INTRODUCTION AND MAIN CONCLUSIONS

During the 1990s the USA and several European countries, including Denmark, saw periods of strongly rising prices for stocks and owner-occupied homes, two important assets in private individuals’ portfolios. The development in asset prices is closely monitored by central banks since substantial fluctuations in asset prices significantly influence financial and economic stability, including price stability. Economic and financial crises have more often been related to strong fluctuation in asset prices than to fluctuation in prices for goods and services. A sharp fall in asset prices following substantial increases has often had severe economic implications.

The price of an asset depends on the expectations of the future course of the economy. Minor changes in the prevailing economic situation can entail considerable shifts in expectations of future trends. Asset prices therefore naturally fluctuate more than other economic variables. In certain periods expectations can be too optimistic, or too pessimistic, causing asset-price fluctuations which deviate considerably from movements consistent with the economic fundamentals (speculative bubbles). A speculative bubble in an asset is typically followed and nourished by an increase in borrowing, e.g. borrowing against the free mortgageable value of a property, or gearing of the rising market value of a stock portfolio. The financial sector is therefore vulnerable when the bubble bursts.

During the last two decades inflation has been reduced successfully in Europe and the USA. Nevertheless, this period has seen more financial crises than previously in the last century\(^1\). Significant increases in prices for stocks and housing in Denmark during the economic expansion in the mid-1980s were followed by strongly falling housing prices and a prolonged recession. The other Nordic countries saw even stronger in-

\(^1\) Michael Bordo and Barry Eichengreen, Is the Crisis Problem Growing More Severe?, presented at the conference Asset Markets and Monetary Policy, Sveriges Riksbank, Stockholm, 16-17 June 2000.
creases in asset prices at the end of the 1980s, and the subsequent price drops had a severe impact on the financial sector, leading to a recession at the beginning of the 1990s. Beyond the Nordic region, a similar scenario prevailed in the UK at the beginning of the 1990s. In Japan, the financial sector is still suffering the consequences of a substantial portfolio of non-performing loans after a speculative bubble in property and stock prices burst at the end of the 1980s. Japan's inflation was low in 1986-87, and the authorities were therefore able to lower interest rates to curb the strengthening of the yen. The lower interest rates led to further increases in prices for stocks and housing. In this case focusing solely on the primary objective proved to be inadequate.

The disruptive effects are most severe if asset prices deviate far from their fundamental level before the bubble bursts. The problems can be reduced if the bubble can be deflated before the deviation becomes large. However, in practice bubbles are difficult to identify before they have burst, and their effect on the overall economy is subject to great uncertainty. If many indicators point to the same, however, this could signal that the development is not sustainable. Under such circumstances an economic-policy response may be needed to ensure fiscal and economic stability in the longer term.

Stock prices in a number of countries, including Denmark, are historically high, even after the fall in prices in recent months. This may reflect that the current estimates of the potential real growth rates of the economies are too low, for example because the effects of the development of networks and information technology are not taken sufficiently into account. It may also reflect that investors in stocks are willing to accept a reduction of the risk premium, e.g. due to the liberalisation and integration of financial markets and the improved macroeconomic environment in the 1980s and the 1990s. It is still unclear, however, whether these effects are of such magnitude that they justify the current level of stock prices.

Property prices have risen considerably in Denmark since 1993. These increases followed a period of price lags in the housing area compared to the general price development. As a ratio of construction costs, the cash price index is close to the relatively high level in the mid-1980s.

This article considers three issues: firstly, what determines the prices of stocks and housing? Secondly, how do substantial fluctuations in asset

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1 Inter alia to comply with the international foreign-exchange agreements (the Plaza and Louvre Accords).
2 The major fluctuations in asset prices in a number of countries, including Denmark, during this period are described in C. Borio, N. Kennedy and S. Prows, Exploring Aggregate Asset Price Fluctuations Across Countries – measurement, determinants and monetary policy implications, BIS Economic Papers, 1994.
prices affect financial activity? And thirdly, what role should monetary policy play in countering threats to economic and financial stability?

**STOCK PRICES**

Like other assets, stocks are a means to postpone consumption from today to a later date. This allows the investor to determine the most suitable consumption pattern over time. The yield on the asset is the compensation for postponing consumption. To obtain the optimal consumption pattern, a person must, at the expected yield by postponing consumption, be indifferent as to whether consumption takes place now or is postponed. If the investor is not indifferent, the consumption pattern can be changed, and overall affluence improved. The price which the investor is willing to pay for the asset thus depends on the expected yield on the asset, as well as the investor’s time preference regarding the consumption pattern (discount factor).

Over a company’s lifetime a stock’s yield is the sum of the dividend in the individual periods. The stock price therefore depends on the sum of the expected future dividend payments, discounted to present value by the discount factor. A mathematical expression of this price is:

$$P_t = \sum_{i=1}^{\infty} \beta^i E(D_{t+i})$$

$P_t$ is the asset price at time $t$, $E(D_{t+i})$ is the expected future dividend payments in current prices, and $\beta$ is the discount factor of the investor.

Since neither the future dividend payments nor the discount factor can be observed, pricing entails certain problems. It is often assumed as an approximation that the actual dividend payments are subject to a constant growth rate and that the discount factor is closely associated with the interest rate. Application of these assumptions gives the following expression of the stock price:

$$P_t = \frac{D_t(1+g)}{r + \rho - g}$$

$g$ is the nominal growth rate for dividend payments, $r$ is the nominal interest rate and $\rho$ is the risk premium on holding the stock rather than government bonds. The discount factor is approximated in terms of $1/r$.

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1. When the time horizon is infinite, capital gains are zero (the transversality condition). If a company has a policy of retaining dividend, e.g. if distributed dividend is subject to higher taxation than retained dividend, a price based solely on dividend will be undervalued. In that case, the profit for the individual periods will be a more correct variable than dividend. A dividend policy leaning towards retained dividend is often pursued by newly-established companies.

In the financial literature $r$ is also known as the risk-free interest rate, and often the government-bond yield is used. The bond yield can also be interpreted as an opportunity cost of the stock investment. An alternative to buying the stock is to invest, almost without risk, in a government bond. If this yield rises, buying the stock becomes less attractive compared to buying the government bond. The equation, also referred to as the Gordon-Shapiro equation, is very simple, but also widely used.

The central element of pricing stocks is that the price depends on the expectations of the company's earnings and the interest rate. The expectations can be excessively pessimistic or optimistic, and can lead to considerable fluctuations in stock prices, with substantial deviation from the fundamental value in certain periods. One of the explanations for non-fundamental fluctuations is that some investors do not act rationally. Examples are herd behaviour, myopic behaviour (e.g. the investor knows that the increases in the market are not sustainable, but he believes that he can buy and sell again before the market turns around) or the application of an incorrect model (e.g. that a high return in the preceding period will be achieved again in this period). However, it can be very difficult to determine the fundamental value.

One approach to assessing stock prices is to compare them with the real rate of growth in the economy, cf. Chart 1. In the long run, real stock prices will normally follow the real growth rate in the economy,
and thereby also the rate of growth in real income\(^1\). Since the mid-1990s the rate of increase in real stock prices in Denmark, Germany and the USA has been considerably higher than the rate of growth in real output.

**Development in the USA**

The discussion of the stock-price increases in recent years has focused particularly on the USA. The US stock market accounts for around 60 per cent of the value of global stock markets, and the development in the USA significantly affects trends in other countries.

Chart 2 shows the development in stock prices as a ratio of business enterprises' earnings per share (price earnings or P/E) and stock prices as a ratio of dividend (P/D). The price earnings ratio is the price an investor has to pay for a share of one unit of the company's profit\(^2\).

The average P/E ratio in the USA for the broad S&P 500 index in the period 1957-2000 is around 16. This entails an E/P (earnings yield) of

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\frac{P_t}{E_t} = \frac{\delta (1 + g)}{r + \rho - g}
\]

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\(^1\) If the earnings and dividend payments of the companies included in the stock index are a stable proportion of GDP.

\(^2\) The P/E ratio can be shown theoretically by a simple adjustment of the Gordon-Shapiro equation where it is assumed that dividend disbursements constitute a stable proportion, \(\delta\), of earnings \(E\) (\(D=\delta E\)): 

\[
\frac{P_t}{E_t} = \frac{\delta (1 + g)}{r + \rho - g}
\]
approximately 6 per cent, which is relatively close to the average real yield for S&P 500 of 6.5 per cent p.a. throughout this period. In practice, the development in the earnings yield for broad stock indices has been relatively close to the average real yield on stocks, and this real yield has been stable for long periods of time. Estimates from the USA show that the real yield on stocks has been around 6.5-7.5 per cent p.a. in various sub-periods for the last 200 years.\footnote{Jeremy Siegel, \textit{Stocks for the Long-Run}, McGraw-Hill, 1998.}

The price earnings ratio has risen considerably from the level at the end of the 1980s. This should be viewed against the background of an unusually long period of high growth in private consumption and investments, falling unemployment and a relatively low inflation rate in the USA. For the last 2 years the P/E ratio for S&P 500 has fluctuated at around 30 (27 in mid-November 2000), which corresponds to an earnings yield of 3.5 per cent, i.e. only half the historical average real stock yield. The P/E ratio for S&P 500 covers a wide range of values for the individual companies, where the P/E ratio of certain of them is higher than 50. The stock price of certain companies in the information technology sector (computer technology and communications) is very high. The NASDAQ index, which primarily comprises technology enterprises, has shown a P/E ratio of more than 100 in 2000, cf. Chart 3. The ratio has fluctuated considerably in the last two years. This average value also conceals large

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chart3.png}
\caption{PRICE/EARNINGS RATIO (P/E) FOR NASDAQ}
\end{figure}

Note: Daily observations. Most recent observation is 10 November 2000. Source: Bloomberg.
differences between the individual enterprises. Certain companies have a P/E ratio of more than 300. Unless there has been a significant change in the discount factor, a P/E ratio of 300 implies that the company's earnings must increase very strongly in order to fulfil expectations. An example of how expectations are met is that the company's earnings increase by approximately 40 per cent p.a. for 10 years, and then level out to approximately 6 per cent p.a. in all subsequent years, i.e. close to the nominal growth rate for the rest of the economy.

Viewed in a historical perspective, these values appear to be extreme. However, it is difficult to apply traditional valuation methods to companies of this type, which often have a low capital stock. A large proportion of their value is associated with their organisational structure and human capital, which are difficult to value.

On the basis of the Gordon-Shapiro equation an implicit risk premium can be derived, cf. Table 1. The Table shows historical averages and current levels for key economic indicators in the USA and Germany. The yields on 10-year government bonds (deflated by the consumer-price index) are used as the risk-free interest rate of the Gordon-Shapiro equation. An investment horizon of 10 years for investors in stocks is often applied in the financial literature. The real growth in the economy is a fair approximation of the growth in real corporate earnings and dividend payments, assuming that profits and dividends are stable percentages of GDP. The potential rate of growth in the economy is an approximation of investors' expectations of the future rate of growth in corporate earnings. The historical average is limited to the period

### Table 1: IMPLICIT RISK PREMIUM IN THE USA AND GERMANY

<table>
<thead>
<tr>
<th></th>
<th>P/E ratio</th>
<th>Dividend yield</th>
<th>Real GDP growth</th>
<th>Real-interest rate</th>
<th>Inflation</th>
<th>Implicit risk premium</th>
</tr>
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<tbody>
<tr>
<td><strong>Average 1987-99</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>USA</td>
<td>14</td>
<td>3.6</td>
<td>3.1</td>
<td>4.3</td>
<td>2.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Germany</td>
<td>17</td>
<td>2.0</td>
<td>2.9</td>
<td>4.4</td>
<td>2.2</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>2000</strong></td>
<td></td>
<td></td>
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<tr>
<td>USA</td>
<td>27</td>
<td>1.1</td>
<td>3.7(^2)</td>
<td>3.5</td>
<td>2.5(^1)</td>
<td>1.4</td>
</tr>
<tr>
<td>Germany</td>
<td>60</td>
<td>1.9</td>
<td>1.9(^2)</td>
<td>3.8</td>
<td>1.5(^1)</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Note.: S&P 500 and CDAX. Data for 2000 are the most recent data available (beginning of November 2000). The risk premium is calculated as \( \rho = (1+g)(1+\pi)D/P - (r+\pi) + (g+\pi) \), where \( \pi \) is inflation, \( r \) is the real-interest rate and \( g \) is growth in real GDP.

Sources: ECB and Bloomberg.

\(^1\) A direct comparison of P/E ratios in various countries is difficult due to variations in legislation, taxation and financial market structure. The high current P/E ratio in Germany reflects that the five largest corporations had values of between 45 and 110.


\(^1\) OECD estimate, spring 2000.
1987-99. This relatively short period is chosen primarily on the grounds of data availability. Furthermore, the period chosen was characterised by relatively stable macroeconomic conditions, in contrast to the 1970s and the beginning of the 1980s. Calculating the average over a longer period results in higher risk premiums.

The current stock market levels are historically high. There are at least four interpretations of the results.

Firstly, if the current values in the stock markets are sustainable, this could imply that investors accept a considerable permanent reduction in the risk premium. The current implicit risk premium in the USA and Germany is respectively 1.2 and 0.5 percentage points lower than the average for 1987-99, according to the above calculation. The current risk premium is also considerably below the previous averages, viewed over a longer period.

It is difficult to say whether a decrease in the risk premium is sustainable in the longer term. Liberalisation and integration of the financial markets, as well as the financial innovation during the last two decades, may have contributed to a lower risk premium. Investors now have greater opportunity to diversify and hedge risk, as well as easier and cheaper access to the financial markets via e.g. mutual funds and the Internet. The risk premium can also be influenced by demographic trends. Higher pension savings in the 1990s by large year-groups can increase demand for stocks, and lead to a reduction of the risk premium. This mechanism will be reinforced if pension funds in the long term increase the proportion of stocks in their portfolios. An improvement in the macroeconomic conditions may also affect the risk premium. The return to low inflation, balance in government budgets and a reduction of public debt may also have contributed to a lower risk premium. However, these factors can only lead to a permanently lower risk premium to the extent that investors expect permanent improvements.

It is not yet clear, however, whether these effects are sufficient to justify the current level of stock prices. The risk premium has tended to fluctuate with the business cycle, so that increasing risk premiums can be expected in the event of a downturn in the economy.

Another interpretation is to assume that the risk premium has not been reduced, but that the current values reflect expectations of future higher earnings growth rates and dividend payments. If this is the case,

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the rate of growth in dividend payments must be respectively 1.2 and 0.5 percentage points higher than the potential real growth in the USA and Germany, according to the calculations in the table.

The ratio of corporate earnings and dividend payments to the overall economy has been seen to rise in the short term, but has been remarkably stable in the long term. The stability of this ratio is normally regarded as a well-established element of economic growth theories1. If this applies, the potential growth rate in the economy must rise to the level corresponding to the expectations of growth in earnings, or the growth in earnings will be below current expectations.

This indicates a third interpretation. The current estimates of the potential real growth rate in the economies may be too low. Large-scale investments in networks and information technology in recent years can improve production processes, stock management and distribution, and enhance competition and productivity. If new technologies increase productivity, the potential real growth rates are currently undervalued. Productivity rose by 2.6 per cent p.a. on average in 1995-99 in the USA after a prolonged period of relatively low productivity growth at 1.7 per cent p.a. in 1972-95. However, it appears from an estimate of the contributions to the increase in productivity growth that half of the increase can be attributed to adjustments to the statistical methodology and normal cyclical effects, while the other half relates solely to the computer sector, which accounts for only 1.2 per cent of the US economy2. However, the introduction of new technology may require changes in production processes and supplementary training, so that the effect is apparent from the data after a certain time lag. The increase in the productivity growth rate in the USA has occurred at a relatively late stage of the expansion, which is unusual.

Previous periods have shown that there is no natural connection between technological progress and strong increases in stock prices. The advance of electricity-based industries in the 1920s resulted in considerable productivity increases, but did not entail the strong rises in stock prices seen for IT stocks in recent years3.

A fourth interpretation of the results is that the current values in the stock market are excessively high and that the stock markets will see a negative correction. A correction of the broad stock indices does not

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rule out the possibility that some business enterprises will be able to fulfil the current high expectations.

**The development in Denmark**

In the late 1990s Denmark saw an increase in stock prices of around the same magnitude as in the USA and Germany, cf. Chart 4. Unlike these countries the price increases in Denmark took place over the past year in particular, which may reflect a lag vis-à-vis abroad. The increases cannot be explained by the development in bond yields and corporate earnings, which are two key factors determining the discount factor and the expectations of future corporate earnings\(^1\). The bond yield has been relatively stable for the last two years, and the growth in corporate enterprises’ earnings is generally subdued.

As in the USA, the P/E ratio for the broad stock index in Denmark is relatively high at present. The average P/E ratio was approximately 18 in the period 1987-99, while it was around 30 in mid-November. This corresponds to an earnings yield of approximately 3.5 per cent and implies an annual real yield on stocks of the same magnitude. This would be a considerable reduction from the historical averages. Since 1980 the av-

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\(^1\) In empirical research corporate earnings and bond yields are robust fundamental variables to explain the development in stock prices, see e.g. Jan Overgaard Olesen, A Simple Explanation of Stock Price Behaviour in the Long Run: Evidence for Denmark, *EPRU Working Paper Series*, 09, University of Copenhagen, 2000.
Average annual real yield, including dividend, from the total index has been around 13 per cent. Including the 1970s, the average is approximately 9 per cent p.a.

Table 2 illustrates that the pricing can vary considerably among the individual sectors. Furthermore, the overall figures reflect a relatively wide spread between individual shares, of which few have a P/E ratio that exceeds 200.

Calculation of the risk premium for Denmark by means of the Gordon-Shapiro equation, as in Table 1 for the USA and Germany, gives a negative risk premium for the period 1987-99. This result appears implausible. One reason may be that the equation is a simplified approximation to "true" values. For example, the equation does not take the taxation factor into account. The pension fund tax which was adopted in Denmark in 1983 did not include yields on stocks, and thus favoured investments in stocks rather than bonds. This may have reduced the pre-tax risk premium for stock investments. The average dividend yield in this period was approximately 1.5 per cent p.a. in Denmark, which is somewhat lower than in the USA and Germany. This can be attributable to a greater tendency for Danish companies to retain dividends during this period. Variations in corporate dividend policies among various countries can be affected by such factors as how disbursed dividends are taxed compared to retained dividends. No value is given to retained dividends in the Gordon-Shapiro equation.

Surveys over a longer period have estimated a positive risk premium in Denmark.

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1 Tom Engsted and Carsten Tanggaard, The Risk Premium on Danish Stocks, (in Danish) *Nationaløkonomisk Tidsskrift*, 1999, estimates the risk premium at 3.7 per cent on average in the period 1922-96.
PROPERTY PRICES

In the short to medium term property prices are to a large extent determined by demand, which follows the business cycle, especially interest-rate levels (financing conditions) and the households’ real incomes\(^1\). Chart 5 presents annual rates of increase in real cash prices and a measure of the cyclical situation – the output gap. This measure is calculated as the deviation of actual real output from an estimate of potential real output.

Property prices also depend on the general price level, the property stock and tax regulations (e.g. the tax value of the deductibility of interest payments).

In the short term at least the supply of properties is relatively inelastic. An increase in the demand for housing compared to the housing stock exerts upward pressure on cash prices. New construction thus becomes more attractive, and housing investments will increase, so that the housing stock will gradually expand. In the long run housing prices are determined by construction costs.

\(^1\) A cash price relation is estimated in e.g. Lone Schøtt Jensen and Dan Knudsen, Housing Investments and Cash Prices (in Danish), *Nationaløkonomisk Tidsskrift*, 1990. The effect on cash prices of fluctuation in bond yields is described in The Monetary Policy Transmission Mechanism, Chapter 4 in *Monetary Policy in Denmark* (in Danish), Danmarks Nationalbank, 1999.
In certain periods housing prices may deviate significantly from the general development in prices, cf. Chart 6. Since 1993 increases in housing prices have been considerably greater than increases in construction costs. However, this acceleration occurred after a period of sluggish

Note: The housing investment deflator is used as an indicator of the development in construction costs.
Source: Statistics Denmark.
housing prices at the end of the 1980s and the beginning of the 1990s. Compared to construction costs, the cash price index is close to the relatively high level seen in the mid-1980s, cf. Chart 7.

The correlation between property prices in various countries is considerably lower than the correlation between stock prices. The interest-rate parity and the effects of the international business cycle have an intensified impact on the stock market due to such factors as the opportunities for international arbitrage and the very liquid nature of the stock market. The property market is influenced first and foremost by domestic conditions. Hence, the capability of economic policy to affect the property market is greater than its capability to affect the stock market.

Households have a fundamental need for housing, but not for a portfolio of stocks. Prices for housing thus tend to be less forward-looking than stock prices. An investor in stocks may choose other liquid investment alternatives, such as bank deposits, in certain periods if a lower return on stocks is expected in the immediate future. For a home owner, the alternative is to rent a home. However, moving in and out of the market for owner-occupied homes is cost-intensive, and furthermore the market for rented housing in Denmark is inefficient.

**ASSET PRICES AND FINANCIAL ACTIVITY**

Strong fluctuations in asset prices have a significant impact on the solvency of the financial sector and the course of the economy. The most frequently cited effect of asset price fluctuations on the business cycle is the effect from the private sector’s wealth to shifts in consumption and investments (wealth effect). For the corporate sector rising asset prices will reduce the cost of acquiring new capital compared to existing capital, which can increase the level of investment (the Tobin’s q effect). Asset prices are generally forward-looking and rising asset prices may reflect expectations of a higher level of future economic activity. Expectations of higher future income will increase consumption and investments (expectations channel). Finally, effects related to the functioning of the credit markets (credit channels) also play an important role. A case in point is that it is easier for financially sound households or business enterprises to borrow, and at a lower interest rate (lower external financing premium), than would have been the

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1 The transmission channels from changes in asset prices to the real economy are described in Erik Haller Pedersen, Capital Gains on Stocks and Owner-Occupied Homes, Danmarks Nationalbank, Monetary Review, 4th Quarter 1998.

case if their financial position were less sound (balance-sheet effect). Assets are used as collateral to enhance access to borrowing and to reduce the premium on external financing, and thereby cushion the effects of adverse selection. Strong fluctuations in asset prices will thus affect the private sector’s access to credit. For example, if the market value of the assets of the private sector declines, while payments on liabilities remain unchanged, creditworthiness is reduced, and thereby also opportunities to achieve the desired level of credit financing. The external financing premium will also tend to increase. The banks are subject to capital adequacy requirements, i.e. they have an incentive to reduce the scope of lending if the value of the collateral declines. This type of credit rationing will affect small business enterprises and households in particular, since their dependence on bank loans is relatively high. The mechanism, called a financial accelerator, amplifies the fluctuations in credit extension and thereby also reinforces business cycles.

The financial sector is exposed both directly and indirectly to fluctuations in asset prices. The direct exposure is via capital gains and losses on its own asset portfolios, while the indirect exposure is via the portfolio of lending to the business sector and households. Falling asset prices undermine the solvency of the private sector and may cause the number of defaulted loans to rise. This diminishes the financial soundness of the banks and reduces opportunities to offer new loans (lending channel). The effect may be amplified if the banks have to realise the assets provided as collateral for the loans, such as stocks, at a time when the asset price is falling sharply. This may again adversely affect stock prices and the banks’ solvency, resulting in a vicious circle which can lead to a credit crunch. The opposite effect can be seen when asset prices are rising strongly, leading to a credit boom.

The principal asset of households is owner-occupied homes. A very large proportion of Danish households own their own home, and this proportion is rising. In 1999 approximately 61 per cent of all households owned their own home, an increase from approximately 47 per cent in 1970. In most OECD countries the proportion of owner-occupied homes is more than 50 per cent. There is a relatively close correlation between

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1 Adverse selection applies when the lender is unable to gain a full insight on the borrower’s ability to repay a loan. In view of the risk of an excessively large proportion of defaulting customers the lender may choose to reduce the volume of lending.
3 Gross housing assets were approximately 290 per cent of disposable income in Denmark in 1999, while the portfolio of listed shares and mutual fund certificates was approximately 22 per cent. Housing makes up approximately 60 per cent of the households’ total wealth, cf. *Economic Survey*, (in Danish) Ministry of Economic Affairs, May 2000.
the development in housing prices and the lending by banks and mortgage-credit institutes in Denmark, cf. Chart 8.

Most of the lending to households by banks and mortgage-credit institutes is to finance homes or to finance consumption backed by real property mortgaged as collateral1. A high marginal tax rate, together with the tax deductibility of interest payments, provides an incentive to borrow against the free mortgageable value in step with rising property prices. Unless the loan is reinvested in the home, borrowing against the free mortgageable value makes households more vulnerable to falling property prices. New credit products have furthermore affected the borrowers’ exposure to changes in interest rates. For example, falling housing prices due to an increase in interest rates will also reduce the debt if the home is financed by a long-term fixed-rate loan. This reduction in the market value of the debt does not equivalently apply to variable-rate loans.

The households’ stock portfolios accounted for less than 5 per cent of net wealth in Germany, France and Italy in 1997, and thus the significance of stock prices to credit granting is less pronounced in Europe. In the USA, on the other hand, the stock portfolio constituted almost 25 per cent of

1 Danish households account for the largest mortgage debt in the EU at approximately 70 per cent of GDP. However, since the various countries’ home financing structures differ considerably, this factor does not accurately express the households’ total debt compared to other countries.
net wealth in 1997, so that credit granting in the USA is more sensitive to stock-price fluctuations, cf. Chart 9.

In the USA maximum 50 per cent of an investment in stocks may be financed by borrowing from a stockbroker (margin borrowing). During the 1990s the growth in margin borrowing remained relatively close to the growth in stock-market value, but with a tendency for stronger increases in the last two years.

The financial markets tend to grow faster than the overall economy. Between 1985 and 1998 the value of outstanding bank loans, bonds and shares rose from around 150 per cent of GDP to around 250 per cent in the major OECD countries. In Denmark a similar trend was seen. In view of the appreciation of households' assets as a ratio of GDP, attributable in particular to the strong increases in asset prices, but also households' greater participation in the financial markets, fluctuations in asset prices can be expected to have a stronger impact on the general economic situation.

Denmark currently has a sound financial sector and a well-consolidated business sector. This is typical of a period with high asset prices. The households also show relatively sound balance sheets. The interest burden fell during the 1990s, but the households are still vulnerable to fluctuations in property prices. The mortgage ratio, i.e. lending in mort-

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gage-credit bonds as a ratio of the property value, was relatively stable at around 65 per cent during the 1990s, but somewhat higher than in the mid-1980s when mortgage-credit lending was still subject to a number of restrictions.

**MONETARY POLICY**

The primary objective of monetary policy in most OCED countries is to maintain price stability. Stable asset prices are not an objective per se. However, large fluctuations in asset prices affect financial and economic stability and can thus have an indirect impact on the primary objective. As a consequence, central banks pay due attention to asset prices in their planning of monetary policy.

Asset prices play an important role since over- or underestimation can amplify cyclical fluctuations, to the detriment of price stability and long-term economic growth and employment. Furthermore, speculative bubbles can distort the utilisation of resources in the economy. For example, over-estimation of an asset will reduce its capital cost and lead to excess investment in that asset. This leads to inefficient allocation of resources, which is comparable to the effect of consumer price inflation.

Asset prices are also important because they contain information on the expectations of future economic activity and inflation which is not contained in other variables. Since assets are claims on future consumption they can in theory be interpreted as the price of future consumption and can therefore be applied to the overall assessment of the future course of inflation. The impact of monetary policy on the real economy is subject to a long time lag, typically more than one year. Forward-looking information from the asset markets can therefore be relevant to the conduct of monetary policy. Financial variables are particularly relevant to economic forecasting, due to their instantaneous nature. Furthermore, they are not subject to revisions and also involve forward contracts, which gives an opportunity for more long-term forecasts than would otherwise be the case.

In Denmark monetary policy is designed to fulfil the fixed-exchange-rate policy, which excludes use of the interest-rate instrument to counter the effect of large fluctuations in asset prices. Other OECD countries such as the USA and the euro area use the interest-rate instrument to influence the economy's course, in order to achieve the primary objective. By adjusting the official interest rate the central bank's monetary policy can influence demand from households and business enterprises for goods and capital goods, thereby ensuring
stable price development. However, monetary policy can also affect economic activity indirectly via the impact of interest-rate adjustments on asset prices, e.g. stock prices and housing prices. For example, reducing the interest rate will increase the discount factor and thereby also asset values. The impact on asset prices may affect the behaviour of households and business enterprises, since fluctuations in asset values affect the size of the net assets (the wealth effect) and may change the access to borrow and the external financing premium by influencing the value of the collateral (the balance-sheet effect).

A key issue is whether central banks should use the interest-rate instrument to counter a speculative bubble in asset prices with a potential impact on the primary objective of the central bank.

A traditional argument against is that when a central bank focuses solely on its primary objective of a stable consumer price index it also implicitly takes the development in asset prices into account. If the markets for goods and service are efficient, the forward-looking information from asset prices will be contained in current prices in the markets for goods and services. It will therefore be sufficient to conduct monetary policy according to the consumer price index. However, efficient markets for goods and services is a strong assumption to make. If the assumption does not hold, the central bank can gain more information on the economy's future course by also including asset prices.

The inclusion of asset prices in a total cost index together with consumer prices, and the application of this index to the conduct of monetary policy, may enable the central bank to implement more timely measures, with smaller interest-rate adjustments than would otherwise be required. Should a speculative bubble in an asset arise, it could be appropriate to raise the official interest rate, even though this will brake economic activity in the short term, and push inflation down. Timely measures would make it possible to avoid a subsequent strong decline in activity and inflation, and achieve more stable development in output, employment and inflation in the long run.

Including asset prices in monetary-policy planning can also pose significant problems, however.

Firstly, the impact of asset prices on economic activity and inflation may vary over time. Periodic fluctuations in asset prices can be caused by

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1 It is normally assumed that the behaviour of households and business enterprises depends on real interest rates rather than nominal official interest rates. However, the nominal rigidity of prices and wages enables the central bank to affect short-term real interest rates by adjusting the official interest rates.

2 This conclusion is reached in e.g. Ben Bernanke and Mark Gertler, Monetary Policy and Asset Prices Volatility, in New Challenges For Monetary Policy, Federal Reserve Bank of Kansas City, 1999.

different underlying factors and have varying overall impacts on real variables.

Secondly, there may be a considerable level of noise in asset prices, which reduces the reliability of the information.

Thirdly, there is a risk of reduced transparency in monetary policy. The individual objectives may send different signals, requiring different responses. In the event of conflicting objectives it can be difficult to communicate simple reasons for monetary-policy adjustments. If there is doubt about the priority given by the central bank to various objectives the credibility of monetary policy will be reduced and its effects weakened.

Fourthly, it is difficult for a central bank to have an explicit or implicit asset-price target. The current value depends on future variables which are subject to great uncertainty. As previously stated, it is not possible to observe the fundamental discount factor, making it difficult to determine whether the current prices include a non-fundamental component.

Even if a central bank is able to determine that asset prices are not fundamentally justified, it is not certain that the central bank's policy instrument is the most appropriate. A speculative bubble in a specific asset makes it desirable to adjust the relative price between the asset and other goods and services, but an interest-rate adjustment has a broadbased impact on the economy. In certain situations other elements of economic policy can have a more effective impact, e.g. via supervision of financial corporations, accounting regulations, and financial legislation, and the elimination of some of the distorting effects of the tax system.

In Denmark the primary objective of monetary policy is to ensure a stable krone rate, while the stabilisation of business cycles is an element of fiscal and structural policy. The economic-policy response to the strong increases in housing prices and private consumption during the 1990s is an example of the application of the fiscal-policy instrument. One of the intentions of the Whitsun package of economic measures was to stabilise the property market by dampening growth in property prices to a level equivalent to inflation. Rising housing prices in the mid-1990s led to expansion of private consumption, partly due to borrowing against free mortgageable property values. The savings ratio fell, and a current-account deficit accumulated. The ensuing tightening of fiscal policy included a reduction of the value of the tax deductibility of interest payments. Since then the propensity to consume has declined and growth in housing prices has subsided. Reducing the value of the

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1 See e.g. Families and Income, (in Danish) Økonomisk Tema, Ministry of Economic Affairs, November 2000.
tax deductibility of interest payments can also contribute to reducing future fluctuations in asset prices as it provides an incentive to reduce speculative gearing, i.e. to limit speculation based on borrowed funds.

The primary objective of the Eurosystem is consumer-price stability. The monetary-policy strategy to achieve this objective is based on two pillars. One is the development in the monetary aggregate, M3, and the other is the development in a wide range of economic and financial variables which are of relevance to the development in consumer prices. The development in asset values such as stock and housing prices is an element of the second pillar, and is therefore monitored on an ongoing basis. Furthermore, a speculative bubble in an asset tends to evolve simultaneously with an expansion of the monetary aggregates. The first pillar can therefore indirectly provide signals of asset price trends, and strong increases in the money stock may provoke a monetary-policy response.

There is an inherent risk of a more immediate economic policy response to declining than to increasing asset prices. Strong asset price fluctuations typically have a stronger impact on the real economy than gradual fluctuations, even though the two trends can be of similar size in overall terms. Increases in asset prices are typically gradual, while decreases can be very abrupt in some cases. This may therefore indicate an asymmetrical economic-policy response whereby investors perceive an automatic safety net under falling asset prices and "benign neglect" in the case of rising asset prices. The impression of an asymmetrical response is an inappropriate signal which may induce investors to increase their risk exposure, e.g. by accepting a lower risk premium in stock investments (moral hazard). If major increases in asset prices are followed by strong expansion of lending by banks, increases in the investment ratio of the private sector, a falling savings ratio and considerable current-account deficits, the overall signal will be that the development is not sustainable. It may be important to demonstrate a willingness to act, should several indicators point to an overheating.