NORGES BANK

Economic Bulletin

4
06

December

The *Economic Bulletin* is published quarterly by Norges Bank.

Editor: *Svein Gjedrem*
Editorial officer: *Jens Olav Sporastøyl*

Communications regarding the *Economic Bulletin* should be addressed to:
Norges Bank
Information Department
P.O. Box 1179 Sentrum
N-0107 Oslo, Norway
Telex: 56 71 369 nbank n
Fax: +47 22 31 64 10
Telephone: +47 22 31 60 00
E-mail: central.bank@norges-bank.no
Internet: http://www.norges-bank.no

Printed at: Tellus Works AS

ISSN 0029-1676 (printed)
ISSN 1503-8831 (online)

Standard signs used in the tables:

.	Category not applicable
..	Data not available
...	Data not yet available
-	Nil
0 } 0.0 }	Less than half the final digit shown

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Economic Bulletin December 2006
Volume LXXVII No. 4

A retrospective on the introduction of prices in the Norwegian payment system

Asbjørn Enge, senior economist and Grete Øwre, assistant director, Payment Systems Department[1]

During the 1980s, Norwegian banks introduced direct pricing of customers' use of payment services. Direct pricing of payment services is relatively uncommon in other countries and Norway thus stands out in relation to the most widespread international practice in this respect. This article provides an account of the transition from free services to direct pricing of payment transactions, and the benefits of the transition. The article draws on theory where relevant, but the focus is on actual events in the period 1970–1993. During the last 8–10 years of the period, a pronounced transition from payment by cheque to payment by card occurred in Norway. Central factors behind this development are also described.

1 Introduction

1.1 Prices and cross-subsidisation

Prices provide important signals about the value of a product or service and therefore have a strong bearing on consumer choices. Rational consumers will choose the product that meets their needs at the lowest possible cost, and this in turn will contribute to economic efficiency. Prices generate revenue for producers. In the short term, the price of a product should cover the variable costs of production, but firms may also choose to operate at a loss for a period. In order to avoid bankruptcy, a firm's income must cover both variable and fixed costs in the long term. The price of each product must not necessarily cover the variable and fixed costs. The price of individual products can be set at below cost price. This means that the price of other products must be set higher than their production cost. This is called cross-subsidising. Such pricing results in lower consumption of higher-priced services than would have been the case without cross-subsidisation. Similarly, consumption of low-priced services will be higher. The impact on consumption of a given price change depends on the price sensitivity of demand for the service.

1.2 Prices for payment services

Pricing of payment services varies across countries. The most common practice is that banks do not price payment services directly, but cover their costs in other ways, for example via float revenue. Float is a result of the fact that money in transit between payer and beneficiary is not interest-bearing for either party for a number of days. Interest income accordingly accrues to the banks. In Norway, Section 27 of the Financial Contracts Act regulates the calculation of interest, and in practice this provision prevents float in the Norwegian payment system. In a number of countries, payment system costs are covered through fixed account management fees charged to customers. In other countries, an interest rate of zero is usual on typical current accounts. Cross-subsidisation of payment services with income from other bank products is also usual.

The introduction of unit prices for payment services can benefit banks both directly and indirectly. They benefit directly through increased revenue. Moreover, prices that reflect the relative differences in production costs will encourage customers to choose the most cost-effective services. This will yield indirect benefits by allowing banks' costs to be lowered in the long term. Unit prices for payment services can also reduce the need for cross-subsidisation by other services, and thereby contribute to more correct pricing and hence also more correct consumption of these services. Why then is direct pricing of payment services not more common?

1.3 Obstacles to the introduction of prices

Many customers will find the transition from free services to direct pricing dramatic, even if the prices are low. The bank that first introduces prices will therefore be faced with dissatisfied customers and negative media coverage, probably resulting in a loss of customers. Although the introduction of transaction prices may potentially yield gains, it may be so costly for the bank that takes the initiative that it is not regarded as an option. It is therefore not very likely that a single bank will decide to introduce prices without other banks doing the same. On the other hand, if all the banks support a decision to introduce prices, none will lose customers, and they will all increase income and/or reduce costs.

There are two challenges to such a strategy. First, it is

[1] The authors would like to thank former Governor Hermod Skånland for useful information received at meetings in autumn 2005, and Director Tor Johan Bjerkedal of the Norwegian Financial Services Association for access to correspondence between the Norwegian Banking Association and the Norwegian Confederation of Trade Unions (LO) / Norwegian Union of General Workers (NAF) and the Directorate of Prices. Thanks also to Harald Haare, Olaf Gresvik, Asbjørn Fidjestøl and Bent Vale for useful input.

not certain that all banks will follow up. One or more banks may see it as being in their interest not to take part, in a bid to increase their market share. If a bank does not introduce pricing, it will be able to "take over" discontented customers from the banks that loyally abide by the decision. For the individual bank it will therefore be more attractive not to observe the joint decision, even though for banks as a whole it is best for all to comply with the decision.[2] The other challenge is banks' relationship with the competition authorities. Competition legislation in most countries places stringent restrictions on price cooperation.

The banks may therefore be deadlocked in a non-optimal situation. They would all benefit from the introduction of transaction prices, but no bank wants to make the first move.

2 The introduction of transaction prices in Norway

2.1 Wage and salary payment free of charge via banks

Direct pricing of payment services is widespread among Norwegian banks today. However, this has not always been the case. On 1 January 1960, a wage account service was established for all commercial and savings banks, and the use of banking services increased through the 1960s as it became more common to pay wages and salaries into a bank account instead of the classic wage packet.

The Norwegian Confederation of Trade Unions (LO) and the Norwegian Employers' Association (NAF) included provisions on payment of salaries by way of bank accounts in the wage agreement of 1966. They informed the Norwegian Banking Association and the Norwegian Savings Banks Association of the provisions. In their response to LO and NAF regarding the wage account arrangement, the two banking associations stated that banks would continue to perform services free of charge for employer, trade union or employee. However, they reserved the right to revert to the question of charging employers and trade unions once they had more experience of the wage account arrangement, particularly how costly it would be.

The *Basic Agreement* of 1969 between LO and NAF provided for payment of wages and salaries through banks (the wage account agreement) if the enterprise wanted this arrangement. Cheques provided easy access to wages. A joint record of objection was entered in the Basic Agreement of 1974 to the effect that wage payment via banks was based on the assumption that employees could access their wage account free of charge by means of cheques. Changes that broke with this assumption would lead to each of the parties having a right to demand renegotiation of the rules concerning salary payment via banks. The banks were interested in the wage account arrangement, and therefore felt that this record of objection limited their opportunity to introduce charges. Any subsequent attempt to introduce transaction prices on payment services led to protests from both employee and employer organisations.

2.2 Increased focus on the costs associated with payment services

Both banks and public authorities realised fairly early that the processing of all the cheques entailed high costs. In autumn 1969, the *Credit Policy Committee* held negotiations between authorities and banks on changes in interest rates. At the time, banks' deposit and lending rates were both regulated, and quotas were imposed on banks' lending (both the price and the volume of the loans). In connection with these negotiations it was stated that banks should to a greater extent cover their operating expenses, and particularly expenses in connection with payment services, by pricing services instead of covering their expenses through interest income.

Focus on the costs of payment services increased during the 1970s. In his annual address in 1973, Knut Getz Wold, then Chairman of Norges Bank's Board of Directors, criticised banks for supplying free payment services. This was also followed up in an article in *Penger og Kreditt* later that year: "Hvorfor skal det koste noe å bruke sjekk?" (Why should it cost anything to use a cheque?). (Magnussen 1973.) In the National Budget for 1973 *(Storting Report no. 1 (1973–74)* p. 29), it was pointed out that payment intermediation (cheques) accounted for a considerable share of banks' costs, and that payment for banking services could contribute to curbing a further rise in interest rates, while at the same time the scope of banking services would be more correct from an economic perspective.

In connection with the renegotiation of the Basic Agreement between LO and NAF in autumn 1973, the banking associations stated that they had no plans to introduce charges on cheques in the four-year period for which the agreement was to apply. However, the banking associations planned an information campaign to reduce the use of cheques for less than NOK 100 and assumed that LO and NAF would take part. If the campaign did not have perceptible effects, the banking associations would consider limiting the number of cheques that were free of charge. Nevertheless, LO and NAF included a formulation about use of cheques free of charge in the Basic Agreement of 1974.

[2] In game theory, this is called 'the prisoner's dilemma'. The problem is that the decision that is best for the parties jointly is the one that is least attractive/most risky on an individual basis. (In the 'prisoner's dilemma', two prisoners who are isolated from one another are given a choice between keeping silent and informing on the other. If the other keeps silent, you get out free by informing, but get 1 year's prison by keeping silent. If the other informs on you, you get 5 years by also informing, but 10 years for keeping silent. Both will inform in order to be released or at any rate not risk 10 years. They will thus both get 5 years, instead of the 1 year they would have got if they could have agreed to keep silent.) As long as the parties cannot meet, discuss and agree on a strategy, it is impossible to achieve the optimal result. And even if the parties can meet and agree on a strategy, each will still benefit from breaking the agreement because breach is the strategy that pays off best on an individual basis. It is therefore improbable that the collectively optimal solution will be achieved without the existence of control and sanction possibilities.

In 1973, the Ministry of Finance appointed a committee to consider various issues relating to payment services (the *Payment Services Committee*). Both cost and efficiency were specifically mentioned in the mandate. A subcommittee estimated banks' unit costs for account-to-account giro payments at between NOK 2 and NOK 5, while unit costs for cheques used for payment were estimated at about NOK 2. The low costs associated with cheques were explained by the fact that shops did much of the work of inspecting cheques when they were received, and that they could deliver a number of cheques to the bank at the same time. The total economic cost of banks and the post office in connection with payment services was estimated at NOK 671 million. In "*NOU 1979:16 Betalingsformidling* (Payment Services)", the majority of the committee were in favour of using fees as a means of promoting a more rational use of resources in payment services.

Banks were also focusing on the high level of costs, and in 1972 appointed a "Reform Committee". The committee was to discuss in principle solutions to the question of costs associated with payment services. In 1975 the committee proposed that the number of free cheques or cash withdrawals should be limited to four per month, and that there be a fee of one krone per cheque used or per cash withdrawal in excess of this number. The committee also proposed introducing a fee of one krone per giro, without any quota free of charge.

In Norway, banks and the government postal giro system (Postgiro) provided giro (credit transfer) services. Giro transfers between postal giro accounts were free of charge, and prices for cash payment or disbursement giros were very low (customers paid postal charges). Postgiro had no plans to introduce prices other than these. The banking industry pointed out to the authorities on several occasions that it was difficult for banks to introduce prices for payment services as long as Postgiro offered the same types of service free of charge.

2.3 The first prices for cheques

In 1978, the Savings Banks Association and the Norwegian Banking Association agreed on a system with 15 cheques free of charge per quarter and pricing of payment services and the issue of bank ID cards (cheque guarantee cards). The implementation of this system was prevented by Royal Decree of 17 February 1978 relating to freezing of prices and price regulation, which the authorities introduced to curb a sharp rise in prices. The banking associations twice applied for exemption from the price freeze, but both the applications were rejected. After input from LO in October 1979, it was decided that all holders of cheque accounts should be charged NOK 2 for cheques of less than NOK 150, instead of making 15 cheques per quarter free of charge. When price regulation was suspended on 1 January 1981, member banks in the Norwegian Banking Association introduced fees on small cheques (cheques of less than NOK 150) from 1 February 1981. At the same time, the Savings Banks Association recommended that its members introduce fees on these cheques at a later date.

The authorities still supported the introduction of prices for payment services. The Revised National Budget for 1983 (*Storting Report* no. 88 (1982–83)) stated that the aim must be for banks to set prices that cover the real costs of the different services. It was argued that this would result in more correct allocation of resources and ensure that those who actually use the services would pay for them. It was not considered rational for such services to be financed by banks' interest margin.

2.4 Applications for more direct pricing of payment services

The banking industry was exempt from the regulations of 1960 relating to competition regulation. The exemption was repealed by Royal Decree of 2 September 1983, with effect from 1 January 1984. The banking associations supported the repeal, but indicated in their comments that they would be applying for exemption for some agreements, and that these applications should be processed before the implementation of the repeal. In December 1983, the banking associations applied for exemption for agreements on interbank charges and common prices for payment services for customers. At this time, the regulation of deposit rates had been repealed, while regulation of lending rates and lending volume remained in force.

In February 1984, the Directorate of Prices stated that there might be a need for exemption from a common price policy for a limited period in order to introduce charges on some customer-oriented payment services. The assumption was that the agreements should be formulated in such a way that they did not prevent individual banks from adjusting their charges policy. The Directorate of Prices also assumed that the banking associations would use the exemption for targeted work to establish a rational pricing system. The Directorate asked to be kept informed of developments, and stated that more cost-oriented pricing of banks' payment services should result in lower interest rate margins in credit intermediation. They also pointed out that a desired change in banks' pricing could be impeded if pricing of competing payment services, such as Postgiro, were not also developed in a rational manner. Specifically, the two associations were given exemption for agreements regarding charges on giros paid in cash, charges to customers for use of ATMs and automated petrol dispensers and charges on cheques for less than NOK 150. The exemptions were limited to the period 1 March 1984 to end-1985. The banking associations were also granted exemption from interbank charges until further notice.

In January 1985, the Board of the Norwegian Banking Association decided that commercial banks should introduce an arrangement with four free cheques each month and pricing of giro payments. The minimum price was NOK 3 for both cheques and giros, while the individual bank was otherwise at liberty to fix its own prices. Prices were to be introduced from 1 July 1985. In line with the Directorate of Prices' statements of February 1984, the Banking Association applied for exemption for the specific pricing scheme. The Banking Association's application for exemption received broad coverage in the media, and reactions were largely negative. The issue was also taken up in the Storting's Question Time. A number of trade unions passed resolutions against pricing of cheques.

The Directorate of Prices sent the application with a request for comments to the Banking Inspectorate (one of the forerunners of the Financial Supervisory Authority) and Norges Bank as experts. The Banking Inspectorate pointed out that a fairly high degree of agreement to the effect that users should cover costs had not been sufficient to win acceptance for the principle of charges on payment services. No individual bank was willing to assume the burden in relation to its own customers and public opinion of being the first to introduce charges. The Banking Inspectorate therefore supported the Banking Association's application for exemption. Norges Bank pointed out that they had indicated on several occasions a need for charges on payment services. The majority of the Board of Directors of Norges Bank were nevertheless opposed to granting exemption from the competition regulations. The reasons for this attitude were that agreements that regulate competition are unfortunate in principle, and that there was no basis in experience for the need for exemption. In a dissenting opinion, the vice-chairman of the Board of Directors (Hermod Skånland) stated that he considered it very desirable to grant the commercial banks a limited period of exemption.

The Directorate of Prices was in favour of granting the Banking Association exemption from the regulations on competition regulation up to 1 January 1986. This was regarded as being a matter of principle, and was therefore submitted to the Ministry for Consumer and Administrative Affairs. In March 1985, the Ministry replied that the Directorate of Prices should not grant exemption, and requested that the Directorate should abide by this decision. The Banking Association's application was therefore denied.

2.5 Introduction of prices

As mentioned, banks received considerable negative press because of their proposal that charges be introduced, and a number of banks may have felt that there was little likelihood that they would lose more standing by actually implementing the proposal. The largest commercial banks accordingly elected individually to introduce charges on payment services despite the rejection of their application for a coordinated introduction. The introduction of charges received little media coverage and aroused relatively little attention. It is not believed that any of the banks that introduced prices experienced a major customer exodus. One of the reasons was probably that the charge issue had been thoroughly debated, and that customers were no longer very interested in the subject. Another possible reason is

Table 1 Developments in prices for selected services 1990–2006*. Banks (commercial and savings banks) and Postgiro/Postbanken separately until 1996, thereafter joint for all types of banks. Prices in NOK

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2002	2004	2006
Mail giros	Banks				3.52	3.67	3.83	3.92	3.88	4.04	4.25	4.84	5.67	6.52	6.92
	Postgiro	0.00	0.00	0.00	2.00	2.00	2.00	3.50							
Over-the-counter giros	Banks	6.22	6.32	6.52	8.89	9.30	9.73	10.19	12.73	13.30	15.28	16.92	25.10	29.99	33.37
	Postgiro														
Giros paid in cash	Banks	8.90	10.55	10.35	11.41	11.84	15.62	17.23	17.95	18.46	23.40	25.67	31.69	41.58	42.00
	Postgiro	3.70	4.50	4.50	5.50	6.50	6.50	16.00							
Internet giros	Banks									1.98	2.03	1.91	1.86	1.88	2.06
	Postgiro														
Cheques	Banks	5.59	5.79	6.34	8.14	8.87	8.84	9.04	9.79	10.72	12.30	15.00	20.70	20.64	27.34
	Postgiro	3.00	3.00	3.00	3.00	3.00	5.00	5.00							
Electronic card payments	Banks	1.74	1.56	1.14	1.90	1.98	2.16	2.07	2.20	2.13	2.07	2.19	2.07	2.11	2.37
	Postgiro	0.00	0.00	0.00	0.00	0.00	2.00	2.00							

* 1 January each year. In some cases prices are from 31 December the previous year.
Blank fields indicate that the banks did not offer the service. A price of zero shows that the service was offered free of charge.

that customers purchase many services from banks, and that the majority of customers consider that it demands considerable time and resources to change banks. The costs of changing banks were therefore disproportionate to the costs imposed on customers by the charges.

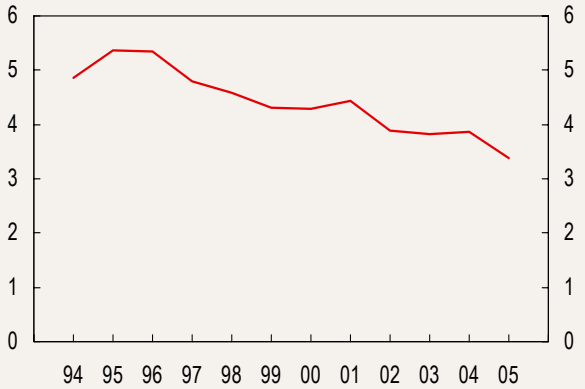
After the largest commercial banks had introduced charges, smaller commercial banks followed suit, and after a while the savings banks. Towards the end of the '80s, Postgiro also increased the extent of its pricing.

During the banking crisis in the late '80s and early '90s, the Ministry of Finance, the Banking Inspectorate and Norges Bank all pointed out that banks should increase their income from charges, among other things on payment services. In March 1992, the Government Bank Insurance Fund sent a letter to the banks that had received support, requesting an overview of their losses on payment services, and proposed measures for reducing these losses. The three commercial banks that had received support implemented price increases as a result of the request.

In the Revised National Budget for 1992, the Government submitted a proposal for the coordination of the payment services of banks and the Post Office. One proposal was that cost coverage through direct pricing should increase by stages in both the state-owned Postgiro and banks. The prices should also reflect the difference between the costs of the individual services. In the budget balancing proposal of autumn 1992, the Government proposed a specific scheme for pricing Postgiro's services.

Norges Bank's price statistics show that prices increased substantially in 1992 (see Table 1). Postgiro/ Postbanken was somewhat slower than the banks to introduce prices, and for a long time had lower prices for the same services. The table shows that prices for paper-based payment services have increased steadily since the early 1990s. Prices for electronic services have been more stable, and in 2006 are considerably lower than prices for paper-based services. This largely reflects the differences between the production costs of the various services.

Chart 1 Weighted nominal average prices for payment services for private individuals 1994-2005 Current weights. In NOK



Source: Norges Bank

Although prices for paper-based payment services have increased substantially, the price for an "average" payment has not increased correspondingly (see Chart 1). This is because there are good and inexpensive electronic alternatives to expensive, paper-based services. The prices have led to customers increasingly choosing the electronic services. Electronic giros have taken over from paper-based giros, and card payment has taken over from cheques.

3 From extensive use of cheques to world leader in use of cards

3.1 Motivation for improving efficiency

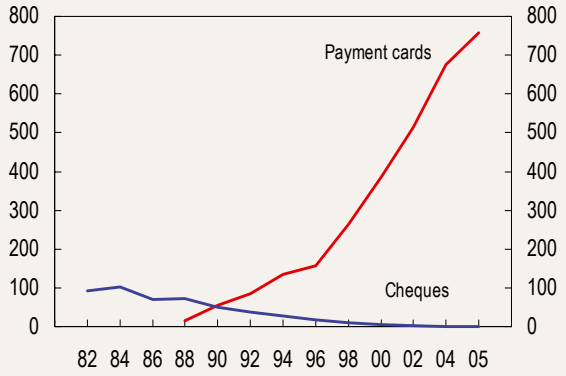
In an efficient payment system, payments are effected quickly, securely and at low cost. According to surveys, there are lower costs associated with payments made with cards than with cheques. An extensive degree of electronic processing is generally more efficient than manual processing. Payment of accounts over the Internet and direct debiting (Avtalegiro) are thus more efficient than paper-based systems (Gresvik and Øwre, 2002). Debit cards (where amounts are charged to the account immediately) are more cost-effective than credit cards, and for large amounts it is generally more cost-effective to use a card than cash (De Nederlandsche Bank, 2004, and National Bank of Belgium, 2006). The economic costs associated with the payment system are often estimated to total 1–3 per cent of GDP. Although this estimate may be slightly high for Norwegian conditions, the potential savings for banks and society of a switch to more efficient payment systems are considerable.

Throughout the '70s and most of the '80s, the Norwegian payments system was characterised by extensive use of cheques. The peak was reached in 1984, with 101 million drawn cheques. Today cheques have been virtually phased out, and electronic payment instruments hold a dominant position (see Chart 2). Norway is a world leader in the use of payment cards (see Chart 3). Although cash continues to play an important role as a means of payment, cash holdings per person in Norway remain stable, by comparison with many other countries, where they are growing (see Chart 4). In the remainder of this section we will take a closer look at important factors behind the extensive use of cards in Norway.

3.2 Standardisation and coordination

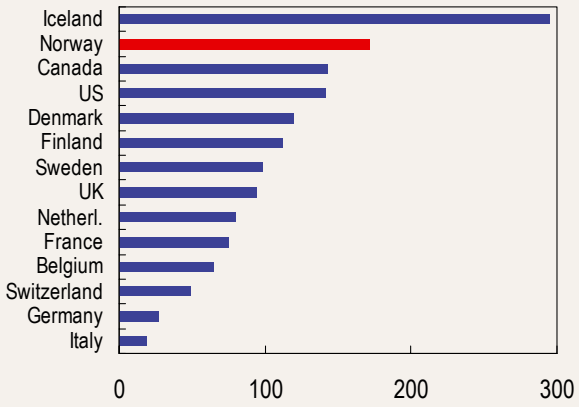
Payment systems generally have high fixed costs, among other things for computer systems and for the

Chart 2 Use of cheques and payment cards 1982-2005. In millions of transactions



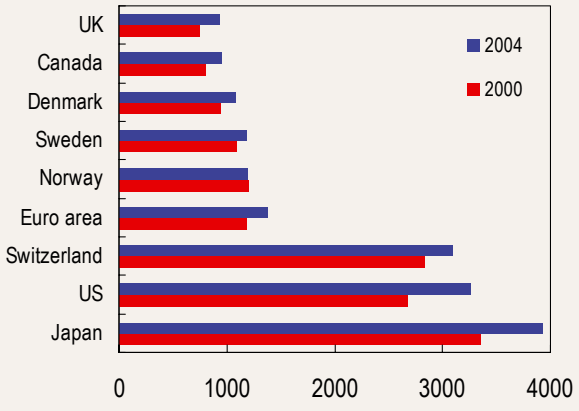
Source: Norges Bank

Chart 3 Number of card transactions (debit and credit cards) per inhabitant in 2004



Sources: Norges Bank, ECB Blue Book, BIS Red Book and Sedlabanki Islands

Chart 4 Cash holdings per inhabitant. 2000 and 2004. In euros (exchange rate at 30.06.2006)



Sources: Norges Bank, ECB Blue Book and BIS Red Book

development of systems and software for processing transactions. This means that costs per payment fall with increased volume (economies of scale). Costs also often fall as services become mature, investments are written off and the technology used becomes less costly. Mature services therefore often have lower unit costs than completely new services, even if the volume is the same.

Payment systems are networks for the exchange of values between payers (consumers) on the one hand and beneficiaries (merchants) on the other. In two-sided markets like this, the benefit to existing users increases when new users join up. For example, the more merchants that accept card payments, the greater the benefit consumers will extract from their cards, and the more consumers with payment cards, the more attractive it will be for merchants to have point-of-sale terminals. Because of economies of scale and the two-sided nature of the market, it is efficient to increase the scope of the network. In order to exploit the network effects, the two sides of the market must be able to communicate appropriately, irrespective of whether there are several types of cards and terminals. This means that there must be a common set of rules and common standards for formats and interfaces for communication between the participants in the system.

Norwegian banks had high costs associated with the extensive use of cheques. After a while, banks developed solutions for the use of payment cards that charged accounts immediately – debit cards.[3] However, a variety of technological solutions were chosen. In the mid-'80s, commercial banks issued cards with microprocessor technology (chip-based), while savings banks chose magnetic stripe technology. Moreover, Postbanken had its own magnetic stripe-based system. There were four different IT environments in the area of card payments with different collection, data entry, netting and settlement concepts. In consequence, there were limits on where customers could use their cards, expensive terminals, and unstable systems with security weaknesses. Norges Bank engaged actively in the work to increase coordination, among other things through the Technical Reporting Committee on Payment Systems. The banks also emphasised that card systems should provide a coordinated, effective service for both users and merchants. In 1986, the two banking associations and retailer organisations entered into an agreement of intent concerning the installation of point-of-sale terminals in shops, and in 1987 an agreement was signed between the two banking associations which partially fulfilled the requirements of increased coordination. Coordination work was difficult, however, partly because of the costs of preparing terminals that could read both chips and magnetic stripes, partly because of different views on the security aspects of the different solutions, and partly for market strategy reasons.

[3] Oil companies were the first to introduce card payments in Norway (each company had its own card). In 1982 the Banking Association entered into framework agreements with oil companies on the use of banks' cards (ATM cards) in the oil companies' terminals. The first bank-operated card payment project took place in 1983/84 at the OBS department store at Løren, Oslo. Samvirkebanken was the bank behind the project.

3.3 BankAxept

In 1990 the foundation was laid for further coordination of commercial and savings bank systems. The banking associations established the trademark "BankAxept" as a common logo for the banks' coordinated card system, and made agreements for the issue and processing of BankAxept cards. The agreements were an important prerequisite for the member banks of the two associations entering into an agreement in October 1991 on the establishment of a joint company (Bank-Axept AS). The company, owned by savings and commercial banks jointly, was established on 30 November 1991. The company was to have operational responsibility for operating a joint infrastructure, choosing the technology for the system and approving the types of terminals before they were linked up to the system. By a given deadline all banks were to use only terminals linked to Bank-Axept AS's system. When payments were made using BankAxept, cards were checked with respect to authorisation of card and person, and the balance on the payer's account was checked for cover. All checking was carried out online. All purchases of goods and all cash withdrawals made with BankAxept cards were charged to the account immediately.

In connection with the establishment of BankAxept, the banking associations applied for approval of the agreement pursuant to Section 2–7: Cooperative agreements, of the Act relating to Financing Activities. The Ministry of Finance regarded the establishment of BankAxept as a satisfactory means of integrating the card systems of commercial and savings banks. However, Postbanken was not integrated in a satisfactory manner. The Ministry of Finance therefore postponed approval of the agreement pending full integration. However, the common card system was in operation even though the agreement had not been formally approved. In December 1992, an agreement was made that Postbanken customers should be able to use their cards in BankAxept terminals from September 1993. In September 1995, the commercial and savings banks and Postbanken entered into an agreement for the integration of Postbanken into the other banks' joint systems. From 1995, all electronic payment terminals in Norway were thus linked up to BankAxept. In January 1996, the banking associations again applied for approval of the BankAxept agreement, which was approved by the Ministry of Finance in May the same year.

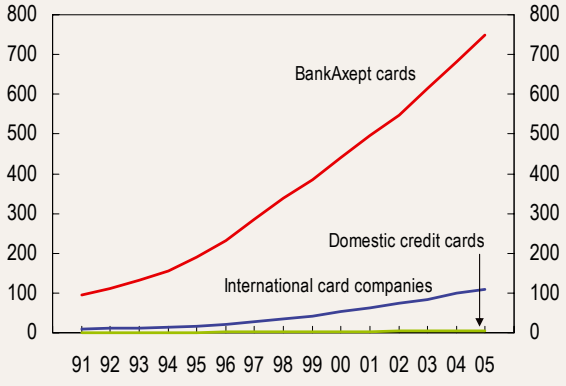
In 1992, banks introduced the possibility for retailers to offer cash withdrawals of up to NOK 500 in connection with purchases paid for with BankAxept cards. In 1997, the banking industry introduced a general set of rules for cash-back, and the limit for withdrawals was increased to NOK 1000. This service is now available to all retailers with terminals that read BankAxept cards provided that the retailer wants to take part in the scheme and fulfils the requirements of the rules. The service has become increasingly popular, and is now the most frequently used manner of making cash withdrawals in Norway.[4]

BankAxept is today decidedly the most widespread card network in Norway (see Chart 5), and virtually all banks with activities in Norway offer BankAxept cards. Extensive integration as a result of the merging of previously separate card networks, and expansion of the range of services to include cash withdrawal have paved the way for economies of scale and network economies in the card payment system. Norges Bank regards this coordination as the deciding factor behind the high use of cards in Norway. The importance of this coordination is highlighted in a study from Sveriges Riksbank (Guiborg, 2001), which concludes that the best strategy for the authorities and others with interest in an efficient payment system is to promote the use of common standards and pave the way for coordination measures among market participants with a view to achieving this standardisation.

3.4 Efficient pricing

In addition to the important coordination factor described above, pricing may have contributed to the high use of cards. The price of using cards in shops has been stable for many years. Over the last ten years, the list price of card payments for a weighted average of banks has only risen by about 16 per cent. Payers have alternatives to using cards, primarily cheques and cash. Hence, the effect of pricing card services cannot be seen in isolation from how alternative instruments are priced. Developments in prices for cheques and cards are shown in Chart 6. The rise in prices for the use of cheques compared with the use of BankAxept has probably been a very important factor behind the strong growth in card use in Norway. Humphrey, Kim and Vale (2001) show that consumers react to prices and choose

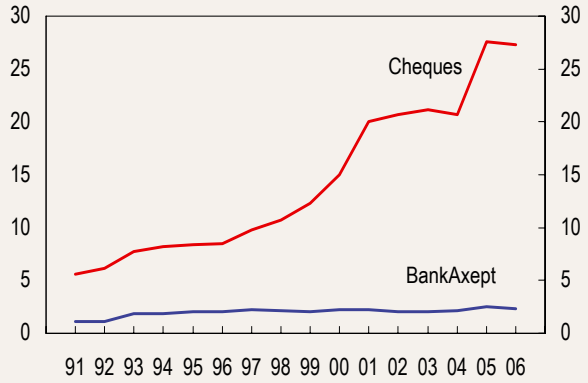
Chart 5 Use of Norwegian payment cards 1991-2005. Goods purchases and ATM withdrawals. In millions of transactions



Source: Norges Bank

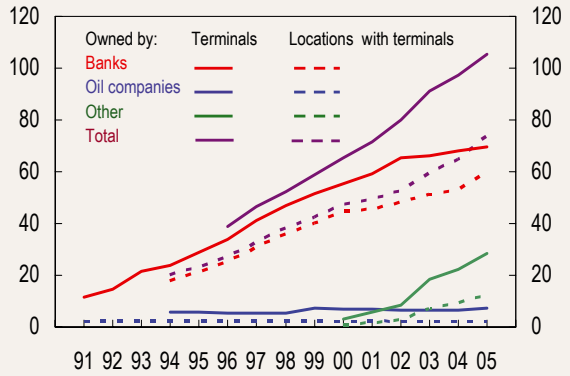
[4] Source: Norges Bank (Annual Report on Payment Systems 2005, page 13)

Chart 6 List prices for cheque and card payments (BankAxept). 1991-2006. Weighted average for the banks in the survey. In NOK



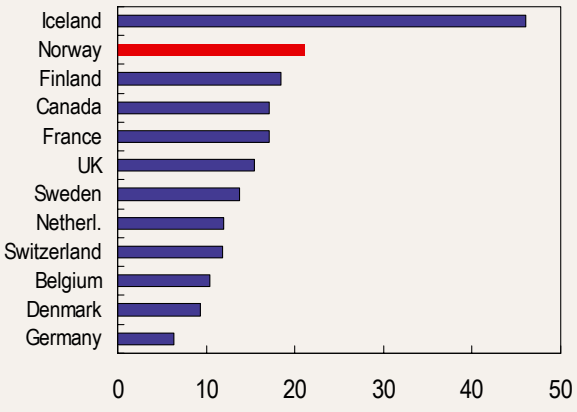
Source: Norges Bank

Chart 7 Payment terminals and locations with payment terminals 1991-2005. In thousands



Source: Norges Bank

Chart 8 Number of electronic payment terminals per million inhabitants in 2004. In thousands



Sources: Norges Bank, ECB Blue Book, BIS Red Book and Sedlabanki Islands

the payment instruments that are cheapest for them.

There are high fixed costs in payment systems. In the introduction it was stated that in the long term prices should cover both variable and fixed costs. However, Atkinson and Stiglitz (1980) show that it may be correct from an economic viewpoint for fixed costs to be covered through cross-subsidisation.[5] This is based on the assumption that costs are covered by higher prices on products where demand is relatively insensitive to price changes. Card systems are as mentioned two-sided markets, with consumers and their banks on one side of the market and retailers and their banks on the other side. Turnover in two-sided markets are affected not only by price level, but also by how a given price level is distributed between the two sides of the market. Rochet and Tirole (2002) and Bergman (2003) show that the price charged to each user group in two-sided markets should reflect the extra benefit the user in question adds to the network. This means that the price imposed on the participant category that adds most value to the network should be lower than the marginal cost this user imposes on the system. The users that are most valuable to the expansion of the network may vary over time. If the deployment of more terminals is regarded as the most important means of achieving higher card use, the theory implies that merchants can be subsidised. This will make it more attractive for them to join the network. If the greatest need is to attract more consumers, they can be subsidised.

The dominant position in connection with the introduction of new payment systems in Norway was that payers should cover costs. For example, a report from the Payment Systems Committee argued as early as in 1974 that it was unfavourable to finance a common card scheme that was planned at that time by charging the merchant side *(NOU 1974: 38 Bank cards)*. It was argued that this would lead to costs being passed on to all consumers, including those who did not use cards. The view was that the costs should be borne by those consumers who paid with payment cards. Consumer organisations held a similar view. Cost surveys carried out by Norges Bank in 1994 and 2001 showed that a substantial share of the total costs associated with the BankAxept system have been covered through prices charged to consumers. In most other countries, the bulk of the costs associated with card systems is borne by merchants (Bergman 2003).

The number of terminals has increased sharply in recent years, and is high compared with other countries (see Charts 7 and 8). Prior to the sharp rise in payment terminals, bank cards were already widely used in Norway. Whereas the number of terminals has increased sixfold since 1991, the number of cards with BankAxept function has increased 2.5 times.

The development of BankAxept in parallel with the charging of high prices for the use of cheques has been one factor behind the extensive use of cards in Norway.

[5] Atkinson and Stiglitz (pp. 461–464) discuss an analogy to this issue, often called the Ramsey problem.

Acceptance for imposing prices on payers has entailed a substantial contribution on the part of payers to covering the costs associated with the card system. This has probably led to a higher number of terminals than would have been the case if merchants had to pay a larger share of total costs.

4 Conclusion

Most Norwegian banks still price payment services directly. However, free services are increasingly being offered. A few banks offer free payment services to all their customers, while several banks offer free or substantially discounted payment services through customer retention or loyalty schemes. Norges Bank has traditionally promoted the principles that the party that chooses the payment service should also pay for it, and that services that are costly to produce should be priced higher than services that are less expensive to produce. However, this does not mean that all services should be priced so as to fully cover the production costs of the individual service. Nor does it exclude the possibility of pricing one or more services higher than their production costs.

When payment services are free, consumers do not receive clear signals about the costs of producing the services. However, the negative consequences are limited if only the most efficient payment services are free. The Norwegian banks that offer free payment services primarily offer electronic services. Similarly, most customer retention and loyalty schemes only offer a discount for electronic services. The differences between prices for efficient electronic services and for less efficient paper-based services will thus be maintained or increased, and customers will still be motivated to choose the most cost-effective payment services. However, a lack of profit opportunities in the payment system may make it less attractive for banks to invest in the development of new payment services in the long run. Extensive use of free services may therefore have negative consequences for the efficiency of the Norwegian payment system in the long term. [6]

Norway is a world leader in the use of cards. Surveys performed by the central banks of the Netherlands and Belgium show that paying by means of debit cards is more efficient than using cash for amounts over 10–12 euros. The results of these surveys cannot be applied directly to Norway, but they indicate that continued growth in the use of cards may improve efficiency here too. The number of cards in Norway is high, and further growth will probably have to be achieved by inducing increased use among existing card-holders, or by increasing the number of terminals and merchants that accept cards. The pricing of card services has probably influenced developments so far, and will probably also influence further growth. In order to encourage the use of services in a two-sided market, banks may choose to charge one side of the market less than its share of actual costs would imply. This may be used strategically, and the pricing may be varied over time in order to achieve growth in the side of the market that is most important for the further growth of the network. The appropriate price structure in the years ahead will therefore depend on the price sensitivity of the various services offered by banks, and what is regarded as most important for further growth in the use of cards.

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[6] Even if banks reduce or eliminate transaction prices, a number of them still have income from annual charges on cards in their customer programmes.

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How large are the financial margins of Norwegian households? An analysis of micro data for the period 1987–2004

Bjørn Helge Vatne, senior adviser, Norges Bank Financial Stability[1]

In this article, financial margins in Norwegian households are calculated using micro data for the period 1987 – 2004. Financial margins are defined as household liquid assets after borrowing costs and ordinary living expenses. This is an indicator of the resilience of household finances to changes in economic conditions such as an increase in interest rates or a reduction in income. Hence, margins can provide information about the risk of losses on bank loans to the household sector. Overall household margins increased substantially from the end of the 1980s to 2004 due to strong income growth coupled with a reduction in the share of income used to cover ordinary living expenses and borrowing costs. Most households have solid margins, although some households have small or negative margins. The share of households with negative margins has decreased over the period analysed.

1 Introduction

In assessing the risk associated with loans from financial institutions, it is important to monitor household debt for two reasons. First, a substantial reduction in households' debt-servicing capacity may increase losses on financial institutions' loans to the household sector. Second, households in financial distress may substantially reduce spending on goods and services. This, in turn, may affect corporate earnings and contribute to increasing losses on bank loans to the business sector.

Financial margins, which are defined as liquid assets after ordinary living expenses and borrowing costs, may shed light on these questions. In this article, micro data are used to calculate the margin of individual households. In Section 2, we present the data and consider the relationship between banks' non-performing loans and household margins. In Section 3, we calculate the total value of households' positive margins to investigate developments in household liquid assets, i.e. assets for consumption in excess of ordinary living expenses and for saving in excess of loan repayments. In Section 4, we look more closely at the portion of debt held by households with negative margins and the characteristics of these households. In Section 5, we analyse how margins are affected by changes in the interest rate, and in Section 6, we summarise our findings.

2 Background

Why study the financial margin in individual households?

Norges Bank monitors household debt as part of its surveillance of financial market risk. Total household debt as a percentage of total disposable income is often used to measure this risk (see, for example, *Financial Stability* 1/06). This indicator has some limitations, however, because it is an aggregated variable. First, this income also includes income from debt-free households. Second, the indicator does not take into account income levels. Households with high income can service relatively more debt than low-income households. Third, the indicator does not take into account fundamental differences between households, such as age, number of household members and number employed.

Access to data at the household level allows us to calculate household financial margins which reflect the financial situation of households. The calculations are similar to the calculations made by banks when they assess household loan applications.

Banks base their assessments on household income. Ordinary living expenses calculated on the basis of household composition are then deducted. On the basis of the resulting disposable income, banks calculate the maximum loan level based on assumptions concerning interest rates and repayment profiles. However, future debt-servicing capacity is uncertain. Interest and principal payments must be paid over the entire life of the loan, whereas various factors such as changes in income and interest rates or changes in household composition affect the financial situation of households.

The data allow us to identify households with a negative margin. We assume that the financial situation of these households is strained. This household debt is particularly vulnerable to default and will hereafter be referred to as exposed debt. Exposed debt as a share of total debt may be an indicator of the direct risk associated with bank loans to the household sector. Total margins are defined as the sum of margins in households with a positive margin. We consider total margins to be

[1] We would like to thank Jon Epland, Vidar Pedersen and Grethe Sparby at Statistics Norway for help in developing the data set. We would also like to thank Snorre Evjen, Birger Vikøren, Karsten Gerdrup and Helge Eide for valuable comments.

Financial margins – definitions and data

In Table 1, different types of margins are defined on the basis of the components included. *Margin after consumption* is defined as annual income after tax less ordinary living expenses. If we in addition deduct interest expenses, we obtain *margin after interest*. *Margin after principal,* which is household liquid assets after interest, estimated principal payments over a 20-year period and ordinary living expenses, is the basis for banks' assessment of loan applications. *Margin with bank deposits* is margin after principal payments plus bank deposits, while *margin with financial assets* includes total household financial assets. Real household wealth, including dwellings, is not considered in this analysis.

Self-employed persons are excluded because it is difficult to differentiate between business activity and private finances. Students are also excluded. Student loans are reported as debt but are used largely to cover ordinary living expenses.

The sample includes 84 per cent of the observations in the available data set. The data set consists of approximately 3 000 households in the data for 1987 and an increasing number of households in subsequent years. In the last years, there are more than 10 000 observations. Due to the relatively small number of observations in the first years, there is greater uncertainty associated with the estimates from the end of the 1980s.

The data on income, bank deposits, interest expenses, financial assets and household composition are drawn from Statistics Norway's *Income and Property Statistics for Households 1987–2004* (see NOS D310 (2004)). The statistics are based on material from the Income Distribution Survey, which is a representative sample survey. Income data are drawn from tax returns for all members of the sample households and data on tax-free income from a number of public registers. The micro data do not contain information on households' insurance technical reserves in connection with group insurance schemes.

Using the standard budget for households developed by the National Institute for Consumer Research (SIFO) through the period 1987–2004, we can calculate the cost of a reasonable level of consumption for an average household of varying sizes. Reasonable implies a level that is acceptable to the majority of households. This consumption level meets requirements for normal health and nutrition standards and allows household members to participate in the most common leisure activities. An assessment of what is a reasonable level of consumption will, of course, vary by geographic location. We have included living expenses other than interest and principal payments, such as electricity, because these are not included in the SIFO budgets.

The data do not include information about principal payments. Principal payments are calculated assuming linear loan repayment over 20 years (serial loan). The principal payments emerge as 1/20 of total debt. It is common, however, to negotiate a longer period of repayment as well as annuity loans.

Table 1. Financial margins. Different definitions and average size 2004. Plus and minus signs indicate which elements are included in the various definitions of margins and whether the contribution is negative or positive.

		Income after tax	Bank deposits	Other financial assets	Ordinary living expenses	Interest paid	Principal paid
	Average NOK 1000	356	239	179	170	24	28
Margin after consumption	186	+			–		
Margin after interest	163	+			–	–	
Margin after principal payments	134	+			–	–	–
Margin with bank deposits	374	+	+		–	–	–
Margin with financial assets	553	+	+	+	–	–	–

Sources: Statistics Norway, National Institute for Consumer Research (SIFO) and Norges Bank

an indicator of total household demand for goods and services from non-financial enterprises. This demand will affect corporate earnings and debt-servicing capacity.

The data comprise too few observations to determine whether there is a stable correlation between margins and loan defaults. Chart 1 indicates that there is a correlation. The bottom curve shows the default rate on all bank loans, which is defined as the value of banks' non-performing loans to households and non-financial enterprises as a share of total lending. There is a positive correlation between the share of exposed debt and default rates. The turning points of exposed debt seem to precede the turning points of default rates. A possible explanation is that households have financial assets on which they can draw for a period before defaulting on loans. There is a negative correlation between the default rate and total positive margins.

It is reasonable to assume that variables that reduce tax, such as interest payments, are reported in full in tax returns, whereas taxable variables such as income and wealth may be underreported. In isolation, the effect of this will be that actual margins are somewhat higher than indicated by the data.

The micro data allow us to analyse the distribution of margins by various types of households. By identifying which groups of households are most exposed and following developments in these groups, we can identify the causes of risk associated with loans from financial institutions at an early stage.

Other countries have conducted a number of micro-based studies of household debt (see DWP (2004) and May et al. (2004)). The analysis in this article is similar to the analyses in Sveriges Riksbank (2004, 2005) and the BIS (2006). These analyses shed light on household vulnerability by dividing households into five income groups and then calculating margins after interest payments. On the basis of figures for 2001, Sveriges Riksbank concludes that the high level of debt in Sweden's household sector does not pose a threat to banks and therefore is not a threat to financial stability. Households are also robust to potential interest rate increases. This is because household debt in Sweden is concentrated in the highest income groups which have solid margins and the majority of financial assets. In Section 4, we compare our results with the results from Sweden.

The register-based data for Norway is considered satisfactory compared with the data in other countries' surveys. With the exception of Sveriges Riksbank's surveys, the micro analyses of the financial situation of households in other countries are largely based on interviews (see e.g. Redwood et al. (2004)).

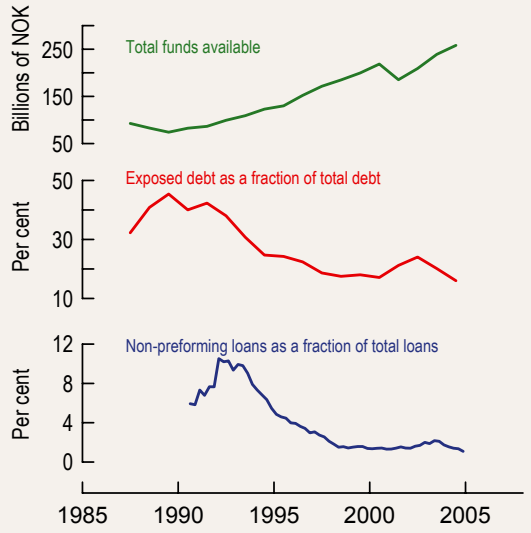
3 Household margins

Total household margins have increased during the period analysed

Household debt more than doubled in the period 1987–2004.[2] The interest rate level, measured as banks' average real interest rate for households, has fallen by more than 6 percentage points from the peak level in the period analysed (see Chart 2). In 2004, the interest rate on bank loans to the household sector averaged 4.1 per cent, or a real interest rate of 3.7 per cent.

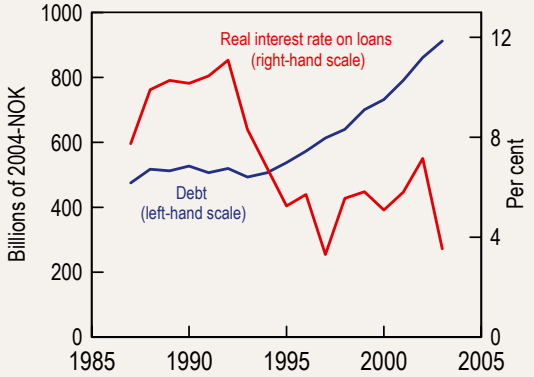
Total household income after tax, measured in 2004-NOK, rose by 69 per cent in the period 1987–2004. In 1987, household liquid assets after ordinary living expenses and borrowing costs represented 19 per cent

Chart 1. Development in total funds available, exposed debt and banks' non-performing loans. Billions of 2004-NOK and per cent



Source: Statistics Norway, SIFO and Norges Bank

Chart 2. Development in total debt and the real interest rate[1)] on bank loans. 1987-2004

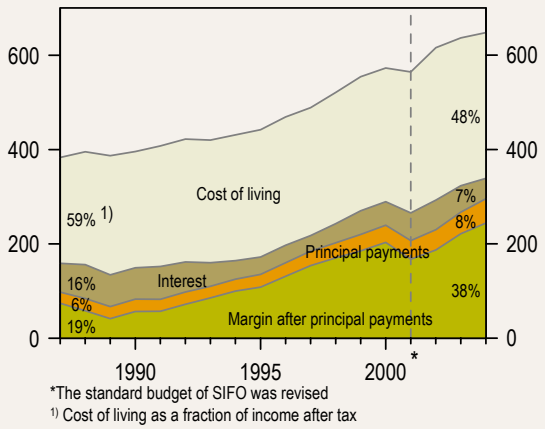


[1)] Real interest rate is defined as interest rate less inflation

Source: Statistics Norway and Norges Bank

[2] See *Financial Stability* 1/06 and Riiser and Vatne (2006) for a general description of the financial situation in the household sector.

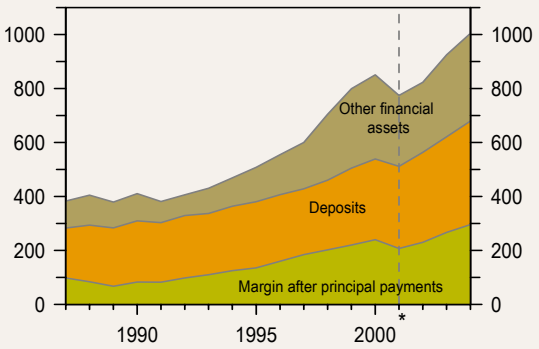
Chart 3. Income after tax broken down by expenses and margin after principal payments. Billions of 2004-NOK and percentage of income. 1987-2004



*The standard budget of SIFO was revised
1) Cost of living as a fraction of income after tax

Source: Statistics Norway, SIFO and Norges Bank

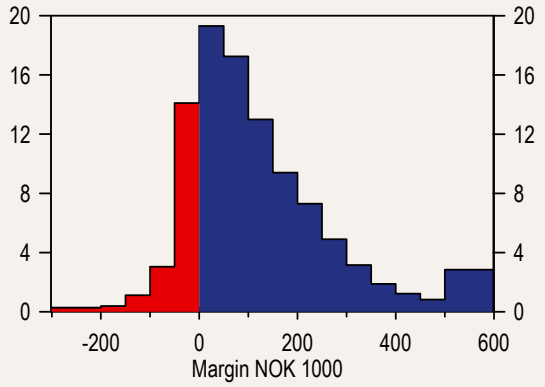
Chart 4. Total funds available including financial assets. Billions of 2004-NOK. 1987-2004



*The standard budget of SIFO was revised
1) Cost of living as a fraction of income after tax

Source: Statistics Norway, SIFO and Norges Bank

Chart 5. Distribution of households by margin after principal payments. Per cent. 2004



Source: Statistics Norway, SIFO and Norges Bank

of income (see Chart 3). In 2004, the share increased to 38 per cent. Households are using less income to cover living expenses and to service debt. The share of income used to cover ordinary living expenses declined from 59 per cent to 48 per cent, whereas the share used to service debt declined from 22 per cent to 15 per cent. On the whole, margins after principal payments increased from 74 billion to 244 billion in 2004-NOK.

Financial assets comprise two components, i.e. bank deposits and other financial assets. In 2004, bank deposits accounted for less than half of household financial assets, excluding insurance reserves. Growth in total bank deposits has been considerably weaker than growth in debt. Therefore, overall debt was secured by deposits to a lesser degree in 2004 than in 1987. The assessed value of other financial assets has increased strongly and more sharply than debt in the period under review. Of other financial assets, approximately 60 per cent consists of unlisted equities and other outstanding claims.

Chart 4 illustrates developments in total liquid assets in the household sector when financial assets are included. If we include all financial assets, liquid assets more than doubled through the period analysed. Financial assets' share of total liquid assets was reduced from 81 to 76 per cent. Bank deposits' share of total margins was reduced in favour of securities which are less liquid and can fluctuate considerably in value. Therefore, it is difficult to assess whether financial assets will provide a buffer in the event of debt-servicing problems.

Distribution of financial margins

In general, the financial situation in the household sector is solid. In 2004, 45 per cent of households had a margin after principal payments of more than NOK 100 000 (see Chart 5). 19 per cent had a margin between 0 and NOK 50 000, while 19 per cent had a negative margin. Households with low and negative margins are vulnerable to increases in interest rates and reductions in income.

4 Debt held by households with a negative margin

One-sixth of total debt was held by households with a negative margin after principal payments

The size of margins is an indicator of the resilience of households to unforeseen events. Chart 6 shows the share of households with a negative margin, measured by the different margin definitions, and the share of total debt held by these households in 2004. Less than 3 per cent of a total debt of about NOK 1 030 billion is

held by households without sufficient income to cover ordinary living expenses. The share increases to 5.2 per cent if interest expenses are included. Households with a negative margin after principal payments held 16 per cent of total debt in 2004. If we include financial assets in the margin, the share of debt held by households with a negative margin declines considerably.

In the rest of the analysis, we focus on margins after principal payments. In the following, the term *exposed debt* refers to debt held by households with a negative margin.

Households with a negative margin after principal payments have several options to avoid defaulting on loans. They can negotiate an interest-only period or extend the life of the loan, reduce consumption or draw on their financial assets. Thus, negative margins after principal payments do not necessarily increase the risk of default.

Table 2. Margin components . Average. 2004. In thousands of NOK

	Income	Living expenses	Estimated principal	Interest	Margin
Positive margin after principal payments	405	175	29	25	175
Negative margin after principal payments	150	147	24	24	–40
Difference	254	29	5	1	216

Sources: Statistics Norway, National Institute for Consumer Research (SIFO) and Norges Bank

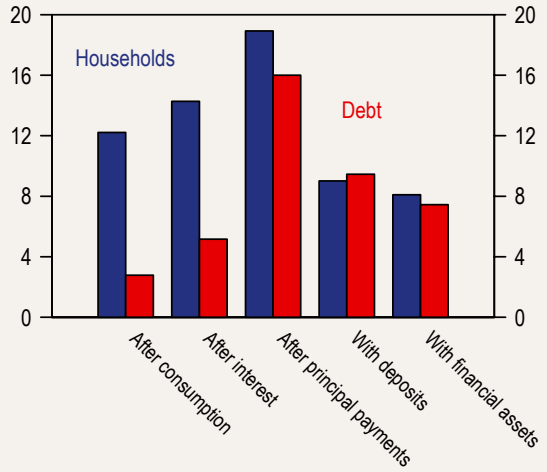
The main difference between households with a positive and negative margin after principal payments is average income level. Differences on the expense side are less pronounced (see Table 2). Roughly speaking, negative margins are largely a result of low income rather than high interest and principal payments.

Low and middle-income households hold most of the exposed debt and are increasing their share of exposed debt

The share of exposed debt relative to total debt is highest for low-income groups (see Chart 7). The 20 per cent of households with the highest income hold 43 per cent of total debt, but only 12 per cent of exposed debt. The two lowest income groups hold 14 per cent of total debt, but 51 per cent of exposed debt. In the lowest income group, nearly all debt is exposed debt.

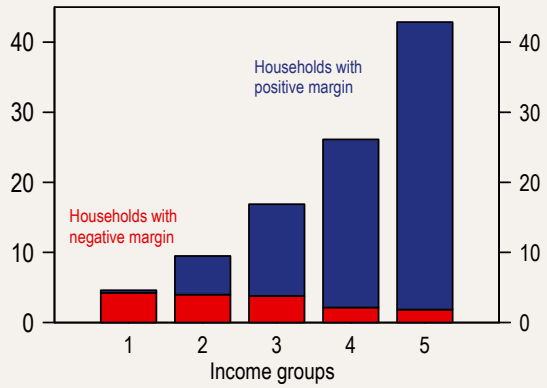
The two highest income groups have reduced their share of exposed debt (see Chart 8). There are two possible reasons for this. First, high-income groups have acquired a larger share of total income through the period analysed at the same time as the groups' share of total debt has declined. In addition, a change in the

Chart 6. Percentage of households with negative margin and percentage of total debt under different margin definitions. 2004



Source: Statistics Norway, SIFO and Norges Bank

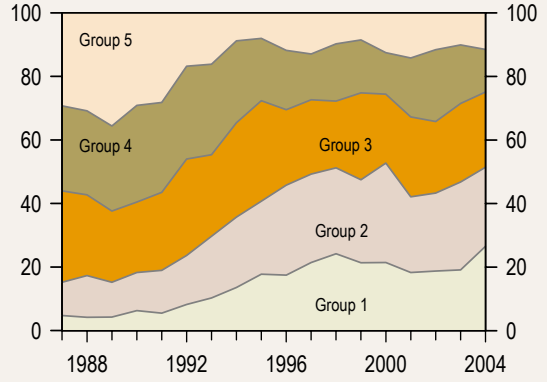
Chart 7. Percentage of total debt by income group*) and divided into households with negative and positive margin after principal payments. 2004



*) Households are divided into five equal-sized groups by increasing income after tax

Source: Statistics Norway, SIFO and Norges Bank

Chart 8. Debt held by households with negative margin by income group *). Per cent. 1987-2004



*) Households are divided into five equal-sized groups by increasing income after tax

Source: Statistics Norway, SIFO and Norges Bank

tax rules in the 1990s made it less attractive for high-income groups to hold debt.

Exposed debt is distributed across the age groups over 25. The share of exposed debt is increasing in households over the age of 45

In this section, we divide households into age groups by the age of the household's main income earner and look at the distribution of total debt and exposed debt. Exposed debt is relatively evenly distributed across all age groups over 25 (see Chart 9). The age group 25–34 holds less than 24 per cent of total debt, but 26 per cent of exposed debt. Households over 55 also hold a relatively large share of exposed debt, 18 per cent of total debt and 22 per cent of exposed debt. There are many pensioners with low income in this age group, but the group also has considerable financial and real assets.

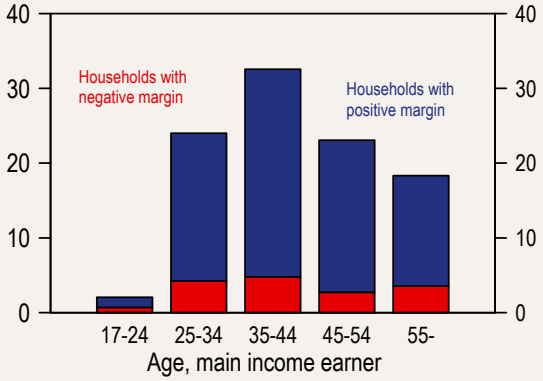
We find the largest increase in the share of exposed debt in the age group over 45. In 1990, this group held about 20 per cent of exposed debt. During the period analysed, the share of exposed debt has doubled for this group (see Chart 10) as a result of strong growth in debt. At the beginning of the period, households over the age of 45 held 24 per cent of debt, while in 2004 the share was 41 per cent. The relative number of households in this age group has also increased due to demographic developments (see Riiser and Vatne (2006)). On the other hand, households under the age of 45 have reduced their share of exposed debt. The age group 25–34 reduced its share of exposed debt from more than 40 per cent to less than 30 per cent during the period under review.

Is the risk associated with household borrowing higher in Norway than in Sweden?

Sveriges Riksbank (2004) concludes in its analysis of margins after interest that the risk associated with loans to Swedish households is limited. Households in the high-income groups hold the majority of debt, but also have the highest margins owing to high income and substantial financial assets. They found that the three highest income categories held 94 per cent of the debt in 2001 and that a small share (1.2 per cent) of these households had a negative margin after interest.

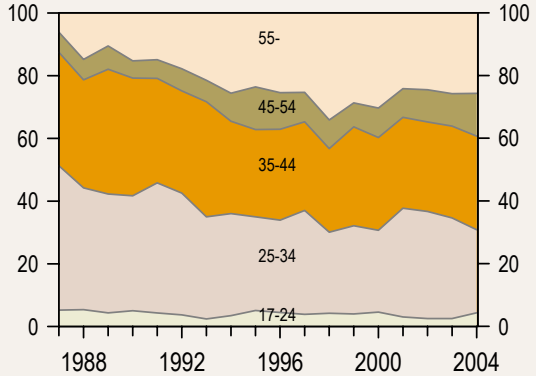
Owing to differing data samples and definitions of income, the results are not directly comparable with our findings for Norway. It appears, however, that low-income groups in Norway hold a larger share of total debt than comparable groups in Sweden. The two lowest income groups in the Norwegian data set hold nearly 20 per cent of total debt, compared with 6 per cent in

Chart 9. Percentage of total debt by age groups and divided into households with negative and positive margin after principal payments. 2004



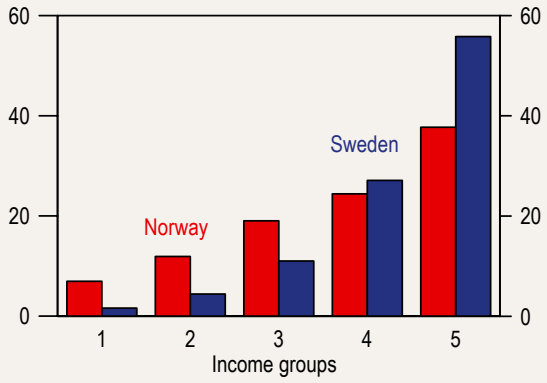
Source: Statistics Norway, SIFO and Norges Bank

Chart 10. Debt held by households with negative margin by age group. Per cent. 1987-2004



Source: Statistics Norway, SIFO and Norges Bank

Chart 11. Total debt by income group*) in Norway and Sweden. Per cent. 2001



*) Households are divided into five equal-sized groups by increasing income after tax

Source: Statistics Norway, SIFO and Norges Bank

the Swedish survey (see Chart 11). In the Norwegian groups, 6 per cent have a negative margin after interest. The finding that households in low-income groups hold a larger share of debt in Norway than in Sweden indicates, in isolation, that the risk associated with bank loans to the household sector was higher in Norway than in Sweden in 2001.

5 How do increased interest rates affect household margins?

The effect of an interest rate increase on household margins depends on the fixed-rate period of the loan. Most loans are at variable rates. For these loans, a change in the interest rate will have an almost immediate effect, whereas a fixed-rate loan will not be affected until the loan is renegotiated. Bank lending rates for household loans vary and are primarily based on the quality of the collateral. In this part of the analysis, we look at the effect of an interest rate change, assuming that the new interest rate applies immediately to all borrowers. The calculated effect thus overestimates the actual effect.

The average nominal bank interest rate on loans to households was about 4.1 per cent in 2004. The calculated effect of an increase in the lending rate from 4 to 6 per cent is that the share of households without margins increases from 18 to 21 per cent (see Chart 12). This corresponds to 49 000 additional households with a negative margin. Exposed debt increases from 16 to 22 per cent of total debt, corresponding to 65 billion in 2004-NOK. Total liquid assets in the household sector are reduced from 261 to 244 billion in 2004-NOK, i.e. a reduction of 6 per cent. The results are more or less symmetrical with a 2 percentage point reduction in the interest rate.

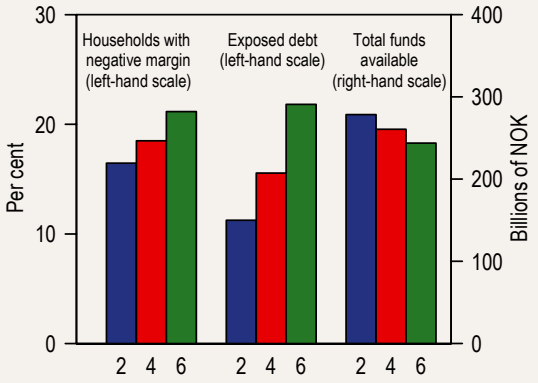
Households in the middle and upper-income groups account for the largest relative increase in exposed debt (see Chart 13). Most households whose margin becomes negative following such an interest rate increase are in income groups two and three. Exposed debt increases most in the age group 35–44, but in relative terms most in the age group 45–54 (see Chart 14).

6 Summary

Total household margins increased markedly from the end of the 1980s to 2004. This was due to solid income growth coupled with a reduction in the share of income used to cover living expenses and to service debt. An increase in financial assets has contributed to a further increase in liquid assets. The share of bank deposits has been reduced, however, in favour of less liquid assets which may fluctuate more in value.

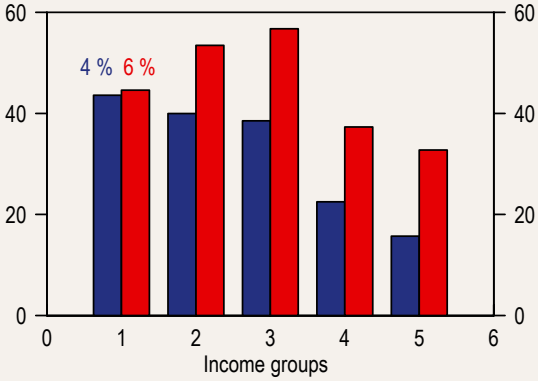
Given our model assumptions, roughly 19 per cent of households had insufficient income to cover ordi-

Chart 12. The effect of interest rate changes on margins after principal payments. Interest rate 2, 4 and 6 per cent. Per cent and billions of NOK



Source: Statistics Norway, SIFO and Norges Bank

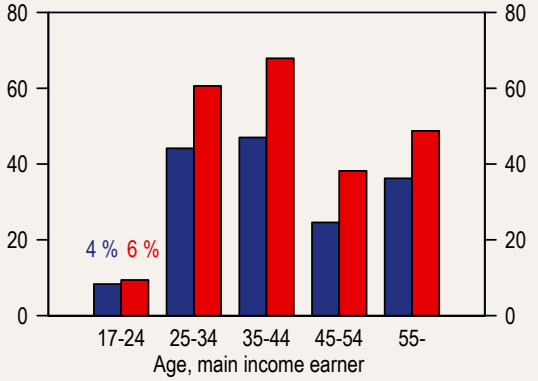
Chart 13. Exposed debt by income group*). Effect of interest rate changes. Billions of NOK. 2004



*) Households are divided into five equal-sized groups by increasing income after tax

Source: Statistics Norway, SIFO and Norges Bank

Chart 14. Exposed debt by age group. Effect of interest rate changes. Billions of NOK. 2004



Source: Statistics Norway, SIFO and Norges Bank

nary living expenses and interest and principal payments in 2004. These households held 16 per cent of total debt. Income is the most significant difference between households with a negative and positive margin. Differences in the amount of interest and principal payments are limited.

The share of total debt held by households with a negative margin declined from the end of the 1980s until 2004. In isolation, this implies a reduction in credit risk associated with bank loans to the household sector. The share of exposed debt held by low-income groups and older households has increased during the period analysed. An increase in the lending rate from 4 to 6 per cent in 2004 would have resulted in an additional 49 000 households with a negative margin after interest and principal payments. The relative change is largest among households in the middle to high-income groups and households in the age group 45–54.

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Benefits from securities markets and reforms in Norwegian securities legislation

Gunnvald Grønvik, Special advisor, Financial stability Norges Bank*

This article discusses the ways in which efficient securities markets benefit society, how Norwegian securities market legislation is being modernised to be in line with European standards, and in addition issues related to changes in Norwegian securities market infrastructure. In the first section the social usefulness of securities markets is explained. The most important aspect of this is that smoothly functioning securities markets, together with a well developed financial sector, promote growth throughout the economy. Through the direct transmission of funding from investor to projects, securities markets also contribute to financial stability. The second section deals with amendments to Norwegian securities markets legislation that are under way. Special attention is paid to the European Economic Area and its implications, including the requisite transposition of EU legislation into Norwegian law. The third section discusses the specific tasks performed by the stock exchange and comments on whether the infrastructure organisations of securities markets need to be domestic in order to reap the social benefits of securities markets.

1. The social functions of securities markets

1.1 Seven benefits

A money economy with access to interest-bearing loans enables the individual to distinguish between income and consumption flows. This encourages capital accumulation, which means that housing projects and investment in production equipment take place at an earlier point in time, thus increasing the stock of real capital in the economy. Investment must be based on predicting the future, and involves elements of risk. Credit is only widely available when the risk factors are managed by a developed credit intermediation system (mainly banks) in which there is sufficient confidence. Very large, high-risk investments are difficult to finance, even for a bank, because the level of risk may be unacceptably high. However, it may be easier to acquire equity capital for such projects if a number of private participants join together, each with limited ownership interests. Furthermore, loans for large projects can be raised if the loan is divided between several lenders (including banks).

Division into interests makes it possible to carry out large projects because the risk and investment are spread between several participants. Equity and lender interests can be standardised as tradable shares and bonds respectively. This reduces the financial costs, since those furnishing the funds require lower compensation because they are able to withdraw the funds when the need arises. An investor can do this by selling securities in secondary markets, but in order to function smoothly, such markets require adequate information and general trading rules governing execution, priorities, etc.

Through securities markets, the risk associated with a particular project is spread and borne directly by the investors. If financial institutions were to fund the project, a large part of the risk would be concentrated in these institutions, but when securities are issued and the risk is directly borne by the investors, this relieves the financial sector of financial risk. In this way securities promote financial stability.

The specific role of securities markets in the economy is to streamline the issue and sale of

- ownership interests in a company, such as shares
- loans to a company or project, such as bonds

by issuing standardised shares and bonds in the form of securities and by organising and centralising the trading of securities in a single marketplace with fixed rules. Through the securities market an unspecified number of participants can become shareholders or bondholders in an undertaking under standardised conditions. After the securities have been listed on the stock exchange, the organised market, shareholders and bondholders can sell their shares and bonds in a secondary market. Securities may be sold to anyone and without consultation with the company that issued them.

The standardisation of contracts and information requirements governing these transactions enable the investor to choose the degree of risk exposure for a particular project. The investor can also impose a required

* I would like to thank colleagues who have provided comments and encouragement to this work during its progress from the mid-1990s to the present. Any remaining errors are the responsibility of the author. The views expressed are my own, and should not be interpreted as views held by Norges Bank. Most of sections 1 and 2 have been published in Norwegian in Grønvik (2006a), and section 3 in Grønvik (2006b).

rate of return in relation to risk, and the investment decision can be reassessed by selling securities. This ensures that capital markets channel capital to projects with the highest return. A share in a company entails the right to share in the profits and to exercise a certain degree of control. In efficiently functioning securities markets the price of claims and shares in the company reflects the information available about the company. A company with a high expected return will be able to finance its expansion by raising capital in the market.

Thus far, five benefits to society to be derived from an organised financial system involving securities have been described:

- Credit in the private sector increases the stock of consumer and real capital.
- Project-sharing spreads risk and makes large, high-risk projects possible.
- This relieves the financial sector of financial risk and promotes financial stability.
- Competition to generate a return results in the best projects being financed.
- The standardisation of securities claims reduces the credit intermediation costs.

This also applies wholly or partly to other types of financial claims, and the social benefits of securities are similar in many ways to those of other financial claims. This similarity means that the boundaries for the form selected change; for example there is competition between bonds and syndicated bank loans. Banks can finance lending in the bond market by securitising assets. Securities are traded in regulated markets, but if other capital or credit intermediation at a particular point in time is considered to be more secure, cheaper and more efficient, this will be preferred. The costs of securities trading are partly determined by costs incurred in the payment and settlement system, the stock exchange and the stockbroker system.

An important consequence of the fact that securities markets offer a number of different standardised equity and lender shares for investment is that an investor can have a diversified portfolio of securities in different companies. Since companies face different risks, a diversified portfolio reduces the risk for the investor. The possibility for an investor to diversify also has social benefits, since it means that a larger number of participants will be willing to invest in high-risk projects with high social returns, enabling the project to acquire equity and loan capital. A further benefit is that investors can themselves choose the degree of exposure to risk they are willing to bear. In practice this is done by hedging different types of risk (exchange rate, interest rate, commodity prices, risks to life or objects: non-life or life insurance).

In addition to the five benefits mentioned above, an organised financial system for securities has the following two advantages:

- By providing opportunities for diversifying and reducing risk, securities markets provide safer saving for those with excess capital.
- Smoothly functioning financial markets, including securities markets, promote long-term economic growth.

1.2 Factors that contribute to economic growth

We have argued above that smoothly functioning financial markets have a positive effect on long-term economic growth: they encourage division of labour and specialisation because transaction costs are lower. This reduces information costs and promotes appropriate allocation of resources, since projects are evaluated in connection with the provision of equity and loan capital. This makes it possible for both savers and entrepreneurs to manage the risks, and promotes transparency in the way the company is managed and a certain degree of control over the management. In this way the financial system encourages saving by making it safer, and promotes specialisation, leading to technological advances in the production of goods and services. Since priority is given to projects with a high degree of product development, such a system increases innovation and growth in the economy.

These effects were empirically verified in a survey by Levine (1997). The survey includes studies comparing different countries and examines particular sectors and the liberalisation of the financial sector in particular countries. He found a significant relationship between long-term economic growth and a well developed financial sector. This is supported by other studies controlling for other factors that contribute to economic growth. Thus there is empirical support for using the existence of a well developed financial sector as an indicator that the country will have a high growth rate later. Comparative studies of economics history that do not use econometric methods also support this conclusion.

The survey shows that we do not know precisely which parts of the financial system are decisive for economic growth, or how the growth-promoting factors act in the different phases of the process from an agricultural economy via an industrial economy to a mainly service-producing economy. Levine mentions in particular that there is no theoretical or empirical answer to the question of whether growth-promoting factors vary systematically with the structure of the financial system (i.e. whether the system is bank-dominated, as in Japan or Germany, or market-dominated, as in the UK and the US). Nor is it possible to distinguish between the contribution made by securities markets and that made by the rest of the financial sector. However, on the basis of the various functions in the financial sector, it seems reasonable to assume that modern and efficient financial

institutions and an efficient securities market both promote growth.

Levine (2005) maintains these conclusions even when taking account of the extensive research activity that has taken place since 1997. He adds that no one has examined whether growth can take place when a country imports all financial services or whether national production of these services is needed to achieve the beneficial effects.

2. New Norwegian securities markets legislation

The Securities Trading Act and the Stock Exchange Act play a central role in the regulation of financial markets in Norway. Sound legislation in this area promotes efficient and knowledge-based allocation of capital. These acts were passed in 1997 and 2000 respectively and have generally functioned well.

During the last two years the Ministry of Finance has held five consultation rounds on securities trading rules in Norway, and has recently proposed completely new legislation. It may seem strange that such a comprehensive process has been set in motion to amend legislation that functions well, but the reason is, as explained in Box 1, that Norway is obliged to do so through the EEA Agreement. Thus, the work in the EU on improving the functioning of the single market for financial services in the EEA has made it necessary to adopt amendments, especially in the structure of the Norwegian acts.

2.1 New EEA legislation

The purpose of the European Commission's Financial Services Action Plan (2000–2005) (FSAP) was to realise more of the growth potential of an integrated and efficient financial market, and FSAP was expected to make a considerable contribution to growth in GNI. The plan pointed out that it was a major problem that it took so long to develop Community law, and that legal acts (directives and regulations) were out of date before they were adopted. The problem is particularly great when developments in the market made details of the rules inappropriate or inapplicable. The provisions of the EU Treaty relating to Community law do not distinguish between the modification of technical details and decisions to adopt new legislation for previously unregulated areas. In order to improve the functioning of the markets a procedure has been developed that will, within the framework of the treaty provisions, allow for a more dynamic legislative process, and ensure that decisions on new framework principles are taken under satisfactory and transparent conditions. The procedure makes it simpler to adapt the technical implementing measures to new developments in the market. This ensures that rules continue to be applicable when new products or financing techniques are introduced.

The new procedure has four levels. Level 1 is the level at which legal acts (directives and regulations) are adopted by the European Parliament and the Council of Ministers in accordance with the rules set out in the Treaty. At this level the framework principles are decided and the authority to determine the technical implementing measures for the legal acts adopted by the Commission is delegated. Level 2 refers to the implementation measures enacted by the Commission through specific comitology procedures. The observers from the EFTA countries in these committees are able to participate and put forward comments and proposals, but they do not have the right to vote. At Level 3 common supervisory standards are developed and legislative proposals to the Commission are drafted. This work is done in committees in which supervisory authorities (and central banks for banking) participate. Since these committees are advisory they do not vote, and the EFTA countries are full members.

When these procedures were initially agreed, it was understood that legal acts would be developed in transparent processes and in extensive consultation with market participants. The cooperation both at the supervisory level and between finance ministries would contribute to equal and simultaneous implementation of legislation throughout the EEA. Norway's participation in this work and in the intensified cooperation on supervision is useful when detailed Norwegian legislation is being drafted.

Level 4 secures correct implementation of Community law by the Member States. The enforcement is planned to be tighter in the new system. The cooperation between supervisory authorities in the various committees plays an important role in the creation of a common understanding of the rules. However, it is also essential that the Commission and ESA monitor the implementation of legal acts and if necessary take a case to the court to ensure equal implementation.

Four directives have been adopted in this new system of regulation, which have been or are being implemented in national law throughout the EEA. These are:

- the prospectus directive
- the market abuse directive
- the markets in financial instruments directive (MiFID)
- the transparency directive

In the field of securities law, a directive has also recently been adopted in which the Commission is not given the authority to issue implementing provisions:

- the directive on takeover bids

The implementation of these directives in Norwegian law is discussed below.

Box 1: The European Economic Area Agreement[1]

The European Economic Area (EEA) Agreement creates a single European market for goods and services. The agreement applies to financial services, which means that the Norwegian financial markets are fully integrated with the European markets. Thus the same rules apply to Norwegians as to all other European market participants abroad, and likewise all European market participants are bound by the same rules relating to their activities in Norway as their Norwegian competitors. The Norwegian authorities are obliged to follow the same rules and supervisory practices as their European counterparts.

Background and general rules

In 1994 Norway joined most of its EFTA partners into an organised cooperation with the EU to create a European economic area. The idea for this arrangement was a follow-up of the Single European Act of 1986. In 1989 Commission President Jacques Delors proposed a European economic area with more structured arrangements for trading and with common institutions to secure a level playing field. At this time the EFTA countries signing the agreement were Austria, Finland, Iceland, Norway and Sweden. Now that Austria, Finland and Sweden have become members of the EU, and other new members have joined both organisations, a total of 28 countries have signed the EEA Agreement: the 25 members of the EU, and Norway, Iceland and Liechtenstein from EFTA.[2]

The EEA is an internal market governed by common rules, which allow the free movement of goods, services, capital and persons within the area. The four freedoms strengthen trade and other economic relations and to ensure equal conditions the agreement covers competition and state aid. It does not apply to the EU's Common Agricultural Policy or the Common Fisheries Policy, but contains provisions relating to certain aspects of trade in agricultural and fish products. Nor do the EFTA countries participate in the tax cooperation within the EU. However, the three EEA EFTA states do participate in a number of Community programmes and agencies. When EFTA countries participate in such programmes, they have the same right to recruit national experts to the programme as EU member states. When appropriate, EFTA countries may also send nationally funded experts to work with the European Commission or in relevant EU Institutions.

The national implementation of the common rules throughout the EEA is monitored by the European Commission for the EU states and the EFTA Surveillance Authority (ESA) for the EFTA states. Conflicts between national authorities and ESA may be brought before the EFTA Court in Luxembourg, which is the counterpart of the Court of Justice of the European Communities in the EU.

Homogeneity of markets and financial services

The free movement of services – including financial services – is important for EEA homogeneity. This is achieved by the integration of EC legislation in the relevant fields into the EEA Agreement through a decision by the EEA Joint Committee on a legal act that has been formally adopted by the EU. Basic legal acts relating to financial services are proposed by the European Commission and adopted through co-decision by the European Council and the European Parliament. Legislation labelled implementing measures are enacted by the Commission through comitology procedures. The EEA EFTA states participate in the same way as EU member countries in the preparatory stages of the work in the Commission on new basic legislation. They are also observers in the comitology committees. However, the EEA EFTA countries do not participate from the time the Commission has proposed a legal act until the adoption by the co-decision procedure is completed.

Decisions of the EEA Joint Committee are prepared by various working groups from the EFTA states. WG FIN deals with financial services, and the Norwegian members of the group represent the Ministry of Finance, Norges Bank and the Financial Supervisory Authority of Norway. The preparations consist of making sure the legal act is relevant, identifying any national problems and clarifying whether additional time is needed for national implementation. An important aspect of this work is related to the nature of the EFTA cooperation. The EFTA member states have not transferred any legislative powers to EFTA or the EEA Joint Committee. The decisions therefore clearly state whether the rules must be approved by the relevant national parliament. In Norway and with regard to financial

[1] This box draws on the home pages of the EFTA, cf. http://secretariat.efta.int/ and on the home pages of the Norwegian Delegation to the EU, cf. http://www.eu-norway.org/about/eeaforside.htm .

[2] At present negotiations are taking place on enlarging the EEA to include the two new EU members, Bulgaria and Romania.

services, it is a constitutional requirement that such approval must be obtained when the EU legal act can only be implemented through amendments to a Norwegian act. This affects the date of the entry into force of the Joint Committee decision. In the financial services area, the EEA EFTA countries and the Commission have so far agreed on which legal acts are to be integrated into the EEA Agreement.

To sum up, Norwegian participation in the development of the internal market for financial services involves membership of preparatory working groups under the European Commission. The Norwegian authorities also participate in the work of the committees at the comitology stage. There are no special Commission programmes related to financial services. However, the Norwegian authorities sometimes send nationally funded national experts to work in relevant EU institutions (e.g. the Commission, the ECB). The competent Norwegian authorities participate in the preparatory work of the EFTA working groups prior to the Joint Committee decisions relating to financial services.

Market consequences

The most important question is of course the consequences of the EEA Agreement for developments in the market. It is fair to say that the objectives of the agreement in the field of financial services have so far been fulfilled. The agreement secures the free participation of European players in the Norwegian part of the European market, and Norwegian participation elsewhere in the EEA. There may be problems relating to the rules regulating the EEA market, but the problems relating to the smooth functioning of the market are not related to differences between EFTA and EU states.

A large number of European players participate in the different financial wholesale and retail markets in Norway, and cross-border consolidations have taken place in almost all areas of financial services. These consolidations have been concentrated in the Nordic area, and many Nordic players wish to extend their activities, particularly to the Baltic region. Thus, market integration is likely to increase.

The cooperation between ministries, central banks and supervisors in the area began long before the EEA Agreement, and has developed in accordance with the rules of EC legislation and market needs.

2.2 Status of Norwegian implementation

All the above directives have been incorporated into the EEA Agreement and must therefore be implemented in Norwegian law, and new legislation (acts or regulations) has been or is in the process of being introduced to this end. Some of the key dates and document names for the five directives are given in Box 2. The current status is as follows:

- The market abuse directive has been incorporated into Norwegian law through amendments to the general provisions in Chapter 2 of the Securities Trading Act.

- The prospectus directive has been implemented by replacing the provisions of Chapter 5 of the Securities Trading Act, which relate to prospectus requirements, with new provisions.

- The Ministry of Finance is preparing the implementation of the directive on takeover bids. The consultation round for amendments to Chapter 4 of the Securities Trading Act has been completed.

- The Ministry of Finance is also preparing the implementation of the MiFID and the transparency directive. The consultation round on a new securities trading act and a new act relating to regulated markets, or stock exchange act, has been completed.

Apart from the directive on takeover bids, these directives amend or modify rules that are already part of the EEA Agreement and have already been incorporated into Norwegian law. The directive regulates an area that has not previously been covered by Community law, but the field is already covered by existing provisions in Norwegian law concerning mandatory bids. Thus it can be said that implementing this directive will only require adjustments in Norwegian law.[1]

[1] This directive was controversial, and in order to arrive at a decision the Community rules were made more lenient than those favoured by many countries and the EU Commission. The directive provides for the authority to issue stricter rules. The Norwegian securities markets legislation committee has as explained below proposed stronger protection of minority shareholders.

The directives are part of the EU's efforts to ensure better and more equal conditions of competition in the internal market for financial services and eliminate differences in market conditions resulting from national law. Provisions are often made more precise and in many cases authority is granted to issue supplementary provisions.

In general there is a need to make at least minor adjustments in Norwegian legislation based on the wording of the directives. In many cases a good solution will be to follow the wording of the directive concerned closely and to authorise the ministry to issue detailed regulations. This is a simple way of fulfilling the obligations devolving from the directives while at the same time improving the dynamics of the legal system.

Although some of the amendments are more substantive, they have several common features:

- In many cases the requirements concerning the disclosure of information have become stricter. Issuers have a stricter obligation to provide information to the market and to publish a prospectus. There are stricter requirements for intermediaries and consultants as regards rules for information disclosure in relation to issuers and customers, for example concerning possible conflicts of interest. The rules on reporting suspicious transactions are also being tightened as part of the efforts to combat economic crime.

- Stricter requirements are being imposed on supervision of securities trading and enforcement of the rules, which have become tighter, and the supervisory authority will be able to impose administrative sanctions. The directives also require the supervisory authority to be independent. The Financial Supervisory Authority of Norway, Kredittilsynet, will therefore have the overriding responsibility for prospectus control[2] and will have greater authority, for example with regard to securing of evidence and information about telephone use.

The following are among the new rules:

- Investment consultancy and operation of multilateral trading facilities will be included among the investment services subject to licensing. Securities firms will be subject to stricter requirements concerning the disclosure of information and possible conflicts of interest. It is proposed to repeal the special Norwegian provision stating that the marketing of financial instruments is an investment service that is subject to licensing. A new special Norwegian provision is proposed, defining limited and general partnerships as financial instruments.

- One of the new provisions for safeguarding non-professional investors is that the existing scheme for individual securities firms is being expanded in the form of a guarantee fund for securities firms. This change is the result of the current dialogue with ESA on how far the previous scheme complied with the provisions of the directive and provided sufficient protection for investors.[3] This is an example of a Level 4 measure influencing Norwegian law.

- The major proposed changes affect the rules concerning mandatory and voluntary bids that protect minority shareholders in the event of a change in control of the company. The government's proposed new rules have not yet been finalised, but the securities markets legislation committee has proposed that the percentage of voting rights in a company requiring a mandatory bid is reduced from the existing requirement of 40 per cent. The majority proposal is a reduction to more than one-third of the voting rights in the company, whereas a minority is suggesting 30 per cent. A majority of the committee has also proposed making it mandatory for the large shareholder to make a new bid upon acquisition of shares representing more than half of the voting rights in the company. A minority wish to introduce the same rule as in the London City Code, whereby a mandatory bid must be offered upon each acquisition above one-third of the voting rights until the shareholder has acquired more than half of the voting rights.[4] The majority are proposing that in the case of mandatory bids the offerer will be able to make it a condition that approval is obtained from the authorities when necessary. In order to prevent the occurrence of poison pills, the room for manoeuvre is limited to the board and management of the target company when a bid is made.

Some of the changes proposed correspond to recent market developments. The following are among the most important reasons for the reforms that are being incorporated into Norwegian legislation:

- The volume of cross-border activity between intermediaries, issuers and investors is growing. It is becoming increasingly common for Norwegian investors to invest abroad and for foreign investors to invest in Norwegian securities. This is often done

[2] According to Norwegian regulations, the Oslo Stock Exchange (OSE) will continue to have the practical responsibility for prospectus control. It has to submit annual reports of its work to Kredittilsynet and notify the authority of all complaints submitted to the OSE Appeals Committee.

[3] In a reasoned opinion of 11 April 2003, the EFTA Surveillance Authority maintained that existing Norwegian law on this point was not fully in conformity with Norway's obligations under the directive. If Norway does not amend its rules pursuant to such a statement, the EFTA Court will be asked to determine whether the rules are in breach of Norway's EEA obligations.

[4] In the public consultation round, Norges Bank gave priority to legal harmony between the Nordic countries and supported a proposal for 30 and 50 per cent for compulsory offers to all shareholders.

Box 2: EEA basis for reforms in Norwegian legislation on securities markets, securities and issuers

European Parliament and Council directives on:	EC legal acts/ OJ reference	Replaces	EEA decision, time limit for implementation	Norwegian consultation round, time limit for comments	Proposition to the Storting	Recommendation of parliamentary committee	New Norwegian rules as from
Market abuse	2003/6/EC L096, 12.04.2003	89/592/EEC	38/2004 of 23.04.2004, by 23.10.2004	Consultative document KT[1] of 1.03.2004, by 03.05.2004	Proposition to the Odelsting No. 12 (2004-2005)	Recommendation O. No.38 (2004-2005)	01.09.2005
Prospectus	2003/71/EC L345, 31.12.2003	89/298/EEC	73/2004 of 08.06.2004, by 01.07.2005	Work group KT[1] of 01.06.2004, by 13.09.2004	Proposition to the Odelsting No. 69 (2004-2005)	Recommendation O. No.90 (2004-2005)	01.01.2006
Takeover bids	2004/25/EC L142, 30.04.2004	New	70/2005 of 30.04.2005, by 20.05.2006	Official Norwegian Report 2005:17, by 05.12.2005			
Markets in financial instruments (MiFID)	2004/39/EC L145, 30.04.2004	93/22/EEC	65/2005 of 29.04.2005, by 31.01.2007	Official Norwegian Report 2006:3, by 29.05.2006			
Transparency	2004/109/EC L390, 31.12.2004	Much of 2001/34/EC	120/2005 of 30.09.2005, by 20.01.2007	Official Norwegian Report 2006:3, by 29.05.2006			
Guarantee fund for securities firms	97/9/EC L084, 26.03.1997		12/98 of 06.03.1998	Consultative document KT[1] of 20.02.2004, by 03.05.2004	Proposition to the Odelsting No. 12 (2004-2005)	Recommendation O. No.38 (2004-2005)	01.07.2006

[1]Kredittilsynet (KT) is the Norwegian FSA.

through a custodian. In practice, such transactions resulted in a specialised activity in which securities are traded within the custodian institution (usually a major international bank). These activities are now the subject of legislation and market supervision. The legal terms are "multilateral trading facilities" and "systematic internalisation".

- Commodity derivative activities are becoming increasingly common in a number of countries, and this is largely a cross-border activity. The directive provisions in this area are new in terms of EEA rules. However, as a result of the common Nordic market for electricity and related market for electricity derivatives, most of them have already been incorporated into Norwegian (and Nordic) law.

- Facilitating effective corporate governance is another growing trend. This takes the form of stricter requirements for the disclosure of information and for the right to make use of voting rights in companies across borders. Stricter requirements are being imposed on issuers to provide information, and amendments in accounting legislation are leading to improved harmonisation of the content of reporting. Tighter requirements are also being imposed on intermediaries with regard to the disclosure of information and possible conflicts of interest.

2.3 Costs

Adapting to the new rules will involve certain costs for both market participants and supervisory authorities. As discussed above, many of these changes are more concerned with form than with content, which means that in many cases there will be one-off costs for the adaptation of procedures to new requirements. Since a new standard is to be adopted for the whole of the EEA, adjustment could result in cheaper operations for intermediaries and issuers. Investors will be able to recognise more easily the system under which other markets are operating and this could reduce the cost of investing in new markets. The Financial Supervisory Authority of Norway will have new responsibilities and will have to follow up more detailed legislation. On the other hand, it will to a greater extent be able to draw on the experience of other supervisory authorities with respect to interpretation and practices in connection with new changes.

3. A national stock exchange?

3.1 Introduction

There have recently been a number of restructurings in the trade in securities and in the settlement of securities trades, either in the form of takeovers or through the formation of alliances. Work is under way to reduce the cost of cross-border trading in securities, and legal monopolies are prohibited throughout the EEA. Until now natural monopolies have existed in most countries in the area, but recently a large group of international banks stated their intention to establish an international market to deliver these services at a lower cost.[5] The debate on possible international consolidations is frequently coloured by national considerations. For instance, the French president, Jacques Chirac, is sceptical of a merger between Euronext[6] and the New York Stock Exchange. He would prefer Euronext to cooperate with the German Deutsche Börse.[7]

Similar views are held in Norway. Some observers argue that it would be a loss to Norway if the Oslo Stock Exchange (OSE) were to be taken over by a foreign owner, on the grounds that a foreign takeover would involve the closure of the national marketplace and the transfer of the activity to the buyer's country. However, the closure of the national marketplace is not an inevitable consequence of foreign ownership. In several international consolidations national markets have continued their activity in national companies owned by an international holding company. Thus there are three possibilities: a national market with a national owner, a national market with a foreign owner and no national market. In the last case, Norwegian companies seeking to be listed and investors wishing to invest in listed securities would have to use the services of foreign marketplaces or stock exchanges.

The benefits of organised trading in securities were described in section 1, and some information on the situation regarding the stock exchange in Oslo is given in Box 3. When considering whether the marketplace needs to be national, it is useful to be more precise as regards the functions performed by the marketplace and the associated costs. A foreign offer to take over the exchange will only succeed if it is sufficiently generous for the current owners to be willing to sell. The buyer needs to be confident that the price paid will generate an acceptable return and must manage the company accordingly. Therefore, it is necessary to weigh the services provided against the costs attached to the trading platform, settlement services and the securities firms.

[5] See http://www.finextra.com/fullstory.asp?id=16156

[6] Euronext owns the stock exchanges of Amsterdam, Brussels, Lisbon and Paris. The settlement of trade on these exchanges is with Clearnet as central counterparty. The CSD's of the Netherlands, Belgium, France, the UK and Ireland form the Euroclear Group.

[7] See for example Le Figaro of 6 June 2006, http://www.lefigaro.fr/eco-entreprises/20060606.WWW000000320_euronext_chirac_espere_encore_une_solution_franco_allemande_.html

Box 3: The situation in Norway and the position of the Oslo Stock Exchange

The Oslo Stock Exchange (OSE) is a limited liability company that was established in 2001 through the demutualisation of the previous stock exchange. The name of the holding company is Oslo Børs Holding ASA. At the end of 2005 the largest shareholders were DnB NOR ASA (19.7 per cent); Fidelity Funds Europe (10.0 per cent); Orkla ASA (10.0 per cent) and Norsk Hydro's pension fund (8.9 per cent). Slightly more than half the equity is held by large Norwegian shareholders. Settlements take place (without a central counterparty) in VPS ASA, the Norwegian CSD.

A change of ownership of the OSE or of the rules relating to the ownership must take place before mid-2007. Legally, the largest ownership share of the parent company may not exceed 10 per cent. The banks that merged to form DnB NOR received a dispensation allowing them to hold their shares until mid-2007, and the Ministry of Finance must soon decide whether the dispensation should be extended or whether the rules on ownership share should be changed. An argument in favour of changing the rules, is that the EFTA Surveillance Authority (ESA) has maintained in a reasoned opinion that limiting the maximum ownership share to 10 per cent breaches the rules on the free movement of capital within the EEA. The ESA accepts the Norwegian argument that this limit ensures market integrity and the independence of providers of infrastructure services, but it considers the limit of 10 per cent to be unnecessarily restrictive in relation to the aim.[1] If a foreign takeover were to take place, the most likely scenario – at least according to the press – is the purchase by the Swedish company OMX AB of part or the entire infrastructure for trading in financial instruments in Norway. OMX AB is a holding company that already owns all the markets for securities trading in the Nordic–Baltic region apart from that in Norway. OMX AB also owns the CSDs of Iceland, Estonia and Latvia and 40 per cent of the CSD of Lithuania.[2] The company also handles the financial settlement of electricity derivatives traded on Nordpool. The largest owner of OMX is Investor AB (10.8 per cent). The Swedish state held 6.8 per cent at end-2005.

The OSE has been cooperating with OMX in the NOREX alliance since 1999. The alliance seeks to develop the Nordic region as a common marketplace for securities, and the cooperation covers the common trading rules. The OSE uses the trading system Saxess, which OMX has developed and owns. In October 2006 about 50 securities firms were members of the OSE, equally distributed between Norwegian and foreign firms. The Norwegian firms were equally distributed between banks and independent brokerage firms.

The market value of the companies listed on the OSE has increased considerably over the last decade, and so has the turnover. The end-1995 market capitalisation was 29.7 per cent of 1995-GDP, and the corresponding figure was 40.5 per cent in 2003 and 73.7 per cent in 2005. Growth has continued and the market value in November 2006 relative to estimated GDP in 2006 is 90.3. The turnover velocity reported by the OSE was 69.3 in 1997, and increased to 97.7 in 2003, 128.9 in 2005 and 153.6 in November 2006.

The OSE's operating income for 2005 was NOK 361 million, and operating expenditures were NOK 174 million. The post-tax profit was NOK 144 million. Increased market activity resulted in growth in operating income of more than 25 per cent in the last reported year, while expenditures increased by 3.5 per cent. With respect to both activity and growth, the Oslo Stock Exchange is dominated by trading in shares. This activity is concentrated on a few large issues. The 10 issues with the largest number of transactions accounted for 36.4 per cent of the trades and 59.6 per cent of trading value in 2005.

[1] See press release 2004-15: http://www.eftasurv.int/information/pressreleases/2004pr/dbaFile5289.html

[2] The CSDs of Sweden and Finland together form an international concern, while the CSDs of Denmark and Norway are independent. Among the large owners of all these companies are large national banks. The CSD and the stock exchange of Iceland are both owned by the holding company that was taken over by OMX in the autumn of 2006.

3.2 The role of the exchange as a marketplace

A stock exchange is an arena where issuers of securities meet with investors, and the meetings take place in primary and secondary markets. The exchange benefits from such activities; it is thus interested in as many meetings as possible taking place, and in issuers and investors returning as frequently as possible. Issuers are needed to supply new projects and investment opportunities, and investors are needed to make new investments and reinvest their funds, since this contributes to efficient capital allocation.

In the primary market issuers present their projects with the assistance of securities firms. Investors assess the investment opportunities, also with assistance from securities firms. The organiser of the marketplace applies quality standards to the issues and determines whether they are suitable for quotation in the marketplace.

In the secondary market investors can reassess their decisions and if necessary move their investments to issues that suit them better. They can also terminate an investment and withdraw their funds. When making their decision, investors can obtain information from companies and analyses by securities firms, newspapers or other sources. Some of this information is freely available and some has to be bought. A high degree of liquidity in the market is a great advantage for the investor because this provides an opportunity to rebalance the portfolio quickly and with only a small market impact on prices. A broad market is also advantageous, since this increases the probability of finding investments with suitable risk profiles. The investor will also consider it important to have rules that ensure that information from issuers is made available to all market participants at the same time, and that insiders are not permitted to use their information advantage. Finally, it is necessary that the market organiser ensures that individuals or groups cannot trade systematically and thereby mislead the market (prohibition of market manipulation).

To facilitate trading the stock exchange offers a trading system with clear rules on execution, priorities, etc. The trading system is made available to investors through securities firms that are members of the exchange. Investors can enter their orders directly into the system, but often they prefer to use a securities firm to look into the trading possibilities. This can be important for large trades, since it ensures that the market price is not changed as a result of knowledge that such a trade (buying or selling) is about to take place.

When the trade has been agreed the information is transmitted to a settlement system where buyer and seller exchange money and securities at the agreed price and time. Settlement systems have netting rules whereby only the net position in securities and money is settled. In the case of trade in several currencies, either the investor needs to have all the necessary currencies available or the settlement system must have a facility for currency exchange. When the settlement is completed the investor will have securities in the central securities depositories (CSDs) of the involved countries, and liquidity in bank accounts in the various currencies. The settlement completes the trading cycle.

3.3 The costs and effects of a foreign takeover

The presentation of the functions of the marketplace allows for a discussion of important points and possible changes in costs and functioning in the event of a foreign takeover.

Efficiency of trading activity

Normally competition serves as a guarantee of social efficiency. Many of the functions performed in or around the marketplace are produced by or with the help of competing securities firms, and would not be affected by a takeover. This applies to services needed by the issuer prior to public offerings, information from issuers to the market, the analysis of securities and investment advice.

There is an element of monopoly in the activity specific to the organiser of the market, or at least there are a very small number of service providers. The marketplace is a meeting point for issuers and investors and between investors, and the usefulness of the marketplace increases with the number of meetings that take place. This is particularly important for liquidity and the breadth of the market. Liquidity increases with the number of participating investors as they will have different liquidity needs and differences in their preferred risk profile. Breadth increases with the number of issuers and the variations in the risk profile they present to the market. An important question for large international investors is the price impact of large trades, but enlarging the investor base should alleviate this problem. Other things being equal, there are benefits to be had from large marketplace organisations. Whether these other things are equal will be discussed below, but if negative effects are excluded, it must be concluded that the consolidation of several marketplaces is advantageous.

Issues related to the trading system, information requirements, distribution of information and surveillance of market activity can also be viewed from this perspective. Information requirements are imposed by the authorities and the marketplace itself. In the EEA the public information requirements are governed by EC legal acts (“acquis communautaire”) and are the same throughout the area. A large market with harmonised requirements makes it simpler to interpret EEA requirements and any other requirements imposed by the marketplace. The same effect can be obtained if several

markets cooperate on setting the same requirements. Similarly, the trading system, distribution of information, and surveillance of market activity can all benefit from a large marketplace, but the gains as regards the service provided can also be achieved through cooperation. The question of how to produce these services at a minimum cost – through a merger or cooperation – is a question that the authorities can leave to the market participants to decide.

New costs with foreign ownership?

Transferring an activity to a location outside Norway may result in new costs for Norwegian market participants, and it is important to identify any new costs incurred by a foreign takeover. If, for instance, the work of obtaining approval for new issues is centralised to the principal location of the marketplace, factors such as language barriers and travel expenses may increase the cost of the process leading up to listing. This may result in fewer listings, which means that a smaller share of the productive capital of the society concerned is subjected to the daily quality assessment provided by trade in an organised securities market. This could reduce capital productivity. The probability of this happening is an argument in favour of the social benefits of national ownership. Another argument for national ownership is small companies' fear of drowning in a large stock exchange and not receiving sufficient attention from securities firms. However, this is not likely to be very important since even the largest exchanges have a stream of new issuers coming in. A number of Canadian energy companies have been listed in Oslo in the last few years. The reason could be their fear of drowning in the North American exchanges, but Norwegian securities firms maintain that the high quality of the energy sector analysis in Oslo, which results in "correct" pricing, is the explanation.

The trading that currently takes place on the OSE can be transferred to foreign hands if issuers and investors transfer their activity to a competitor offering better and cheaper services. This would not be a problem for society, and furthermore as the activity in question is network activity the likelihood of such a change is very small. It is more likely that foreign control of the activity will be the result of a takeover. The buyer will have to offer a large enough payment for the enterprise for the current owner to be willing to sell. To obtain a return on the investment, the buyer will have to attract more activity or reduce costs, or a combination of the two.

Many of the advantages of a takeover of the OSE by OMX have already been achieved through the use of the same IT solution for trade, common rules on trading and the same system of market surveillance. There may be gains from centralising and streamlining the large IT systems and networks, and for emergency backup systems for power supply and telecommunications.[8] Centralising market surveillance may provide similar gains. It seems certain that Norway will participate in the recently established Nordic index in order to increase the level of activity. The effect of a takeover on trading activity is not obvious, and an additional language requirement will increase the cost to issuers. A new owner will try to increase activity through an increase in the number of issuers and investors. Therefore, it does not seem rational for a new owner to introduce reforms that increase the costs related to but outside the trading activity. A similar argument would apply to other buyers, and this could explain why local exchanges have been continued in consolidations in Europe. This also has the advantage that no new legal uncertainty is introduced. Thus, the argument probably also applies to Norway.

Settlement efficiency

The countries of the Nordic–Baltic region do not have the same system for settlement of trades. At present there are national settlement systems using the eight different local currencies. Even after the probable entry of the Baltic republics into the euro area, there will be five currencies in use (the euro in Finland and the Baltics and the various krone currencies in the four Nordic countries). The registry of ownership will still be national. It is therefore likely that different settlement systems will continue to be used. Maximum efficiency in the use of capital can only be attained if a currency received in one country can be invested in another currency on the same day and without the need for a supplementary exchange of currencies. This is not possible today and investors need to have settlement accounts in all relevant currencies. The movement of liquidity has to be organised as a special trade with two cost elements: the exchange fee (including spread) and the costs of tying up liquidity in several currencies.

Banks gain from providing services that facilitate trading in securities in different currencies. The gain increases proportionally with the spread and almost proportionally with the trade. Box 4 shows that the greater the number of netting possibilities, the greater the spread that can be taken from customers without their having to carry out currency trades in their own books.

No further gains in this area can be expected from a change of ownership of the OSE. The Norwegian service provider is VPS, and it is this institution that would need to change its systems if further improvements are to be made. A project, S–4, to create a single securities settlement system for the four markets in Oslo, Copenhagen, Helsinki and Stockholm was considered in 1999, but the project was never realised since the four involved CSDs could not reach agreement on the payment for a feasibility study. The obstacles were the differences in size of the parties and the differences between what each hoped to gain. The relative market sizes have changed dramatically, but there has been no

[8] Euronext reports that large gains can be made in this area through the possible merger with the New York Stock Exchange (http://www.finextra.com/fullstory.asp?id=16151). A similar situation would be if OMX were to join a large international alliance so that maintenance and development of one IT platform can be closed down.

Box 4: Gains to banks from currency trading

Banks can profit from trading in securities in currencies other than their own. An example of this is when a Norwegian bank facilitates equity trading in Stockholm for its customers. On a particular day the bank has two customers making use of the facility. B buys Swedish equity for SEK 1 million, and S sells Swedish equity worth the same amount. The middle rate is 0.90 and the currency margin is ± 0.5 per cent. The commission for equity trade in Sweden is 0.1 per cent.[1]

In the example the payments will be:

- The bank's commission from B:
  1 000 000 · 0.9045 · 0.001 = NOK 904.5
- The bank's commission from S:
  1 000 000 · 0.8955 · 0.001 = NOK 895.5
- The bank's total commission:
  904.5 + 895.5 = NOK 1 800

This seems acceptable to customers, but if all transactions on the day in question are disclosed, they will reveal that the bank makes a larger profit on currency trading than from commissions.

Transactions related to B's purchase of Swedish equity:

- B transfers to the bank, for the equity and as commission: NOK 904 500 + NOK 904.5.
- The bank transfers to the Swedish broker and the Swedish exchange: SEK 1 000 000 + exchange commission.
- The Swedish broker transfers to the bank, which passes it on to customer B: the Swedish equity.

Transactions related to S's sale of Swedish equity:

- S transfers to the bank, which passes on to the Swedish broker: Swedish equity.
- The Swedish broker transfers to the bank:
  SEK 1 000 000.
- The bank transfers to the Swedish exchange: exchange commission.
- The bank transfers to S, for the equity net of the commission: NOK 895 500 – NOK 895.5.

Net result for the three:

- B pays NOK 905 404.5 and receives Swedish equity.
- S sells Swedish equity and receives NOK 894 604.5.
- Net for the bank in NOK: + 905 404.5 – 894 604.5 = NOK 10 800.
- Net for the bank in SEK: –1 000 000 + 1 000 000 – 2 · exchange commission = –2 · exchange commission.

The exchange commission is very low. At the OSE it is NOK 20 for a trade of NOK 1 million. In addition, there is an annual membership fee. The bank's costs in SEK will be very small.

As shown above, the bank makes a profit on the activity. In the example the commission is only a fifth of the total; the remainder comes from providing services to customers with different needs. If the bank's customers had been buying shares, the only profit to the bank would have been the commission, since it would have had to buy SEK in the market. In the example there is complete netting: the bank does not need to engage in any currency trade, and makes a good profit.

It is the customers who pay for the extra profit to the bank. This can easily be seen when the entire investment is considered. The customer buying equity will at a future date sell the equity and convert the proceeds to NOK. He will then have to pay commission and a currency margin. When investing in Norway he will only pay commission on both occasions, but when the investment is in Sweden he pays the margin between buying and selling the currency in addition. In the above example and on the basis of observed margins and commissions, the Norwegian investor pays a fee of 0.2 per cent on a Norwegian investment, while the total fee for the investment in Sweden is 1.2 per cent when the investment is terminated. The consequence is that the required expected return will have to be larger for an investment in Sweden than for one in Norway. This is a rational element in the so-called "home bias" in investment decisions.

A general formula for the bank's daily profit from the activity has two elements:

$$\Pi = v \cdot (\Sigma S + \Sigma B) \cdot (m + c - t) - v \cdot |(\Sigma S - \Sigma B)| \cdot m$$

[1] The commission and exchange rate margin chosen here are close to the rates given on Norwegian banks' home pages on 31 October 2006.

The profit (Π) is calculated in NOK. The first element is the income and costs associated with the total activity. Gross activity in NOK is the exchange rate (v) multiplied by the gross trading value in SEK ($\Sigma S + \Sigma B$). The activity is multiplied by the sum of the currency margin (m, measured from the middle rate) and the commission (c), less the trading commission to the Swedish exchange (t). The second element is the size of the foreign exchange trade the bank will in fact have to engage in. Because the netting is not complete, the cost to the bank is the exchange rate multiplied by the absolute value of the net trade in SEK $|(\Sigma S - \Sigma B)|$ and by the currency margin.

There are two reasons why the above formula gives a lower profit than what is actually achievable. One is that a bank with international activity will have other activity in the country in question and will therefore have some local liquidity. This may be enough to avoid the need for an exchange of currency to serve the equity trade customers. The other reason is that the formula applies to a particular day. If the profits from the activity over several days are calculated, the first element (with the earnings) will increase, while the second element, the bank's costs, will normally be reduced (at least relatively) and therefore the actual trade for the bank will be reduced.

relaunching of the idea in the shape of an S–4 or an S–8[9] project. It might be easier to start such a project if one consolidated stock exchange were to request it on behalf of all its customers. However, among those who might not be in favour of the project are the banks. They derive considerable earnings from the present currency trading, and some of them are large owners of exchanges. The banks' earnings (explained in Box 4) would fall if a multicurrency settlement system were established as this would involve smaller volumes of currency trading. The earnings would also fall if currency exchange margins become smaller. There are examples of competition of this kind.[10]

Supervision issues

Public supervision of the participants in securities markets and of trading activities ensures that securities firms and the exchange have a sound basis, and that the activities comply with the legislative requirements in this area. If a consequence of a change of ownership of the OSE or VPS is that adequate supervision is no longer feasible, this could be used as an argument to stop a foreign takeover. The provisions of the EEA Agreement covering the free movement of capital in the internal market include financial services such as stock exchanges. Considerable efforts are being made to reduce the cost of cross-border trading in securities, and the supervision and regulation of the activity in the markets are being developed at the European level. As explained in section 2, these rules also apply to Norway. The principle is that the home country supervises the institutions involved and the host country the activity in the markets. As about 25 foreign securities firms are active members of the OSE, there is already cooperation on supervision. A foreign takeover of the OSE and a transfer of some of the functions of the market to another country in the EEA would mean changes in the responsibilities of the national supervisory authorities involved. However, under the EEA Agreement the Norwegian authorities' desire to retain supervisory authority over institutions operating in Norway is not a viable argument for stopping a foreign takeover.

If a project like the S–4 described above were to be carried out, the relevant central banks would have an interest in securing the integrity of their national payment system and ensuring the safety of the settlement system. There are international standards for the safety of settlement systems (cf. the BIS and IOSCO (2001)). A project like the S–4 would also link the payment systems of the countries involved, but this would require cooperation between the central banks. In principle, such cooperation is not new and there is a norm for cooperation on systems for trading in currencies (i.e. CLS). Trades in the Nordic krone currencies are settled through CLS, and the Nordic central banks participate in the cooperation, cf. Andresen and Bakke (2004).

4. Summary

All financial systems provide services that are essential for project assessment, division of labour and risk management, but there are considerable differences in the quality of the services provided in the various countries around the world. Improvements in these areas can affect saving and investment decisions and thereby economic growth. Since there are many sources of friction in the markets, and since legislation, rules and policies are substantially revised in different economies over time, an improvement in one of these functions may have very different consequences for resource allocation

[9] S–8 would include Iceland and the three Baltic states.

[10] A Norwegian internet-based securities firm says that it does not benefit from currency activity. Most likely the company makes one daily currency transaction for the net position of its customers and uses the same exchange rate for buyers and sellers of currency that day. The income for the company is only the trading fee.

and prosperity. The effects of the improvement will depend on what other market imperfections there are in the economy concerned.

The importance of keeping the regulatory system abreast of developments in the market, and the need to have a tighter regulatory regime, are two of the reasons why comprehensive reforms are being carried out in European – and Norwegian – legislation relating to securities trading. The aim is to establish a legislative system that is able to keep pace with such developments and that is understood by the industry. This will ensure better and more equal competitive conditions throughout the internal market for financial services.

Among the new measures being introduced are the requirements for better and more comparable information about issuers, which will improve the conditions for capital allocation. The stricter requirements concerning common rules for information and disclosure of information will also improve these conditions. Intensified competition between securities firms will reduce transaction costs and benefit both issuers and savers. Equal practices by supervisory authorities will be important for the achievement of these objectives.

The changes will involve some restructuring costs, but the main advantage is that a new European standard for information etc. about and trading in financial instruments will be established through implementation of the new Community legislation in national law. This will improve the efficiency of the capital market and promote economic growth to the benefit of all the EEA countries, including Norway.

This analysis of whether social efficiency will be impaired if ownership of the marketplace changes to foreign hands did not find systematic deviations between private gains to the owner of the marketplace and to society. To keep the costs to users for using the network low, business will probably be maintained nationally even with a foreign takeover, and a policy for national ownership should not be necessary.

Costs in cross-border securities trading can be reduced. It is probably easier to decide on efficiency measures in the settlement of such trades if there is common ownership of the CSDs or the marketplace. As banks gain from the present system, they cannot be expected to work actively in favour of efficiency measures at this point. Important efficiency gains in this field can probably be achieved without a change of ownership in market infrastructure.

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Indicators of underlying inflation in Norway

Morten Jonassen, assistant director, Monetary Policy Department, and Einar Wøien Nordbø, Economics Department, Norges Bank[1]

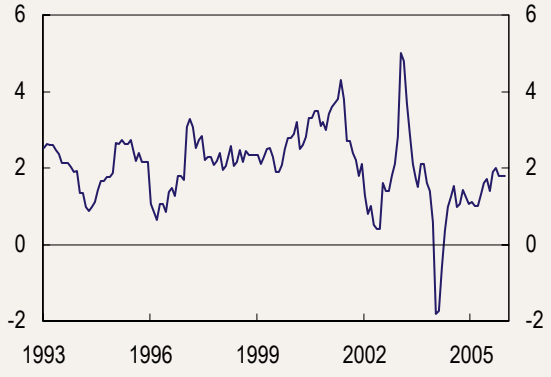
A central bank that is to steer inflation ahead in time seeks to exclude temporary price variations when setting policy rates. At a given point in time, it is not that easy to determine which price changes are permanent and which changes are temporary. Indicators of underlying inflation can be useful in this context. In this article, we make an empirical evaluation of various indicators of underlying inflation in Norway. Our conclusion is that there is no one indicator that is a perfect measure of underlying inflation at all times. A central bank should therefore follow developments in several indicators of underlying inflation.

1 Introduction

Low and stable inflation is a central objective of monetary policy in many countries. In countries where monetary policy is operated using an explicit inflation target, a quantified inflation target is often linked to the consumer price index (CPI). In Norway, for example, the Regulation on Monetary Policy of 29 March 2001 states that "the operational target of monetary policy shall be annual consumer price inflation of close to 2.5 per cent over time".

In periods, the CPI may be influenced by temporary changes in one or several prices. This is illustrated in Chart 1, which shows the year-on-year rise in the CPI in Norway in the period January 1993 to December 2005. The degree of variability in the rise in prices was particularly high between 2001 and 2004, primarily reflecting pronounced changes in VAT rates and wide variations in electricity prices. These factors only had a short-term impact on headline inflation.

Chart 1 CPI. 12-month change. Per cent. Jan 93 – Dec 05



Source: Statistics Norway

In interest rate setting, the central bank seeks to ignore such short-term price variations. The Regulation on Monetary Policy in Norway also states that in general "direct effects on consumer prices resulting from changes in interest rates, taxes, excise duties and extraordinary temporary disturbances shall not be taken into account". At a given point in time, it is not that easy to determine which price changes will persist and which changes will only have a temporary effect on headline inflation. Indicators of underlying inflation that seek to remove temporary noise and show the more persistent trend in price developments may be useful in this context. A number of central banks therefore follow developments in indicators of underlying inflation.

In this article, we first take a close look at the uses of indicators of underlying inflation and the definition of "underlying inflation" in the literature. Section 3 provides a brief overview of the various methods proposed for estimating underlying inflation. The main contribution in this article can be found in Section 4, which presents an empirical evaluation of various indicators of underlying inflation for Norway.[2] We evaluate both new indicators presented in this article and indicators that are already in use in Norges Bank. The final section provides a summary of this article.

2 Uses of indicators of underlying inflation

Indicators of underlying inflation can be used for different purposes. The indicator's purpose may have implications for its construction and properties. An indicator of underlying inflation can be constructed with a view to evaluating monetary policy. Such an indicator should not incorporate prices that the central bank has little

[1] We would like to thank Tom Bernhardsen, Anne Berit Christiansen, Gunnvald Grønvik, Kåre Hagelund, Arne Kloster, Per Espen Lilleås, Jon Nicolaisen, Kjetil Olsen, Ingvild Svendsen, Shaun Vahey and Fredrik Wulfsberg for useful comments and input. We would also like to thank other colleagues at Norges Bank and participants at the conference Joint UNECE/ILO Meeting on Consumer Price Indices in Geneva, 10–12 May 2006. Morover, we would like to thank Lasse Sandberg and Ingvild Johansen at Statistics Norway for providing us with the data used in this paper.

[2] See Bråten and Olsen (1997) and Johansen et al. (2006) for other studies of empirical properties of different indicators of underlying inflation in Norway. Silver (2006) provides a general account of methods for measuring underlying inflation and concept use.

scope for influencing. In Norway, for example, electricity prices are largely determined by temperature and water reservoir levels, and electricity price swings may result in wide fluctuations in the CPI. A central bank has little scope for countering such fluctuations in the CPI.

The indicators can also be used to assess the inflation outlook. Monthly CPI figures are influenced by short-term fluctuations in certain prices. An indicator of underlying inflation used in this context should only capture persistent changes in inflation. An increase in electricity prices that is perceived as permanent may gradually lead to a higher rate of increase in other prices because producers seek to compensate for higher electricity costs (second-round effects) or because it has an influence on economic agents' inflation expectations. Such a change in electricity prices should not be disregarded when making inflation forecasts.

It has been argued that an indicator of underlying inflation is not necessary when the central bank is conducting a forward-looking monetary policy. Temporary disturbances will not affect inflation 2–3 years ahead, and projections for underlying and headline inflation will have converged.[3] The projected level of inflation 2–3 years ahead will, however, depend on how high the central bank judges the "persistent" part of inflation to be when the projection is made. Indicators of underlying inflation are useful in determining the correct starting point for the projection.

An indicator of underlying inflation can also be a useful tool in justifying and explaining the conduct of monetary policy to the general public. If the rise in the CPI temporarily deviates from the inflation target, an indicator of underlying inflation can contribute to preventing doubts as to the central bank's commitment to reaching the target. It will minimise the risk that temporary shocks to price trends influence inflation expectations. At the same time, when the general public uses an indicator that varies less than the CPI as a reference, this may contribute to more stable inflation expectations. An indicator of underlying inflation that is established and well-known by the general public can have this function.

Disagreement about what underlying inflation really is, is one reason why indicators of underlying inflation have different purposes. In the literature, definitions vary. Eckstein (1981) defined underlying inflation as "trend increase in the cost of factors of production". Underlying inflation is the level of inflation prevailing when the economy is in long-term equilibrium, i.e. in the absence of shocks and when actual output is equal to potential output. This definition of underlying inflation is closely linked to economic agents' long-term inflation expectations. Inflation caused by cyclical factors is not considered as a component of underlying inflation according to this definition.

Quah and Vahey (1995) defined underlying inflation as the component of inflation that is due to shocks that do not affect output in the long run. The definition in Quah and Vahey (1995) includes Eckstein's (1981) concept of underlying inflation, but also incorporates price rises caused by cyclical factors. Inflation caused by permanent supply-side shocks is not included in underlying inflation.

Other definitions of underlying inflation are more related to how one should in practice choose the best underlying indicator among several candidates. Bryan et al. (1997) defined underlying inflation as the indicator that tracks a moving average of headline inflation most closely. Smith (2004) defined underlying inflation as the indicator that is the best forecaster of inflation. This definition was inspired by Blinder (1997), who defined underlying inflation as the "persistent component" of inflation.

3 Different measures of underlying inflation

Numerous methods for constructing an indicator of underlying inflation have been proposed. This reflects varying concepts of underlying inflation, but it is also because indicators of underlying inflation can have different purposes. The various methods can be broadly divided into four groups:

- **Exclude fixed components from the CPI.** This is the most common method, and the calculation in Norway of the CPI-ATE (the consumer price index adjusted for tax changes and excluding energy products) is an example. The choice of components to be excluded can be based on statistical criteria – for example, exclude the most volatile price index components – or can be based on a greater element of discretion. In a number of countries, food and energy prices are excluded. This is often justified by the highly volatile nature of these prices, and that variations are caused by supply-side changes rather than changes in demand. A simple example is that bad weather can lead to a sharp rise in prices of certain food products.

- **Exclude different components of the CPI from one period to another.** The choice of the components that are excluded can be based on statistical criteria or discretion. The indicators trimmed mean and weighted median, which are regularly published by Norges Bank, are two examples where components are excluded based on statistical criteria. Up to 1997, the central bank of New Zealand made adjustments for various shocks on a discretionary basis. But this approach was discontinued as the central bank considered it awkward to estimate the indicator monetary policy would be judged by.[4]

[3] See Nessen and Soderstrom (2000).

[4] See press release of 15 December 1997 from the Reserve Bank of New Zealand (http://www.rbnz.govt.nz/news/1997/0092611.html)

- **Reweighting of CPI components.** In this method, no component is completely excluded from the estimation of underlying inflation, but the weight that is assigned to each sub-group will depend on the sub-group's historical time-series properties. An example is the indicator published by the Bank of Canada, which gives less weight to prices for goods and services that have shown wide historical variations.[5]

- **Model-based methods.** These methods are somewhat different from those above. An example is the indicator of core inflation that was proposed by Quah and Vahey (1995). This indicator is based on a structural VAR model of inflation. Another example is the indicator that was introduced by Cristadoro et al. (2005). They use a factor model to calculate underlying inflation based on developments in a large number of time series.

4 Empirical evaluations of different indicators

Since there is no agreement on the definition of underlying inflation, there is no agreement on the weight to be given to various criteria when evaluating different indicators. Roger (1998) and Wynne (1999) discuss several criteria that an indicator of underlying inflation should satisfy. The criteria can be summed up in six points:

(a) The indicator of underlying inflation should not systematically deviate from the CPI over a longer period.

(b) It should be possible to estimate the indicator of underlying inflation at the same time as the total CPI is published, and previously published observations should not be revised when new data are released.

(c) The indicator of underlying inflation should be able to contribute to predicting future developments in headline inflation.

(d) To avoid doubts as to whether the central bank manipulates the indicator of underlying inflation, it should be calculated by other institutions than the central bank.

(e) The indicator of underlying inflation should be easy for the public to understand.

(f) The indicator should be founded in economic theory.

The criteria applied to an indicator of underlying inflation will depend on its intended purpose. An indicator of underlying inflation that is to play a central role in communicating monetary policy must necessarily be easy for the general public to understand. It is not natural to apply the same criteria to an indicator that is used internally in the central bank as an aid in assessing the inflation outlook.

All the indicators examined in this article satisfy the criterion in point (b). An example of an indicator that does not satisfy the criterion is when underlying inflation is estimated using a two-sided filter, for example, the well-known HP-filter. The criterion in point (d) has, in many countries, been satisfied by leaving the task of estimating underlying inflation to the statistical agency. Point (e) and (f) can only be evaluated on a discretionary basis. Indicators where fixed components have been excluded, such as the CPI-ATE and the traditional indicators excluding food and energy will typically be more easily understood by the general public than the other measures of underlying inflation mentioned above. Few of the model-based measures will be easy to explain to the general public. On the other hand, only some of the model-based methods can be said to be clearly founded in economic theory. One example is the indicator proposed by Quah and Vahey (1995), based on the notion that the long-run Phillips curve is vertical. None of the indicators examined in this article have a direct foundation in economic theory.

Among the points mentioned above, only points (a) and (c) are relevant in terms of empirical testing, and it is the empirical evaluation that we emphasise in this article. We do not seek to give a complete answer to the question about which indicators are "good" or "poor".

The empirical tests in this article are partly related to the criteria in points (a) and (c). The tests have been used in a series of international studies of underlying inflation, see for example Rich and Steindel (2005), Catte and Sløk (2005) and Clark (2001). The tests examine whether the different indicators of underlying inflation have:

- had the same average as the CPI over time
- been less volatile than the CPI
- tracked a moving average of the CPI over time
- contributed to explaining future developments in the CPI

In the following, indicators from the first three groups above are examined. Model-based methods are not studied. In the group of indicators that excludes permanent CPI components, the following indicators are tested:

- CPI-ATE – consumer price index adjusted for tax changes and excluding energy products
- CPI-AT – consumer price index adjusted for tax changes, but including energy products
- CPI-AE – consumer price index excluding energy products, but including tax changes
- CPI-ATED – domestically produced goods and

[5] See Bank of Canada May 2001: Renewal of the Inflation-Control Target, Background Information (http://www.bankofcanada.ca/en/press/background.pdf)

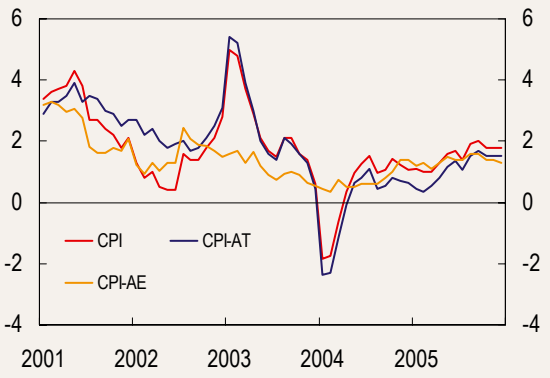
services adjusted for tax changes and excluding energy products, i.e. the domestic component of the CPI-ATE

These are indicators that Norges Bank uses in its assessment of inflation developments. With the exception of the CPI-ATED, calculated by Norges Bank, all the indicators are calculated and published monthly by Statistics Norway (see Charts 2 and 3).

We have also constructed new indicators, using 96 sub-groups of the consumer price index. Two of the new indicators belong to the class of indicators in which certain product groups are permanently excluded. We have removed the sub-groups with the highest volatility in the period January 1993 to December 2005.[6] In the indicator "excluding the most volatile 10 per cent", product groups corresponding to 10 per cent of the weighting basis are excluded. In the indicator "excluding the most volatile 20 per cent", product groups corresponding to 20 per cent of the weighting basis in the CPI are excluded (see Chart 4). The reason why we have looked at these indicators is that there are also products other than energy products that vary widely from one period to the next, and that can contribute to short-term swings in the CPI. Air travel, tele-equipment (mobile phones), fruit, vegetables, and some clothing articles are among the product groups excluded.

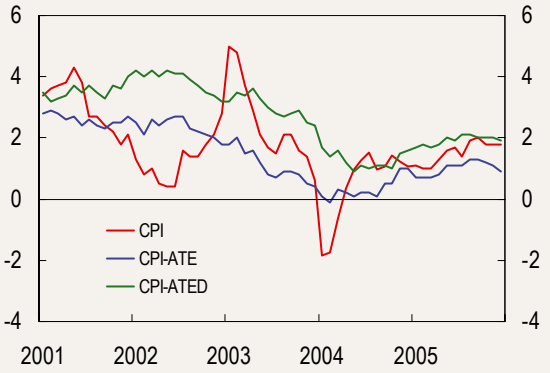
In the group of indicators where different components are excluded from one period to the next, the two indicators weighted median and trimmed mean are examined. These two indicators are based on 146 sub-groups of the CPI. The indicators are calculated by ranking the 12-month price rise for the different sub-groups in ascending order from the strongest price fall to the highest price rise. In "trimmed mean (20 per cent)", the price changes corresponding to 10 per cent of the rise in the CPI, in the upper and lower end of the distribution, are excluded. All in all, 20 per cent of the weighting basis is excluded. The rise in prices is based on the remaining

Chart 2 CPI and indicators of underlying inflation based on exclusion. 12-month change. Per cent. Jan 01 – Dec 05



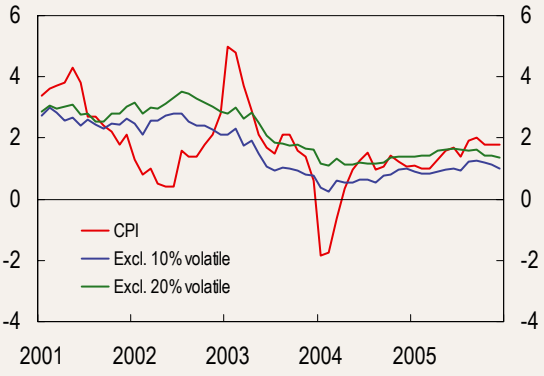
Source: Statistics Norway

Chart 3 CPI and indicators of underlying inflation based on exclusion. 12-month change. Per cent. Jan 01 – Dec 05



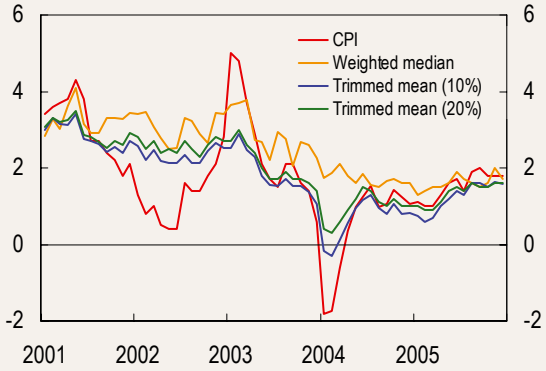
Sources: Statistics Norway and Norges Bank

Chart 4 CPI and indicators of underlying inflation excluding volatile components. 12-month change. Per cent. Jan 01 – Dec 05



Sources: Statistics Norway and Norges Bank

Chart 5 CPI, weighted median and trimmed mean. 12-month change. Per cent. Jan 01 – Dec 05



Source: Statistics Norway

[6] The volatility measure used is the standard deviation of the monthly difference between the 12-month rise in the CPI and the 12-month rise in the respective sub-index, $Vol = sd(\Pi_t^{CPI} - \Pi_t^i)$. ($\Pi$ denotes 12-month rise) We have also tested other volatility measures, but do not present the results here. We refer the reader to an earlier edition of this article: Jonassen and Nordbø (2006).

observations. In "trimmed mean" (10 per cent)", 10 per cent of the weighting basis is excluded. The weighted median is a special case of trimmed mean, where all the price observations are excluded with the exception of the middle one, when the product group's weight in the CPI is taken into account (see Chart 5).

In the group of indicators where the different components' weight depends on historical time-series properties, we have looked at three new indicators. All the indicators are calculated based on 96 CPI sub-groups. Unlike the indicators above, no product group is excluded from these indicators. The idea behind the construction of the indicators is that the historical time-series properties of each sub-group provide an indication of the information content of the sub-group's price observations. This again determines the weight to be given to the sub-group in estimating total inflation.

In two of the indicators, the weight of each sub-group depends on the historical volatility of the sub-group. In the first indicator, a volatility-weighted indicator, the weight of the sub-index is determined solely by its historical volatility.[7] Little weight is given to the most volatile sub-indices, whereas the least volatile are given considerable weight. The product group's weight in the consumer price index has no bearing on the weight it is given in this indicator.

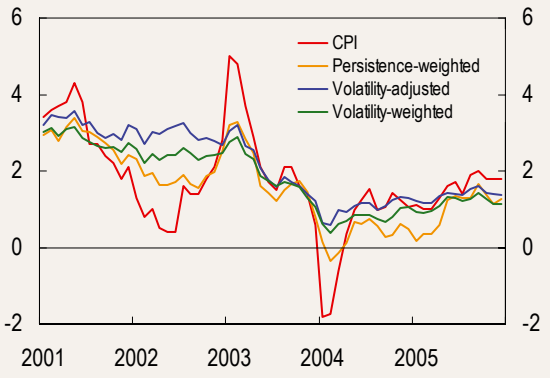
The other indicator, a volatility-adjusted indicator, differs from the volatility-weighted indicator in that the weights of the different sub-indices are a combination of the original CPI weights and the weights used in the volatility-weighted indicator. Energy prices, which have traditionally been very volatile, have been given somewhat higher weights in the volatility-adjusted indicator than in the volatility-weighted indicators. In both indicators, the weight given to energy prices is considerably lower than in the CPI.[8]

In the third indicator, a persistence-weighted indicator, it is the historical "inflation persistence" that determines each sub-group's weight.[9] Inflation persistence is a measure of how slowly the inflation rate in the respective sub-groups changes. Cutler (2001) has looked at a similar indicator for the UK. Her work was inspired by Blinder (1997). The most persistent sub-groups are given the highest weight, while the least persistent sub-groups are given the lowest weight. Like the volatility-weighted indicator, each sub-group's economic importance has no bearing on its weight in this indicator (see Chart 6).

4.1. Have the different indicators had the same average as the CPI?

In this section we examine if the different indicators have over time risen at the same pace as the CPI. If an indicator has deviated substantially from CPI inflation over a longer period, it means that not only temporary price disturbances, but also more permanent developments have been stripped out of the calculation of underlying inflation. This is tested by examining if the difference between the average 12-month rise in the CPI and the underlying indicator has been different from

Chart 6 CPI and indicators of underlying inflation based on reweighting. 12-month change. Per cent. Jan 01 – Dec 05



Sources: Statistics Norway and Norges Bank

Table 1. Difference between average 12-month rise in the various indicators and CPI inflation. Percentage points

	1983 – 2005	1993 – 2005	1999 – 2005
CPI-ATE	**–0.18**	**–0.34**	–0.32
CPI-ATED	**0.34**	**0.42**	**0.89**
CPI-AT	–0.07	–0.16	–0.01
CPI-AE	–0.11	**–0.21**	**–0.34**
Trimmed mean (20 %)	0.00	–0.04	0.15
Trimmed mean (10 %)	–0.06	–0.14	0.01
Weighted median	**0.20**	0.22	**0.59**
Exclu. most volatile (10 %)	–0.06	–0.17	–0.24
Exclu. most volatile (20 %)	0.09	0.05	0.22
Volatility-adjusted	0.07	0.10	0.28
Volatility-weighted	–0.05	0.09	0.10
Persistence-weighted	–0.04	0.06	–0.11
CPI average	3.65	2.03	2.03

The table shows the average difference between the 12-month rise in the CPI and the different indicators of underlying inflation in the period from January 1983, January 1993 and January 1999, respectively, to December 2005. Figures in bold type mean that the difference is statistically significant. A positive figure denotes that CPI inflation has been lower than the indicator over time, and a negative figure that CPI inflation has been higher.

[7] The volatility measure used is the same as the indicators where we have excluded the most volatile components: The standard deviation of the monthly difference between 12-month CPI inflation and the 12-month rise in the respective sub-index. The rate of increase of each sub-group is updated annually and is based on the volatility recorded for the previous 10 years. We have also studied indicators based on other volatility measures, but the results are not reported here. The reader is again referred to Jonassen and Nordbø (2006).

[8] Electricity prices can serve as an example. In the consume price index, electricity prices are given a weight of about 2 per cent. In the volatility-adjusted indicator, the weight is 0.5 per cent, while the weight in the volatility-weighted indicator is 0.2 per cent.

[9] The persistence of the sub-group is given here by the autoregressive coefficient ρ^i in an AR(1) model of the 12-month rise in the respective sub-group, $\Pi_t^i = \alpha + \rho^i \Pi_{t-1}^i + \varepsilon_t$. The weight of each sub-group is equal to the autoregressive coefficient (ρ), normalised so that the sum of the autoregressive coefficients for the 96 sub-groups is equal to 1. The weights are updated annually and determined by the persistence in the previous 10 years.

zero over different periods. The results are reported in Table 1. Bold figures mean that the average difference was statistically significant.[10, 11]

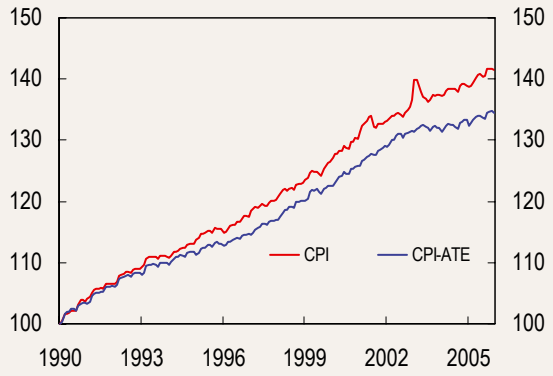
The average 12-month rise in the CPI-ATE was below the average 12-month rise in the CPI in all the time periods in Table 1. The difference is largest in the period January 1993 to December 2005 (see Chart 7). In this period, 12-month CPI-ATE inflation was on average 0.34 percentage point lower than CPI inflation. This difference was also statistically significant. The difference has been approximately the same in the period January 1999 to December 2005, whereas it was somewhat smaller from January 1983 to December 2005.

The difference between CPI and CPI-ATE is partly due to the rise in the general level of indirect taxes, but also to a higher rise in energy prices over time than in other prices in the CPI. In the period 1999–2005, energy prices, and electricity prices in particular, account for the difference between the two indices. The total contribution from tax changes to the difference between the CPI and the CPI-ATE is close to zero in this period. The indicator where only energy prices are excluded and tax changes are included, the CPI-AE, deviated only slightly more from the CPI than the CPI-ATE during this period. The CPI-AE was significantly lower than the CPI during the two last periods, but the difference was not significant for the period 1983 to 2005. The period where energy prices show a clearly higher rate of increase than other prices has in other words not been very long.

Not unexpectedly, the domestic component of the CPI-ATE, CPI-ATED, has generally risen at a faster pace than the CPI. This is because total inflation has been pushed down by low imported inflation since the mid-1990s. Low imported inflation partly reflects a rising share of imports from low-cost countries to Norway.

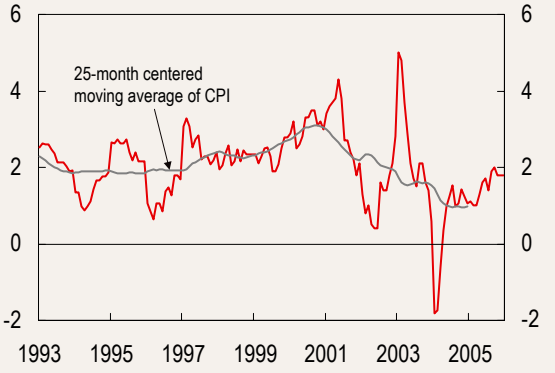
Inflation measured by a weighted median has been somewhat higher than inflation measured by the CPI, particularly in very recent years. The fact that the weighted median has been higher than the CPI, which is a weighted average, indicates that the largest price changes have been negative. The other indicators in Table 1 have been closer to the CPI over time, and none of them has been significantly different from the CPI in any of the periods.

Chart 7 CPI and CPI-ATE. Index. 100 = Jan 90.
Jan 90 – Dec 05



Sources: Statistics Norway and Norges Bank

Chart 8 CPI and 25-month centered moving average.
12-month change. Per cent. Jan 93 – Dec 05



Sources: Statistics Norway and Norges Bank

4.2 Has the indicators tracked a moving average of CPI inflation?

The next question we explore is how the indicators have tracked a moving average of CPI inflation over time. This corresponds to the definition of underlying inflation given by Bryan et al. (1997). In accordance with Catte and Sløk (2005), the moving average is calculated here by applying a moving centred 25-month average of 12-month CPI inflation.[12] Chart 8 shows the development in the moving average and total CPI inflation.

Table 2 shows how the different measures of underlying inflation have tracked the moving average of CPI inflation. This is measured by looking at mean square error (MSE) between the moving average of the CPI and the different indicators. MSE is expressed as

$$\frac{\sum_{t=1}^{T}(\Pi_t^i - \Pi_t^{ma})^2}{T}$$

where Π_t^i and Π_t^{ma} are respectively the relevant indicator and the moving average in period t.

With the exception of domestic CPI-ATE, all the indicators have tracked the moving CPI average more closely than the CPI. The CPI-AT only performs marginally better than the CPI.

[10] That the difference is statistically significant means here that the constant term in the regression $(\Pi_t^{CPI} - \Pi_t^{U}) = \alpha + \varepsilon_t$ is found to be different from zero at a significance level of 5 per cent. The covariance matrix of the residual terms is estimated by the method proposed by Newey and West (1987).

[11] We have looked at figures for the various indicators dating back to 1983. The official series from Statistics Norway do not date back as far. The CPI-AE index starts in August 1995 and the CPI-ATE and CPI-AT indicators start in December 2002. However, Statistics Norway has published figures for the 12-month rise in the CPI-AT and the CPI-ATE since August 2000. The figures used for the indicators prior to this are estimated by Norges Bank.

12 As a cross-check, we also smoothed inflation using an HP-filter (λ=14 400). The results were very similar to those obtained by applying a 25-month moving average. See Jonassen and Nordbø (2006).

Table 2. Deviation (MSE) from a moving average of CPI inflation

	1983 – 2004	1993 – 2004	Same average 1993–2004
CPI-ATE	0.42	0.30	0.18
CPI-ATED	0.63	0.88	0.71
CPI-AT	0.55	0.70	0.68
CPI-AE	0.44	0.33	0.31
Trimmed mean (20 %)	0.26	0.22	0.22
Trimmed mean (10 %)	0.29	0.24	0.22
Weighted median	0.55	0.52	0.47
Exclu. most volatile (10 %)	0.43	0.29	0.26
Exclu. most volatile (20 %)	0.41	0.31	0.31
Volatility-adjusted	0.28	0.27	0.26
Volatility-weighted	0.28	0.19	0.19
Persistence-weighted	0.38	0.37	0.36
CPI	0.58	0.72	0.72

The table shows the mean square error (MSE) between the 12-month rise in the different indicators of underlying inflation and a 25-month moving average of 12-month CPI inflation. We have calculated MSE for the period from January 1983 and January 1993, respectively, to December 2004. In the last column, the series are adjusted so that they have the same average before MSE is calculated.

Table 3. Volatility of the various indicators and CPI inflation

	1983– 2005	1993– 2005
CPI-ATE	0.26	0.18
CPI-ATED	0.28	0.22
CPI-AT	0.40	0.44
CPI-AE	0.29	0.25
Trimmed mean (20 %)	0.28	0.25
Trimmed mean (10 %)	0.29	0.26
Weighted median	0.41	0.32
Exclu. most volatile (10 %)	0.29	0.24
Exclu. most volatile (20 %)	0,28	0.23
Volatility-adjusted	0.28	0.25
Volatility-weighted	0.25	0.21
Persistence-weighted	0.33	0.29
CPI	0.43	0.47

The volatility is calculated as the standard deviation of monthly change in the 12-month rise of the various indicators. We have looked at the volatility from January 1983 and January 1993, respectively, to December 2005.

Of the indicators used by Norges Bank, the trimmed mean (20 per cent) has been closest to the moving average both in the entire period from January 1983 to December 2004 and in the shorter period from January 1993 to 2004. Among the new indicators, the volatility-weighted indicator has tracked the moving average very closely. In the period from 1993 to the end of 2004, this indicator has the lowest MSE of all the indicators. The deviation between the weighted median and the moving average has been considerably wider.

With this test, indicators that have a lower average than the CPI over time will be systematically punished. From Section 4.1 we already know, for example, that CPI-ATE inflation has been lower than CPI inflation over time. For this reason, it is interesting to examine if the different indicators have deviated from the moving average of CPI inflation over time only because their average has been different over time, or because they also have a different profile. We have therefore re-calculated the MSE after demeaning all the series. The results are shown in the last column of Table 2. Of all the indicators, the CPI-ATE performs best now. This can be interpreted to mean that CPI-ATE inflation has moved fairly closely in tandem with the moving average, but has often been somewhat lower.

4.3 Have the indicators varied less than CPI inflation?

The reason why many central banks focus on indicators of underlying inflation is that the CPI can show wide monthly swings. Consequently, an indicator of underlying inflation should be less volatile than the CPI. The volatility measure we have used to examine if this actually applies is the standard deviation of the monthly change in the 12-month rise in the respective indicators (see Table 3).

Most of the indicators in Table 3 have varied considerably less than the CPI both in the periods from January 1983 to December 2005, and in the period from January 1993 to December 2005. An exception is the CPI adjusted for tax changes, CPI-AT, which has only been marginally less volatile than the CPI in both periods. On the other hand, if only energy products are excluded, as in the CPI-AE, volatility is substantially lower. This illustrates that the price rise for energy products has contributed more to short-term variations in the CPI than changes in taxes.

The indicator adjusted both for tax changes and energy prices, the CPI-ATE, is the one that has varied the least from month to month of all the indicators in the period from 1993 to 2005. Of the indicators already used in Norges Bank, the weighted median has shown wider monthly variations than all the others. Among the new indicators, the volatility-weighted indicator has varied the least from month to month.

Sometimes an indicator of underlying inflation varies widely from one month to another. This may be due to temporary noise, but it may also change because the fundamental factors that determine inflation have changed. That an indicator typically shows small monthly variations does not necessarily mean that it is an accurate indicator of underlying inflation. The central question is if it is only noise, or also relevant information that is removed. The simple volatility measure we have used here cannot answer this question. In the next section we will attempt to shed further light on the different indicators' ability to strip out temporary disturbances.

4.4 Can the indicators predict future changes in CPI inflation?

As mentioned, Smith (2004) defined underlying inflation as the indicator that is the best forecaster of inflation. We have therefore tested to which extent the different indicators can contribute to predicting inflation. This is done by analysing if the deviation between underlying inflation and CPI inflation can at a given time explain future changes in CPI inflation.

In accordance with Catte and Sløk (2005), we estimate the coefficients α and β in the following equation:

$$\Pi_{t+k}^{CPI} - \Pi_t^{CPI} = \alpha + \beta(\Pi_t^{CPI} - \Pi_t^{U}) + \varepsilon_t \qquad (1)$$

We expect that the coefficient in front of the deviation between CPI inflation, Π^{CPI}, and underlying inflation, Π^{U}, in period t, will be negative and significant. The background for this is that if CPI inflation caused by a temporary shock is higher than underlying inflation at a given time, CPI inflation will fall in the following period. Therefore, the test indicates to what extent the underlying indicator neglects temporary disturbances and captures relevant new developments, as an accurate indicator of underlying inflation should. By allowing a constant term in the regression equation, α, it becomes possible for the CPI and underlying inflation to increase at a systematically different pace over time.[13] Ideally, the coefficient β should be equal to –1. This means that if, for example, total inflation is pushed up by a temporary disturbance in period t, the deviation between total and underlying inflation will be back to the average level k periods later.

We evaluate the different indicators according to the degree to which the difference between CPI inflation and underlying inflation explains the changes in CPI inflation 6, 12, 18 and 24 months ahead. This is measured by the different indicators' explanatory power, measured by R^2 in the estimated regression equation.[14]

In Table 4, the coefficient β and explanatory power R^2 are reported by the different horizons. We also report the average explanatory power over all horizons. Figures marked with * denote that the coefficient estimate was not significantly different from zero.[15]

The estimated coefficients were negative and significant for all the indicators, except the CPI-AT, 6, 12, and 18 months ahead. For the CPI-AT, the estimated coefficient was only significant at a horizon of 12 months, and the explanatory power of this indicator is generally lower. We see that particularly 6 months ahead many coefficients were near –1, while the estimates vary more with longer horizons.

At a horizon of 24 months, the following indicators had a significant correlation with the changes in CPI inflation: The indicators where the 10 and 20 per cent most volatile sub-groups in the CPI were excluded, the volatility-weighted indicator, the persistence-weighted indicator and the CPI-AE.

If we look at the average explanatory power at all horizons, as shown in the last column of Table 4, two of the new indicators perform best together with the CPI-AE. The volatility-weighted indicator and the indicator where the 10 per cent most volatile sub-groups are excluded both have an average explanatory power of 0.4. The two indicators perform consistently well in explaining future changes in CPI inflation for all time-horizons. The same applies to the CPI-AE.

The CPI-ATE has on average ranked fourth in terms of explanatory power. The CPI-ATE is particularly accurate 6 and 12 months ahead, and none of the other indicators perform better at these horizons. However, its explanatory power is somewhat weaker at the 18- and 24-month horizon.

Table 4. Estimates of coefficient β and explanatory power (R^2) in the regression equation.

	6 months		12 months		18 months		24 months		Average
	β	R^2	β	R^2	β	R^2	β	R^2	R^2
CPI-ATE	–0.95	0.20	–1.45	0.58	–0.86	0.28	–0.59*	0.17	0.36
CPI-ATED	–0.51	0.25	–0.79	0.34	–0.37	0.11	–0.12*	0.01	0.18
CPI-AT	–0.49*	0.05	–1.05	0.13	–0.36*	0.02	0.30*	0.02	0.05
CPI-AE	–1.07	0.41	–1.49	0.46	–1.00	0.29	–1.13	0.45	0.40
Trimmed mean (20 %)	–1.05	0.33	–1.72	0.53	–0.94	0.22	–0.36*	0.04	0.28
Trimmed mean (10 %)	–1.19	0.35	–2.01	0.58	–1.06	0.23	–0.39*	0.04	0.30
Weighted median	–0.55	0.18	–0.98	0.34	–0.59	0.17	–0.03*	0.00	0.17
Exclu. most volatile (10 %)	–1.10	0.42	–1.50	0.46	–1.02	0.30	–1.17	0.43	0.40
Exclu. most volatile (20 %)	–1.05	0.34	–1.25	0.36	–0.74	0.18	–0.78	0.21	0.27
Volatility-adjusted	–1.17	0.36	–1.59	0.39	–0.92	0.18	–0.72*	0.11	0.26
Volatility-weighted	–1.17	0.36	–1.84	0.52	–1.33	0.38	–1.24	0.36	0.40
Persistence-weighted	–1.05	0.23	–1.65	0.32	–1.34	0.30	–1.23	0.30	0.29

In the table, the coefficient estimates and explanatory power (R^2) are reported for the different indicators in the regression equation in (1). We have estimated the equation at a horizon of 6, 12, 18 and 24 months. The last column shows estimated average explanatory power over all horizons.

[13] We have examined whether the different indicators have risen at the same rate as the CPI in section 4.1.

[14] R^2 is a measure of the degree to which the variable on the right-hand side of the equal sign in the regression equation explains the variation in the left-hand side variable. R^2 will always be between 1 and 0, with 0 as minimum and 1 as maximum.

[15] In order to take account of possible heteroskedacity and autocorrelation in the residuals, we have estimated the covariance matrix using the method proposed by Newey and West (1987).

Once again, the weighted median performs relatively poorly, with an average explanatory power of 0.17, which is lower than half of the average explanatory power of the best indicators.

4.5 Comparisons with international studies

The indicators that perform best in the tests in similar international studies vary from country to country and from one period to another.

Catte and Sløk (2005) find that the indicators where volatile components were given less weight are closest to trend inflation[16] in the US and Japan, while the trimmed mean has been closest to trend inflation in the euro area and the UK. Rich and Steindel (2005) only look at US figures and find that a weighted median that is exponentially smoothed[17] has been closest to trend inflation.

When Catte and Sløk (2005) tested whether the deviation between core inflation and total inflation can predict future changes to aggregate inflation, the traditional indicators excluding food and energy performed best in the US. In the euro area the weighted median performs best, and in the UK the trimmed mean and a volatility-weighted indicator produce the best results. Rich and Steindel (2005) concluded that the weighted median and a weighted median that is exponentially smoothed have the greatest explanatory power in the US.[18]

5 Summary

The volatility-weighted indicator has generally performed well in the empirical tests in this article. The indicator has increased at approximately the same rate as the CPI. It has been among the least volatile of the indicators we have examined and has been closest to a moving average of the CPI. None of the other indicators has made a greater contribution to accounting for future changes in CPI inflation.

However, the volatility-weighted indicator also has clear weaknesses. First, it is constructed in a fundamentally different way to the consumer price index in that there is no relationship between the weight each sub-group is given and the sub-group's share of a typical household's expenses. Second, the volatility-weighted indicator is more difficult to understand intuitively than indicators where, for example, certain product groups are permanently excluded.

Nor is there any agreement in the literature as to whether the empirical tests that we have carried out are the "proper" tests (see Robalo Marques et al. (2003) for a further discussion). This suggests that one should be cautious about placing too much emphasis on the results. Nevertheless, we believe that this study has produced a number of useful answers. The indicator that has been most frequently used by Norges Bank, the CPI-ATE, performs reasonably well in the majority of the tests but, over time, it has increased at a slower rate than the total consumer price index. Advantages of the CPI-ATE are that it is relatively simple for the general public to understand, and that it is already established and recognised as an indicator of underlying inflation. The trimmed mean (both 10 and 20 per cent) also produced relatively good test results, while the results for the weighted median were less satisfactory.

The indicator that was only adjusted for tax changes, the CPI-AT, was very volatile. It did not track the moving CPI average well, and it made a limited contribution to explaining future changes in CPI inflation. This indicates that an indicator of underlying inflation where components are excluded permanently should be adjusted for more than only tax changes.

Our conclusion is that there is no single indicator that can be a perfect measure of underlying inflation at all times. Different indicators perform best in different tests. For example, the CPI-ATE followed the moving CPI average closest when we demeaned the series, while the volatility-weighted indicator was among the best in terms of explaining future changes in CPI inflation. The results of this study have also shown that the choice of time period may be of significance for an indicator's performance in the different tests. For example, for the entire period from1983 to 2004 it was the trimmed mean (20 per cent) that was closest to the moving CPI average, but this indicator did not perform as well during the period from 1993 to 2004.

Since the information content of the different indicators may vary over time, a central bank should follow several indicators of underlying inflation. If the various indicators provide fairly unambiguous signals about underlying inflation at a given point in time, it may indicate that the degree of uncertainty is low. If the different indicators deviate considerably, it is a sign that the uncertainty surrounding underlying inflation is greater. The central bank should then place additional emphasis on understanding the deviations between the different indicators. In order to illustrate that underlying inflation is uncertain at a given point in time, an uncertainty interval for underlying inflation was introduced in Norges Bank's *Inflation Report 2/06*.

The level of underlying inflation at a given point in time ultimately becomes a matter that must be decided with the help of the central bank's discretion. Various mechanically measured indicators can be useful aids in exercising this discretion.

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17 See Cogely (2002) for an introduction to this method.

18 Rich and Steindel (2005) analyse data back to 1960. Catte and Sløk only look at figures dating back to 1984.

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Tables

Norges Bank publishes more detailed and updated statistics on the Internet (www.norges-bank.no). The advance release calendar on the website shows when new figures for the statistics in question will be released.

Standard symbols:

. Category not applicable
.. Data not available
... Data not yet available
– Nil
0 } Less than half the
0.0 } final digit shown

Table 1. Norges Bank. Balance sheet. In millions of NOK

	31.12.2004	31.12.2005	31.08.2006	30.09.2006
Financial assets	**1 287 865**	**1 744 575**	**1 941 636**	**2 046 393**
International reserves	268 360	318 163	313 171	327 922
Investments for the Government Pension Fund - Global	1 015 471	1 397 896	1 618 758	1 711 271
Other assets	4 034	28 516	9 707	7 200
Liabilities and capital	**1 287 865**	**1 744 575**	**1 941 636**	**2 046 393**
Foreign liabilities	51 167	63 332	95 959	101 118
Deposits Government Pension Fund - Global	1 015 471	1 397 896	1 618 758	1 711 271
Notes and coins in circulation	47 595	51 910	48 763	48 332
Other domestic liabilities	126 330	162 815	111 531	110 399
Capital	47 302	68 622	66 625	75 273

Source: Norges Bank

Table 2. Norges Bank. Investments for Government Pension Fund - Global. In millions of NOK

	31.12.2004	31.12.2005	30.06.2006	30.09.2006
Total investments	**1 015 471**	**1 397 896**	**1 504 420**	**1 711 262**
Fixed income securities	631 256	682 024	746 861	1 005 701
Equities	407 673	576 683	600 826	682 149
Lending (reverse repos etc.)	380 117	558 979	689 872	664 740
Borrowing (repos etc.)	-406 194	-438 717	-529 545	-623 527
Other investments	2 619	18 927	-3 594	-17 801

Source: Norges Bank

Table 3. Banks. Balance sheet. In millions of NOK

	31.12.2004	31.12.2005	31.08.2006	30.09.2006
Financial assets	**1 805 276**	**2 137 694**	**2 445 655**	**2 514 608**
Cash and deposits	87 227	128 597	139 704	154 763
Bonds and notes	147 597	162 842	200 704	207 974
Loans to the general public	1 303 655	1 542 683	1 722 472	1 743 325
Other loans	155 110	191 165	223 839	240 972
Other assets	111 688	112 407	158 935	167 574
Liabilities and capital	**1 805 276**	**2 137 694**	**2 445 655**	**2 514 608**
Deposits from the general public	844 782	928 045	1 037 720	1 051 528
Other deposits from residents	83 408	108 476	102 566	96 102
Deposits from non-residents	209 277	309 878	416 720	428 973
Bonds and notes	422 430	499 844	563 831	600 955
Other liabilities	134 779	169 321	186 293	197 124
Capital and profit / loss	110 600	122 130	138 525	139 926

Source: Norges Bank

Table 4. Banks. Loans and deposits by public sectors. In millions of NOK

	31.12.2004	31.12.2005	31.08.2006	30.09.2006
Loans to:	**1 303 655**	**1 542 683**	**1 722 472**	**1 743 325**
Local government (incl. municipal enterprises)	2 832	2 562	3 221	2 904
Non-financial enterprises	362 765	436 976	514 484	524 324
Households	938 058	1 103 145	1 204 767	1 216 098
Deposits from:	**844 782**	**928 045**	**1 037 720**	**1 051 528**
Local government (incl. municipal enterprises)	34 731	37 661	41 233	41 778
Non-financial enterprises	268 049	314 792	372 951	383 524
Households	542 002	575 592	623 536	626 227

Source: Norges Bank

Table 5. Profit/loss and capital adequacy. Per cent of average total assets

	2004	2005	2006 Q 2	2006 Q 3
Interest income	4,2	4,4	4,7	4,7
Interest expenses	2,4	2,7	3,1	3,2
Net interest income	1,8	1,7	1,5	1,5
Operating profit before losses	1,1	1,2	1,1	1,1
Losses on loans and guarantees	0,1	-0,1	-0,0	-0,1
Ordinary operating profit (before taxes)	1,1	1,3	1,1	1,1
Capital adequacy	12,2	11,9	11,4	11,2
- of which core capital	9,8	9,6	8,9	8,5

Source: Norges Bank

Table 6. Banks. Average interest rates on NOK loans and deposits. Per cent per annum

	31.12.2005	31.03.2006	30.06.2006	30.09.2006
1. Loans (1)	4,02	4,06	4,22	4,40
2. Deposits (2)	1,62	1,78	1,97	2,22
Interest margin (1 - 2)	2,40	2,28	2,25	2,18

Source: Norges Bank

Table 7. Securities registered with the Norwegian Central Securities Depository (VPS), by issuing sector. Nominal values. In millions of NOK

	Interest-bearing securities		Equities	
	31.12.2005	30.09.2006	31.12.2005	30.09.2006
Total	**718 550**	**780 942**	**134 050**	**141 733**
Central government	207 622	224 970	0	0
Banks	245 637	249 755	32 282	32 246
Other financial institutions	67 489	66 217	20 224	20 210
Public non-financial enterprises	29 773	35 187	17 522	17 305
Private non-financial enterprises	62 818	83 030	52 718	58 685
Other resident sectors	71 428	67 192	197	197
Non-residents	33 784	54 391	11 107	13 089

Sources: Norwegian Central Securities Depository and Norges Bank

Table 8. Securities registered with the Norwegian Central Securities Depository (VPS), by holding sector. Estimated market values. In millions of NOK

	Interest-bearing securities		Equities	
	31.12.2005	30.09.2006	31.12.2005	30.09.2006
Total	**747 764**	**801 353**	**1 529 404**	**1 761 165**
Central government	46 137	51 574	466 511	495 669
Banks	105 117	129 133	13 728	18 323
Insurance companies	288 338	285 857	42 334	39 025
Mutual funds	95 637	101 152	55 723	57 685
Other financial enterprises	8 534	8 336	27 366	30 132
Private non-financial enterprises	36 408	35 798	266 592	354 733
Households	35 610	36 067	77 094	75 260
Other resident sectors	42 659	45 099	17 647	19 767
Non-residents	89 326	108 337	562 410	670 571

Sources: Norwegian Central Securities Depository and Norges Bank

Table 9. Credit indicators and money supply. In billions of NOK and per cent

	Stock	Growth last 12 months. Per cent		
	31.10.2006	31.08.2006	30.09.2006	31.10.2006
C2, credit from domestic sources	2 544	14,8	15,0	14,6
C2, households	1 534	12,8	12,9	12,8
C2, non-financial enterprises	832	20,7	21,6	20,4
C2, local government	179	6,6	6,0	4,9
Total credit from domestic and foreign sources, C3 [1]	2 982	13,8	...	…
Narrow money M0	66	-25,2	-21,7	15,7
Broad money M2	1 178	11,9	11,4	12,3
M2, households	663	5,7	6,6	6,5
M2, non-financial enterprises	392	33,6	30,1	32,8

[1] C3 as at 31.08.2006

Source: Norges Bank

Table 10. Household financial account. Transactions in billions of NOK

	2004	2005	2006 Q 1	2006 Q 2
Currency and deposits	28,0	36,4	15,3	39,1
Equities and primary capital certificates	39,8	37,8	-0,8	1,1
Mutual fund shares	-0,5	30,6	-8,7	-4,3
Insurance technical reserves	52,3	56,2	25,0	3,1
Other assets	28,1	42,7	13,2	-8,9
Net acquisition of financial assets	147,7	203,7	44,0	30,1
Loans from banks	113,8	134,0	30,5	44,2
Other loans	17,6	31,6	3,9	0,8
Other liabilities	3,5	-3,4	-7,8	7,4
Net incurrence of liabilities	134,8	162,2	26,6	52,4
Net financial investments	12,9	41,5	17,4	-22,3

Source: Norges Bank

Table 11. Consumer price indices. 12-month growth. Per cent

	2005:12	2006:08	2006:09	2006:10
Norway (CPI)	1,8	1,9	2,6	2,7
Norway, adjusted for tax and excluding energy products	0,9	0,4	0,5	0,7
US	3,4	3,8	2,1	...
Euro area	2,2	2,3	1,7	...
Germany	2,1	1,7	1,0	...
UK	2,2	3,4	3,6	...
Sweden	0,9	1,6	1,5	...

Sources: Statistics Norway and IMF

Tables previously published in *Economic Bulletin*

The Statistical Annex in *Economic Bulletin* has been reduced with effect from no. 1/06. The following is a list of tables published up to and including no. 4/05, with website references.

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Returadresse:
Norges Bank
Postboks 1179 Sentrum
N-0107 Oslo
Norway

Economic Bulletin No. 4 - December - 2006

ISSN 0029-1676