry of Finance, 2018.

Note: Complete data are only available until 2015.

*Figure 3* illustrates the increase in social security subsidies of the government as a share of the general account budget since 1990. These subsidies include payments to the public pension system.<sup>10</sup> While the share of social security subsidies in the government's general account expenditure was 15.6% in 1960 it had doubled to 32.5% in 2015. This is equivalent to an average increase by 25.3 % from 1990 until 2015, whereas the share had only increased by 19.3% on average in the previous years since 1960.

<sup>10</sup> The mandatory social security pension program for private sector employees is the Kosei Nenkin Hoken (KNH, Employees Pension Insurance). In 1954, the KNH shifted from an earnings-related pension to a two-tier benefits system, of which one tier consists of flat-rate basic benefits and the other of an individual flat-rate contribution. One-third of the KN benefits are financed by subsidy through the general account budget (Takayama, 2003).

### 3.2 Monetary effects on Japanese household saving

The literature on Japanese household savings leaves a gap as it is mainly confined to the impact of demographic change on life-cycle savings, despite economic theory offering alternative explanations. Thus, existing empirical evidence on Japan's household saving behavior may suffer from omitted variable bias. For example, Iwaisako and Okada (2012) argue that the nonlinear movement in the Japanese saving rate clearly challenges research that relies on the monotonic trend of population aging, suggesting that other determinants of household saving behavior need to be accounted for.

In particular, there is limited research on the link between monetary policy and household savings, which may be important for three reasons. First, the persistently expansionary monetary policy warrants a review of the interest rate elasticity of savings (interest rate channel). Secondly, the prolonged low-interest rate policy may affect real labor income negatively via its negative impact on labor productivity, further hampering a household's ability to save (labor income channel). Thirdly, unconventional monetary expansions may have redistributive consequences, which could deter household savings (redistribution channel).

First, monetary policy may affect household savings via changes in the interest rate, particularly a prolonged zero policy rate (interest rate channel). Classical, neoclassical, and Austrian economic theory as well as the theory of financial repression agree that a household's motivation and ability to save are positively related to the interest rate (see *section 2*). Accordingly, a falling interest rate discourages saving and would tempt households to withdraw savings from deposits whose profitability depends on interest payments. Theoretical ambiguity of the interest elasticity of saving only exists in the life-cycle model so that the total effect of interest rate changes on household savings in this model remains an empirical question.

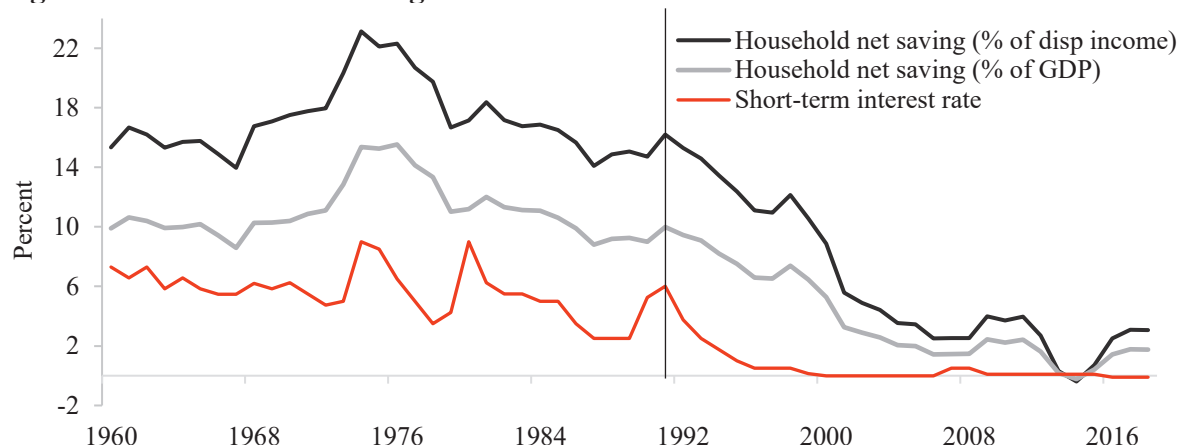
In the case of Japan, the sparse empirical evidence regarding the interest elasticity of savings is mixed and does not include evidence on the elasticity given the recent prolonged low interest rate policy. Nakagawa (1999) does not find a significant relationship between real interest rate changes and the aggregate household saving rate.<sup>11</sup> However, *Figure 4* illustrates that the decrease of Japanese net household savings as a share of disposable income and GDP coincides with the falling policy rate of the Bank of Japan. Until 1991, the year-on-year change

---

<sup>11</sup> An earlier study by Komiya (1966) of post-war Japan also does not find evidence for the interest elasticity of the average Japanese saver to changes in the interest.

in net savings as a share of disposable income and GDP was on average 0.028 and 0.003 percentage points p.a., respectively, while the policy rate decreased by 0.042 percentage points p.a. on average. Since 1992, the policy rate fell rapidly to the zero-lower bound in 1999 (with on average 0.731 percentage points p.a.), where it has remained until 2018. This has accelerated the decrease of net household savings, with a fall of 0.470 and 0.296 percentage points p.a., respectively, until 2018.

**Figure 4: Net household saving and the short-term interest rate**



Source: OECD Economic Outlook, IMF – International Financial Statistics, Bank of Japan, 2018.

Note: Household net savings are a flow variable.

The co-movement of Japanese net household savings and the interest rate may reflect a monetary policy effect on the motivation and ability of households to save. On the one hand, the falling interest rate has rendered savings deposits unprofitable, dampening the motivation of households to save. On the other hand, aggregate net household savings may have declined as households maintained their preference for savings in currency and deposits since 1995. Yoshino and Mizoguchi (2013) show that households have continuously kept around 50% of their total financial assets in currency and deposits. Yet, the constantly declining interest rates have dampened the return from saving in currency and deposits in Japan, and thus depressed the ability of households to increase their savings.

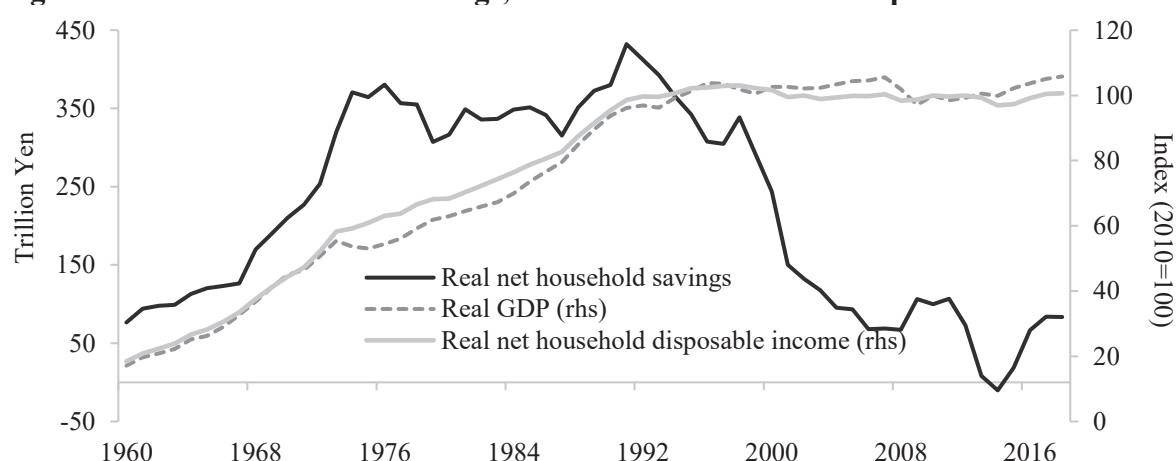
Secondly, monetary policy may affect household savings via the effect of prolonged monetary expansions on real wages (labor income channel). Economic theory agrees that household savings would decline as a response to falling real wages (see *section 2*). Moreover, theory postulates that the trend decline of real wages may be a result of expansionary monetary policy. In New Keynesian models, the negative effect is due to sticky nominal wages (Evans, 2001; Christiano et al., 2005), whereas it is due to surprise inflation in the Barro-Gordon model

(Barro and Gordon, 1983). In the Austrian Business Cycle model, real wages decline during a business cycle downswing, after a low-interest rate induced economic boom (Hayek, 1976 [1929]); Wicksell, 2005 [1898]; Mises, 1998 [1949]).

Empirical evidence for Japan agrees on the relationship between falling (real) income and decreasing household savings, although the literature has not yet connected this to Japan's expansionary monetary policy. Horioka (2009b) and Iwaisako and Okada (2012) argue that, in the late 1990s and early 2000s, declining real income growth and income losses due to higher tax deductions and social insurance premiums as well as temporary reductions in social security benefits had a significantly negative impact on household savings of retired and working-age households at advanced ages. Chen et al. (2007) link negative changes in total factor productivity growth to the decline of the saving rate.

Figure 5 shows that trends in Japanese real net household savings, real GDP and real net household disposable income have evolved in a parallel way since 1960. Until 1991, increasing real net household savings coincided with high real GDP growth, which was on average at 5.8% p.a. Real disposable income growth was on average at 5.6% p.a. In contrast, Japan's low-growth phase starting in 1992, with real GDP and real disposable income growing on average at 0.9% and 0.7% p.a., was accompanied by a remarkable fall of real net household savings by 80.6%, from 432.1 trillion yen in 1991 to 84.0 trillion yen in 2017.

**Figure 5: Real net household savings, GDP and net household disposable income**



Source: OECD Economic Outlook, IMF – International Financial Statistics, DG ECFIN AMECO, 2018.  
Note: Net household savings, GDP and net household disposable income are deflated using the CPI. Net households savings are a flow variable.

The parallel trends of real net household savings and economic growth in Japan may indicate an effect of the prolonged low-interest environment on the household's *ability to save*.

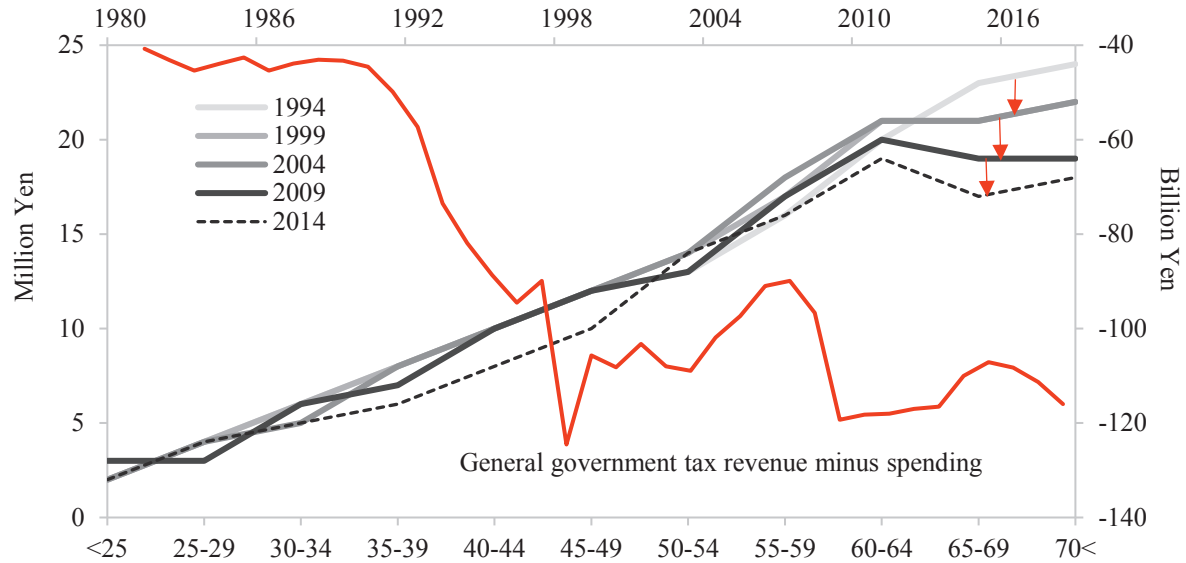
During the bubble economy, a low-interest-rate triggered investment boom helped raise real wages, which enabled households to increase their savings to a historical high. After the burst of the bubble economy (1985-1990), however, real wages declined alongside falling interest rates. Real income growth has stagnated since the mid-1990s, which further depressed net household savings. While earlier research by Shinohara (1970) relates high Japanese household savings to bonus income growth that was enabled by investment booms, current research has yet to relate falling household savings to the shrinking investment and declining (bonus) incomes triggered by the burst of the bubble economy.

Thirdly, monetary policy may affect the household saving behavior as it redistributes resources from young to elderly households as well as from the private (household) to the public sector (redistribution channel). On the one hand, the life-cycle accumulation of savings assumes an inequal distribution of wealth across generations, whereby young working-age households tend to have relatively little physical or financial assets (see *section 2*). Given unconventional expansionary monetary policy, low interest rates diminish incomes from savings deposits of young households. In contrast, unconventional monetary expansions increase asset prices, which raise the existing wealth of elderly households (Saiki and Frost, 2014), thus redistributing financial resources across generations.

On the other hand, unconventional expansionary monetary policy allows a government to exert financial repression by keeping the interest rate on government bonds artificially low. This allows the government debt to remain sustainable, but redistributes resources from the private to the public sector (see *section 2*). Moreover, enabled by unconventional monetary expansion and motivated by demographic change, a government may redistribute resources in the form of social transfers to elderly households as an increasing group of retirees is a potent electoral group.

Yoshino and Mizoguchi (2013) provide empirical evidence for the redistribution effects of monetary policy on household savings in Japan. The authors examine changes in the Japanese flow of funds and show that private savings are directed to elderly households via government transfers as well as to the public sector via government bond purchases and reduced interest payments on such bonds. Yoshino and Mizoguchi (2013) also find that private firms do not invest and capital formation does not occur as private savings generally flow to the government.

**Figure 6: Japan's general government balance and net household savings by age group**



Source: Oxford Economics, DG ECFIN AMECO, 2018.

Figure 6 shows that the rising government deficit in Japan, expressed as the difference between general government tax revenue and spending, has coincided with decreasing net household saving of elderly households. Traditionally, Japanese elderly households maintained their household savings instead of engaging in life-cycle dissaving until the early 1990s. However, starting with the dramatic increase in general government spending in 1990, which includes social security spending for public pensions, and the rise of the deficit from 44.6 to 116.0 Trillion yen, these households reduced their savings gradually. While in 1994, the average elderly household (ages 65+) held net household savings of about 23.5 million yen, this declined to 17.5 million yen in 2014. This appears to support Saito's (2016) argument that household saving behavior has become less Ricardian over time.

#### 4. Empirical estimation framework and results

Up to the present, the literature on Japanese household savings has not scrutinized the effect of the low interest rate policy on the household saving behavior. Moreover, the empirical literature on Japanese savings behavior is divided along the growth path of the Japanese economy. While recent literature examines the low-growth phase of the economy since the 1990s, other papers discuss the high growth phase of the past. Therefore, this paper tests the relationship between Japan's monetary policy and the household saving behavior, using a large data sample from 1960 to 2018, while emphasizing the low interest rate policy starting in 1991.



#### 4.1 Data and estimation framework

The data span from 1960 to 2018. This long sample period accounts for the shift of the Japanese economy from a high-growth to a low-growth phase. All data are of annual frequency, as this is the only frequency consistently available for such a long time span. The observation period starts in 1960, with the beginning of Japan's post-war high-growth phase, when reliable data for most necessary variables is accessible. Due to missing values for some time series, a shorter observation period ranges from 1980 to 2018. The shorter sample still incorporates the end of Japan's high-growth phase and thus also allows modeling the shift of the Japanese economy from a high-growth to a low-growth phase in 1998. *Table 1* offers a detailed description of the data, including data sources.

**Table 1: Data Description**

Acronym	Description	Sample period	Source
<i>Bonus</i>	Average bonus payments (of regular employees in enterprises with more than 30 employees).	1970 – 2017	Ministry of Health, Labour and Welfare, Japan.
<i>currdep</i>	Currency and deposits as share of total financial assets of households.	1980 – 2014	Annual National Accounts, OECD.
<i>depend_adj</i>	Adjusted old-age dependency ratio (unemployed old-age as share of total employees).	1968 – 2017	Ministry of Internal Affairs and Communication (MIC), Japan.
<i>govdef_GDP</i>	Government deficit, calculated as the difference between general government tax revenue and spending, as share of GDP.	1981 – 2018	Oxford Economics; DG ECFIN AMECO.
<i>labprod</i>	Labor productivity, calculated as output (GDP) per employee in yen.	1960 – 2017	International Financial Statistics (IFS), International Monetary Fund (IMF); OECD Economic Outlook.
<i>ncWage</i>	Nominal average cash wage (per employee) in million yen.	1960 – 2018	OECD Economic Outlook.
<i>nGDP</i>	Nominal gross domestic product in trillion yen.	1960 – 2018	IFS, IMF.
<i>nIR</i>	Nominal Bank of Japan short-term main policy rate (percent).	1960 – 2018	Bank of Japan.



<i>nNHHDI</i>	Nominal net household disposable income in trillion yen.	1960 – 2018	OECD Economic Outlook.
<i>nNHHS</i>	Nominal net household savings in trillion yen.	1960 – 2018	OECD Economic Outlook.
<i>NHHS_GDP</i>	Net household savings (as share of GDP).	1960 – 2018	OECD Economic Outlook; IFS, IMF.
<i>NHHS_NHHDI</i>	Net household savings (as share of net household disposable income).	1960 – 2018	OECD Economic Outlook.
<i>NHHW_GDP</i>	Net household wealth (as share of GDP).	1970 – 2016	OECD Economic Outlook; IFS IMF.
<i>rGDP</i>	Real GDP (Index 2010 = 100).	1980 – 2018	IFS, IMF; DG ECFIN AMECO.
<i>rIR</i>	Real short-term interest rate (percent).	1961 – 2018	Bank of Japan; DG ECFIN AMECO.
<i>rNHHDI</i>	Real net household disposable income in trillion yen.	1960 – 2018	OECD Economic Outlook.
<i>rNHHS</i>	Real net household savings (Index 2010 = 100).	1960 – 2018	OECD Economic Outlook.
<i>Sharequ</i>	Shares (and other equity) as a share of total financial assets of households.	1980 – 2014	Annual National Accounts, OECD.
<i>socsec_GDP</i>	Social security government expenditure as share of GDP.	1966 – 2017	Ministry of Finance, Japan.

The saving behavior of Japanese households can be modelled using aggregate net household savings (*nNHHS*) as well as aggregate net household savings as share of GDP (*NHHS\_GDP*) and of disposable income (*NHHS\_NHHDI*). Nominal net household savings are deflated using the *CPI* to obtain real net household savings (*rNHHS*). The net household saving rates are calculated by dividing nominal net household savings by GDP (*nGDP*) as well as net disposable income (*nNHHDI*).

Based on the analysis in section 3, important determinants of the Japanese household saving behavior are household income and wealth, as well as monetary policy. Household income includes current level and expected income as well as bonus income. Current level income is provided by the nominal average cash wage per employee (*ncWage*) and deflated by the *CPI* to obtain real average cash wages per employee (*rcWage*). Current level income in the form of transitory income (*bonus*) is approximated by average bonus payments for regular employees since data for average bonuses of all employees are not available. Expected income is approximated by labor productivity growth (*labprod*), which is calculated dividing GDP data

by the total number of employees. The positive relationship between real income and labor productivity permits such approximation as workers expect their real wages to rise with their rising labor productivity.<sup>12</sup> Japanese household wealth is modelled using net household wealth as share of GDP (*NHHS\_GDP*). The impact of monetary policy on household saving behavior is measured via the nominal (short-term) policy rate (*nIR*). CPI inflation is subtracted to obtain the real interest rate (*rIR*).

Structural factors, such as the social security system or the government deficit, savings preferences, and the demographic structure of an economy may also determine household saving behavior. Social security expenditure of the government is taken as share of GDP (*socsec\_GDP*). The government deficit is calculated as the difference between general government tax revenues and general government spending as share of GDP (*govdef\_GDP*). Savings preferences are represented by currency and deposits as a share of total household financial assets (*currdep*) or shares and other equity as a share of total household financial assets (*sharequ*).

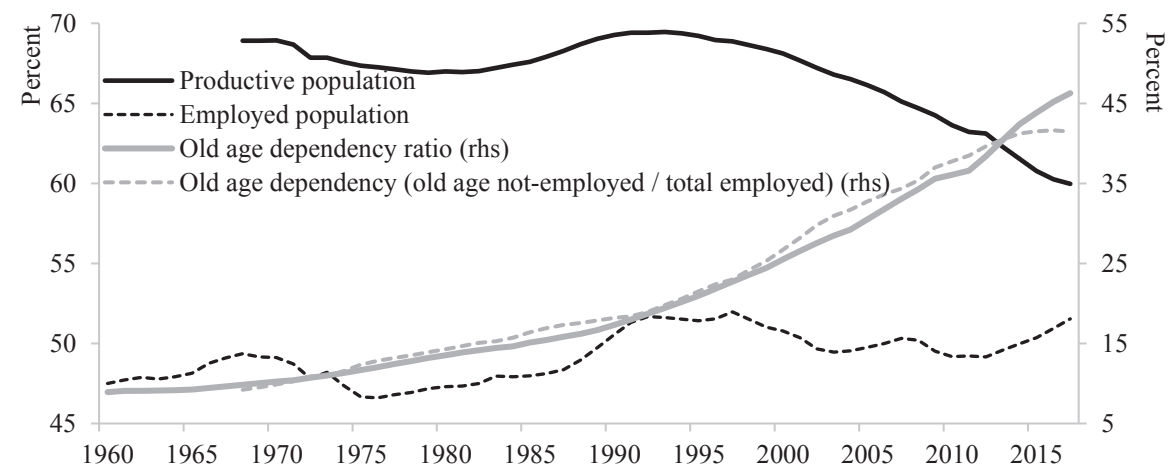
The demographic structure is typically represented by the old-age dependency ratio and the productive population ratio. However, the ratios are downward- and upward-biased, respectively, as they do not include elderly employees aged 65+ (*Figure 7*). The productive population as a share of the total population fell from 68.9% in 1968 to 60.0% in 2017, peaking at 69.5% in 1993 but decreasing steadily ever since. Similarly, the old age dependency ratio increased from 8.8% in 1960 to 43.9% in 2016.<sup>13</sup> Yet, the employed population as a share of the total population has remained at around 50% since 1990, displaying a recent upward trend which is significantly driven by increasing old-age employment. Thus, the adjusted old age dependency ratio, which measures only the “*de facto not employed*” old age as a share of total employees, has stagnated since 2010 currently remaining at 41.5%.

---

<sup>12</sup> See Blanchard and Katz (1999) and Mankiw (2009) for a discussion of the relationship between real wages and labor productivity.

<sup>13</sup> The productive population measures the working age population (ages 15-64) as a share of total population, whereas the employed population measures all employees as a share of total population. The old age dependency ratio measures the old age (65+) as a share of the working age population, whereas the adjusted old age dependency ratio measures the not-employed old age as a share of total employees.

**Figure 7: Japanese productive and employed population as well as old age dependency**



Source: World Bank WDI, MIC, OECD.

Table 2 shows the descriptive statistics for the overall sample of the year-on-year rates of change of the data, after removing two outliers for the real interest rate driven by the high CPI inflation in 1973 and 1974. The descriptive statistics indicate that Japan experienced a high- and a low-growth phase. Nominal and real GDP, net household disposable income, aggregate net household savings as well as the two household savings rates display a high degree of variability over the sample period (see Table 2). For example, nominal GDP (*nGDP*) ranges from 16.01 to 555.61 trillion yen, with a mean of 335.69 trillion yen and a standard deviation of 197.57. Net household disposable income (*nNHHDI*) ranges from 10.34 to 321.14 trillion yen, with a mean of 203.40 trillion yen but with a standard deviation of 115.06. Similarly, nominal net household savings (*nNHHS*) range from -1.17 to 46.90 trillion yen, with a mean of 19.26 trillion yen and a standard deviation of 14.22.

**Table 2: Descriptive Statistics (1960 – 2018)**

Variable	Obs.	Mean	Std. Dev.	Min	Max
<i>Bonus</i>	46	-0.32	7.30	-26.07	18.22
<i>Currdep</i>	35	52.07	3.25	45.23	59.08
<i>depend adj</i>	50	23.08	10.60	9.22	41.63
<i>govdef GDP</i>	38	0.02	0.00	0.01	0.02
<i>labprod</i>	57	-4.32	5.19	-16.07	5.30
<i>ncWage</i>	59	3.02	1.47	0.26	4.55
<i>nGDP</i>	59	335.69	197.57	16.01	555.61
<i>nIR</i>	59	3.24	2.91	-0.10	9.00
<i>nNHHDI</i>	59	203.40	115.06	10.34	321.14
<i>nNHHS</i>	59	19.26	14.22	-1.17	46.90
<i>NHHS GDP</i>	59	7.64	4.42	-0.23	15.53
<i>NHHS NHHDI</i>	59	12.07	6.67	-0.39	23.13
<i>NHHW NHHDI</i>	47	716.36	148.82	427.65	948.14

<i>prodpop</i>	50	66.79	2.54	59.97	69.46
<i>rGDP</i>	59	75.87	29.13	17.15	105.80
<i>rIR</i>	56	0.44	1.55	-3.20	3.69
<i>rNHDI</i>	59	217.25	84.25	48.28	311.63
<i>rNHHS</i>	59	220.62	129.85	-10.22	432.14
<i>rcWage</i>	59	91.32	21.92	35.07	111.89
<i>sharequ</i>	35	13.77	4.17	7.75	24.02
<i>socsec</i>	52	22.31	4.59	15.60	32.50

All time series are tested for unit roots. While it has been common practice in the literature to use augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to determine potential non-stationary behavior of time series, it is preferable to use the Dickey-Fuller-General-Least-Squares (DF-GLS) unit root test instead because it has a statistically significantly greater power than previous versions of the ADF test and the PP test (Elliott, Rothenberg and Stock, 1996; Baum, 2000).<sup>14</sup> The DF-GLS test has a null hypothesis postulating that the time series is a non-stationary random walk, possibly with drift. Alternatively, the time series is either stationary about a linear time trend, or with a possibly nonzero mean but without a linear time trend. The null hypothesis is tested against both alternative hypotheses to account for the possibility of a time trend. The optimal lag length for each unit root test is specified in accordance with the Ng-Perron criterion (Baum, 2000).<sup>15</sup>

Caution is warranted with regard to the identification of unit root processes. First, type I and II errors can occur when time series exhibit large outliers or structural breaks. Outliers can cause a type I error when the null hypothesis of a unit root is falsely rejected so that the time series is not differenced (Hamilton, 1994). Structural breaks can cause a type II error as unit root tests are generally biased towards not rejecting a unit root although the true process may be stationary within each regime (Perron, 2015). The failure to reject the null hypothesis of a unit root leads to mistakenly differencing a time series. Secondly, misspecification of unit root tests in terms of the null and alternative hypotheses also leads to false identification. Depending on the inclusion of deterministic or stochastic terms in the regression, the asymptotic distribution of the test statistic differs, leading to varying conclusions about the tested times series (Hamilton, 1994).

<sup>14</sup> The test proposed by Elliott, Rothenberg and Stock (1996) initially transforms the time series via a generalized least squares (GLS) regression before performing the unit root test. Thus, the DF-GLS test fits a regression analogous to that of the ADF test, but uses GLS-detrended data for the regression (Stock and Watson, 2011).

<sup>15</sup> All augmented Dickey-Fuller-type unit root tests are sensitive to lag length (Elliott, Rothenberg and Stock, 1996).

Following Greene (2012), graphs and summary statistics for each time series enhance the identification of potential biases of unit root tests as well as the potential type of non-stationary behavior. Consequently, two outliers for  $rIR$  are removed as well as outliers for the year-on-year percentage change of net household savings in the years 2013-2016. The latter outliers are a result of a temporary drop of net household savings into negative territory. In accordance with the high- and low-growth phases of Japan's economy, a structural break can be identified for the year 1998, marking the outbreak of the Japanese financial crisis. Moreover, a structural break can be identified for all real variables in 1973/4, when CPI inflation in Japan sparked. The Chow test confirms these identifications for all variables at high levels of significance (Greene, 2012).

DF-GLS unit root tests around the structural breaks do *not* reject the null hypothesis (the time series is a non-stationary random walk, possibly with a drift) at high levels of significance (against the alternative that the time series is trend stationary) for all variables, except for the year on year percentage change in real net household savings growth, in real household income ( $rcWage$ ), and in labor productivity. The results are robust for optimal lag lengths according to the Ng-Perron criterion. Thus,  $NHHS\_GDP$ ,  $NHHS\_NHHDI$ ,  $nIR$ ,  $rIR$ ,  $bonus$ ,  $NHHW$ ,  $depend\_adj$ ,  $socsec\_GDP$ ,  $govdef\_GDP$ ,  $currdep$ , and  $sharequ$  are first differenced. The Newey-West estimator consistent with autocorrelation and heteroscedasticity and with an optimal lag length of 3 is used for all regressions.<sup>16</sup>

In line with the empirical literature on household saving behavior and taking into account the transmission channels of monetary policy, the following equation is estimated:

$$HHsavings_t = \alpha_t + \beta_1 nIR_t + \beta_2 rcWage_t + \beta_3 bonus_t + \beta_4 labprod_t + \beta_5 NHHW_t + \beta_6 depend\_adj_t + \beta_7 socsec\_GDP_t + \beta_8 govdef\_GDP_t + \beta_9 savings\_pref_t + \varepsilon_t, \quad (3)$$

where the regressand  $HHsavings_t$  is either the year on year change in real net household savings ( $rNHHS$ ) or the differenced household savings rate as percent of GDP ( $NHHS\_GDP_t$ ) or as percent of net household disposable income ( $NHHS\_NHHDI_t$ ). In line with the life-cycle model and permanent income hypothesis, the regressors include household income and wealth.

---

<sup>16</sup> Newey and West (1987, p. 705) show that their estimator for the covariance matrix is consistent if the lag length  $m$  grows with the sample size  $T$  so that  $\lim_{T \rightarrow \infty} T = +\infty$ , and if  $m$  grows at a slower rate than  $T^{1/4}$  so that  $\lim_{T \rightarrow \infty} [m(t)/T^{1/4}] = 0$ . Accordingly,  $m$  is set to the integer part of  $T^{1/4}$  (Greene, 2012, p. 960).

The coefficients for current labor income ( $\beta_2$  and  $\beta_3$ ) as well as expected labor income ( $\beta_4$ ) should have a positive sign as households save to accommodate expected rising future consumption alongside rising lifetime income. In contrast, a negative sign is expected for a household's wealth endowment ( $\beta_5$ ) since households save less with a rising wealth endowment. Moreover, the aging of the society as well as the extent of the social security system ( $\beta_6$  and  $\beta_7$ ) are both expected to have a negative sign. Economic theory suggests that an aging economy is characterized by dissaving and a well-developed social security system renders precautionary household savings unnecessary. According to the Ricardian equivalence, the coefficient for the government deficit ( $\beta_8$ ) is expected to have a positive sign as household saving rates increase with rising government deficit (as percent of GDP). The savings preference ( $\beta_9$ ) is approximated either by currency and deposits as a share of total household financial assets (*currdep*) or shares and other equity as a share of total household financial assets (*sharequ*), with an expected positive sign. Households with an increasing share of equity or currency and deposits in their savings portfolio would increase their saving rate.

In order to identify the impact of monetary policy on household savings, the interest rate (*interest rate channel*), real income (*labor income channel*), and the government deficit as percent of GDP (*redistribution channel*) are added to the regression. The expected signs for all these regressors are positive (coefficients  $\beta_1$ ,  $\beta_2$ , and  $\beta_7$ , respectively). Accordingly, households should decrease their savings as a declining interest rate lowers their incentive to save. They should also decrease their savings along their decreasing ability to save, when their real income falls. Lastly, they should increase their (precautionary) savings alongside a rising fiscal deficit as they expected higher taxes and lower government expenditure in the future (Ricardian equivalence).

## 4.2 Estimation results

*Table 3* and *Table 4* report the estimation results for the household saving rate as percent of GDP (*NHHS\_GDP*) and of net household disposable income (*NHHS\_NHDI*), respectively, for the sample period from 1960 until 2018. The regression results do not change for the small sample, which runs from 1980 until 2018. Moreover, changing the regressand to a measure of real aggregate net household savings also does not change the results in terms of signs and significance of the coefficients. For reason of parsimony, these results are not reported here.

Models (1) through (6) capture the potential effects of monetary policy on the household saving rate. Models (1) through (3) test the benchmark, which only includes measures for the three monetary transmission channels as well as household income and wealth. Models (4) through (6) also include structural factors, such as measures for economic and financial uncertainty as well as measures for the saving preference of households and the demography of the economy.

*Table 3* and *Table 4* show that monetary policy has a highly significant and positive effect on the household saving rate via the *interest rate channel* in all of the six models and for both regressands. The coefficient for the nominal interest rate (*nIR*) is significant at the 1% level. Accordingly, a one percentage point cut in the interest rate reduces the household saving rate as percent of GDP by 0.43 percentage points on average, whereas it reduces the saving rate as percent of net household disposable income by 0.65 percentage points on average (models 6). This is in line with economic theory that predicts a positive relationship between the policy rate set by a central bank and the household saving rate.

Similarly, fiscal policy has a significantly positive effect on the household saving rate via the *redistribution channel*. This is evidence in favor of the Ricardian equivalence, similar to Anderson's (1990) findings but contrary to Saito (2016). The coefficient for the government deficit (*govdef\_GDP*) is significant at the 1% level for all models and for both regressands (*Table 3* and *Table 4*). The consistently positive sign indicates that the household saving rates increase with rising government deficit (as percent of GDP). In other words, a rising fiscal government deficit triggers precautionary household savings as households expect higher taxes and lower government expenditure in the future. In particular, a one percentage point rise in the government deficit increases net household savings as percent of GDP and of disposable income by 0.181 and 0.286 percentage points on average, respectively (models 6).<sup>17</sup>

Monetary policy does not appear to have a significant impact on the household saving rate via the *labor income channel*. The coefficients for household income (*rcWage*) and labor productivity (*labprod*), which represents expected household income, are insignificant for all models and for both regressands (*Table 3* and *Table 4*). Models (1) – (3) show that the results for the income channel do not change if transitory income (*bonus*) is used as proxy for real income instead of real cash wages (*rcWage*, which excludes overtime, bonus payments and

---

<sup>17</sup> Note that the government deficit as percent of GDP is on average 0.02 percent.



social transfers), or if both payment measures or only one of the two are included in the regression model. This also holds for models (4) – (6) so that, for reason of parsimony, the results reported for models (4) – (6) only include the real cash wage (*rcWage*) and labor productivity (*labprod*).

**Table 3: OLS estimation results – net household savings as percent of GDP 1960-2018**

NHHS_GDP	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
nIR	0.33*** (0.10)	0.32*** (0.10)	0.33*** (0.10)	0.33*** (0.10)	0.39*** (0.10)	0.43*** (0.11)
rcWage	-0.01 (0.07)		-0.03 (0.07)	-0.01 (0.08)	-0.07 (0.07)	-0.10* (0.06)
bonus		-0.00 (0.01)	-0.01 (0.01)			
labprod	0.07 (0.05)	0.07 (0.04)	0.08 (0.05)	0.08 (0.05)	0.11** (0.05)	0.11 (0.07)
NHHW	0.04*** (0.01)	0.04** (0.01)	0.04** (0.02)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)
govdef_GDP	173.52*** (30.15)	171.10*** (31.10)	169.62*** (30.86)	174.24*** (31.61)	165.51*** (27.10)	181.02*** (27.25)
depend_adj	-1.03*** (0.25)	-1.04*** (0.21)	-1.01*** (0.24)	-1.04*** (0.27)	-1.04*** (0.27)	-0.93** (0.42)
rGDP				0.01 (0.03)	-0.00 (0.03)	-0.03 (0.04)
socsec_GDP					-0.10 (0.08)	-0.10 (0.08)
sharequ						0.03 (0.03)
Constant	0.60*** (0.21)	0.60*** (0.20)	0.59*** (0.21)	0.61** (0.23)	0.72*** (0.26)	0.60 (0.43)
Prob > F	9.84***	10.45***	8.60***	9.72***	9.90***	23.46***
Obs.	36	36	36	36	36	33

Note: Newey-West robust standard errors are reported in parentheses. The significance of coefficients is reported at the 10%, 5%, and 1% level, indicated by \*, \*\*, \*\*\*, respectively.

Net household wealth (*NHHW*) has a significantly positive effect on the household saving rate as percent of GDP and net household disposable income throughout all model specifications, although the effect is small (*Table 3* and *Table 4*). The coefficient is significant at the 1% level for all models and both regressands, except for models (2) and (3) where it is significant at 5%. The results concerning the significance of variables remain unchanged for all models and both regressands if household wealth is included as percent of household disposable income or GDP. For reason of parsimony, these results are not reported here. Thus,



the household saving rate as percent of GDP and of disposable income increases with rising household wealth. This is contrary to economic theory, which postulates a negative sign.

Given the significantly positive effect of household wealth on household saving rates (Table 3 and Table 4), it appears that this coefficient captures a household's ability to save (instead of the coefficients of household labor income). This suggests that monetary policy may have affected the household saving behavior via the *wealth channel* instead of the labor income channel. Bordo and Lane (2013) show that monetary easing, particularly unconventional policy, has a positive impact on asset prices, including house, stock and commodity prices, increasing financial household wealth. However, given an unequal distribution of wealth among households, such positive changes do not affect all households equally. For Japan, Saiki and Frost (2014) show that expansionary monetary policy widened inequality, especially after 2008, when quantitative easing became more aggressive.<sup>18</sup>

**Table 4: OLS estimation results – net household savings as percent of net household disposable income 1960-2018**

NHHS_NHHDI	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
nIR	0.50*** (0.16)	0.48*** (0.14)	0.50*** (0.16)	0.50*** (0.15)	0.59*** (0.16)	0.65*** (0.17)
rcWage	-0.07 (0.12)		-0.10 (0.11)	-0.06 (0.12)	-0.16 (0.11)	-0.22** (0.10)
bonus		-0.00 (0.02)	-0.01 (0.02)			
labprod	0.10 (0.08)	0.07 (0.08)	0.10 (0.08)	0.10 (0.09)	0.16 (0.10)	0.14 (0.13)
NHHW	0.06*** (0.02)	0.06** (0.02)	0.06** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)
govdef_GDP	274.13*** (49.55)	272.72*** (50.38)	267.77*** (50.00)	276.19*** (50.83)	262.43*** (43.67)	286.05*** (45.73)
depend_adj	-1.57*** (0.43)	-1.64*** (0.38)	-1.54*** (0.42)	-1.61*** (0.47)	-1.61*** (0.47)	-1.29* (0.71)
rGDP				0.02 (0.04)	-0.00 (0.04)	-0.04 (0.06)
socsec_GDP					-0.16 (0.12)	-0.15 (0.13)
sharequ						0.05 (0.05)
Constant	0.90** (0.37)	0.93** (0.35)	0.89** (0.37)	0.94** (0.41)	1.12** (0.47)	0.79 (0.72)
Prob > F	9.01***	9.86***	7.90***	8.49***	8.90***	19.69***

<sup>18</sup> The aggregate data on household wealth used in Saiki and Frost (2014) do not capture such heterogenous effects so that future research will have to investigate this aspect of monetary transmission on household saving.

Observations	36	36	36	36	36	33
--------------	----	----	----	----	----	----

Note: Newey-West robust standard errors are reported in parentheses. The significance of coefficients is reported at the 10%, 5%, and 1% level, indicated by \*, \*\*, \*\*\*, respectively.

Regression models that include structural factors (*rGDP* and *socsec\_GDP*) mostly yield insignificant results for the coefficients of structural variables, without changing the sign and significance of coefficients of the monetary transmission variables as well as household wealth (*Table 3* and *Table 4*). The coefficient for economic uncertainty, measured by real GDP growth (*rGDP*), has the expected (negative) sign in models (5) and (6), but is insignificant for household saving decisions. These results do not change if unemployment is used as a measure of economic uncertainty. Moreover, the coefficient for financial household uncertainty, measured by the public social security expenditure (*socsec\_GDP*), has the expected negative sign, but is also insignificant for the household saving rates.

Similarly, a household's savings preference is also insignificant for its saving behavior, but has the expected sign (*Table 3* and *Table 4*). While insignificant for all models and both regressands, the coefficient for shares and equity as percent of total financial assets (*sharequ*) in model (6) has a positive sign. Although not reported here for reason of parsimony, the coefficient for currency and deposits as percent of total financial assets (*currdep*) has a negative sign, but also remains insignificant for all specifications.

In contrast, the demographic development (*depend\_adj*) of the economy has a highly significant and negative coefficient for all models and both regressands (*Table 3* and *Table 4*). The coefficient for the old-age-dependency ratio is significant at 1% for all models, excluding models (6) where it is significant at 5% and at 10% for the regressions with the household saving rate as percent of GDP and of disposable income, respectively. On average, a one percentage point increase in the dependency ratio lowers the household saving rate as percent of GDP and of disposable income by 0.93 and 1.29 percentage points, respectively (models 6). This is in line with the literature that investigates Japanese household saving using the life-cycle model. Life expectancy instead of the old-age-dependency ratio is insignificant but does not change the results for the other variables. It is not reported here for reason of parsimony.

## 5. Outlook

This paper scrutinizes the role of prolonged, expansionary monetary policy on the savings behavior of Japanese households, focusing on the dramatic change of Japanese household

savings behavior since 1998, from high to low savings. Existing literature generally attributes this behavioral shift to the country's shift from a high-growth to a low-growth economy and its demographic change. This paper adds to the existing literature by examining changes in the incentives for saving and the ability to save connected to monetary policy.

The empirical results of this paper indicate that monetary policy has played a significant role in the change of the Japanese household saving behavior during the investigated time frame. The significant impact of monetary policy on Japan's household saving behavior has been threefold, via the interest rate channel, the redistribution channel, and the wealth channel. In contrast, monetary policy does not appear to have had a significant impact on the household saving rate via the labor income channel.

Future research may extend this analysis for Japan, investigating whether and to what extent the impact of monetary policy on the household saving behavior varies at times of conventional versus unconventional expansionary monetary policy. Moreover, research may apply this analysis to other industrialized economies, such as member states of the European Union, that have experienced similar shifts from a high-growth to a low-growth economy and demographic change, as well as prolonged phases of expansionary monetary policy.

Lastly, while a household's saving preference appears to be insignificant in the empirical analysis at hand, the signs for *sharequ* as well as *currdep* were as expected. At times of persistently low interest rates, households that prefer to save via equity (*sharequ*) would increase their saving rate. In contrast, households that prefer to save via currency and deposits (*currdep*) would decrease their saving rate. Interestingly, Saiki and Frost (2014) find that the saving preference of Japanese households depends on the income and wealth bracket a household belongs to.

Thus, future research may reassess the effect of a household's saving preference on its ability to save. Research may also consider that the potential effect of monetary policy on Japanese household saving behavior may depend on the distribution of household wealth. This is an important research task as household savings can have crucial implications for the economic wealth of households or financial institutions, as well as for household consumption decisions that in turn affect the corporate sector and thus long-term economic growth.

## Bibliography

- Anderson, S. (1990). "The Political Economy of Japanese Savings: How Postal Savings and Public Pensions Support High Rates of Household Saving in Japan", *The Journal of Japanese Studies*, Vol. 16, No. 1, pp. 61-92.
- Ando, A. and Modigliani, F. (1963). "The 'life-cycle' hypothesis of saving: aggregate implications and tests", *American Economic Review*, Vol. 53, No. 1, pp. 55-84.
- Barro, R. and Gordon, D. (1983). "A Positive Theory of Monetary Policy in a Natural-Rate Model", *Journal of Political Economy*, Vol. 91, No. 4, pp. 589-610.
- Baum, C. (2000). "DFGLS: Stata module to compute Dickey-Fuller/GLS unit root test", IDEAS-SSC: <http://ideas.uqam.ca/ideas/data/Softwares/bocbocodeS410001.html>
- Bernanke, B. (2005). "The Global Saving Glut and the U.S. Current Account Deficit", *Remarks at the Sandridge Lecture*, Virginia Association of Economists, Richmond, Virginia.
- Blanchard, O. and Katz, L. (1999). "Wage Dynamics: Reconciling Theory and Evidence", *American Economic Review*, Vol. 89, No. 2, pp. 69-74.
- Bordo, M. and Landon-Lane, J. (2013). "Does expansionary monetary policy cause asset price booms? some historical and empirical evidence", *Journal Económica Chilena*, Central Bank of Chile, Vol. 16, No. 2, pp. 04-52.
- Braun, A., Ikeda, D., and Joines, D. (2007). "The Saving Rate in Japan: Why it has fallen and why it will remain low", *International Economic Review*, Vol. 50, No. 1, pp. 291-321.
- Brown, T. (1952). "Habit Persistence and Lags in Consumer Behaviour", *Econometrica*, Vol. 20, No. 3, pp. 355-371.
- Carroll, C. (1997). "Buffer-stock saving and the life-cycle/permanent income hypothesis", *Quarterly Journal of Economics*, Vol. 112, No. 1, pp. 1-55.
- Cass, D. (1965). "Optimum Growth in an Aggregative Model of Capital Accumulation", *Review of Economic Studies*, Vol. 32, No. 3, pp. 233-240.
- Chen, K., Imrohoroglu, A., Imrohoroglu, S. (2007). "The Japanese saving rate between 1960 and 2000: productivity, policy changes, and demographics", *Economic Theory*, Vol. 32, No.1, pp. 87-104.
- Chen, X. (2016). "Globalization and household saving: is there a link?", *Applied Economics Journal*, Vol. 49, No. 29.
- Christiano, L. (1989). "Understanding Japan's Saving Rate: The Reconstruction Hypothesis", *Federal Reserve Bank of Minneapolis Quarterly Review*, Vol. 13, No. 2, pp. 10-25.

- Christiano, L., Eichenbaum, M. and Evans, C. (2005). “Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy”, *Journal of Political Economy*, Vol. 113, No. 1, pp. 1-45.
- Cœuré, B. (2012). “What can monetary policy do about inequality?”, Speech at the International Day for the Eradication of Poverty, Intergroup “Extreme Poverty and Human Rights, Fourth World Committee” event, European Parliament, Brussels, 17 October 2012.
- Curtis, C., Lugauer, S. and Nelson, M. (2017). “Demographics and aggregate household saving in Japan, China, and India”, *Journal of Macroeconomics*, Vol. 51, pp. 175-191.
- Deaton, A. (1991). “Saving and liquidity constraints”, *Econometrica*, Vol. 59, No. 5, pp. 1221–48.
- Dekle, R. (1990). “Do the Japanese elderly reduce their total wealth? A new look with different data”, *Journal of the Japanese and International Economies*, Vol. 4, No. 3, pp. 309-317.
- Dekle, R. and Summers, L. (1991). “Japan’s high saving rate reaffirmed”, *Bank of Japan Monetary and Economic Studies*, Vol. 9, No. 2, pp. 63-78.
- Draghi, M. (2015). “The ECB’s recent monetary policy measures: Effectiveness and challenges”, Camdessus lecture, IMF, Washington, DC, 14 May 2015.
- Elliott, G., Rothenberg, T. and Stock, J. (1996). “Efficient Tests for an Autoregressive Unit Root”, *Econometrica*, Vol. 64, No.4, pp. 813-836.
- Elmendorf, D. (1996). “The effect of interest-rate changes on household saving and consumption: a survey”, *Mimeo Federal Reserve Board*, Washinton, D.C.
- Evans, C. (2001). Comment in NBER Macroeconomics Annual, Comment on: Barth, M. J. III and Ramey, V. The Cost Channel of Monetary Transmission, pp. 240ff.
- Feldstein, M. and Horioka, C. (1980). “Domestic Saving and International Capital Flows”, *The Economic Journal*, Vol. 90, No. 358, pp. 314-329.
- Friedman, M. (1957). “The Permanent Income Hypothesis”. *A Theory of the Consumption Function*. Princeton University Press.
- Galindo, A., Schiantarelli, F, and Weiss, A. (2007). “Does financial liberalization improve the allocation of investment?: Micro-evidence from developing countries”, *Journal of Development Economics*, Vol. 83, No. 2, pp. 562-587.
- Gourinchas, P.-O. and Parker, J. (2002). “Consumption Over the Life Cycle”, *Econometrica*, Vol. 70, No. 1, pp. 47-89.
- Gemech, F. and Struthers, J. (2003). “The McKinnon-Shaw Hypothesis: Thirty Years on: A Review of Recent Developments in Financial Liberalization Theory”, presented at the

- Development Studies Association Annual Conference on “Globalization and Development”, Glasgow.
- Giovannini, A. (1983). “The Interest Elasticity of Savings in Developing Countries: The Existing Evidence”, *World Development*, Vol. 11, No. 1, pp. 601-607.
- Giovannini, A. (1985). “Saving and the Rate of Interest in LDCd”, *Journal of Development Economics*, Vol. 18, pp. 197–217.
- Greene, W. (2012). *Econometric Analysis*, 7<sup>th</sup> edition, Essex, England: Pearson Education Limited.
- Hall, R. (1978). “Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence”, *Journal of Political Economy*, Vol. 86, No. 6, pp. 971–987.
- Hamilton, J. (1994). *Time Series Analysis*, Princeton: Princeton University Press.
- Hansen, A. (1939). “Economic Progress and Declining Population Growth”, *American Economic Review*, Vol. 29, No. 1, pp. 1–15.
- Hayashi, F. (1986). “Why is Japan’s saving rate so apparently high?”, *NBER Macroeconomic Annual*, Vol. 1, pp. 147-234.
- Hayashi, F. (1989a). “Is Japan’s saving rate high?”, *Federal Reserve Bank of Minneapolis Quarterly Review*, pp. 3-9.
- Hayashi, F. (1989b). “Japan’s Saving Rate: New Data and Reflections”, *Understanding Saving: Evidence from the U.S. and Japan*, MIT Press.
- Hayashi, F. (1992). “Explaining Japan’s saving: A review of recent literature”, *Monetary and Economic Studies* (Bank of Japan), Vol. 10, No. 2, pp. 63-78.
- Hayashi, F., Ando, A. und Ferris, R. (1988). “Life cycle and bequest savings. A study of Japanese and U.S. households: Based on data from the 1984 NSFIE and the 1983 survey of consumer finances”, *Journal of the Japanese and International Economies*, Vol. 2, pp. 450-491.
- Hayek, F. (1976 [1929]). *Geldtheorie und Konjunkturtheorie*, Salzburg: Neugebauer.
- Horioka, C. (1985). A survey of the literature on household saving in Japan: Why is the household saving rate so high in Japan? Kyoto University, Mimeo.
- Horioka, C. (1990). “Why is Japan’s saving rate so high? A literature survey”, *Journal of the Japanese and International Economies*, Vol. 4, pp. 49-92.
- Horioka, C. (1995). “Is Japan's Household Saving Rate Really High?”, *Review of Income and Wealth*, Vol. 41, No. 4, pp. 373-397.



- Horioka, C. (2006). "Are the Japanese Unique? An Analysis of Consumption and Saving Behavior in Japan", in: Garon, S. and Maclachlan, P. (eds.), *The Ambivalent Consumer: Questioning Consumption in East Asia and the West*, pp. 113–136, Ithaca, New York: Cornell University Press.
- Horioka, C., Suzuki, W. and Hatta, T. (2007). "Aging, Savings, and Public Pensions in Japan", *Asian Economic Policy Review*, Vol. 2, No. 2, pp. 303-319.
- Horioka, C. (2009). "The (Dis)saving Behavior of the Aged in Japan", *Japan and the World Economy*, Vol. 22, No. 3, pp. 151-158.
- Horioka, C. and Watanabe, W. (1997). "Why do People Save? A Micro-Analysis of Motives for Household Saving in Japan", *The Economic Journal*, Vol. 107, No. 442, pp. 537-552.
- Horioka, C., Suzuki, W., and Hatta, T. (2007). "Aging, Saving, and Public Pensions in Japan", *Asian Economic Policy Review*, Vol. 2, No. 2, pp. 303-319.
- Ishikawa, T. (1988). "Saving and labor supply behavior of aged households in Japan", *Journal of the Japanese and International Economies*, Vol. 2, No. 4, pp. 417-449.
- Ito, T. (1992). *The Japanese Economy*, Cambridge: MIT Press, Chap. 9.
- Ito, T. und Kitamura, Y. (1994). "Public Policies and Household Saving in Japan", in: Poterba, J. (ed.), *Public Policies and Household Savings*, pp. 133-160, University of Chicago Press.
- Iwaisako, T. and Okada, K. (2012). "Understanding the decline in Japan's saving rate in the new millennium", *Japan and the World Economy*, Vol. 24, No. 3, pp. 163-173.
- Iwamoto, Y. (1996). "Japan's saving rate is indeed lower than Professor Hayashi revealed", *Japan and the World Economy*, Vol. 8, No. 1, pp. 35-41.
- Koga, M. (2006). "The Decline of Japan's Saving Rate and Demographic Effects", *The Japanese Economic Review*, Vol. 57, No. 2.
- Komiya, R. 1966. The supply of personal savings. In *Postwar economic growth in Japan*, ed. R. Komiya, 157—86. (trans. Robert Ozaki). Berkeley: University of California Press.
- Koopmans, T. (1965). "On the Concept of Optimal Economic Growth", *The Economic Approach to Development Planning*, pp. 225–287, Chicago: Rand McNally.
- Kurosaka, .. and Hamada, .. (1984). "Why is the personal saving rate so high?"
- Leland, H. (1968). "Saving and Uncertainty: The Precautionary Demand for Saving", *Quarterly Journal of Economics*, Vol. 82, No. 3, pp. 465–73.
- Mankiw, G. (2009). *Principles of Macroeconomics*, Cengage Learning, Inc, 7th edition.
- McKinnon, R. (1973). *Money and Capital in Economic Development*, The Brookings Institution: Washington.

- Mersch, Y. (2014). “Monetary policy and economic inequality”, Keynote speech, Corporate Credit Conference, Zurich, 17 October 2014.
- Mises, L. von (1998 [1949]). *Human Action*, Scholar’s Edition, Auburn: Ludwig von Mises Institute.
- Mishkin, F. (2001). “Financial Policies and the Prevention of Financial Crises in Emerging Market Countries”, *NBER Working Paper* No. 8087.
- Mizoguchi, T. (1970). “High personal saving rate and changes in the consumption pattern in postwar Japan”, *The Developing Economies*, Vol. 8, No. 2, pp. 407-426.
- Modigliani, F. (1970). “The life-cycle hypothesis and intercountry differences in the saving ratio”, in: Eltis, W., Scott, M. and Wolfe, J. (eds.), *Induction, growth, and trade: essays in honour of Sir Roy Harrod*, pp. 197–225, Oxford University Press, Oxford.
- Modigliani, F. (1986). “Life Cycle, Individual Thrift, and the Wealth of Nations”, *The American Economic Review*, Vol. 76, No. 3, pp. 297-313.
- Modigliani, F. and Sterling, A. (1983). “Determinants of Private Saving with Special Reference to the Role of Social Security – Cross-country Tests”, in: Modigliani, F. and Hemming, R. (eds.), *The Determinants of National Saving and Wealth*, pp. 24-55, Palgrave Macmillan UK.
- Moriizumi, Y. (2003). “Targeted saving by renters for housing purchase in Japan”, *Journal of Urban Economics*, Vol. 53, pp. 494-509.
- Murata, Keiko, 2003, “Precautionary Savings and Income Uncertainty: Evidence from Japanese Micro Data”, *Monetary and Economic Studies*, Vol. 21, No. 3, pp. 21–52.
- Newey, W. and West, K. (1987). “A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix”, *Econometrica*, Vol. 55, No. 3, pp. 703-708.
- Noguchi, Y. (1990). “The Role of Intergenerational Transfer in the Formation of Household Asset (in Japanese)”, *JILI Forum* (1), pp. 6-17.
- Obstfeld, O. (1998). “The Global Capital Market: Benefactor or Menace?”, *Journal of Economic Perspectives*, Vol. 12, No. 4, pp. 9–30.
- OECD (2018). Household saving, retrieved 17 April 2018 from <https://data.oecd.org/hha/household-savings.htm#indicator-chart>.
- Ogawa, K. (1991). “Income uncertainty and precautionary saving”, *Keizai Kenkyu*, Vol. 142, No. 2, in Japanese.
- Okita, S. (1957). “Savings and Economic Growth in Japan”, *Economic Development and Cultural Change*, Vol. 6, No. 1, pp. 32-41.



- Ostry, J. and Reinhart, C. (1992). “Private Saving and Terms of Trade Shocks: Evidence from Developing Countries”, *Staff Papers International Monetary Fund*, Vol. 39, pp. 495–517.
- Perron, P. (2015). “Dealing with Structural Breaks”, *Palgrave Handbook of Econometrics*, Vol 1: Econometric Theory.
- Ramsey, F. (1928). “A Mathematical Theory of Saving”, *Economic Journal*, Vol. 38, No. 152, pp. 543–559.
- Reinhart, C. and Tokatlidis, I. (2005). “Before and After Financial Liberalization”, *MPRA Paper* 6986, University Library of Munich, Germany.
- Ricardo, D. (1821). *On the Principles of Political Economy and Taxation*, 3<sup>rd</sup> edition, Batoche Books 2001.
- Saiki, A. and Frost, J. (2014). “Does Unconventional Monetary Policy Affect Inequality? Evidence from Japan”, *Applied Economics*, Vol. 46, No. 36, pp. 4445–4454.
- Saito, J. (2015). “The New Era of the Negative Household Savings Rate”, Japan Center for Economic Research.
- Saito, I. (2016). “Fading Ricardian Equivalence in Ageing Japan”, IMF Working Paper WP/16/194.
- Sato, K. (1987). “Saving and investment in Japan”, Center on Japanese Economy and Business Working Papers, Columbia University.
- Schnabl, G. (2001). “Weak Economy and Strong Currency: The Origins of the Strong Yen in the 1990s”, *Vierteljahrshefte zur Wirtschaftsforschung / Quarterly Journal of Economic Research*, German Institute for Economic Research, Vol. 70, No. 4, pp. 489-503.
- Schnabl, G. (2018). “Exit Strategies from Monetary Expansion and Financial Repression”, *The Cato Journal*, Vol. 38, No. 2.
- Shaw, E. (1973). *Financial Deepening in Economic Development*, Oxford University Press: New York.
- Sheng, Z. and Mu, X. (2012). “Research on the Changes in Japan’s Savings Rate”, *Business and Management Research*, Vol. 1, No. 3, pp. 121-124.
- Smith, A. (1789). *An Inquiry into the Nature and Causes of the Wealth of Nations* (5th ed.). London: A. Strahan; T.Cadell.
- Solow, R. (1956). “A contribution to the theory of economic growth”, *Quarterly Journal of Economics*, Vol. 70, No. 1, pp. 65–94.
- Solow, R. (1957). “Technical change and the aggregate production function”, *Review of Economics and Statistics*, Vol. 39, No. 3, pp. 312–320.

- Stock, J. and Watson, M. (2011). *Introduction to Econometrics* (3<sup>rd</sup> ed.), Boston: Addison–Wesley.
- Stulz, R. (1999). “Globalization of Capital Markets and the Cost of Capital”, *NBER Working Paper* No. 7021.
- Summers, L. (2014). “U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound”, *Business Economics*, Vol. 49, No. 2, pp. 65–73.
- Swan, T. (1956). “Economic growth and capital accumulation”, *Economic Record*, Vol. 32, No. 2, pp. 334–361.
- Tachibanaki, T. (1994). “Housing and Saving in Japan“, in: Noguchi, Y. and Poterba, J. (eds.), *Housing Markets in the U.S. and Japan*. pp. 161-190, University of Chicago Press.
- Takayama, N. and Kitamura, Y. (1994). “Household Saving Behavior in Japan”, in: Poterba, J. (ed.), *International Comparisons of Household Saving*, pp. 125-168, University of Chicago Press.
- Takayama, N. (2003). “The Japanese Public Pension System: What Went Wrong and What Reform Measures We Need”, *International Conference on Japan and Italy: Economic Performances and Policies Compared*, Bocconi University, Milano, 9-10 October 2003.
- Tokuoka, K. (2010). “Rebalancing in Japan: The Role of Private Consumption”, *IMF Working Paper* WP/10/293.
- Visco I. (2002). “Ageing Populations: Economic Issues and Policy Challenges”, in: Siebert, H. (ed.), *Economic Policy for Aging Societies*, Springer, Berlin.
- Visco I. (2005), “Ageing and pension system reform: implications for financial markets and economic policies”, Report prepared at the request of the Deputies of the G10, available at <http://www.imf.org/external/np/g10/2005/pdf/092005.pdf>
- Weizsäcker, Christian v. (2014). “Public Debt and Price Stability”, *German Economic Review*, Vol. 15, No. 1, pp. 42–61.
- Wicksell, K. (2005 [1898]). *Geldzins und Güterpreise*, Jena und München.
- Williamson, J. and de Bever, L. (1978). “Saving, Acculuation and Modern Economic Growth: The Contemporary Relevance of Japanese History”, *The Journal of Japanese Studies*, Vol. 4, No. 1, pp. 125-167.
- Yoshino, N. and Mizoguchi, T. (2013). “Change in the Flow of Funds and the Fiscal Rules Needed for Fiscal Stabilization”, *Public Policy Review*, Vol. 9, No. 1, pp. 51-70.
- Zhou, Y. (2003). “Precautionary saving and earnings uncertainty in Japan: A household-level analysis”, *Journal of the Japanese and International Economies*, Vol. 17, No. 2, 192-212.

# Universität Leipzig

## Wirtschaftswissenschaftliche Fakultät

Nr. 1	Wolfgang Bernhardt	Stock Options wegen oder gegen Shareholder Value? Vergütungsmodelle für Vorstände und Führungskräfte 04/1998
Nr. 2	Thomas Lenk / Volkmar Teichmann	Bei der Reform der Finanzverfassung die neuen Bundesländer nicht vergessen! 10/1998
Nr. 3	Wolfgang Bernhardt	Gedanken über Führen – Dienen – Verantworten 11/1998
Nr. 4	Kristin Wellner	Möglichkeiten und Grenzen kooperativer Standortgestaltung zur Revitalisierung von Innenstädten 12/1998
Nr. 5	Gerhardt Wolff	Brauchen wir eine weitere Internationalisierung der Betriebswirtschaftslehre? 01/1999
Nr. 6	Thomas Lenk / Friedrich Schneider	Zurück zu mehr Föderalismus: Ein Vorschlag zur Neugestaltung des Finanzausgleichs in der Bundesrepublik Deutschland unter besonderer Berücksichtigung der neuen Bundesländer 12/1998
Nr. 7	Thomas Lenk	Kooperativer Föderalismus – Wettbewerbsorientierter Föderalismus 03/1999
Nr. 8	Thomas Lenk / Andreas Mathes	EU – Osterweiterung – Finanzierbar? 03/1999
Nr. 9	Thomas Lenk / Volkmar Teichmann	Die fiskalischen Wirkungen verschiedener Forderungen zur Neugestaltung des Länderfinanzausgleichs in der Bundesrepublik Deutschland: Eine empirische Analyse unter Einbeziehung der Normenkontrollanträge der Länder Baden-Württemberg, Bayern und Hessen sowie der Stellungnahmen verschiedener Bundesländer 09/1999
Nr. 10	Kai-Uwe Graw	Gedanken zur Entwicklung der Strukturen im Bereich der Wasserversorgung unter besonderer Berücksichtigung kleiner und mittlerer Unternehmen 10/1999
Nr. 11	Adolf Wagner	Materialien zur Konjunkturforschung 12/1999
Nr. 12	Anja Birke	Die Übertragung westdeutscher Institutionen auf die ostdeutsche Wirklichkeit – ein erfolg-versprechendes Zusammenspiel oder Aufdeckung systematischer Mängel? Ein empirischer Bericht für den kommunalen Finanzausgleich am Beispiel Sachsen 02/2000
Nr. 13	Rolf H. Hasse	Internationaler Kapitalverkehr in den letzten 40 Jahren – Wohlstandsmotor oder Krisenursache? 03/2000
Nr. 14	Wolfgang Bernhardt	Unternehmensführung (Corporate Governance) und Hauptversammlung 04/2000
Nr. 15	Adolf Wagner	Materialien zur Wachstumsforschung 03/2000
Nr. 16	Thomas Lenk / Anja Birke	Determinanten des kommunalen Gebührenaufkommens unter besonderer Berücksichtigung der neuen Bundesländer 04/2000
Nr. 17	Thomas Lenk	Finanzwirtschaftliche Auswirkungen des Bundesverfassungsgerichtsurteils zum Länderfinanzausgleich vom 11.11.1999 04/2000
Nr. 18	Dirk Büttel	Continuous linear utility for preferences on convex sets in normal real vector spaces 05/2000
Nr. 19	Stefan Dierkes / Stephanie Hanrath	Steuerung dezentraler Investitionsentscheidungen bei nutzungsabhängigem und nutzungsunabhängigem Verschleiß des Anlagenvermögens 06/2000
Nr. 20	Thomas Lenk / Andreas Mathes / Olaf Hirschfeld	Zur Trennung von Bundes- und Landeskompetenzen in der Finanzverfassung Deutschlands 07/2000
Nr. 21	Stefan Dierkes	Marktwerte, Kapitalkosten und Betafaktoren bei wertabhängiger Finanzierung 10/2000
Nr. 22	Thomas Lenk	Intergovernmental Fiscal Relationships in Germany: Requirement for New Regulations? 03/2001
Nr. 23	Wolfgang Bernhardt	Stock Options – Aktuelle Fragen Besteuerung, Bewertung, Offenlegung 03/2001
Nr. 24	Thomas Lenk	Die „kleine Reform“ des Länderfinanzausgleichs als Nukleus für die „große Finanzverfassungs-reform“? 10/2001

Nr. 25	Wolfgang Bernhardt	Biotechnologie im Spannungsfeld von Menschenwürde, Forschung, Markt und Moral Wirtschaftsethik zwischen Beredsamkeit und Schweigen 11/2001
Nr. 26	Thomas Lenk	Finanzwirtschaftliche Bedeutung der Neuregelung des bundestaatlichen Finanzausgleichs – Eine allokative und distributive Wirkungsanalyse für das Jahr 2005 11/2001
Nr. 27	Sören Bär	Grundzüge eines Tourismusmarketing, untersucht für den Südraum Leipzig 05/2002
Nr. 28	Wolfgang Bernhardt	Der Deutsche Corporate Governance Kodex: Zuwahl (comply) oder Abwahl (explain)? 06/2002
Nr. 29	Adolf Wagner	Konjunkturtheorie, Globalisierung und Evolutionsökonomik 08/2002
Nr. 30	Adolf Wagner	Zur Profilbildung der Universitäten 08/2002
Nr. 31	Sabine Klinger / Jens Ulrich / Hans-Joachim Rudolph	Konjunktur als Determinante des Erdgasverbrauchs in der ostdeutschen Industrie? 10/2002
Nr. 32	Thomas Lenk / Anja Birke	The Measurement of Expenditure Needs in the Fiscal Equalization at the Local Level Empirical Evidence from German Municipalities 10/2002
Nr. 33	Wolfgang Bernhardt	Die Lust am Fliegen Eine Parabel auf viel Corporate Governance und wenig Unternehmensführung 11/2002
Nr. 34	Udo Hielscher	Wie reich waren die reichsten Amerikaner wirklich? (US-Vermögensbewertungsindex 1800 – 2000) 12/2002
Nr. 35	Uwe Haubold / Michael Nowak	Risikoanalyse für Langfrist-Investments Eine simulationsbasierte Studie 12/2002
Nr. 36	Thomas Lenk	Die Neuregelung des bundesstaatlichen Finanzausgleichs auf Basis der Steuerschätzung Mai 2002 und einer aktualisierten Bevölkerungsstatistik 12/2002
Nr. 37	Uwe Haubold / Michael Nowak	Auswirkungen der Renditeverteilungsannahme auf Anlageentscheidungen Eine simulationsbasierte Studie 02/2003
Nr. 38	Wolfgang Bernhard	Corporate Governance Kodex für den Mittel-Stand? 06/2003
Nr. 39	Hermut Kormann	Familienunternehmen: Grundfragen mit finanzwirtschaftlichen Bezug 10/2003
Nr. 40	Matthias Folk	Launhardtsche Trichter 11/2003
Nr. 41	Wolfgang Bernhardt	Corporate Governance statt Unternehmensführung 11/2003
Nr. 42	Thomas Lenk / Karolina Kaiser	Das Prämienmodell im Länderfinanzausgleich – Anreiz- und Verteilungsmittelnwirkungen 11/2003
Nr. 43	Sabine Klinger	Die Volkswirtschaftliche Gesamtrechnung des Haushaltssektors in einer Matrix 03/2004
Nr. 44	Thomas Lenk / Heide Köpping	Strategien zur Armutsbekämpfung und –vermeidung in Ostdeutschland: 05/2004
Nr. 45	Wolfgang Bernhardt	Sommernachtsfantasien Corporate Governance im Land der Träume. 07/2004
Nr. 46	Thomas Lenk / Karolina Kaiser	The Premium Model in the German Fiscal Equalization System 12/2004
Nr. 47	Thomas Lenk / Christine Falken	Komparative Analyse ausgewählter Indikatoren des Kommunalwirtschaftlichen Gesamt-ergebnisses 05/2005
Nr. 48	Michael Nowak / Stephan Barth	Immobilienanlagen im Portfolio institutioneller Investoren am Beispiel von Versicherungsunternehmen Auswirkungen auf die Risikosituation 08/2005
Nr. 49	Wolfgang Bernhardt	Familiengesellschaften – Quo Vadis? Vorsicht vor zu viel „Professionalisierung“ und Ver-Fremdung 11/2005
Nr. 50	Christian Milow	Der Griff des Staates nach dem Währungsgold 12/2005

Nr. 51	Anja Eichhorst / Karolina Kaiser	The Institutional Design of Bailouts and Its Role in Hardening Budget Constraints in Federations 03/2006
Nr. 52	Ullrich Heilemann / Nancy Beck	Die Mühen der Ebene – Regionale Wirtschaftsförderung in Leipzig 1991 bis 2004 08/2006
Nr. 53	Gunther Schnabl	Die Grenzen der monetären Integration in Europa 08/2006
Nr. 54	Hermut Kormann	Gibt es so etwas wie typisch mittelständige Strategien? 11/2006
Nr. 55	Wolfgang Bernhardt	(Miss-)Stimmung, Bestimmung und Mitbestimmung Zwischen Juristentag und Biedenkopf-Kommission 11/2006
Nr. 56	Ullrich Heilemann / Annika Blaschzik	Indicators and the German Business Cycle A Multivariate Perspective on Indicators of Ifo, OECD, and ZEW 01/2007
Nr. 57	Ullrich Heilemann	“The Soul of a new Machine” zu den Anfängen des RWI-Konjunkturmodells 12/2006
Nr. 58	Ullrich Heilemann / Roland Schuhr / Annika Blaschzik	Zur Evolution des deutschen Konjunkturzyklus 1958 bis 2004 Ergebnisse einer dynamischen Diskriminanzanalyse 01/2007
Nr. 59	Christine Falken / Mario Schmidt	Kameralistik versus Doppik Zur Informationsfunktion des alten und neuen Rechnungswesens der Kommunen Teil I: Einführende und Erläuternde Betrachtungen zum Systemwechsel im kommunalen Rechnungswesen 01/2007
Nr. 60	Christine Falken / Mario Schmidt	Kameralistik versus Doppik Zur Informationsfunktion des alten und neuen Rechnungswesens der Kommunen Teil II Bewertung der Informationsfunktion im Vergleich 01/2007
Nr. 61	Udo Hielscher	Monti della città di firenze Innovative Finanzierungen im Zeitalter Der Medici. Wurzeln der modernen Finanzmärkte 03/2007
Nr. 62	Ullrich Heilemann / Stefan Wappler	Sachsen wächst anders Konjunkturelle, sektorale und regionale Bestimmungsgründe der Entwicklung der Bruttowertschöpfung 1992 bis 2006 07/2007
Nr. 63	Adolf Wagner	Regionalökonomik: Konvergierende oder divergierende Regionalentwicklungen 08/2007
Nr. 64	Ullrich Heilemann / Jens Ulrich	Good bye, Professir Phillips? Zum Wandel der Tariflohdeterminanten in der Bundesrepublik 1952 – 2004 08/2007
Nr. 65	Gunther Schnabl / Franziska Schobert	Monetary Policy Operations of Debtor Central Banks in MENA Countries 10/2007
Nr. 66	Andreas Schäfer / Simone Valente	Habit Formation, Dynastic Altruism, and Population Dynamics 11/2007
Nr. 67	Wolfgang Bernhardt	5 Jahre Deutscher Corporate Governance Kodex Eine Erfolgsgeschichte? 01/2008
Nr. 68	Ullrich Heilemann / Jens Ulrich	Viel Lärm um wenig? Zur Empirie von Lohnformeln in der Bundesrepublik 01/2008
Nr. 69	Christian Groth / Karl-Josef Koch / Thomas M. Steger	When economic growth is less than exponential 02/2008
Nr. 70	Andreas Bohne / Linda Kochmann	Ökonomische Umweltbewertung und endogene Entwicklung peripherer Regionen Synthese einer Methodik und einer Theorie 02/2008
Nr. 71	Andreas Bohne / Linda Kochmann / Jan Slavík / Lenka Slavíková	Deutsch-tschechische Bibliographie Studien der kontingenten Bewertung in Mittel- und Osteuropa 06/2008
Nr. 72	Paul Lehmann / Christoph Schröter-Schlaack	Regulating Land Development with Tradable Permits: What Can We Learn from Air Pollution Control? 08/2008
Nr. 73	Ronald McKinnon / Gunther Schnabl	China's Exchange Rate Impasse and the Weak U.S. Dollar 10/2008
Nr. 74	Wolfgang Bernhardt	Managervergütungen in der Finanz- und Wirtschaftskrise Rückkehr zu (guter) Ordnung, (klugem) Maß und (vernünftigem) Ziel? 12/2008

Nr. 75	Moritz Schularick / Thomas M. Steger	Financial Integration, Investment, and Economic Growth: Evidence From Two Eras of Financial Globalization 12/2008
Nr. 76	Gunther Schnabl / Stephan Freitag	An Asymmetry Matrix in Global Current Accounts 01/2009
Nr. 77	Christina Ziegler	Testing Predictive Ability of Business Cycle Indicators for the Euro Area 01/2009
Nr. 78	Thomas Lenk / Oliver Rottmann / Florian F. Woitek	Public Corporate Governance in Public Enterprises Transparency in the Face of Divergent Positions of Interest 02/2009
Nr. 79	Thomas Steger / Lucas Bretschger	Globalization, the Volatility of Intermediate Goods Prices, and Economic Growth 02/2009
Nr. 80	Marcela Munoz Escobar / Robert Holländer	Institutional Sustainability of Payment for Watershed Ecosystem Services. Enabling conditions of institutional arrangement in watersheds 04/2009
Nr. 81	Robert Holländer / WU Chunyou / DUAN Ning	Sustainable Development of Industrial Parks 07/2009
Nr. 82	Georg Quaas	Realgrößen und Preisindizes im alten und im neuen VGR-System 10/2009
Nr. 83	Ullrich Heilemann / Hagen Findeis	Empirical Determination of Aggregate Demand and Supply Curves: The Example of the RWI Business Cycle Model 12/2009
Nr. 84	Gunther Schnabl / Andreas Hoffmann	The Theory of Optimum Currency Areas and Growth in Emerging Markets 03/2010
Nr. 85	Georg Quaas	Does the macroeconomic policy of the global economy's leader cause the worldwide asymmetry in current accounts? 03/2010
Nr. 86	Volker Grossmann / Thomas M. Steger / Timo Trimborn	Quantifying Optimal Growth Policy 06/2010
Nr. 87	Wolfgang Bernhardt	Corporate Governance Kodex für Familienunternehmen? Eine Widerrede 06/2010
Nr. 88	Philipp Mandel / Bernd Süßmuth	A Re-Examination of the Role of Gender in Determining Digital Piracy Behavior 07/2010
Nr. 89	Philipp Mandel / Bernd Süßmuth	Size Matters. The Relevance and Hicksian Surplus of Agreeable College Class Size 07/2010
Nr. 90	Thomas Kohstall / Bernd Süßmuth	Cyclic Dynamics of Prevention Spending and Occupational Injuries in Germany: 1886-2009 07/2010
Nr. 91	Martina Padmanabhan	Gender and Institutional Analysis. A Feminist Approach to Economic and Social Norms 08/2010
Nr. 92	Gunther Schnabl / Ansgar Belke	Finanzkrise, globale Liquidität und makroökonomischer Exit 09/2010
Nr. 93	Ullrich Heilemann / Roland Schuhr / Heinz Josef Münch	A "perfect storm"? The present crisis and German crisis patterns 12/2010
Nr. 94	Gunther Schnabl / Holger Zemanek	Die Deutsche Wiedervereinigung und die europäische Schuldenkrise im Lichte der Theorie optimaler Währungsräume 06/2011
Nr. 95	Andreas Hoffmann / Gunther Schnabl	Symmetrische Regeln und asymmetrisches Handeln in der Geld- und Finanzpolitik 07/2011
Nr. 96	Andreas Schäfer / Maik T. Schneider	Endogenous Enforcement of Intellectual Property, North-South Trade, and Growth 08/2011
Nr. 97	Volker Grossmann / Thomas M. Steger / Timo Trimborn	Dynamically Optimal R&D Subsidization 08/2011
Nr. 98	Erik Gawel	Political drivers of and barriers to Public-Private Partnerships: The role of political involvement 09/2011
Nr. 99	André Casajus	Collusion, symmetry, and the Banzhaf value 09/2011
Nr. 100	Frank Hüttner / Marco Sunder	Decomposing $R^2$ with the Owen value 10/2011
Nr. 101	Volker Grossmann / Thomas M. Steger / Timo Trimborn	The Macroeconomics of TANSTAAFL 11/2011

Nr. 102	Andreas Hoffmann	Determinants of Carry Trades in Central and Eastern Europe 11/2011
Nr. 103	Andreas Hoffmann	Did the Fed and ECB react asymmetrically with respect to asset market developments? 01/2012
Nr. 104	Christina Ziegler	Monetary Policy under Alternative Exchange Rate Regimes in Central and Eastern Europe 02/2012
Nr. 105	José Abad / Axel Löffler / Gunther Schnabl / Holger Zemanek	Fiscal Divergence, Current Account and TARGET2 Imbalances in the EMU 03/2012
Nr. 106	Georg Quaas / Robert Köster	Ein Modell für die Wirtschaftszweige der deutschen Volkswirtschaft: Das "MOGBOT" (Model of Germany's Branches of Trade)
Nr. 107	Andreas Schäfer / Thomas Steger	Journey into the Unknown? Economic Consequences of Factor Market Integration under Increasing Returns to Scale 04/2012
Nr. 108	Andreas Hoffmann / Björn Urbansky	Order, Displacements and Recurring Financial Crises 06/2012
Nr. 109	Finn Marten Körner / Holger Zemanek	On the Brink? Intra-euro area imbalances and the sustainability of foreign debt 07/2012
Nr. 110	André Casajus / Frank Hüttner	Nullifying vs. dummifying players or nullified vs. dummified players: The difference between the equal division value and the equal surplus division value 07/2012
Nr. 111	André Casajus	Solidarity and fair taxation in TU games 07/2012
Nr. 112	Georg Quaas	Ein Nelson-Winter-Modell der deutschen Volkswirtschaft 08/2012
Nr. 113	André Casajus / Frank Hüttner	Null players, solidarity, and the egalitarian Shapley values 08/2012
Nr. 114	André Casajus	The Shapley value without efficiency and additivity 11/2012
Nr. 115	Erik Gawel	Neuordnung der W-Besoldung: Ausgestaltung und verfassungsrechtliche Probleme der Konsumtionsregeln zur Anrechnung von Leistungsbezügen 02/2013
Nr. 116	Volker Grossmann / Andreas Schäfer / Thomas M. Steger	Migration, Capital Formation, and House Prices 02/2013
Nr. 117	Volker Grossmann / Thomas M. Steger	Optimal Growth Policy: the Role of Skill Heterogeneity 03/2013
Nr. 118	Guido Heineck / Bernd Süßmuth	A Different Look at Lenin's Legacy: Social Capital and Risk Taking in the Two Germanies 03/2013
Nr. 119	Andreas Hoffmann	The Euro as a Proxy for the Classical Gold Standard? Government Debt Financing and Political Commitment in Historical Perspective 05/2013
Nr. 120	Andreas Hoffmann / Axel Loeffler	Low Interest Rate Policy and the Use of Reserve Requirements in Emerging Markets 05/2013
Nr. 121	Gunther Schnabl	The Global Move into the Zero Interest Rate and High Debt Trap 07/2013
Nr. 122	Axel Loeffler / Gunther Schnabl / Franziska Schobert	Limits of Monetary Policy Autonomy and Exchange Rate Flexibility by East Asian Central Banks 08/2013
Nr. 123	Burkhard Heer / Bernd Süßmuth	Tax Bracket Creep and its Effects on Income Distribution 08/2013
Nr. 124	Hans Fricke / Bernd Süßmuth	Growth and Volatility of Tax Revenues in Latin America 08/2013
Nr. 125	Ulrich Volz	RMB Internationalisation and Currency Co-operation in East Asia 09/2013
Nr. 126	André Casajus / Helfried Labrenz	A property rights based consolidation approach 02/2014
Nr. 127	Pablo Duarte	The Relationship between GDP and the Size of the Informal Economy: Empirical Evidence for Spain 02/2014
Nr. 128	Erik Gawel	Neuordnung der Professorenbesoldung in Sachsen 03/2014
Nr. 129	Friedrun Quaas	Orthodoxer Mainstream und Heterodoxe Alternativen Eine Analyse der ökonomischen Wissenschaftslandschaft 04/2014
Nr. 130	Gene Callahan / Andreas Hoffmann	The Idea of a Social Cycle 05/2014



Nr. 131	Karl Trela	Klimaanpassung als wirtschaftspolitisches Handlungsfeld 06/2014
Nr. 132	Erik Gawel / Miquel Aguado	Neuregelungen der W-Besoldung auf dem verfassungsrechtlichen Prüfstand 08/2014
Nr. 133	Ulf Papenfuß / Matthias Redlich / Lars Steinhauer	Forschend und engagiert lernen im Public Management: Befunde und Gestaltungsanregungen eines Service Learning Lehrforschungsprojektes 10/2014
Nr. 134	Karl Trela	Political climate adaptation decisions in Germany - shortcomings and applications for decision support systems 11/2014
Nr. 135	Ulf Papenfuß / Lars Steinhauer / Benjamin Friedländer	Beteiligungsberichterstattung der öffentlichen Hand im 13-Länder-Vergleich: Erfordernisse für mehr Transparenz über die Governance und Performance öffentlicher Unternehmen 02/2015
Nr. 136	Gunther Schnabl	Japans Lehren für das Schweizer Wechselkursdilemma 02/2015
Nr. 137	Ulf Papenfuß / Christian Schmidt	Determinants of Manager Pay in German State-Owned Enterprises and International Public Policy Implications: 3-Year Study for Sectors, Performance and Gender 02/2015
Nr. 138	Philipp Mandel / Bernd Süßmuth	Public education, accountability, and yardstick competition in a federal system 05/2015
Nr. 139	Gunther Schnabl	Wege zu einer stabilitäts- und wachstumsorientierten Geldpolitik aus österreichischer Perspektive 06/2015
Nr. 140	Ulf Papenfuß / Matthias Redlich / Lars Steinhauer / Benjamin Friedländer	Forschend und engagiert lernen im Public Management: Befunde und Gestaltungsanregungen eines Service Learning Lehrforschungsprojektes – 2. aktualisierte Auflage 08/2015
Nr. 141	Friedrun Quaas / Georg Quaas	Hayeks Überinvestitionstheorie 10/2015
Nr. 142	Bastian Gawellek / Marco Sunder	The German Excellence Initiative and Efficiency Change among Universities, 2001-2011 01/2016
Nr. 143	Benjamin Larin	Bubble-Driven Business Cycles 02/2016
Nr. 144	Friedrun Quaas / Georg Quaas	Effekte des Kapitalmarktzins auf die Preis- und Produktivitätsentwicklung Eine Analyse der deutschen Volkswirtschaft 1970-2014 02/2016
Nr. 145	Thomas Lenk / Matthias Redlich / Philipp Glinka	Nachhaltige Stadtfinanzen - Akzeptanzsteigerung der bürgerschaftlichen Beteiligung an der Haushaltsplanung 02/2016
Nr. 146	Michael von Prollius / Gunther Schnabl	Geldpolitik, Arabellion, Flüchtlingskrise 10/2016
Nr. 147	David Leuwer / Bernd Süßmuth	The Exchange Rate Susceptibility of European Core Industries, 1995-2010 05/2017
Nr. 148	Gunther Schnabl	Monetary Policy and Wandering Overinvestment Cycles in East Asia and Europe 05/2017
Nr. 149	Ullrich Heilemann / Karsten Müller	Wenig Unterschiede – Zur Treffsicherheit internationaler Prognosen und Prognostiker 07/2017
Nr. 150	Gunther Schnabl / Sebastian Müller	Zur Zukunft der Europäischen Union aus ordnungspolitischer Perspektive 10/2017
Nr. 151	Gunther Schnabl	Ultra-lockere Geldpolitiken, Finanzmarktblasen und marktwirtschaftliche Ordnung 10/2017
Nr. 152	Pablo Duarte / Bernd Süßmuth	Implementing an approximate dynamic factor model to nowcast GDP using sensitivity analysis 02/2018
Nr. 153	Sophia Latsos	Real Wage Effects of Japan's Monetary Policy 03/2018
Nr. 154	Gunther Schnabl / Klaus Siemon	Die EU-Insolvenzrichtlinie zu vorinsolvenzlichen Verfahren aus ordnungspolitischer Perspektive The EU Directive on Preventive Restructuring Frameworks from a Ordoliberal Perspective 07/2018
Nr. 155	Marika Behnert / Thomas Bruckner	Cost effects of energy system stability and flexibility options – an integrated optimal power flow modeling approach 09/2018
Nr. 156	Gunther Schnabl	70 Years after the German Currency and Economic Reform: The Monetary, Economic and Political Order in Europe is Disturbed 10/2018
Nr. 157	Wolfgang Bernhardt	Corporate Governance und Compliance Bunte Streiflichter 2018 11/2018

Nr. 158      Friedrun Quaas

Der spezifische Liberalismus von Hayek im Spektrum des Neoliberalismus  
01/2019

Nr. 159      Sophia Latsos

The Low Interest Policy and the Household Saving Behavior in Japan  
03/2019