Consumption, Income and Wealth

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INTRODUCTION AND SUMMARY

In Denmark, private consumption accounts for around half of domestic demand and has a strong impact on the business cycle. Consequently, it is important to have good insight into the determinants of private consumption, e.g. in connection with business cycle analyses of the Danish economy.

Over the last 10-15 years, Danish households have increased their net wealth as a ratio of income. At the same time, they have also expanded their balance sheets, i.e. both assets and liabilities. As a result, their gross debt ratio is now among the highest in the world even though their net wealth ratio is on a par with comparable countries. The high gross debt has attracted considerable attention both nationally and internationally.

In Part 2 of this Monetary Review we analyse how net wealth and its composition have influenced fluctuations in private consumption, first in a wider international perspective, followed by a separate analysis for Denmark. We also investigate the effects of financial flows from household wealth on household income and hence the scope for consumption. This overview article contains a non-technical summary of the most important findings and conclusions of the analyses.

Rising wealth entails more scope for consumption, and the consumption and net wealth ratios are expected to show similar patterns under normal circumstances. However, a number of countries have seen an increase in the net wealth ratio without the consumption ratio following suit. Growth in net wealth covers in particular rising housing wealth and in some countries – including Denmark – rising pension wealth. There are a number of possible explanations of why the higher net wealth ratio has not led to a higher consumption ratio, such as the widespread use of savings-based pension schemes.

As regards fluctuations in consumption, Denmark stands out from most other comparable countries. The divergence seems to be related particularly to differences in fluctuations in housing wealth and income. The strong influence of housing wealth on fluctuations in consumption

can be attributed to e.g. the fact that rising house prices reduce credit constraints.

In order to throw light on the significance of wealth to consumption in Denmark, we construct and estimate a model with special focus on the short and medium run. The properties of the consumption function are then examined within the framework of Danmarks Nationalbank's macroeconomic model, MONA. This makes it possible to take into account dynamic effects of shocks to the consumption function, e.g. how increased consumption stimulates income, which in turn boosts consumption.

Fluctuations in housing wealth play a large role in the aggregate model. During the boom in 2004-07, house prices rose by approximately 60 per cent, whereas they fell by around 15 per cent from end-2007 to end-2009. According to the model, this was the most important factor behind the surge in consumption during the boom and the subsequent sharp fall. The key role of housing wealth in consumption fluctuations ties in well with the observations from the international comparison.

Moreover, the model demonstrates that the falling interest rates in recent years – in response to the marked international economic slowdown – have contributed substantially to cushioning private consumption. The decline in interest rates has both reduced net interest expenses and supported house prices.

The key role of interest rates can be attributed, among other factors, to the households' accumulation of a high gross debt ratio over the last 15 years without correspondingly increasing interest-bearing assets. In the model, investment income from pension wealth is accumulated rather than being transferred directly to households, so that it affects disposable income only with a lag via future pension payouts. Consequently, interest-rate changes will be passed through to household interest expenses immediately, while interest income from pension wealth will only slowly affect income. Alternatively, pension wealth can be regarded as fixed-rate wealth due to guarantees and interest-rate hedging. Interest-rate changes will, also in this case, principally have an impact on household interest expenses and only to a limited extent on their interest income. Moreover, a far larger part of the debt is now variable-rate debt. All in all, this implies higher interest-rate sensitivity for household disposable income and thus private consumption today, compared with previously.

As a result of the more pronounced interest-rate sensitivity, the transmission mechanism of monetary-policy has strengthened and, viewed in isolation, normalisation of international and Danish monetary-policy interest rates will have a stronger dampening effect on consumption

today than a corresponding interest-rate increase would have had 10 years ago. This emphasises how important it is that financial markets have confidence in the Danish economy.

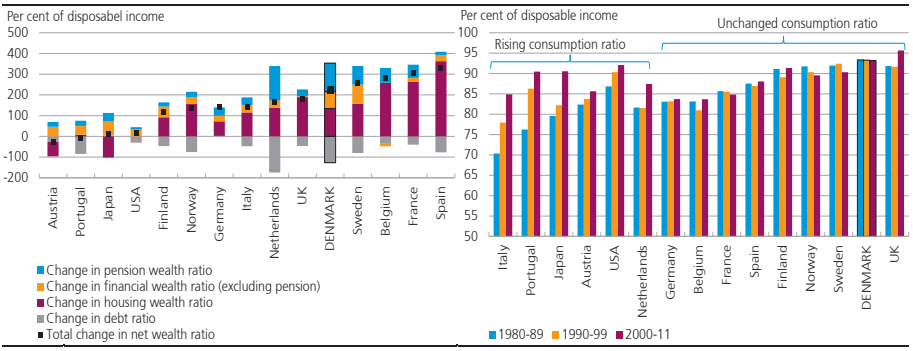
CONSUMPTION, INCOME AND WEALTH IN AN INTERNATIONAL CONTEXT

Many countries have seen a general increase in the net wealth ratio for households over the last 30 years, cf. Chart 1 (left). Higher housing wealth has been the principal contributor to the increase, but in some countries, such as Denmark and the Netherlands, higher pension savings have also contributed substantially.

Given the increase in the wealth ratio over the last 30 years, the consumption ratio could also be expected to have risen. However, not many western countries have seen such an increase. Instead, average consumption ratios have been virtually stable over the last three decades, cf. Chart 1 (right). Only Italy, Portugal and Japan have seen a considerable increase in the consumption ratio, which should be viewed in light of such factors as the initially very low consumption ratio in these countries relative to other OECD countries.

Several factors may have contributed to the rise in net wealth over time without the consumption ratio following suit. Demographics, for instance, may have contributed to the development. In some countries, changes in the pension system may also have played a role due to the widespread use of savings-based pension schemes. Moreover, falling interest rates may increase wealth, a case in point is the growth in house prices in most countries. House price gains over the last 20 years have

CHANGE IN HOUSEHOLD WEALTH RATIO IN THE PERIOD 1995-2011 (LEFT) AND THE AVERAGE CONSUMPTION RATIO FOR HOUSEHOLDS (RIGHT) Chart 1



Note: Left-hand chart: Including pension wealth before tax. Right-hand chart: It has been attempted to adjust for data breaks. For Austria and Belgium the average in the 1980s covers only 1985-89.
Source: Left-hand chart: OECD, Statistics Denmark and Isaksen et al. (2011), right-hand chart: OECD and Isaksen (2011).

presumably only partially been translated into consumption. Possible reasons are credit constraints – for instance, it is not possible to borrow against home equity in a number of countries – or households' aversion to increasing their loan-to-value, LTV, ratios.

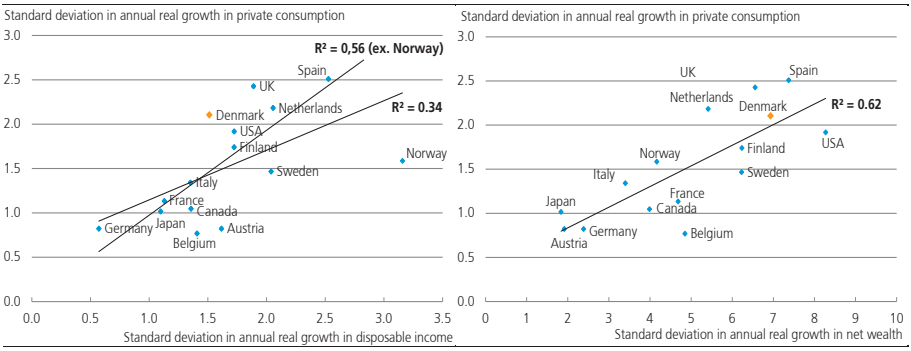
Consequently, the pattern in Denmark over the last three decades with an increasing wealth ratio and a stable consumption ratio is not unique; it is also found in other countries such as Sweden, France and to a lesser extent Germany. However, this development may not necessarily have the same determinants across countries. In Denmark, the LTV ratio for homes has increased over the last 20-30 years, presumably due to the Danish mortgage-credit system, but also to the fact that high pension wealth reduces the need for having redeemed all debt by the time of retirement. This makes it possible that a larger share of house price increases in Denmark over the last 20 years has been translated into consumption compared with other countries. Moreover, a further distinguishing feature of private consumption in Denmark relative to comparable countries is the high degree of volatility.

The difference in fluctuations in consumption growth seems to be attributable especially to variations in the volatility of income and wealth across countries, cf. Chart 2. Fluctuations in disposable income may result from e.g. changes in employment, but also changes in interest rates. Changes in interest rates will have a particularly strong impact on household disposable income in countries with a high ratio of interest-bearing net debt to income.

There is also a clear relationship between cyclical fluctuations in wealth and consumption, cf. Chart 2 (right). The principal reason is the strong correlation between fluctuations in housing wealth and fluctuations in private consumption over a business cycle. However, the rea-

CORRELATION BETWEEN FLUCTUATIONS IN CONSUMPTION, INCOME AND WEALTH

Chart 2



Note: 1996-2011.
Source: OECD, Statistics Denmark and Isaksen et al. (2011).

sons for the correlation cannot be determined on the basis of these simple graphs. One possibility is that falling interest rates or a fiscal easing increases both consumption and house prices. Another possible explanation is that fluctuations in housing wealth affect credit constraints and thus volatility in consumption.

On the other hand, fluctuations in pension wealth have been only weakly correlated with private consumption, especially if the focus is on countries where households hold substantial pension wealth (Denmark, the Netherlands, Sweden, the UK and the USA).

PRIVATE CONSUMPTION IN DENMARK

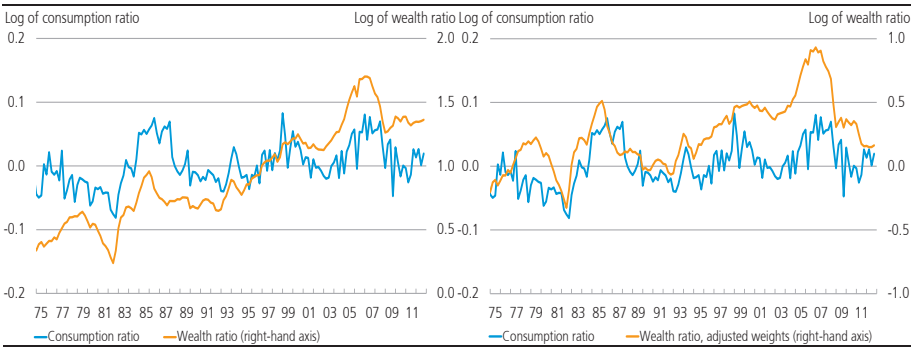
Annual growth in consumption in Denmark has been almost 2 per cent over the last 30 years. However, this masks substantial fluctuations. For example, consumption increased strongly in the period up to the financial crisis and then dropped by almost 6 per cent from the 2nd quarter of 2008 to the 1st quarter of 2009. In order to analyse the reasons for this development, we construct and estimate a model that explains fluctuations in consumption by income, wealth and several other factors.

The short-run and medium-run properties of the consumption function are to a high degree determined by the choice of definition of income (consumption-determining income), while the definition of wealth plays a smaller role. In particular, the properties depend on how investment income from pension wealth is treated. We opt for a description where the accumulation of investment income from pension wealth affects household disposable income only with a lag via future pension payouts.[1] Thus, changes in interest rates will immediately be passed through to household interest expenses, while interest income from pension wealth will only slowly affect income. In the short and medium term, interest-rate increases will thus lead to higher net interest expenses for the households.

Alternatively, interest income from pension wealth can be included directly in consumption-determining income, e.g. by using the disposable income of the private sector. However, this approach will not necessarily change the pass-through of a change in interest rates to net interest expenses, since pension wealth to a high degree has a fixed return as a result of guarantees and interest-rate hedging. Hence, interest-rate changes will, also in this case, principally impact household interest expenses and only to a limited extent on their interest income.

[1] The treatment of investment income from mandatory pension savings corresponds to the disposable income concept in the national accounts. Other macroeconomic models, such as ADAM, have the same approach in the short run.

CONSUMPTION AND WEALTH RATIOS IN LOGARITHMS Chart 3



Note: See the article: Consumption, Income and Wealth in Part 2 of this Monetary Review for a specification of income and wealth definitions.
Source: Own calculations based on data from Statistics Denmark, Danmarks Nationalbank and MONA.

The identification of consumption-determining wealth is difficult and associated with uncertainty, but as mentioned, the choice of definition of wealth has only a minor impact on the properties of the consumption function in the short and medium run. The wealth ratio of Danish households – like households in a number of other countries – has risen considerably over the last 30 years without the consumption ratio following suit, cf. Chart 3 (left). An increasing wealth ratio in conjunction with a stable consumption ratio poses challenges when constructing a stable consumption function, which initially requires identical development patterns for the two ratios. It is not possible to identify clearly, on the basis of macroeconomic data, which components of wealth have risen without influencing consumption. However, there are some empirical and theoretical clues.

The various types of household assets, such as pension schemes, equities, bank deposits and housing, are very different, implying varying influence on consumption. Pension savings, for instance, are tied up until retirement, cannot be pledged and are typically paid out over a number of years.[1] This indicates a small impact on the consumption ratio from pension wealth, especially in the short and medium run. For some households, e.g. those that are close to retirement, pension wealth no doubt plays a larger role.[2] An in-depth analysis of the long-run effects of

1 Moreover, payouts from household pension wealth in part reduce public pension payouts by decreasing the pension premium, among other channels. The widespread use of labour-market pensions for civil servants and corresponding phasing-out of civil servant pensions may also have increased pension wealth without affecting the consumption ratio.

2 This is confirmed by analyses at individual level, cf. Søren Arnberg and Mikkel Barslund, The crowding-out effect of mandatory labour market pension schemes on private savings: Evidence from renters in Denmark, *The Economic Councils Working Paper*, 1, 2012. For younger households, one additional krone of pension contribution increases their total savings by kr. 1, i.e. they do not reduce other savings. For older households close to retirement, on the other hand, other savings are reduced by kr. 0.30, whereby their total savings rise by only kr. 0.70. An aggregate measure for all households is that one additional krone of pension savings increases total savings by approximately kr. 0.80. It is not possible to transfer these estimates of household savings behaviour directly to a specific weight of pension wealth in the macro analysis.

increased private pension wealth is beyond the scope of this analysis, however.

Equity wealth is typically also found to have a relatively small impact on consumption, *inter alia* because the distribution of this wealth is very uneven, as it is held by high-income families in particular. Moreover, in Denmark any capital gains are taxable.

Real house prices have risen over the last 20 years, e.g. due to falling interest rates and introduction of new loan types. Housing wealth can only be translated into consumption by the households borrowing against home equity or selling the home. The Danish mortgage-credit system provides ample room for borrowing against home equity, thus translating house price increases into consumption, but there are limits to how much the households can and will increase the loan-to-value, LTV, ratio. This means that the last 20 years' house price increases have only partially been translated into consumption.

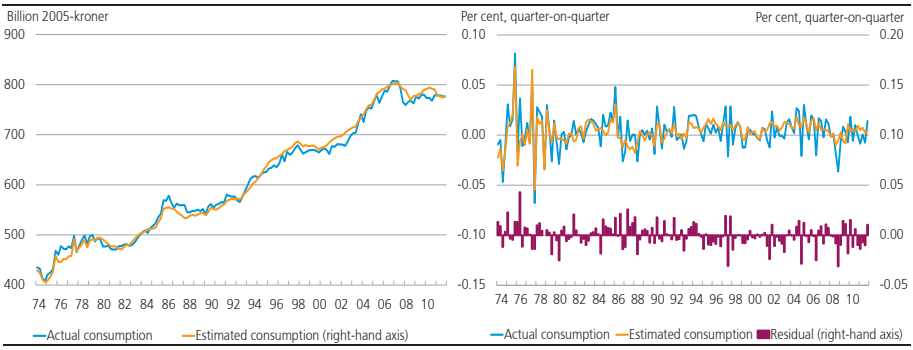
The above discussion indicates that increasing pension and equity wealth has played a substantial role in the divergence of the consumption and wealth ratios over the last 30 years, but that higher housing wealth may also have been a factor. This is confirmed by a simple estimation explaining the consumption ratio by the pension, equity and housing wealth ratios and the remainder of the net wealth ratio. The estimated weights of the pension and equity wealth ratios become small and not statistically significant, while the weight of the housing wealth becomes slightly smaller than the weight of remaining net wealth ratio. Hence, it seems obvious to reduce the weights of these wealth components in a model context.

Specifically, the weight of pension wealth is set at 0.2, equity wealth at approximately 0.4, and housing wealth at 0.8, ensuring that the consumption-determining wealth ratio has, by and large, fluctuated around a historical average, cf. Chart 3 (right). The weights reflect an empirical choice, but formal estimations confirm that the above weighting of wealth strengthens the long-run relationship between consumption, income and wealth compared with the choice of total household net wealth.

As mentioned already, the information content of data is not sufficient to provide clear identification of the correct weights; for example, the weight of pension wealth could be reduced if the weights of housing and/or equity wealth are increased. A robustness check shows that such changes of the weights have only a small impact on the model properties in the short and medium run.

A long-run relation has been estimated between consumption, income and wealth as described above. In the short run, however, consumption

ACTUAL AND SIMULATED CONSUMPTION Chart 4



Note: Left-hand chart: dynamic simulation, i.e. the error correction term is based on the difference between the simulated short-run and long-run models. Start in the 1st quarter of 1974. Right-hand chart: static simulation.
Source: Own calculations.

could deviate from the long-run relation, as indicated by a number of factors. We therefore construct a model in which the quarterly changes in consumption are explained by deviations from the long-run model and a number of variables that may influence consumption in the short run, such as unemployment and real interest rates.

In order to take into account in the best possible way dynamiceffects of shocks to the consumption function, e.g. how increased consumption stimulates income, which in turn boosts consumption, the estimated consumption function is linked to Danmarks Nationalbank's existing macroeconomic model, MONA. This requires construction of a financial submodel to manage the relationship between household income, consumption and savings on the one hand and wealth on the other.

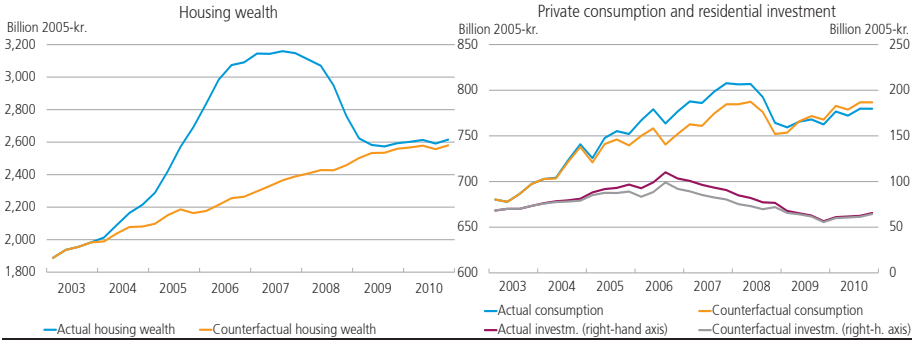
Overall, the estimated model captures the fluctuations in consumption since 1974, cf. Chart 4 (left), and simulated consumption is close to actual consumption throughout the boom years prior to the financial crisis.

Consumption before the financial crisis – the role of the housing bubble

In order to assess the significance of the strong fluctuations in house prices to private consumption in the period 2004-09, the counterfactual development in consumption is calculated, given steady growth in housing wealth from the beginning of 2004 until the beginning of 2010, cf. Chart 5 (left).

The consumption effect of the strong increases in house prices was quite pronounced. Steady growth in housing wealth in 2004-09 would have entailed approximately kr. 25 billion lower private consumption by end-2007, cf. Chart 5 (right), corresponding to almost 1.5 per cent of GDP, while residential investment would have been around kr. 11 billion lower, equivalent to 0.75 per cent of GDP.

IMPACT OF HOUSING WEALTH ON CONSUMPTION Chart 5



Note: Right-hand chart: house prices in the counterfactual scenario are identical to actual house prices in the 4th quarter of 2003 and the 1st quarter of 2010. Counterfactual housing wealth is slightly lower than actual housing wealth at the end of the period as a result of a lower level of investment in the counterfactual scenario. Left-hand chart: counterfactual scenario: start in the 1st quarter of 2004.

Source: Own calculations.

Consumption after the financial crisis – the role of lower interest rates

In the wake of the financial crisis, private consumption contracted by almost 6 per cent from the 2nd quarter of 2008 to the 1st quarter of 2009. Since then, private consumption has shown weak development despite the easing of both fiscal and monetary policies and the strong drop in market interest rates. This should be viewed in light of a very weak international economic position.

From the 2nd quarter of 2009 to end-2012, the 1-year mortgage yield decreased by approximately 2.4 percentage points, cf. Chart 6 (left), but also longer-term mortgage yields and bank interest rates declined almost correspondingly. As a result of the drop in interest rates, household net interest expenses, calculated as the difference between interest paid and interest received, fell from 10.7 per cent to 5.9 per cent of disposable income.[1]

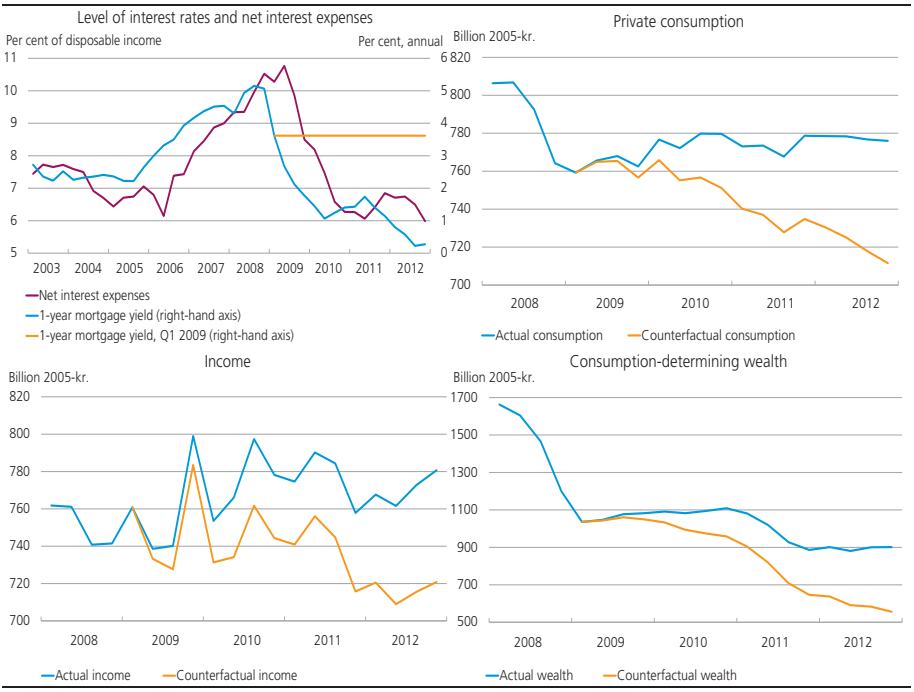
In order to assess the significance of the drop in interest rates to consumption, the counterfactual development in consumption according to our model is calculated, assuming that all interest rates were constant at the level from the 1st quarter of 2009 to end-2012, but if the international economic situation remained unchanged.[2] Thus, the counterfactual experiment shows the development in consumption given a combination of high interest rates and a very weak international economic position.

1 Interest payments in the national accounts include FISIM, which is an estimate of the share of the interest margin that can be regarded as payment for a service. Consequently, the net expenses shown are slightly lower than the actual net interest expenses. But the development is presumably largely unaffected by FISIM.

2 The level of e.g. the 1-year mortgage yield in the 1st quarter of 2009 roughly corresponds to its average level since 2000.

LEVEL OF INTEREST RATES, NET INTEREST EXPENSES AND COUNTERFACTUAL DEVELOPMENT IN CONSUMPTION, INCOME AND WEALTH

Chart 6



Note: Top left: Net interest expenses are based on the national accounts, i.e. according to FISIM. Bottom right: Consumption-determining wealth is both less and more volatile than actual net household wealth.

Source: Top left: Own calculations based on data from Statistics Denmark and Danmarks Nationalbank. Remaining charts: own calculations.Top left: own calculations based on data from Statistics Denmark and Danmarks Nationalbank. Remaining charts: own calculations.

A higher level of interest rates would have led to lower disposable income (higher net interest expenditure) and lower house prices. The calculations show that as a result of the lower interest rates, household disposable income is 7.7 per cent higher than it would otherwise have been, cf. Chart 6 (bottom left), while consumption-determining wealth is almost kr. 400 billion higher than it would otherwise have been.

Hence, via lower interest-rate expenses and higher wealth, the drop in interest rates since 2009 has contributed to cushioning private consumption. Without the drop in interest rates, private consumption at end-2012 would have been approximately kr. 60 billion lower, corresponding to 8.5 per cent, cf. Chart 6 (top right)

The substantial impact of the drop in interest rates on consumption can be attributed to the high household debt ratio, which has risen strongly over the last 15 years from around 200 per cent of disposable income in 2000 to more than 300 per cent at end-2012. Household interest-bearing assets, on the other hand, have not increased – given

that investment income from pension wealth is accumulated in pension accounts and thus paid out with a considerable lag – but have remained relatively stable near 100 per cent of disposable income. As a result, interest-bearing net household debt is currently more than 200 per cent of disposable income. At the same time, a far larger share is variable-rate debt today. Alternatively, pension wealth can be regarded as fixed-rate wealth, so interest-rate changes will, also in this case, principally affect household interest expenses and only to a limited extent their interest income. All in all, this entails higher interest-rate sensitivity for household disposable income today, compared to previously.