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ABSTRACT

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This paper explores the importance of wealth effects for monetary policy in the context of the policy strategy of the European Central Bank (ECB). Causality tests indicate that nominal equity prices have predictive power for ECB policy indicators of real activity, while housing prices have predictive power for price indicators, and money and credit aggregates. This means that, at least indirectly, monetary policy takes asset price developments into account. The results, however, point to strong differences among individual euro area countries. On the question of whether or not a central bank should explicitly target asset prices directly or through the inclusion of asset prices in its measure of inflation, counterfactual model simulations suggest that this would not have led to a significantly different macroeconomic performance in the euro area.

Key words: Wealth effects, asset prices, monetary policy

JEL codes: E3, E44, E5

SAMENVATTING

Titel onderzoeksrapport: Vermogenseffecten en monetair beleid

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Deze studie onderzoekt de rol van vermogenseffecten voor het monetaire beleid, aan de hand van de monetaire beleidsstrategie van de ECB. Causaliteitstoetsen laten zien dat nominale aandelenprijzen informatie bevatten over het toekomstige beloop van door de ECB gevolgde macro-economische volume-indicatoren, terwijl huizenprijzen met name voorspellende waarde hebben voor prijsindicatoren en geld- en kredietaggregaten. Dit betekent dat het monetaire beleid in ieder geval indirect rekening houdt met het beloop van vermogensprijzen. Wel worden grote verschillen tussen de diverse eurolanden geconstateerd. Daarnaast wordt ingegaan op de vraag of centrale banken een expliciete doelstelling moeten nastreven voor vermogensprijzen, hetzij direct, hetzij via opneming van vermogensprijzen in de definitie van inflatie. Modelsimulaties voor het eurogebied suggereren dat dit weinig zou hebben uitgemaakt.

Trefwoorden: Vermogenseffecten, vermogensprijzen, monetair beleid

JEL codes: E3, E44, E5

1 INTRODUCTION

Over the past decades economists and policy makers have come to accept that maintaining price stability is a central bank's single most important task. Although central banks differ as to the actual fulfilment of this task and the policy strategies that go with it, we may conclude that most central banks do these days focus on price stability. Given the actual development of prices of goods and services over the past decade, central banks in most industrialised countries have been reasonably successful. Asset prices, however, are another matter altogether. In all countries – Japan excepted – share prices rose strongly throughout a long period, while in several countries – including the Netherlands – housing prices, too, soared high (Capel & Jansen, 2001). This fact has prompted several authors to advocate a different definition of inflation. Among them, Goodhart (2002) holds that the inflation measure used as a policy guideline should also include asset prices:

'My dictionary defines inflation as a fall in the value of money, not as a rise in the consumer price index. If I spend my money now on obtaining a claim on future housing services by buying a house, or on future dividends by buying an equity, and the price of that claim on housing or on dividends goes up, why is that not just as much inflation as when the price of current goods and services rises?' (Goodhart, 2001, p. 3).

In contrast, Mishkin (2001) argues that monetary policy which also aims at stable asset prices is likely to produce worse economic results and may even undermine the independence of central banks. However, the importance of wealth effects for monetary policy makers is not confined to the question to what extent central banks should seek (among other things) the stabilisation of asset prices. Perhaps more important is the impact of asset prices on real economic variables such as consumption, investment and the stability of the financial sector. Monetary policy makers will naturally be inclined to take these effects into account in their monetary strategy. In this paper, we discuss the role of wealth effects in monetary policy viewed from the perspective of the monetary policy strategy of the European Central Bank (ECB). After charting the monetary policy indicators used by the ECB, we investigate where and how wealth effects (may) influence ECB policy. In addition, we address the question to what extent the role of wealth varies over the different countries of the euro area. Too much divergence complicates the ECB's monetary policy. If, for instance, the sensitivity of private consumption to changes in private wealth varies across EMU countries, a change in ECB interest rates will have a different impact in different countries (see also Arnold & De Haan, 2001). Our analysis is based on comparative statistical data for as many euro countries as possible.

The paper is organised as follows. Section 2 summarises the way monetary policy influences the economy and concentrates specifically on the role of wealth effects in that process, on the basis of balance sheet information for households, non-financial corporations and monetary financial institutions. After discussing the ECB's monetary policy strategy and the indicators used in assessing the economic situation and the outlook for inflation in the euro area, we attempt to establish a theoretical link between wealth effects and these indicators, in order to identify the possible influence of wealth effects. Next, Section 3 investigates whether these links are supported by empirical evidence. Section 4 addresses the question of whether the ECB should extend its definition of price stability and inflation to include asset prices, or should adopt a separate objective related to asset prices. Section 5 presents our conclusions.

2 WEALTH EFFECTS AND ECB POLICY INDICATORS

2.1 **Wealth effects on economy activity**

Potentially, wealth effects may play a prominent role in monetary transmission, which describes the process by which monetary policy decisions influence key macroeconomic variables. The underlying idea is that asset prices are affected by interest rate decisions of the central bank – although of course, wealth effects may also be the result of a range of other causes [1]. Here, we take a look at the influence of wealth effects on the real economy, irrespective of what causes them. However, our analytical framework shows strong similarities to that of monetary transmission, which also distinguishes between direct wealth effects and indirect effects passed on through the credit market (see Arnold & De Haan, 2001). Before charting these effects, we begin by defining the concept of wealth.

2.1.1 *Components of wealth*

In principle, every item on the balance sheets of households and corporations may be instrumental in the creation of wealth effects. Net wealth is defined as the sum of financial assets (cash, savings deposits, bonds and equities) and real assets (residential property, durable consumer goods and capital goods), minus debts (mortgage and other loans). Strictly speaking, human capital should also be counted in, yet it is often left out due to measurement problems. We also point out that the wealth items on the balance sheet should ideally be measured on the basis of market value, which emphasises the importance of expectations. The present study focuses primarily on share prices and housing prices as sources of changes in net wealth. These assets prices are highly volatile and may therefore exert a strong influence on the financial position of both households and corporations over a relatively short time span.

Tables 1 to 3 present the financial balance sheets and hence the wealth components of, respectively, households, non-financial corporations and monetary financial institutions for the euro area as a whole, but also for eight individual euro countries for which relevant data are available. The balance sheets are compiled according to the financial accounts obtained from Eurostat. Due to measurement problems, the balance sheets do not present a complete picture of each sector's financial position. While the households' balance sheet has been supplemented by information on the value of housing

[1] A recent euro-area-wide study based on structural macroeconomic models in use by the ECB and the Eurosystem's national central banks shows that the wealth channel of monetary transmission is, to date, of very modest importance (Van Els *et al*., 2001). This is due in part to the fact that these models were estimated on sample periods (1980s to mid 1990s) when equity holdings were far less widespread among huoseholds.

Table 1 Balance sheet household sector, 1995 and 2000 (percentages of GDP)

	Belgium		Germany		Finland		France		Italy		Netherlands		Austria		Portugal		Spain		Euro area	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
Currency and deposits	75	72	65	61	44	34	60	60	69	56	57	55	81	74	95	91	78	69	66	61
Securities other than shares	80	64	21	18	4	1	8	5	52	43	9	7	20	10	3	9	5	4	23	19
Loans	0	0	0	0	0	0	2	1	0	0	1	1	0	0	2	0	2	0	1	0
Shares and other equity/participations	77	138	28	48	66	98	56	108	30	97	49	69	8	23	72	65	44	87	40	80
Pension reserves	24	38	40	50	9	15	34	54	18	29	133	165	21	28	20	33	15	25	36	50
Other	9	2	2	2	1	1	4	7	2	2	5	0	0	0	6	3	7	6	3	3
Total financial assets	265	314	156	180	123	150	165	236	171	227	254	297	129	135	198	201	150	190	169	213
Loans	39	40	66	73	36	31	37	38	17	22	66	92	37	40	28	62	33	47	45	51
Other	4	5	1	1	3	1	6	9	4	8	0	-7	0	0	16	16	12	12	4	5
Net financial assets	223	270	89	106	84	118	123	190	151	197	189	212	92	95	154	122	105	131	121	157
Total financial liabilities	265	314	156	180	123	150	165	236	171	227	254	297	129	135	198	201	150	190	169	213
Value owner-occupied housing wealth (% GDP) a)	129	149	155	154	129	158	152	170	249	233	112	182	141	124	--	--	298	334	179	191
Owner-occupied houses (% households) b)		65		41		61		54		78		52		55		82		78		57
House prices (1995, 1,000 euro) c)	118		218		87		123		130		115		139		79		98		145	
Total percentage change house prices, 1995-2000 d)		33		-3		51		22		12		101		-10		33		48		17

Explanatory note: balance sheet is based on Eurostat Financial Accounts and own computations.

a) Source: De Netherlandssche Bank, database model EUROMON.

b) Most recent figures available for the late 1990s. Source: Credit Suisse First Boston (2000) and Ludwig en Sloek (2002).

c) Source: Credit Suisse First Boston (2000).

d) Source: BIS and Banca d'Italia. Percentage price change 2000q4 compared to 1994q4.

Table 2 Balance sheet non-financial corporations, 1995 and 2000 (percentages of GDP)

	Belgium		Germany		Finland		France		Italy		Netherlands		Austria		Portugal		Spain		Euro area	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
Currency and deposits	23	27	15	15	10	8	9	11	8	9	21	30	14	13	23	27	15	17	13	14
Securities other than shares	4	7	4	8	10	8	8	12	4	6	3	4	7	5	0	7	2	3	5	7
Loans	17	38	3	6	18	46	17	21	1	4	22	44	1	5	8	16	1	3	8	13
Shares and other equity/participations	64	126	30	56	31	59	58	151	18	52	31	41	9	20	14	37	29	76	35	79
Other	18	9	12	18	37	26	41	42	27	26	28	31	5	3	48	49	55	70	26	30
Total financial assets	126	207	64	102	106	148	133	236	58	97	105	150	35	46	93	136	102	170	87	145
Securities other than shares	7	14	3	3	7	11	13	19	2	2	5	13	5	7	8	10	5	4	6	8
Loans	59	72	48	63	71	88	61	60	47	54	85	100	68	81	57	87	44	61	54	65
Shares and other equity	121	218	46	82	140	352	103	291	43	93	99	164	16	24	97	109	74	156	68	153
Other	10	8	15	21	35	21	41	44	27	28	31	32	4	3	53	54	52	65	28	32
Net financial assets	-71	-106	-48	-66	-147	-325	-85	-177	-62	-80	-115	-159	-57	-68	-121	-125	-73	-116	-69	-112
Total financial liabilities	126	207	64	102	106	148	133	236	58	97	105	150	35	46	93	136	102	170	87	145

Explanatory note: balance sheet is based on Eurostat Financial Accounts.

Table 3 Balance sheet monetary and financial institutions, 1995 and 2000 (percentages of GDP)

	Belgium		Germany a)		Finland		France		Italy a)		Netherlands		Austria		Portugal		Spain		Euro area	
	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000	1995	2000
Currency and deposits	98	69	47	67	13	18	85	92	26	27	32	48	63	62	39	46	60	40	53	60
Securities other than shares	83	80	36	51	28	17	40	56	33	28	22	30	23	31	47	25	28	26	36	43
Loans	102	102	129	150	73	67	94	88	73	89	128	164	124	137	70	147	81	100	104	117
Shares and other equity/participations	5	10	11	27	7	2	14	42	3	12	4	10	13	21	9	15	9	29	9	25
Other	11	20	3	8	7	3	10	14	1	0	5	9	0	0	8	5	3	3	5	8
Total financial assets	299	281	225	304	128	107	242	292	135	156	192	262	223	251	174	237	181	196	207	253
Currency and deposits	219	196	151	193	66	60	151	171	98	97	122	170	161	176	150	190	152	149	141	161
Securities other than shares	49	34	49	70	35	23	49	50	10	26	23	42	43	57	4	20	5	9	36	46
Loans	0	13	0	0	16	13	2	3	8	10	24	20	2	3	1	6	3	1	4	5
Shares and other equity	14	16	13	22	3	6	26	34	9	33	9	18	11	12	18	24	19	32	15	26
Other	17	22	6	10	7	4	8	13	2	2	9	15	0	0	7	3	2	5	6	9
Net financial assets	0	0	6	9	1	1	6	21	8	-12	5	-3	5	3	-6	-6	0	1	5	5
Total financial liabilities	299	281	225	304	128	107	242	292	135	156	192	262	223	251	174	237	181	196	207	253

Explanatory note: balance sheet is based on Eurostat Financial Accounts.

a) Includes central bank. For these countries currency and deposits include gold reserves and SDRs.

wealth, other assets such as the value of the stock of durable consumer goods, other property and human capital are not accounted for. Likewise, the tangible assets of non-financial corporations, such as buildings, land and machines do not show up on their balance sheet, nor do intangibles such as the value of licences and goodwill. This explains in part why the net financial position of non-financial corporations is strongly negative.

Households

Between 1995 and 2000, total financial assets of households in the euro area (Table 1) increased from 169% of the gross domestic product (GDP) to 213% of GDP. Percentages for the year 2000 vary from country to country, from 135 for Austria to circa 300 in Belgium and the Netherlands. The growth of financial assets was mainly caused by the doubling of equity holdings over the period under review, from 40% to 80% of GDP. This development, in turn, largely reflects the strong rise of share prices, and it implies that the decline of share prices since 2000 may have changed the picture for 2002. The size of bond portfolios (part of 'securities other than shares') and of currency and deposits has, since 1995, slightly declined throughout the euro area. This also holds for Belgium and Italy where, in line with relatively high public debt figures, bond holdings are important. Assets accruing to households through (compulsory) pension savings and other insurance-technical provisions are largest in the Netherlands, representing a share of GDP that is roughly 3 to 4 times as large as that in the entire euro area. On the liability side, the Netherlands shows the highest household indebtedness, followed by Germany and Portugal. Available data suggest that the bulk of loans taken out by households are long-term (mortgage) loans.

Data on the value of owner-occupied housing wealth were not directly observed but calculated on the basis of information on the percentage of homeownership among households and the average price of a typical (apartment) home. The presented figures offer a rough indication of the total value of housing wealth, while considerable uncertainty surrounds, in particular, the differences between national levels. In line with the high degree of homeownership among Spanish and Italian households, housing wealth in these countries is relatively high [2]. The doubling of Dutch housing prices in the 1995–2000 period caused the value of housing wealth in the Netherlands to increase from 112% if GDP in 1995 to 185% in 2000. For the euro area as a whole, the average rise was much smaller: from 179% of GDP in 1995 to 191% of GDP in 2000. Very moderate housing price rises in large countries such as Germany and Italy account for the modest rise in euro area wide housing wealth. On balance, the conclusion

[2] Recent research by Guiso and Japelli (2002) based on survey data for Italy suggests that the value of housing wealth might even be larger than is indicated by Table 1. The estimates for Germany derive support from research by Eymann and Börsch-Supan (2002).

seems to be justified that the net wealth of households, especially when home property is counted in, has become more sensitive to fluctuations in asset prices. The share of risky investments in total assets has grown.

Non-financial corporations

The balance sheet of non-financial corporations (Table 2) reveals national differences, which in some cases are large. On the asset side, it seems that notably Belgian, Finnish and Dutch companies tend to extend loans to subsidiaries and other (foreign) companies. Especially in France, shares and participations in other (foreign) companies are a prominent item, and have become more so since 1995. This asset category, of which direct investments are an important component, has also grown in other countries, both as a percentage of GDP and compared to total assets. Remarkable on the liability side is that corporations in the euro area did step up their borrowing (from 54% of GDP in 1995 to 65% in 2000), but hardly increased the amount in bonds issued. Roughly speaking, corporate borrowing is two thirds long-term and one third short-term. But most striking is the strong growth of equity issued, which more than doubled in the review period, to make up by far the largest liabilities item in 2000, at 153% of euro area GDP. Especially in Finland (Nokia!) and France, equity financing is a large percentage of GDP. All in all, the net financial position of corporations, and by consequence, it would seem, corporate borrowing conditions, has become increasingly sensitive to fluctuations in share prices.

Monetary financial corporations

Table 3 presents an overview of the balance sheet positions of monetary financial institutions (MFIs). This sector comprises credit institutions including merchant banks, money market funds and the central bank. For most countries, with the exception of Italy and Germany, data relate to 'other MFIs', meaning that the central bank has been left out. On the asset side, lending and bond portfolios of MFIs in the euro area as a share of GDP increased during 1995–2000, by 13 and 7 percentage points, respectively. Equity and participations rose from 9% of GDP in 1995 to 25% of GDP in 2000, raising the share of this item in the balance sheet total from 4% to 10%. The increase is mainly attributable to France, Spain and Germany. Traditionally, deposits have made up the bulk of MFIs' liabilities. Despite a hefty 20% of GDP rise, their share in the balance sheet total declined from 68% in 1995 to 64% of GDP in 2000. Bond and equity financing filled the gap, growing from 25% to 28% of the balance sheet total. On balance, the net financial position of MFIs in the euro area remained unchanged during the review period. The significance of equity and bonds for MFIs' financial position did increase slightly on the whole, but far less so than it did for households and corporations. A fact of some importance is that banks' profits have become more dependent on commission and investment

income, with the result that the impact of asset price movements on MFIs' net worth has become stronger.

2.1.2 *Direct wealth effects*

Consumers tend to spend more when they become richer or when they feel richer (see also Alessie & Kapteyn, 2002). This is called the direct wealth effect on consumption. It is based on the life-cycle model developed by Modigliani (1970), according to which consumption is determined not just by consumers' current income but by all the means at their disposal throughout their life span. A rise in stock market prices strengthens their financial position and thus encourages them to spend. Higher stock market prices usually reflect increased future economic growth (see for an overview Capel & Jansen, 2001). If stock market optimism spills over into consumer sentiment, consumers become more confident about their future income and raise their spending in advance. Note, however, that, according to Case *et al*. (2001), the housing market is more important to consumers than the stock market, because in most households, homeownership makes up a larger part of financial assets than equity holdings. Table 1 and the calculated value of housing wealth confirm this. By contrast, Ludwig and Sloek (2002) provide evidence for 16 OECD countries that consumer spending is less sensitive to changes in housing prices than to changes in share prices. Edison and Sloek (2001a) investigate the difference in impact between price changes in 'old economy' equities and price changes in 'new economy' equities. Because 'new economy' equities are more risky, it would seem likely that the marginal propensity to consume is lower for these components of household wealth. At the same time, however, stock options are a common form of remuneration in the 'new economy', making households more dependent on share prices. Edison and Sloek find that households do indeed respond differently to 'new economy' share price changes than to 'old economy' share price changes, especially in Europe: while the effect of changes in 'old economy' share prices is very limited, 'new economy' stock price changes have a significant impact on consumer spending.

The theoretical basis for direct wealth effects on corporate investment is provided by Tobin's q theory (see also Garretsen & Sterken, 2002). Tobin's q is defined as the ratio of a corporation's market value and its replacement value (see Tobin, 1969). A high q implies that the price of newly built plants and machines is low compared to the stock market value of existing corporate capital. When q is high, corporations benefit by issuing stock on the market and using the proceeds to invest in new equipment and buildings. When q is low, it is more profitable to buy or participate in existing firms instead of expanding physical capital. Confidence effects also affect corporate investment decisions, since future sales expectations determine the present willingness and attractiveness to invest. According to Edison and Sloek (2001b), the impact on investment demand of price changes in, especially, 'old economy' stock is much lower in Europe than it is in the US.

Some debate has been going on in the literature about the causal relationship between equity prices and the real economy (see e.g. Morck *et al*., 1990). Does causality run from equity prices to the economy, or do expectations held on the future course of the economy influence the stock market, making stock market prices no more than a useful predictor? For the present context, the difference is not very significant, since wealth effects occur under either scenario. The perceived value of future income (whether from dividends, wages or sales) has changed, with immediate potential effects on present spending.

2.1.3 *Indirect wealth effects via the credit market*

Apart from the direct effects discussed so far, wealth effects may also impact the credit market. Due to information asymmetries the credit market is not an ordinary market (see Stiglitz & Weiss, 1981). The main information issue is uncertainty about the credit risk posed by the debtor. Debtors have much better information about their own activities and behaviour than the creditor does, and this creates an information asymmetry between both parties. This may cause the credit market to be distorted by adverse selection and moral hazard. Adverse selection means that as a bank increases the interest on its loans, its debtors become more dubious (see Akerlof, 1970). Moral hazard is the tendency of debtors to invest in risky projects once they have obtained a bank loan. Both information issues may reinforce the consequences of wealth effects.

Bernanke and Gertler (1995) introduce the 'external finance premium' to denote the difference between the cost of financing by means of external funds – obtained on financial markets of from financial institutions – and the cost of financing through internal funds (retained profits). Credit market imperfections, caused by the information issues mentioned above, drive a wedge between external and internal financing costs. There are two main arguments explaining how this mechanism works. The first one is referred to as the *balance sheet channel*. The second one, referred to in the literature as the *bank-lending channel*, departs from the banking system and the impact of wealth effects on banks' willingness to extend loans.

According to the *balance sheet channel* argument, the external finance premium depends on the debtor's financial position. The larger a corporation's net worth or equity capital base, the less influence is exerted by information asymmetries. By staking its own capital in addition to a bank loan, a corporation reduces the clash of interests between itself and the bank, since both parties stand to lose money on the deal. This explains, of course, why in practice banks demand the contribution of funds or valuable collateral as a precondition for extending credit. When the financial position of a corporation deteriorates, lending conditions will follow. In extreme cases, a bank may decide to terminate all credit facilities. The corporation's investment demand will decline and when it comes to

the worst, the corporation may be forced to wind up. Recent studies by central banks within the Eurosystem indicate that such effects may be strongest in Italy, Austria, Belgium and France (see Chatelain *et al*., 2001, and Angeloni *et al*., 2002).

Consumers, too, may be affected by the balance sheet channel mechanism. Homeowners, in particular, have vulnerable balance sheets: the home makes up the bulk of a household's assets, whereas the liability side is weighed down by a large nominal mortgage debt. A rising interest rate may affect the housing market, bringing down housing prices. The nominal value of the mortgage debt, however, remains unchanged. On balance, consumers' net wealth declines, putting a brake on consumer borrowing and consumer spending (see Mishkin, 1978) [3].

So far, we have assumed that a deterioration of the borrower's financial position will prompt lenders to become more reluctant in extending loans as problems of adverse selection and moral hazard grow. Less credit means less spending and lower economic growth. Yet corporations and consumers themselves may of course also decide to cut down on spending when wealth effects make their financial position more vulnerable. One explanation for this is the desire to hold sufficient liquid assets when the likelihood of financial distress is perceived to increase.

The *bank-lending channel* argument departs from the special role of banks in the economy. As already explained, lenders have an information gap vis-à-vis their borrowers. Although it is very difficult to close the gap completely banks, of course, do what they can to assess the debtor's credit risk. They specialise in reducing information problems. Unable to access the capital market directly, smaller businesses typically have to rely on intermediation by banks.

Wealth effects may influence a bank's balance sheet in either of two ways. In the first place, there is the effect on the financial position and hence the creditworthiness of clients (corporations and households). But banks are also exposed to wealth effects ensuing from their own activities on financial markets. A weakening of the bank's balance sheet due to wealth effects may cause a bank to tighten its lending policy, the more so because they must satisfy the supervisor's capital requirements. In the most severe case of such a scenario – a so-called credit crunch – financial intermediation almost comes to a halt. A credit crunch notably affects corporations that lack ready access to alternatives for

[3] For a recent analysis of Dutch households' asset management in relation to developments on the housing market, see Van den End *et al*. (2002).

bank loans, so that small businesses in particular will have more difficulty in financing investment plans. Large, more creditworthy companies are usually able to access the capital market directly. A recent study by Ehrmann *et al*. (2001) for the euro area suggests that during a monetary tightening it is the less liquid banks which tighten credit supply. According to Angeloni *et al*. (2002), the bank loan channel plays a particularly prominent role in monetary transmission in Germany and Italy.

2.2 **Indicators for the policy of the ECB**

The monetary policy strategy of the ECB is based on two pillars. The *first pillar* is concerned with the role of money – to which the ECB attaches central importance in its pursuit of price stability. Under the first pillar, the growth of M3 and its components (including loans) are monitored and analyses are made of the extent to which actual M3 growth deviates from its reference value. These deviations provide indications regarding the risks to price stability. This is in line with the view that inflation is ultimately a monetary phenomenon and that money growth leads inflation (Berk & Houben, 1999; Issing *et al*., 2001). When money demand is stable, actual money growth is a reliable guidepost for monetary policy. The ECB has adopted a 4½% reference value for annual money growth, being the growth rate which is consistent with medium-term price stability in the euro area, the latter being the principal policy objective of the ECB. This value refers to the growth of the broad aggregate M3, so that no distortion will be caused by substitution between various liquid assets [4]. The reference value is made up of the price stability standard (a 2% maximum inflation rate), trend growth of real production (estimated at 2% to 2½%) and the trend fall in the velocity of circulation (estimated at 0.5% to 1%).

Apart from an analysis of possible causes underlying deviations of money growth compared to the reference value, systematic analysis of a broad range of other indicators for future price developments in the euro area is performed under the *second pillar* of monetary policy strategy. The ECB closely analyses the following (groups of) variables [5] :

- *Price indicators* for the euro area including the Harmonised Index of Consumer Prices (HICP). The HICP is, of course, significant because the ECB has defined its primary objective of price stability in

[4] M3 includes M2, repo's, money market fund shares, debt instruments issued by money-creating institutions with maturities of up to 2 years, money market paper; and holdings in governmental and other public bodies having characteristics similar to the other elements of M3. M2 includes currency in circulation plus euro area (non-governmental) residents' overnight deposits, deposits with a maturity of up to 2 years, deposits redeemable at a notice of up to 3 months, and deposits held with governmental and other public bodies having characteristics similar to the other elements of M2.

terms of the annual rise of the HICP (2% maximum for the entire euro area in the medium term). In addition, components of the HICP such as energy, services and food, are closely followed separately. Producer prices are also monitored, being leading indicators of HICP inflation. The same holds for global commodity prices keeping, of course, an especially keen eye on oil prices, with their strong potentially pass-through effects on inflation in the euro area. The ECB also monitors movements in the deflator of GDP and its components. And finally, property prices in the euro area are monitored where possible.

- *Indicators for real economic activity*. The ECB monitors the development of real GDP and its components, plus output in several sectors such as manufacturing. Retail sales and new car registrations are also closely followed. Capacity utilisation in the economy may also be counted in this category.
- *Confidence indicators*. These include an indicator of economic sentiment and indicators for producer and consumer confidence and confidence indicators for specific sectors (construction, retail and services).
- *Labour market indicators*. The ECB keeps a close watch over both employment and unemployment, and also over the development of labour costs (both the total figure and its components) and of labour productivity.
- *Exchange rates*. The ECB monitors the development of the euro-dollar and other bilateral exchange rates, as well as rates the (nominal and real) euro effective exchange rate. This is because large and persistent changes in exchange rates vis-à-vis the euro may influence inflation in the euro area.
- *Financial indicators*. These relate to the development of long-term interest rates, the term structure, and equity prices. The development of long-term interest rates may provide information on inflation expectations in financial markets. The same holds for the term structure, which according to some economists is also useful as an indicator for the business cycle.
- *Projections for inflation and economic activity*. These include external projections, such as the Consensus forecasts, as well as ESCB staff projections for both inflation and economic activity in the entire euro area based on econometric analyses – which are prepared in close co-operation with the national central banks.

5 See e.g. ECB *Monthly Bulletin* of May 2002, notably the statistical annex and the chapter on 'Economic Developments in the Euro Area'.

2.3 **Links between wealth effects and ECB indicators**

Table 4 attempts to establish theoretical links between wealth effects and the ECB policy indicators, in order to investigate which ECB indicators are affected by wealth effects. Table 4 also provides the framework used in Section 3 to measure empirically the relationship between asset prices and ECB

Table 4 Wealth effects and ECB indicators

Wealth effects	On ECB indicators
1 On private consumption	
1a. Direct wealth effects	• Consumer confidence • Consumer price index (HICP) • Industrial output • Capacity utilisation rate • Retail sales • Car sales • Inflation projections • Growth projections
1b. Indirect wealth effects via balance sheet channel	See 1a plus: • Money stock (M3) • Loans to households
2. On corporate investment	
2a. Direct wealth effects (Tobin's q)	• Producer confidence • Purchasing managers index • Producer prices • Industrial output • Capacity utilisation rate • Activity in construction (housing permits) • Retail sales • Inflation projections • Growth projections
2b. Indirect wealth effects via balance sheet channel	See 2a plus: • Money stock (M3) • Loans to corporations
3. On banking sector (credit crunch)	• Money stock (M3) • Bank lending
4. Resulting from portfolio (re)allocation	• Term structure of interest rates • M3 and components • Share prices • Exchange rates

indicators. As regards wealth effects on consumption, attention is focused on those ECB indicators, which are related to consumer spending and consumer confidence. These include not only consumption-specific indicators such as consumer confidence but also more general ones like projections for inflation and economic growth. Balance sheet effects should express themselves in lending and the money stock. When we look at wealth effects on investment demand, we observe a similar list of indicators, with consumption-related indicators replaced by indicators pointing to corporations' willingness to invest (producer confidence, purchasing managers' index). Here, too, we would expect balance sheet effects to show up in lending and the money stock. Finally, the impact of wealth effects on bank's willingness to lend should also lead to changes in both total lending and the money supply.

The last item in Table 4 lists the impact of portfolio reallocation on ECB indicators. This item was not discussed above, because such effects take place in the financial rather than the real sphere. Yet, reallocation between asset components may impact ECB indicators. A well-known example of this is the substitution of bonds for liquid assets during episodes of an inverse term structure, complicating the interpretation of the M3 indicator. Another example might be the effect of capital outflows on the exchange rate.

Absent from Table 4 are labour market indicators. Naturally, changes in consumption and corporate investment will pass through into the labour market. Yet we expect this indirect effect to take place with some lag (see Demertzis *et al*., 2002 for simulations with DNB's multi-country model EUROMON, or Fagan *et al*., 2001, for simulations with the ECB's Area-Wide Model). Concentrating on labour market indicators does therefore not appear to be very helpful in analysing the influence of wealth effects on monetary policy. Nonetheless, it will be taken into account in the empirical analysis.

3 WEALTH EFFECTS AND ECB INDICATORS – EMPIRICAL FINDINGS

The predictive power of asset prices for ECB indicators (and vice versa) is investigated using Granger causality tests. The results are summarised in Tables 5 and 6 presenting the predictive power of nominal share and housing prices for, respectively, seven indicators of real activity (consumer confidence, producer confidence, capacity utilisation, industrial production, retail sales, unemployment and housing permits) and six indicators of nominal developments (consumer prices, producer prices, money supply M1 and M3, private sector borrowing and wages).

The presented figures are the p-values of the Wald test of the joint significance of two lags (quarterly data) or six lags (monthly data) of the right-hand-side variables. More specifically, the test is on whether the sum of the coefficients differs significantly from zero. Wald tests were also performed for testing the individual significance of coefficients, but these results are not presented here because they did not provide any new insights. An asterisk indicates a p-value equal to or less than 0.05, which points to statistical significance at the usual 95% confidence level. Bold type figures indicate results based on quarterly data, while regular type indicates results based on monthly data. In cases where data on either time series were available on a quarterly basis only, the monthly data of the other series were converted to quarterly figures by using the data for the last month of each quarter. The tables show that, contrary to equity prices, housing prices were mostly available on a quarterly basis. The model applied also incorporates seasonal dummies adjusting for the distorting influence of seasonal effects. All series are first-differences of logarithms, except for consumer and producer confidence, which are included as absolute first-differences. The minimum number of observations (N) required is 40 quarters or 100 months. Where fewer observations are available, no test values are calculated. In principle, the period for which data are collected covers the years from 1973 to 2001, but for some series the sample period is shorter.

The EMU_3 figures in Tables 5 and 6 are based on using aggregate series for France, Germany and Italy. These aggregate series are constructed on the basis of GDP weights. The EMU_3 aggregate covers some 70% of the euro area. Including more countries would imply that more series must be dropped owing to lack of available data and to imperfectly matched time series, resulting in an overall sample period of too short duration. At the same time, we note that an EMU-aggregate should be interpreted with some caution. Where the aggregate was calculated from pre-EMU data, a correlation is not necessarily indicative of the relationship that exists since EMU came into force. Indeed, the introduction of monetary union is a structural break with potentially strong repercussions on the correlation between European variables and hence the behaviour of EMU-wide aggregates (see Arnold, 1997). This is an example of the well-known Lucas-critique. However, for lack of sufficient

Table 5 Causality of nominal asset prices and real activity indicators

	Nominal share prices			Nominal house prices		
	Indicator causes wealth	Wealth causes indicator	N	Indicator causes wealth	Wealth causes indicator	N
Consumer confidence						
Belgium	0.84	0.91	321	**0.19**	**0.11**	**101**
Germany	0.63	0.00*	345	**0.65**	**0.07**	**93**
Finland	0.96	0.02*	167	0.40	0.28	168
France	0.54	0.35	345	**0.48**	**0.46**	**77**
Ireland	0.11	0.01*	333	**0.38**	**0.35**	**52**
Italy	0.14	0.31	344	**0.99**	**0.03***	**105**
Netherlands	0.24	0.00*	345	0.49	0.64	309
Austria						
Portugal	0.14	0.16	129	0.79	0.63	165
Spain	0.88	0.21	184	**0.52**	**0.87**	**56**
United Kingdom	0.42	0.10	334	0.48	0.41	225
United States	0.17	0.04*	285	**0.01***	**0.03***	**89**
EMU_3	0.91	0.05*	344	**0.79**	**0.09**	**73**
Producer confidence						
Belgium	0.69	0.07	345	**0.88**	**0.94**	**109**
Germany	0.75	0.01*	345	**0.28**	**0.72**	**93**
Finland	0.16	0.44	105	0.36	0.00*	106
France	0.71	0.01*	345	**0.37**	**0.32**	**77**
Ireland	0.50	0.47	325	**0.06**	**0.89**	**52**
Italy	0.54	0.10	344	**0.64**	**0.00***	**105**
Netherlands	0.30	0.00*	345	0.87	0.96	309
Portugal	0.63	0.26	129	0.65	0.89	165
Austria	0.56	0.25	202	**0.59**	**0.47**	**61**
Spain	0.73	0.00*	174	**0.67**	**0.89**	**52**
United Kingdom	0.04*	0.05	310	0.27	0.20	225
United States	0.11	0.00*	345	**0.83**	**0.51**	**101**
EMU_3	0.81	0.01*	344	**0.68**	**0.11**	**73**
Capacity utilisation rate						
Belgium	**0.46**	**0.02***	**113**	**0.80**	**0.24**	**109**
Germany	**0.39**	**0.05***	**113**	**0.31**	**0.40**	**93**
Finland						
France	**0.69**	**0.06**	**113**	**0.12**	**0.65**	**77**
Ireland	**0.80**	**0.24**	**86**	**0.11**	**0.97**	**52**
Italy	**0.88**	**0.02***	**133**	**0.42**	**0.32**	**105**
Netherlands	**0.85**	**0.13**	**113**	**0.82**	**0.30**	**105**
Austria	**0.85**	**0.40**	**114**	**0.26**	**0.33**	**109**
Portugal	**0.62**	**0.46**	**41**	**0.33**	**0.09**	**89**
Spain	**0.62**	**0.07**	**113**	**0.17**	**0.24**	**101**
United Kingdom	**0.99**	**0.48**	**114**	**0.92**	**0.75**	**73**
United States	0.11	0.00*	345	**0.06**	**0.67**	**101**
EMU_3	**0.77**	**0.00***	**113**	**0.34**	**0.54**	**73**

Table 5 Causality of nominal asset prices and real activity indicators (continued)

	Nominal share prices			Nominal house prices		
	Indicator causes wealth	Wealth causes indicator	N	Indicator causes wealth	Wealth causes indicator	N
Retail sales						
Belgium	0.08	0.14	236	**0.99**	**0.25**	**73**
Germany						
Finland	0.92	0.39	200	0.00*	0.04*	200
France	0.82	0.90	213	**0.00***	**0.82**	**65**
Ireland	0.67	0.01*	344	**0.38**	**0.05***	**52**
Italy	0.89	0.92	128			
Netherlands	0.53	0.08	129	0.23	0.27	129
Austria						
Portugal	0.63	0.28	105	0.00*	0.95	141
Spain						
United Kingdom	0.11	0.42	190	0.09	0.81	189
United States	0.60	0.01*	344	**0.11**	**0.38**	**101**
EMU_3						
Industrial output						
Belgium	0.66	0.43	345	**0.07**	**0.61**	**109**
Germany	0.21	0.01*	345	**0.70**	**0.44**	**93**
Finland	0.65	0.00*	201	0.79	0.01*	201
France	0.89	0.95	225	**0.13**	**0.19**	**69**
Ireland	0.11	0.45	314	**0.17**	**0.56**	**52**
Italy	0.85	0.27	344	**0.67**	**0.34**	**105**
Netherlands	0.78	0.14	345	0.11	0.91	309
Austria	0.66	0.22	343	**0.31**	**0.38**	**109**
Portugal	0.65	0.58	129	0.96	0.34	164
Spain	0.58	0.11	345	**0.77**	**0.16**	**101**
United Kingdom	0.09	0.44	345	0.54	0.02*	225
United States	0.19	0.00*	345	**0.05***	**0.60**	**101**
EMU_3	0.59	0.06	224	**0.21**	**0.20**	**65**
Housing permits						
Belgium	0.13	0.05*	345	**0.34**	**0.47**	**109**
Germany	0.55	0.58	345	**0.14**	**0.12**	**93**
Finland	**0.61**	**0.87**	**104**	**0.02***	**0.01***	**92**
France	**0.29**	**0.18**	**73**	**0.99**	**0.35**	**41**
Ireland						
Italy						
Netherlands	0.79	0.22	306	0.62	0.91	270
Austria						
Portugal	**0.63**	**0.23**	**41**	**0.00***	**0.37**	**53**
Spain						
United Kingdom						
United States	0.19	0.05*	345	**0.30**	**0.43**	**113**
EMU_3						

Table 5 Causality of nominal asset prices and real activity indicators (continued)

	Nominal share prices			Nominal house prices		
	Indicator causes wealth	Wealth causes indicator	N	Indicator causes wealth	Wealth causes indicator	N
Unemployment						
Belgium	0.39	0.75	345	**0.88**	**0.63**	**109**
Germany	0.30	0.03*	345	**0.08**	**0.57**	**93**
Finland	0.50	0.01*	345	0.32	0.01*	286
France	0.59	0.19	345	**0.05***	**0.54**	**77**
Ireland	0.72	0.05*	225	**0.00***	**0.99**	**52**
Italy	**0.24**	**0.25**	**81**	**0.99**	**0.68**	**73**
Netherlands	0.93	0.16	345	0.07	0.07	309
Austria	0.31	0.52	346	**0.35**	**0.76**	**109**
Portugal	**0.20**	**0.75**	**41**	**0.63**	**0.59**	**49**
Spain	**0.12**	**0.07**	**113**	**0.38**	**0.90**	**101**
United Kingdom	0.22	0.10	346	0.48	0.27	225
United States	0.10	0.00*	345	**0.25**	**0.93**	**101**
EMU_3	**0.26**	**0.27**	**81**	**0.05***	**0.99**	**73**

Table 6 Causality nominal asset prices and nominal indicators

	Nominal share prices			Nominal house prices		
	Indicator causes wealth	Wealth causes indicator	N	Indicator causes wealth	Wealth causes indicator	N
Consumer price index						
Belgium	0.04*	0.12	345	**0.33**	**0.71**	**109**
Germany	0.78	0.87	345	**0.06**	**0.00***	**93**
Finland	0.17	0.97	345	0.55	0.08	286
France	0.45	0.11	345	**0.82**	**0.80**	**77**
Ireland	0.23	0.00*	345	**0.98**	**0.07**	**52**
Italy	0.91	0.62	344	**0.05***	**0.23**	**105**
Netherlands	0.02*	0.39	345	0.16	0.65	309
Portugal	0.02*	0.47	129	0.25	0.00*	165
Austria	0.21	0.43	345	**0.57**	**0.01***	**109**
Spain	0.01*	0.71	345	**0.11**	**0.67**	**101**
United Kingdom	0.12	0.07	322	0.30	0.55	225
United States	0.18	0.57	345	**0.43**	**0.00***	**101**
EMU_3	0.57	0.64	344	**0.99**	**0.05***	**73**

Table 6 Causality nominal asset prices and nominal indicators (continued)

	Nominal share prices			Nominal house prices		
	Indicator causes Wealth	Wealth causes indicator	N	Indicator causes wealth	Wealth causes indicator	N
Producer prices						
Belgium	0.00*	0.28	345	**0.29**	**0.27**	**109**
Germany	0.25	0.80	345	**0.03***	**0.01***	**93**
Finland	0.32	0.24	345	0.93	0.09	286
France	0.58	0.65	345	**0.45**	**0.72**	**77**
Ireland	0.98	0.00*	345	**0.59**	**0.42**	**52**
Italy	0.33	0.67	344	**0.00***	**0.67**	**105**
Netherlands	0.61	0.18	249	0.46	0.09	249
Austria	0.91	0.64	346	**0.36**	**0.02***	**109**
Portugal	0.84	0.77	129	0.19	0.37	165
Spain	0.06	0.51	345	**0.78**	**0.50**	**101**
United Kingdom	0.96	0.00*	346	0.21	0.97	225
United States	0.25	0.63	345	**0.02***	**0.00***	**101**
EMU_3	0.20	0.66	344	**0.56**	**0.35**	**73**
Money stock M1						
Belgium	0.28	0.10	261	**0.34**	**0.49**	**81**
Germany	0.55	0.67	261	**0.74**	**0.82**	**77**
Finland	0.14	0.69	261	0.07	0.29	262
France	0.68	0.08	261	**0.90**	**0.04***	**77**
Ireland	0.56	0.39	261	**0.02***	**0.09**	**52**
Italy	0.43	0.09	260	**0.16**	**0.13**	**77**
Netherlands	0.36	0.42	261	0.20	0.10	261
Austria	0.32	0.47	263	**0.08**	**0.00***	**81**
Portugal	0.06	0.28	129	0.39	0.07	165
Spain	0.91	0.71	261	**0.04***	**0.04***	**81**
United Kingdom	0.59	0.99	346	0.65	0.99	225
United States	0.50	0.77	345	**0.41**	**0.55**	**101**
EMU_3	0.83	0.29	260	**0.44**	**0.26**	**73**
Money stock M3						
Belgium	0.51	0.00*	261	**0.09**	**0.46**	**81**
Germany	0.37	0.63	261	**0.23**	**0.01***	**77**
Finland	0.68	0.84	261	0.20	0.10	261
France	0.33	0.58	261	**0.01***	**0.00***	**77**
Ireland	0.69	0.31	261	**0.03***	**0.47**	**52**
Italy	0.76	0.77	260	**0.09**	**0.02***	**77**
Netherlands	0.59	0.54	261	0.36	0.69	261
Austria	0.76	0.15	261	**0.45**	**0.64**	**81**
Portugal	0.06	0.05*	129	0.53	0.01*	165
Spain	0.65	0.35	261	**0.33**	**0.17**	**81**
United Kingdom	0.98	0.26	232	0.46	0.03*	225
United States	0.46	0.98	345	**0.61**	**0.99**	**101**
EMU_3	0.25	0.75	260	**0.63**	**0.00***	**73**

Table 6 Causality nominal asset prices and nominal indicators (continued)

	Nominal share prices			Nominal house prices		
	Indicator causes Wealth	Wealth causes indicator	N	Indicator causes wealth	Wealth causes indicator	N
Private sector borrowing						
Belgium	0.87	0.36	225	**0.45**	**0.33**	**69**
Germany	0.76	0.50	225	**0.12**	**0.03***	**65**
Finland	0.54	0.94	225	0.37	0.04*	226
France	0.48	0.33	225	**0.00***	**0.00***	**69**
Ireland	0.89	0.51	225	**0.00***	**0.01***	**52**
Italy	0.58	0.74	224	**0.03***	**0.19**	**65**
Netherlands	0.50	0.11	225	0.00*	0.10	225
Austria	0.38	0.64	227	**0.08**	**0.27**	**69**
Portugal	0.86	0.98	129	0.28	0.59	165
Spain	0.91	0.81	225	**0.41**	**0.17**	**69**
United Kingdom						
United States	0.16	0.50	345	**0.18**	**0.14**	**101**
EMU_3	0.95	0.74	224	**0.13**	**0.03***	**65**
Wages						
Belgium	**0.01***	**0.01***	**113**	**0.20**	**0.96**	**109**
Germany	0.10	0.17	345	**0.07**	**0.00***	**93**
Finland	**0.89**	**0.54**	**105**	**0.24**	**0.04***	**93**
France	**0.27**	**0.69**	**112**	**0.50**	**0.13**	**77**
Ireland	**0.57**	**0.01***	**110**	**0.32**	**0.48**	**52**
Italy	0.49	0.26	344	**0.03***	**0.00***	**105**
Netherlands	0.01*	0.04*	345	0.60	0.70	309
Austria	0.73	0.75	345	**0.65**	**0.02***	**109**
Portugal						
Spain	**0.56**	**0.76**	**77**	**0.77**	**0.38**	**77**
United Kingdom	0.85	0.45	345	0.65	0.36	225
United States	0.08	0.82	345	**0.19**	**0.06**	**101**
EMU_3	**0.10**	**0.28**	**112**	**0.22**	**0.13**	**73**

observations for the EMU era, we decided to present the results for the entire sample period, including the pre-EMU era. For comparison, we have also included figures for the United States and the United Kingdom.

The results in Tables 5 and 6 show strong differences in significance between European countries. There is not a single case where p-values for all European countries are significant simultaneously. Yet the results may be broadly summarised as follows. Nominal share prices lead confidence indicators, capacity utilisation and, to a lesser extent, industrial production. Producer confidence is particularly strongly correlated with equity prices. Note that in the US, equity prices lead all volume indicators included in Table 5. The same is true of Germany, with the exception of housing permits.

In France and Italy, share prices only influence producer confidence and capacity utilisation. For the EMU_3 aggregates, equity prices are correlated with confidence indicators, capacity utilisation and (at a 6% significance level) with industrial production. Unfortunately, no aggregate indicator could be calculated for retail sales because German data were unavailable. Data availability was limited, too, for housing construction permits. As regards unemployment, individual countries, including Germany, show significant correlations. The corresponding result for the EMU-aggregates, however, is statistically insignificant. On the whole, nominal equity prices are poorly correlated with price indicators – not only for the European countries but for the United States as well.

Only in Finland do nominal housing prices contain information on the future development of most volume indicators. In Germany, housing prices seem to exert (some) influence on consumer confidence only; in Italy they affect both consumer and producer confidence. For the EMU-aggregates, the relation between housing prices and consumer confidence is significant at the 10% level, while in the US there is a strong two-way correlation between housing prices and consumer confidence.

By contrast, the predictive power of nominal housing prices for price indicators is considerably more significant and widespread. Both for the United States and the EMU_3, nominal housing prices lead consumer prices. The same holds for a number of individual European countries. Remarkably strong is the predictive power of housing prices for price and wage developments in Germany. The link with producer prices is less strong, except in the United States. Money and credit aggregates for Europe, by contrast, are more stongly correlated to housing prices than their counterparts for the US. M3 performs especially well and is significantly linked with nominal housing prices in Germany, France and Italy. In a number of European countries, changes in nominal housing prices precede movements in private sector borrowing.

When real instead of nominal asset prices are considered (with asset prices deflated by the consumer price index) essentially the same picture emerges – which for that reason is not presented here. This finding is not very surprising, since equity and housing prices vary much more strongly than consumer prices, resulting in strong correlation between real and nominal asset prices [6].

6 The underlying hypothesis here is that real asset prices are more strongly correlated to volume indicators than nominal asset prices.

It has already been mentioned that the p-values vary (strongly) from one EMU country to the next. It is still too early to say whether the euro area's single monetary policy will reduce these differences. Nevertheless we may make some comments. To begin with, the potential for differences in wealth effects within the euro area is much larger for housing prices than for equity prices. Table 7 shows that correlations between growth rates of European equity prices are much stronger than those between growth rates of European housing prices. Moreover, correlations between share prices have increased since 1995, contrary to housing price correlations. Indeed, while increased financial integration in Europe has strengthened the link between equity markets, weak labour mobility in Europe results in a strong segmentation of national housing markets, where cross-border arbitration has been very limited.

Table 7 Bilateral correlations between growth rates of share prices (bold) and housing prices

	BE	GE	FN	FR	IR	IT	NE	AT	PT	ES
Belgium		**0.52**	**0.37**	**0.57**	**0.58**	**0.44**	**0.66**	**0.31**	**0.66**	**0.54**
Germany	0.45		**0.52**	**0.65**	**0.56**	**0.50**	**0.77**	**0.53**	**0.60**	**0.55**
Finland	-0.16	-0.22		**0.45**	**0.40**	**0.42**	**0.51**	**0.18**	**0.42**	**0.47**
France	-0.14	0.34	0.07		**0.55**	**0.43**	**0.61**	**0.32**	**0.59**	**0.49**
Ireland	-0.38	-0.31	0.31	0.15		**0.43**	**0.63**	**0.27**	**0.69**	**0.59**
Italy	0.14	0.55	-0.03	0.36	-0.13		**0.53**	**0.36**	**0.66**	**0.53**
Netherlands	0.11	-0.03	-0.03	-0.06	-0.12	-0.16		**0.38**	**0.73**	**0.62**
Austria	0.09	0.57	-0.16	0.16	-0.16	0.53	-0.12		**0.38**	**0.24**
Portugal	-0.06	0.34	-0.04	0.23	0.08	0.48	-0.08	0.57		**0.70**
Spain	-0.10	0.15	0.19	0.19	0.13	0.09	0.24	0.18	0.40	

Explanatory note: based on quarterly figures.

Table 8 Average bilateral correlations across 10 euro countries

	1973-2001	1995-2001
Nominal share prices	0.51	0.77
Nominal house prices	0.10	0.07
Consumer confidence	0.22	0.17
Producer confidence	0.49	0.50
Capacity utilisation rate	0.18	0.28
Industrial production	0.14	0.25
Consumer price index	0.59	0.36
Producer prices	0.54	0.64
M1	0.55	0.55
M3	0.21	0.13
Private sector borrowing	0.18	0.17

Explanatory note: based on quarterly figures.

Table 8 summarises the correlations between some of the indicators, both for the full sample and for the 1995–2001 subperiod. It reveals that indicators correlated with equity prices in the euro area have been linked slightly more strongly since 1995 (with the exception of consumer confidence). Surprisingly, this does not hold for the nominal indicators. Mutual bilateral correlations of M3 growth and private sector borrowing in euro area countries have been particularly weak. This suggests that divergences between national housing markets in Europe lead to differences in impact on money and credit aggregates, which may complicate the use of such indicators by the ECB.

4 SHOULD CENTRAL BANKS ALSO STABILISE ASSET PRICES?

Most central banks pursue the aim of price stability, usually defined in terms of a price index that does not include asset prices. Various recent studies have advocated a broadening of the definition of price stability, or the adoption of an explicit target related to asset prices. Others have opposed this idea as they expect little benefit or even worse results of too explicit a role for asset prices as target variables or monetary policy. First, we will address the cases for and against, and the theoretical and practical arguments that play a role in them. Next, counterfactual simulations with DNB's multi-country macroeconometric model EUROMON are used to demonstrate the implications if a broadened definition of inflation, which includes a role for asset prices, is applied to the euro area.

4.1 **Arguments in the literature**

Pros……

In the literature various arguments have been brought forward in favour of an explicit role for asset prices in the definition of inflation, or as a monetary policy target variable. Cecchetti *et al*. (2000) argue that for a central bank which aims to minimise the volatility of inflation and/or output, the optimal policy is to respond not only to (expected) inflation and the output gap, but also, to some extent, to asset price movements or 'bubbles'. In their framework this result holds even if the inflation projection itself already incorporates information on asset prices. Moreover, it is robust to changes in the specification of the policy rule and/or the underlying model [7]. Cecchetti *et al*. further argue that if the public is aware that monetary authorities respond to asset prices, and if monetary policy co-determines the size of bubbles, it will be possible to prevent bubbles from growing out of control and creating 'boom-bust' cycles. The authors acknowledge the problem that asset prices may persistently deviate from their fundamental values but conclude, referring to similar measurement problems surrounding the output gap and potential production, that this is insufficient reason to disregard asset prices in determining monetary policy.

The results obtained by Cechetti *et al*. are supported by Filardo (2001), who uses another model with a separate role for asset prices and asset price bubbles. Filardo concludes that monetary policy should

[7] The model used is that of Bernanke and Gertler (2000), which includes a role for credit market imperfections reinforcing the impact of asset price developments on the economy. This model is discussed further below in this section.

respond to asset prices for as long as they contain information about the development of inflation and output. This conclusion is maintained even where the fundamental and the bubble components are indistinguishable. Asset prices should not be responded to, however, when there is large uncertainty about their macroeconomic effects.

The literature discussed so far argues that asset prices be incorporated in the reaction function of monetary authorities. Another school in the literature addresses the question of whether asset prices should be incorporated in the definition of inflation. Proponents usually base themselves on the pioneering study by Alchian & Klein (1973). These authors argue that monetary policy should be looking at the intertemporal costs of living. This is a weighted average of the prices of current and future consumption. As follows from Goodhart's quotation in the introduction above, current asset prices may serve as an approximation of future goods and services prices. Alchian & Klein (1973) and Goodhart (2001) therefore recommend that the central bank aims for stabilisation of a 'broad' price index defined as a weighted average of current consumer and asset prices – an index, as it were, of the cost of living. Following Bryan *et al*. (2001), we may clarify this argument using the Arrow-Debreu complete markets model – with contingent claims for the trade in any goods and services, now and in the future. These claims may be interpreted as financial assets. Let us also assume that transactions are concluded by means of money. Trade creates nominal prices for all present and future goods delivered and services rendered now and in the future. Now assume that we are in the same world, with all things equal except for an increased money supply. Compared to the former world, nominal prices of all products will have increased proportionally. The same amount of money will now buy fewer claims on good and services in the present and the future. A comparison of nominal prices in each of these worlds yields the rate of inflation.

The problem with Alchian & Klein's theoretical approach is that prices of contingent claims on future consumption are not available. Pollack (1975) and Shibuya (1992) argue that a so-termed intertemporal cost of living index (ICOLI) may be construed, using current prices of financial assets (claims on future consumption) as an approximation of the theoretically more accurate Arrow-Debreu prices of contingent claims [8]. In constructing an ICOLI, asset prices are assigned by far the largest weight. Bryan *et al*. (2001) have developed an alternative approach which takes account of financial asset prices, arguing that the price of financial assets – or, more accurately, present nominal cost of a

[8] Alchian and Klein point out, however, that although prices of financial assets may serve as substitutes, the interpretation of changes in financial asset prices might be problematic, since such changes may have any of several causes: 1) a change in the price of an unchanged future service; 2) a change in preferences regarding such a service; 3) a change in preference towards present as against future consumption; and 4) a change in the scope of the service the financial asset is expected to buy.

claim on future consumption – is an example of what is called 'excluded goods bias'. This phenomenon occurs when a price index disregards a systematic relative price change which is relevant to economic subjects. In elaborating this approach, the question arises how the weights of asset prices should be calculated under the broader definition of inflation. In the literature we find asset price weights based on their empirical relation to prices of goods and services; weights based on the share of total income (or total expenditure) spent on financial assets; weights based on the relative variance of asset prices; and weights that depend on the information in asset price movements on a common price (increase) trend, calculated on the basis of a so-called dynamic factor index (DFI).

Each of the latter approaches – relative variance weights and DFI – has been tested by Bryan *et al*. (2001). They show that the weights found for asset prices differ quite strongly from one country to the next and are also dependent on the measure of disaggregation into types of goods and services (larger weights for little disaggregation; smaller weights for strong disaggregation) and on the frequency of the data used (larger weights for quarterly data; smaller weights for monthly data). Considerable DFI-weights are notably found for housing prices. This finding is supported by empirical studies into the predictive power of asset prices for the future development of expenditure categories and inflation. On the basis of regression analyses for several countries, Goodhart (2001) and Goodhart & Hofman (2000a and 2000b) cite housing prices as particularly relevant in this context,[9] and therefore argue that careful consideration should be given to the issue of how to assign a role to housing prices in the definition of inflation. A clear link between equity prices and subsequent fluctuations in output and inflation is much more difficult to establish. Similar conclusions are drawn by Filardo (2000) on the basis of US data. Partly because of their relatively volatile nature, relative variance weights for asset prices are much more modest.

……..and cons

The most important arguments against the inclusion of asset prices in the definition of inflation are typically of a practical nature. There are many financial assets for which prices are not available. And even if they are available, how are they to be measured? For equity prices this is obvious, but reliable and representative figures on property prices, for example, are lacking for many countries. Which asset prices should be included in the index and how should they be weighted? Again, no unequivocal answer has been found (Capel & Jansen, 2001). Provisos are also raised regarding the response by monetary authorities to asset price movements.

Among the sceptics are Bernanke & Gertler (2000). They think it is neither desirable nor necessary to respond to changes in asset prices, except insofar as they signal future inflationary or deflationary developments. They start out from the idea of a framework within which monetary authorities automatically adjust policy interest rates with the aim of stabilising aggregate demand. Such a 'leaning against the wind' policy will also benefit the stability of the financial markets themselves, especially if an aggressive anti-inflation and -deflation policy is pursued. Bernanke and Gertler support their conclusions with calculations using a dynamic neo-Keynesian model in which credit market imperfections feature importantly and in which exogenous asset price bubbles occur, influencing the financial position of borrowers, and hence the external finance premium and corporate investment. A later model analysis by Bernanke and Gertler (2001) confirms these findings. Although the volatility of output is (marginally) lower if the central bank responds to asset prices explicitly, this comes at the cost of a more volatile inflation.

Bernanke and Gertler (2000) also estimate a reaction function for the Federal Reserve, inferring that the Fed has done in reality what their model analyses suggest: respond (aggressively) to expected inflation while not responding directly to equity prices. A problem inherent in such an analysis is the simultaneity of monetary policy and equity prices. This issue has been analysed more fully by Rigobon and Sack (2001), using a novel technique to identify the monetary policy response to equity prices. These authors find that a 5% rise of equity prices increases the probability of a 25 basis point interest rate hike by one half. Such a response is approximately equal to the one that would be derived from the impact of equity price rises on expenditure. From this, Rigobon and Sack conclude that the Fed responds to equity price movements in a way consistent with their impact on the economy. In other words, there is no evidence for the existence of a direct separate influence of share prices in the reaction function of the Fed.

Mishkin (2001) is strongly opposed to any asset price-related target for monetary policy. Such an objective would require the central bank to identify a bubble as such at an early stage. In other words, a central bank must have better predictive capacity at its disposal or must have an informational advantage vis-à-vis the private sector. In the words of Mishkin (2001, p. 16):

9 At the same time, Goodhart (2001) claims that most consumer price indices are not pure measures of the price of current consumption, if only because they include prices of many durable goods.

‘Without an informational advantage, the central bank is as likely to mispredict the presence of a bubble as the private market and thus will frequently be mistaken, thus frequently pursuing the wrong monetary policy’.

The fact that the model simulations by Cecchetti *et al*. (2000) suggest that a monetary policy with an asset price objective leads to a superior macroeconomic performance is, according to Mishkin, the result of the assumption that the central bank is aware at any moment of the existence of a bubble. This assumption, Mishkin argues, is highly questionable.

An asset price objective also presupposes a central bank’s ability to steer asset prices. The question is, of course, how strong this ability really is. The link between monetary policy and, for instance, equity prices is fairly weak. Most equity price fluctuations cannot be traced back to monetary policy. This means that a central bank has only limited influence on equity prices. If a central bank indicates that equity prices ought to move in a certain direction whereas those prices continue to move in the opposite direction, the impression will be created that the central bank has proved itself unable to achieve its own objectives [10]. A central bank with too many unachieved objectives will lack confidence and support, which may jeopardise the bank’s independence. According to Mishkin, central banks have succeeded in increasing public support for their independence precisely by focusing on a clear and limited objective.

The view that asset prices signal the future development of inflation and that the central bank should therefore incorporate these prices in its objectives, is referred to by Bryan *et al*. (2001) as a ‘fundamental confusion’. While an asset price *rise*, owing to the spending effects it will trigger, may lead to higher inflation in the future [11], the asset price *level* is, in theory, insensitive to changes in future inflation.

Based on the standard objective function assumed by the theoretical literature, with central bank utility depending on, among other things, the difference between actual inflation and the inflation target, the optimal monetary policy will respond to changes in asset prices. The optimal response will, however, depend on the nature of the shock and on whether the shock is transitory or permanent (Mishkin, 2001).

[10] When Alan Greenspan claimed in late 1996 that the US stock market showed signs of what he called ‘irrational exuberance’ the Dow Jones Index stood at about 6,500 points. It subsequently went on to cross the 11,000 point mark.
[11] To the extent that additional spending exceeds additonal supply.

4.2 **Implications of a broader concept of inflation: a counterfactual simulation analysis**

In order to provide evidence supplementing the literature cited above, we simulated the Nederlandsche Bank's multi-country model, EUROMON (see Demertzis *et al*., 2002), to find out what the difference would have been if monetary policy makers had responded to a broader inflation measure assigning a specific weight to equity and housing prices. The aim of the simulation exercise was to get a feeling for the potential effects on the level and volatility of growth and inflation. Although in the literature, the variance of inflation and growth in many cases enter the monetary authorities' objective function, we emphasise that the present exercise does not seek to investigate to what extent and under what assumptions responding to asset price fluctuations by the central bank would be optimal.

As appears from the above review of the literature, there are various ways to determine the weights of equity and housing prices in a broader inflationary measure. For the US, Bryan *et al*. (2001) have the weights of equity prices vary between 0.001 and 0.45, and the weights of housing prices between 0.001 and 0.21. For the euro area, we use similar weights. In order to check for robustness, results are presented for different values regarding the weights.

The initial year in our simulation period is 1994 – a choice prompted mainly by practical considerations. It was the year the European economy started uphill again (after negative growth in 1993). Housing prices fluctuated modestly and the equity price volatility remained approximately within the standard deviation calculated over the 20-year period from 1981 to 2001. The strong equity price boom would not gain momentum until 1996, while housing price increases in the euro area were not to rise clearly above consumer price inflation until the late 1990s. The counterfactual simulation covers the 1994–2001 period, under the assumption that the target inflation rate (2% maximum) would not have changed as a result of the broader inflation measure. The simulations merely present the effects of using a broader inflation measure in the interest rate rule of the monetary authorities. In other respects, this rule is identical to the standard Taylor rule:

$$RS(t) = \rho\, RS(t-1) + (1-\rho)\,[1.5\,(\pi(t) - \pi^*) + 0.5\, gap(t)]$$

where $RS(t)$ is the policy rate at time t, ρ is the 'smoothing parameter', $\pi(t)$ is the inflation rate at time t measured in relation to the corresponding quarter of the preceding year, π^* is the target inflation rate and $gap(t)$ is the output gap at time t. The smoothing parameter ρ indicates that the monetary authorities do not immediately fully adjust the policy rate in response to changes in the observed inflation rate and output gap. The broad inflation rate $\pi(t)$ is defined as follows:

$$\pi(t) = \varphi_{cp}\, \pi_{cp}(t) + \varphi_h\, \pi_h(t) + \varphi_{eq}\, \pi_{eq}(t) \quad \text{with} \quad \varphi_{cp} + \varphi_h + \varphi_{eq} = 1$$

The broad inflation rate is thus a weighted average of the rise in consumer prices π_{cp}, the rise in housing prices π_h and the rise in equity prices π_{eq}. In determining asset price inflation, total price rises are considered, disregarding any distinction between the fundamental and the bubble component. The simulations use various weighting schemes, with weights of 10% and 20% for housing price inflation and 0.5%, 2% and 4% for equity price inflation.

The results, summarised in Table 9, show the mean (M) and the standard deviation (SD) of annual real GDP-growth, consumer price inflation, the policy controlled interest rate, housing price inflation and equity price inflation for the 1994–2001 period. In the first column the actually observed figures are given, while in the other columns we present counterfactual figures that would have come out, according to the EUROMON model, had central banks used a monetary policy rule featuring a broader definition of inflation. For simplicity, a similar policy rule is assumed to have been applied by the monetary authorities in the US, UK and Japan. For the pre-EMU period up to end-1998, national asset price movements are allowed to influence the national policy rates of individual euro area countries; starting 1999, a single policy rule applies to the entire euro area, with interest rates determined by euro-area-wide developments in inflation and output. This implies that up to end-1998, changes in

Table 9 Actual macroeconomic performance in the euro area over 1994-2001 versus counterfactual performance based on a broader definition of inflation that includes asset prices

	Actual	Counterfactual for broader inflation definition						
		$\varphi_{cp=0.90}$ $\varphi_{h=0.10}$ $\varphi_{eq=0.00}$ ρ =0.0	$\varphi_{cp=0.80}$ $\varphi_{h=0.20}$ $\varphi_{eq=0.00}$ ρ =0.0	$\varphi_{cp=0.995}$ $\varphi_{h=0.00}$ $\varphi_{eq=0.005}$ ρ =0.0	$\varphi_{cp=0.98}$ $\varphi_{h=0.00}$ $\varphi_{eq=0.02}$ ρ =0.0	$\varphi_{cp=0.96}$ $\varphi_{h=0.00}$ $\varphi_{eq=0.04}$ ρ =0.0	$\varphi_{cp=0.96}$ $\varphi_{h=0.00}$ $\varphi_{eq=0.04}$ ρ =0.9	$\varphi_{cp=0.88}$ $\varphi_{h=0.10}$ $\varphi_{eq=0.02}$ ρ =0.0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
M y	2.22	2.14	2.06	2.20	2.12	2.02	2.01	2.06
SD y	0.84	0.81	0.81	0.81	0.75	0.69	0.79	0.73
M π_{cp}	2.23	2.32	2.41	2.21	2.17	2.12	2.18	2.26
SD π_{cp}	0.74	0.68	0.63	0.74	0.74	0.76	0.74	0.68
M RS	4.68	4.84	4.98	4.69	4.75	4.88	5.02	4.89
SD RS	1.24	0.93	0.74	1.24	1.32	1.47	1.10	1.02
M π_h	3.07	3.09	3.10	3.01	2.84	2.62	2.75	2.88
SD π_h	2.05	1.99	1.95	2.01	1.91	1.77	1.77	1.89
M π_{eq}	11.84	10.92	10.12	12.26	13.32	14.24	11.63	12.25
SD π_{eq}	21.05	20.30	19.86	19.91	17.00	14.22	19.07	16.72

Counterfactual results based on simulations with EUROMON model.

policy-controlled interest rates in countries such as France, Belgium and the Netherlands may differ slightly from those in German interest rates, although in general they fluctuate within a narrow band on either side of it.

A number of reservations should be made with respect to the results. To begin with, the results are of course strongly dependent on the model used. EUROMON is a world model in which housing and equity prices are endogenous and international spillover effects are at work. Expectations in EUROMON are 'backward looking' and asset price movements, apart from determining the interest rate when inflation is broadly defined, affect the economy via household consumer spending. These effects on consumption are modest in the euro area and Japan (with wealth-elasticities of consumption averaging 0.05) and considerably stronger in the US (0.20) and the UK (0.29). There are no direct effects of asset price movements on goods prices. EUROMON's backward looking expectations is part of the reason why the impact of monetary policy on inflation takes close to two years to show up effectively.

Table 9 provides an impression of the macroeconomic implications, which a monetary policy of responding to a broadly defined inflation measure during 1994–2001 might have had. Columns 2 and 3 regard the inclusion of housing prices in the inflation measure. Over the simulation period, the average annual rise in housing prices in the euro area was initially slightly negative, fluctuated around the 1.5% mark from 1995 to 1998, only to accelerate during 1999–2001 to a level of 5% to 6%. Should the housing price rise have been included in the definition of inflation, then the average interest rate would have been slightly higher and average real GDP growth slightly lower. Consumer price inflation, by contrast, would have come out somewhat higher, because interest rates would have been lowered initially during 1994–1996 due to very low house price rises, only to increase again after that period. As tighter monetary policy passes through to inflation with a lag, a higher average inflation over the entire period results. The average rise in housing prices is hardly affected. One of the reasons for this is the relatively small influence of interest rate rises on housing prices; another is the fact that housing prices also respond to changes in the general price level. The volatility of the interest rates and (asset) inflation rates does decline somewhat, whereas the volatility of real GDP growth increases slightly.

If equity prices are included in the definition of inflation, the picture presented by columns 4 through 7 emerges. Equity prices start out considerably higher in 1994 than the year before, but proceed to decline, on balance, until end-1995. After that, the boom sets in, with almost uninterrupted 10% annual price rises, peaking in the first quarter of 2000. Then the decline follows, somewhat hesitantly at first, followed by substantial equity price reductions from the fourth quarter of the year 2000 onward. Despite the strong equity price rises during most of the simulation period, the average interest

rate in the counterfactual simulation is only slightly higher than the actual rate, for two reasons. First, the average interest rate would have been much higher if 2001, when equity prices plummeted, had been excluded. Secondly, equity prices themselves are interest rate sensitive [12]. The initial rise in interest rates is attended by lower equity prices and slightly lower housing prices, and also by lower average growth and consumer price inflation, mitigating further interest rate rises. At the same time, the volatility of equity prices declines sharply and that of real GDP growth modestly. By contrast, the volatility of the interest rate (which now responds to strongly fluctuating equity prices) increases. Meanwhile the volatility of broadly defined inflation (i.e. including equity prices) remains lower. This overall picture changes little when interest rate smoothing is taken into account (column 7), although of course the volatility of interest rates then declines sharply, whereas the variance of equity price movements narrows much less strongly.

All in all, a mixed picture emerges from the simulation results. If a broad definition of inflation had been adopted, with a substantial weight for both housing and equity prices (see column 8 of Table 9), according to EUROMON, the euro area would have had higher average (real) interest rates during 1994–2001, causing economic growth to remain slightly lower (0.1 to 0.2 percentage point). Responding to equity price movements – through including asset prices in the definition of inflation – would have contributed mostly to reducing the volatility of those prices. Thus, our simulations lend some support to the claim by Cecchetti *et al*. (2000) that responding to asset prices mitigates the probability that bubbles will develop. The average consumer price inflation would have been influenced only marginally during the review period, on account of the fact that for a long time (up to 1999) housing price rises in the euro area lagged behind the 2% target inflation rate, while equity prices initially fell, on balance, during 1994–1995. This makes the simulated interest rate lower than the actual rate during 1994–1995, equal to it during 1996, only to rise above it until mid-2000, under the impact of an exuberant equity price boom. In line with this development, consumer price inflation initially rises and only starts falling from 1999 onward. Average asset price rises over 1994–2001 are not affected strongly. We should, however, note that these results are to some extent distorted by the events of 2001. Across the 1994–2000 period, the average equity price inflation declines from 18.1% (actual) to 16.8% (under the counterfactual simulation presented in column 8).

The relatively small differences between actual and counterfactually simulated macroeconomic developments, despite the considerable weights given to asset prices in some of the definitions of

[12] In 2001 due to the bursting of the equity bubble interest rates decline sharply compared observed actual rates. This fall in interest rates, in turn, largely mitigates the fall in equity prices. This is part of the reason why average counterfactual equity price rises across the entire 1974-2001 timespan come out slightly higher than they did in reality.

inflation and despite the exuberant equity price development over the simulation period, raise the question of whether the monetary authorities gain much by responding to asset price movements. Judging by the simulation results, one might answer in the negative, although some qualifications are in order. First, the results are model-dependent. To the extent that corporate investment might be affected substantially by equity price developments – a mechanism not accounted for by EUROMON – and to the extent that the transmission of monetary policy might become stronger and faster by including forward-looking behaviour, the implications of using a broader definition of inflation in the conduct of monetary policy rules might prove larger than would appear here. Also, as a result of more widespread equity holdings and homeownership among households, wealth effects may have become stronger than the empirical evidence over the sample period suggests. By contrast, the asynchronous movements of national asset price measures might dilute the effects on a European level. Tables 7 and 8 in Section 3 suggest, however, that this would apply to housing prices more than to equity prices. Second, the effects of asset price fluctuations may be asymmetrical and non-linear. A very steep drop in prices, as in June-July 2002, may trigger additional confidence effects and may therefore have a relatively large impact on the economy. The model simulations considered here do not take account of such regime-dependent effects. A better understanding of this and underlying mechanisms in the transmission of wealth effects will be instrumental in determining the scope and nature of the (optimal) policy response to asset price developments. A third remark is that the review period, 1994–2001, does not include a full business cycle. To the extent that an earlier bursting of the equity price bubble would have induced higher economic growth in 2002 and possibly also in 2003, the simulation underestimates the benefits of including asset prices in the definition of inflation.

5 CONCLUSIONS

This paper explores the importance of wealth effects for monetary policy in the context of the policy strategy of the European Central Bank (ECB). Having discussed the monetary policy indicators used by the ECB, we investigated where and in what way wealth effects may influence ECB policy. The predictive power of asset prices for the economic indicators used by the ECB in preparing its policy (and vice versa) was analysed using Granger causality tests. Nominal equity prices lead confidence indicators, capacity utilisation and, to a lesser extent, industrial production. German equity prices lead almost all included indicators of real economic activity, while in France and Italy they influence producer confidence and capacity utilisation only. The overall correlation of nominal equity prices with price indicators is poor. Only in Finland do nominal housing prices contain information on the future movements of most volume indicators. In Germany, housing prices appear to have (some) influence on consumer confidence only; in Italy both consumer and producer confidence are affected. The predictive power of nominal housing prices for price indicators and for money and credit aggregates, however, is both considerably stronger and more widespread.

The results point to strong differences among euro area countries. No set of test results is the same for all countries. Yet it is too early to draw final conclusions as to whether the single monetary policy in the euro area will reduce these differences. Our analysis shows that the potential for differences in wealth effects across the euro area is much bigger for housing prices than for equity prices. Also, divergences among national housing markets within the euro area appear to influence money and credit aggregates in different ways, which might complicate the use of such indicators by the ECB.

Finally, we summarised the debate on whether a central bank should (also) pursue the stabilisation of asset prices. In this context, a counterfactual simulation was carried out using the EUROMON model, with the definition of inflation extended to include prices of financial assets. If a broad definition of inflation had been applied, including substantial weights for both housing and equity prices, (real) interest rates across the euro area would have been higher, on average, during the 1994–2001 period, causing economic growth to have been a fraction slower. Responding to equity price developments – in our case through their inclusion in the definition of inflation – would mainly have helped to dampen equity price volatility. The relatively small differences between actual and simulated macroeconomic developments, despite the considerable weights given to asset prices in some of the definitions of inflation and despite the exuberant equity price development over the simulation period, raise the question of whether the monetary authorities stand to gain much by responding to asset price movements. Judging by the simulation outcome, the answer is negative.

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