

Norway¹

Øyvind Eitrheim, Central Bank of Norway

Work on historical monetary statistics (HMS) at the Central Bank of Norway started in the 1990s. We were inspired by the Bank of England's work on collecting data for UK inflation over 300 years, which appeared in connection with its tercentennial in 1994. In 2001, the Central Bank of Norway's HMS project was extended and contributions from a national network of academic experts were commissioned. This project laid the basis for the construction of composite long-run historical time series for credit, interest rates and housing prices for Norway. The aim was to cover as much as possible, based on available sources, of the past two centuries, since the Central Bank of Norway was established in 1816. We also included in the project a host of historical data in areas such as consumer prices and exchange rates, monetary aggregates, stock price indices, nominal wages and real variables such as GDP and its components, which were all documented in two books (Eitrheim et al (2004, 2007)).

The "Norges Bank Bicentenary Project 1816–2016" has produced four books and more than 60 research publications, which are available from the Central Bank of Norway's website. The bank established contacts with an international network of economic historians and were fortunate to have Professor Michael Bordo and Professor Marc Flandreau as academic consultants during the entire project. This international network of economic historians has been instrumental in bringing together researchers within and outside the central bank community and has stimulated work; this historical monetary and financial statistics (HMFS) project is a good example. Another example is the book *Central Banks at a Crossroads. What Can We Learn from History?* (edited by Bordo et al (2016)). The bicentenary project also stimulated further works on collecting historical data for Norway, many of which were presented in the book, *A monetary history of Norway, 1816–2016* (Eitrheim et al (2016)). The data will be documented in a forthcoming book, *Historical monetary and financial statistics for Norway* (hereafter *HMFS for Norway*), edited by Eitrheim et al (2022). The Central Bank of Norway will continue its work in the area of monetary and central bank history and this work will lay the foundation for further research. This is anchored in a strategy document approved by the Executive Board. The Central Bank of Norway HMFS database is updated and managed by the bank's Data Management unit (with some expert assistance). The data are used by top and senior management (in briefings and speeches), as well as by Central Bank of Norway staff (in analytical work), and for research purposes. Data are also used by the bank's Communications Department (again with some expert assistance). The Central Bank of Norway HMFS database is publicly available in spreadsheet format (XLSX) and tables (HTML) and can be found on the Central Bank of Norway website.²

¹ The views expressed are those of the author and do not necessarily reflect the views of the Central Bank of Norway.

² www.norges-bank.no/en/topics/Statistics/Historical-monetary-statistics/

1. Background

Norway's 1814 Constitution and political system

Before 1814, Norway was in a tight union with Denmark. Norway became a constitutional monarchy in 1814 after the dissolution of the Dano-Norwegian union. Shortly after the Treaty of Kiel of January 1814, a Constitutional Assembly was hastily called for, which finished its work on Norway's Constitution on 17 May 1814. After a short war, Norway entered a loose union with Sweden in the autumn of 1814 but retained its Constitution and national institutions like its Parliament, Supreme Court, a separate monetary system and a bank of issue, which led to the establishment of the Central Bank of Norway in 1816. Hence, it is fair to say that Norway enjoyed a considerable degree of independence in the union with Sweden. The revised Constitution, which took effect on 4 November 1814, had new paragraphs which underlined this independence, for example, that Norway should be solely responsible for its national debt (§93) and that it should keep its own bank and monetary system (§110), for which statutes were left to the Norwegian Parliament to decide. From 1884 on, Norway became a parliamentary democracy. In 1905, Norway left the union with Sweden and has since been an independent sovereign country.

A Tabular Office was established in the Ministry of Finance in 1832, quinquennial reports of the county governors were published from 1835 on and the first statistical overview for Norway appeared in Schweigaard (1840). A permanent Central Bureau of Statistics (today known as Statistics Norway) was established in 1876.

Currency unit and monetary regime

Norway's currency unit today is the kroner. When the Central Bank of Norway was established in 1816, the speciedaler was introduced as the country's new currency unit, which replaced the currency units previously used during the Dano-Norwegian union. From 1818 onwards, the Central Bank of Norway enjoyed monopoly rights to issue speciedaler banknotes. The speciedaler was later replaced with the kroner from 1874 onwards. In 1875, Norway joined Denmark and Sweden in the Scandinavian Currency Union (SCU). Therefore, since 1874 the krone has been the currency unit in all three Scandinavian countries, even after the break-up of the SCU shortly after the First World War, and it still is.

Norway's monetary system was in a state of chaos after the Napoleonic Wars in Europe and had to be rebuilt from scratch. The establishment of the Central Bank of Norway as the country's bank of issue in 1816 was the beginning of a lengthy process of repairing Norway's monetary system. The start was difficult. It took 26 years to fulfil the promise, which was written into the Central Bank of Norway Act of 1816, that its banknotes should be redeemable in silver coins at par value. After this was successfully restored in 1842, Norway enjoyed a stable monetary regime until the dawn of the First World War. From 1874 the monetary regime changed rather smoothly to the gold standard, and in 1875 Norway entered into the SCU, which lasted until gold convertibility was suspended in 1914. As a neutral country, Norway benefited economically during the First World War from its exports of fish and minerals, and from its merchant fleet, which earned huge war dividends. The interwar years were turbulent times. Norway aimed to restore the prewar gold parity but only managed to do so in 1928 after a troublesome decade which started with a deep postwar recession followed by a severe banking crisis. When the United Kingdom abandoned the gold standard in 1931, Norway followed suit. After first pegging to

the pound sterling in 1933, Norway switched to a US dollar peg from 1939. Norway joined the post-Second World War Bretton Woods system of fixed exchange rates in 1946. In 1949, Norway again followed the United Kingdom and devalued the krone by 30% against the US dollar. The monetary regime in the postwar economy in Norway rested on low interest rates, credit rationing and financial repression. Interest rates were administered by the Ministry of Finance until the 1980s. After the Bretton Woods system collapsed in the early 1970s, Norway entered into the European snake agreement. In late 1978, Norway left the European snake for a unilateral system in which the krone was linked to a trade-weighted basket of international currencies. After a decade, with 10 devaluations, the Central Bank of Norway was, in 1986, again given the authority to set the key policy interest rate to defend a fixed exchange rate level. In 1990, Norway unilaterally decided to tie the krone to the European Currency Unit (ECU). After the European exchange rate mechanism (ERM) broke up in 1992, Norway had floating exchange rates until a managed float regime was introduced in 1994. Norway introduced inflation targeting *de facto* in 1999 and *de jure* in 2001. In 2018, the inflation target was reduced from 2.5% to 2% growth in consumer prices over time.³

Banking system and other financial institutions

During the Dano-Norwegian union, Denmark had blocked all attempts to establish banks in Norway. The Central Bank of Norway therefore became the first Norwegian banking institution that provided credit to the population. Until the middle of the 19th century, the Central Bank of Norway acted predominantly as a mortgage lender, whereas discount loans accounted for less than 20% of credit granted by the Central Bank of Norway before 1850. As the banking system developed, with savings banks from 1822 and commercial banks from 1848, the Central Bank of Norway's role changed from being *the* bank to become *a* bank *among other* banks. A state-owned mortgage bank (Hypotekbanken) was created in 1851. The Central Bank of Norway's mortgage portfolio was gradually reduced and the bank specialised in providing short-term loans to private customers in the discount market. However, it was not until the turn of the century that the Central Bank of Norway predominantly provided liquidity to other banks, thus completing its transition from being a bank *among other* banks to becoming a bank *for* the other banks – a central bank. A pivotal event was the 1899 Christiania crash in the capital's property market, which triggered a local banking crisis. The Central Bank of Norway acted forcefully in this situation as the lender of last resort to troubled banks.

The 19th century constituted a period of continuous growth in the Norwegian banking system. At the start of the First World War, there were 650 banks in the country, of which 125 were commercial banks. Four years later, after the financial boom during the First World War, there were 750 banks, of which 200 were commercial banks. This rapid expansion did not end well. A deep postwar recession soon developed into a systemic banking crisis. The Central Bank of Norway, which had only passively observed the build-up of the financial bubble, became the key institution in managing the crisis during the 1920s. The commercial banking system almost collapsed and continued to shrink its aggregate lending until the mid-1930s. The Second World War and German occupation had a strongly negative effect on commercial and savings banks, and the run-down of their loan portfolios continued

³ Alstadheim (2016) provides an overview over exchange rate regimes in Norway. See also Eitrheim et al (2016), Section 1.10, pp 37–45.

during the war years. After the Second World War, the monetary policy regime changed dramatically, as interest rates below market clearing levels required some form of credit rationing. The government's priorities in funding persistently high levels of real investments – in housing, hydroelectric power and export-oriented manufacturing industries – were met by channelling funds through a growing state banking sector, whereas financial repression restricted the expansion of the private banking sector. With excess demand for credit, the banks could cherry-pick borrowers. No banking crisis took place until the aftermath of the financial deregulation of the 1980s.

Banking regulations and supervision

The first banking laws in Norway date back to 1824 when the first Savings Bank Act took effect. This was two years after the first savings bank, Christiania Sparebank, had been established in 1822.⁴ The first commercial bank, Christiania Bank og Kredittkasse, was established in 1848. According to the liberal ideology of the time, it operated freely in the same way as other non-financial firms. In other words, commercial banks were not subject to any specific regulations or supervision. The first legislation for limited liability companies was introduced as late as 1910. A preliminary Commercial Banking Act was introduced during the First World War but it was in 1924, several years into the postwar banking crisis, that comprehensive banking acts for both savings and commercial banks were first introduced. The equity capital requirement for commercial banks was set at 9%. For savings banks, the law did not state equity capital requirements explicitly but it included regulations about deposit insurance, which had first been introduced as a voluntary arrangement but was stipulated in the Savings Bank Act from 1924.

Before the banking crisis in the 1920s, there was only limited monitoring of banks. From 1900 onwards, an Inspectorate for savings banks was gradually built up. In order to help the Central Bank of Norway manage the crisis, an Administration Act was introduced in 1923 under which troubled banks were placed in a form of receivership for the orderly liquidation of insolvent banks. In 1924, a Banking Inspectorate was established to oversee both savings banks and commercial banks. In 1961, there was a new overhaul of the Savings Banks Act and the Commercial Banking Act, and at this time mandatory deposit insurance was also introduced for commercial banks, a voluntary arrangement having been in place since 1938.

There was little focus on banks' capital adequacy in the post-war Norwegian economy. In fact, the equity capital requirement for commercial banks was reduced in this period, first to 8% when the Commercial Banking Act was revised in 1961 and later to 6.5% in the 1972 revision. Commercial banks mostly did not meet these requirements before 1972, and in order to help banks fulfil the requirements the government accepted larger volumes of subordinated debt as part of the banks' equity capital. On-site bank supervision had declined to a level near zero in the midst of the 1980s. In 1986, the Banking Inspectorate, which from 1983 onwards also included the Securities Commission, was merged with the Insurance Council, thereby creating a fully integrated national institution for regulation and supervision of financial markets, today known as the Financial Supervisory Authority of Norway.

⁴ Approved savings banks enjoyed certain privileges as they were exempted from the usury legislation and could charge a maximum of 5% interest on mortgages instead of 4% (Knutsen and Ecklund (2000)).

Banking and financial crises

The last 150 years have witnessed several banking and financial crises in Norway. The financial crisis of 1857–58 was the first – later there were local banking crises which erupted in 1864 (the Oppland crisis) and 1886 (the Arendal crisis).⁵ A more severe banking crisis followed in the aftermath of the Christiania⁶ real estate crash in 1899,⁷ after which six newly established banks in the capital Christiania were liquidated and the Central Bank of Norway stepped in as lender of last resort to support the monetary system.⁸ The post-First World War banking crisis 1920–28 (systemic in nature during 1921–23), represented a threat to overall financial stability.⁹ This was also the case for the 1988–93 banking crisis which followed deregulation of the financial markets in the 1980s (systemic in nature during 1991–92).¹⁰

2. Credit

Today, monthly data for credit to the general public are available online from Statistics Norway. The data start in the 12th month of 1985, and the data differentiate between domestic and foreign debt. The types of credit cover loans from banks and credit companies, and debt securities (bonds and certificates) as well as debt originating from insurance companies, pension funds and other sectors. Statistics Norway also publishes quarterly data on financial accounts across institutional sectors, which provides a comprehensive and consistent overview of the sectors' assets and liabilities. The data start in the fourth quarter of 1995, but it is possible to combine these data with data from the fourth quarter of 1975, which originated from a model project undertaken in the Central Bank of Norway in the 1980s.

For the years before 1975, the story is less straightforward. Eitrheim et al (2004) provided an overview of historical data for the credit from domestic financial sectors, based on available sources at that time. Bank lending from savings banks was available only at five-year intervals from 1840 to 1865, thereafter annually from 1869 onwards. Bank lending from commercial banks was available annually from 1848 onwards. For both groups, coverage was incomplete. Klovland (2007a,b) presented a complete set of annual bank lending data for savings banks and commercial banks, respectively, during the nineteenth century.

Credit across different lending sectors

Loans from the Central Bank of Norway

The Central Bank of Norway's balance sheets are available from 1818 and distinguish between three types of loans: secured mortgage lending using fixed property as collateral, discount lending on private securities (bills of exchange and bill bonds) and the redemption loan to the Temporary Riksbank in connection with the changeover

⁵ Hodne and Grytten (2000, p 156).

⁶ Christiania changed its name to Oslo in 1924. A Norwegian spelling, Kristiania, had been used since 1877.

⁷ See Brunnermeier and Schnabel (2016).

⁸ Eitrheim et al (2016), Section 6.6, pp 237–51.

⁹ Ibid, Section 8.3, pp 310–20.

¹⁰ Ibid, Section 14.3, pp 532–41.

from riksbankdaler banknotes to speciedaler banknotes in 1817–19. Annual balance sheet data for the Central Bank of Norway will be published in Chapter 2 in *Historical Monetary and Financial Statistics for Norway* (Eitrheim et al (2022)).

Loans from savings banks

Savings banks were quantitatively the most important group of financial intermediaries in Norway in the nineteenth century (Klovland (2007a)). Commercial banks gradually increased their share of the business of banking, surpassing the savings banks in 1898 in terms of loans to the public, but only in 1915 with respect to the volume of deposits held by the public. Some of the savings banks were relatively large by Norwegian standards; in 1870, for example, there were six savings banks among the 10 largest banks in the country.

The great majority of savings banks were chartered banks, ie they were given permission by the government to operate as savings banks according to the Savings Bank Act of 1824 by applying for approval of their statutes. From 1845 the quinquennial reports of the County Governors (Amtmennes Femårsberetninger) contain statistics relating to nearly all savings banks, excluding only a few unchartered or newly established banks.¹¹ The information given was restricted to deposits, equity and total balances. There was generally less information available for the asset side of the balance sheet. However, since savings banks had a relatively simple and stable structure of their balance sheet, Klovland (2007a) provided estimates of loans and other assets which are considered by the author to be valid and reliable. Because the total balance for savings banks was known with a reasonable degree of precision, a residual item on the liability side, other funds, is also available.

In the existing Savings Bank Statistics (SBS), the practice of including the few unchartered banks varies from bank to bank and over time. In a few cases it is a matter of judgment whether a bank should be classified as a savings bank since some of the banks in question were organised with some of the features of a commercial bank.

The first year covered by the annual SBS is 1869, which thus marks a watershed regarding sources of balance sheet data. From 1870 to 1879 the statistics were published by the Ministry of Finance. The quality of the statistics was markedly improved when Statistics Norway took over responsibility for collecting the data and producing the SBS in 1880. There are several problems with the SBS prior to 1881 that had to be dealt with to obtain a satisfactory database for these years. Klovland (2007a) reconstructed balance sheet data for individual savings banks from archives, anniversary publications, contemporary newspapers etc. The National Archive and its regional branches are important sources of data prior to the annual SBS. The National Archive is the repository for documents the savings banks were required to report annually to the Ministry of Finance from 1861 onwards.

Loans from commercial banks

Commercial banks were organised as limited liability companies, and in accordance with the liberal ideology of the time, they were supposed to operate freely just as any other non-financial firm. Placing deposits at commercial banks was supposed to be at depositors' own risk. Hence, commercial banks were not subject to any regulation

¹¹ In 1861 all savings banks were required to report their accounts to the Ministry of Finance annually (Egge (1972, p 132)).

or supervision. There were also no uniform accounting and disclosure standards in place. The first Act of Parliament concerning limited liability companies – which implied regulation of the establishment, organisation, operation, management etc of commercial banks – was introduced as late as 1910.

The reconstruction of balance sheet items of individual banks is a difficult task for various reasons. In 1877, Statistics Norway began publishing annual data on selected items of the balance sheets of the main commercial banks. The data on deposits and equity of the banks which are included in the statistics are reliable, but the loan series covers only bills, which did not account for more than roughly two thirds of total loans. In earlier years, data on commercial banks were presumably not collected systematically by the authorities, or at least they cannot be found in available sources.

Matre (1992) presented figures on deposits and loans for commercial banks before 1900, which represented a significant improvement over the existing data provided by Statistics Norway. Klovland (2007b) reported revised and improved data for *deposits, equities* and *loans* for all commercial banks from 1848 to 1918, based on hitherto unused sources for individual banks, including data from the regional branches of the National Archive, and information from local newspapers, anniversary publications and in publications from Statistics Norway.

In contrast to savings banks, which published reasonably complete balance sheets in this period, many commercial banks seem to have adopted a policy of secrecy, giving the public only partial or, sometimes, no information at all about their balance sheet. Due to this incompleteness of published balance sheets for many commercial banks before 1900, only crude estimates of their total assets have previously been available. Improved estimates of the total balance of commercial banks before 1918, including some revisions to their total loans, are reported in Eitrheim and Klovland (2022) in *HMFS for Norway*. This has allowed the author to present estimates of two residual items, *other assets* and *other funds*, respectively, for commercial banks.

Data on loans from savings banks and commercial banks in Norway were collected in the first two volumes of the Central Bank of Norway's HMS project, starting when the first savings bank was established in 1822. Balance sheet data for individual savings banks (1822–75) and individual commercial banks (1848–1900) were documented in Klovland (2007b), and national loan aggregates covering almost two centuries were documented in Eitrheim et al (2007). Monthly data on private bank loans have been collected from 1913 onwards, see Eitrheim and Klovland (2022).

Loans from state banks

The first Norwegian state bank was established in 1828 in the form of regional state discount commissions. The commissions were organised by the Ministry of Finance to distribute a state loan to private borrowers during a period of financial distress. A new state bank, Hypotekbanken (the state mortgage bank) went into operation in 1852 and gradually took over as the main provider of mortgage loans. After the Second World War more state banks were established in support of the new economic and political regime based on low (real) interest rates, credit rationing, private banks subject to financial repression and a growing state banking sector, which would play an increasingly central role in the allocation of credit to areas of political priority. Annual data for state bank lending in Norway from 1828 onwards are documented in Eitrheim and Klovland (2022).

Credit across different borrowing sectors

Credit to the general public, the private non-financial sector

Whereas a complete set of annual data for the total supply of loans from different domestic financial sectors, ie from the Central Bank of Norway, savings banks, commercial banks, state banks, credit companies and financial companies, are now available from 1818 onwards (Eitrheim and Klovland (2022)), information on the debtor sectors is much more scarce. Historical data for broad credit indicators, ie estimates of total credit to the general public when we take into account all types of credit to the private non-financial sector, are available from 1899 onwards in Skånland (1967). Such broad credit indicators include loans from other sectors such as insurance companies and public funds, plus bond market credit and credit from abroad.

We should also take note of the fact that while banks play a central role in Norway's credit markets today, credit has not always been bank-centred historically, and that non-bank lending, which for some reason has gone under the radar, creates the potential for unmeasured credit.

Central government debt

Historical data for central government debt in Norway are available from 1814 onwards, including estimates of the debt to Denmark which was a consequence of the breakup of the Danish-Norwegian union in 1814. Annual data for government debt (in domestic and foreign currencies) are documented in Eitrheim and Fevolden (2022b).

Where information is scarce: non-bank lending

Before banks were established in Norway in the 19th century, from 1816 onwards, credit intermediation took place within the private sector, for example between citizens in the form of peer-to-peer lending or trade credits. There were merchant bankers in Norway who specialised in facilitating payments for trade in imported and exported goods using (international) bills of exchange or bill bonds. Collateralised mortgage loans were registered at public notaries. The financial instruments defined, respectively, a short-term market, a medium-term market and a mortgage market for credit. International merchant houses in cities like Copenhagen, Hamburg and London were important sources of financing of international trade. A detailed study of credit flows between Hamburg/Altona and Norway in the period 1814–60 is provided by Tveite (1963).

One question we ask is the following: when the banks appeared, such as the Central Bank of Norway, state banks, savings banks and commercial banks, did they replace this non-bank credit market or did they create new credit? We have to acknowledge that this is still largely a black box and it is therefore difficult to gauge the total amount of credit in Norwegian society in the 19th century. More studies are therefore needed to shed light on this. Some sources have been investigated, at least partially, such as the protocols from public notaries, which were used to make crude estimates of regional mortgage lending from different sources – including the public sector, the Central Bank of Norway, savings banks, insurance companies, state banks and within the private sector – for selected years during the period 1823–65 (Hvidsten (2022)).

There are also hitherto unused sources, such as the other side of the Central Bank of Norway's balance sheet – the bank's customers who received discount loans in the 19th century. Furthermore, studies about wealthy families in Norway, like the Andresen family (Sogner (2012)), as well as research on merchant banks in Hamburg and London, could also be exploited.

3. Interest rates

Today, the Central Bank of Norway publishes interest rates in three areas: its key policy rate and the interest rates on standing facilities where banks can borrow reserves or deposit surplus liquidity overnight in the central bank; a weighted average interest rate on unsecured NOK loans between banks that are active in the Norwegian overnight market, denoted as the Norwegian overnight weighted average (Nowa)¹²; and yields on Norwegian government securities in the form of zero coupon yields.

The published zero coupon yields are estimated values based on observed effective yields on Norwegian Treasury bills (zero coupon securities) and government bonds (coupon securities).

Today, Norwegian financial reference rates are provided by Norwegian Financial References Ltd (NoRe) who is the administrator for Norwegian interbank offered rate (Nibor). Nibor interest rates are calculated and published by Global Rate Set Systems (GRSS) with maturities of one week, one month, two months, three months and six months. Daily data are available for subscribers. Monthly data are available for analytical purposes from the web-site of NoRe. Daily observations of historical money market interest rates are available at the Central Bank of Norway's web-site from 1982 (tomorrow-next rates) and 1986 (interest rates for one week to 12-months of maturity), respectively, until 2013.

Statistics Norway has published monthly data for a small subset of short-term interest rates which start in the first month of 2013, whereas quarterly data are available from the fourth quarter of 1979. Monthly data for interest rates on deposits and loans from private and public financial institutions are available from Statistics Norway's database starting in the first month of 2013, whereas quarterly data start in the fourth quarter of 1979. The remaining paragraphs in this section provide information about available historical data on interest rates in Norway.

Government bond yields

The first international loan to the newly reborn Kingdom of Norway was negotiated with the banking firm of Bennecke Brothers in Berlin in 1820. In the following century most long-term bond issues were raised abroad, and the main markets for Norwegian government bonds were initially to be found in Hamburg and Copenhagen, later also in London and Paris. From the First World War onwards, Norwegian government bonds were traded chiefly on the Oslo Bourse rather than abroad. But even before the First World War, there was a market for the bonds issued by Hypotekbanken (the state mortgage bank).

With one minor exception (Hypotekbank bonds in Christiania prior to 1881), all yield estimates are derived from market quotations on Norwegian bonds traded on the bourses of the main financial centres of Northern Europe (in the century until

¹² Norges Bank has been administrator of Nowa since January 2020.

1914) and in Christiania (beginning in 1881). Bond quotations are basically transcribed from contemporary newspaper sources before 1960; thereafter the official lists published daily by the Oslo Stock Exchange have been used.

Time series for bond yields have been constructed by Klovland (2004). In order to derive these yields there was a need to clarify the principles involved in (i) computing the yield on individual bonds, (ii) selecting which bonds to include in the samples from which monthly yield estimates are computed, and, finally (iii) the method used to estimate the yield for a given maturity. These issues are discussed in detail in Klovland (2004).

Money market rates

Information on the money market in Norway in the early period is confined mainly to the central bank discount market and the market for bank deposits. Short-term securities with a maturity of one year or less were not issued until treasury bills were introduced in May 1941, and even in this case there were no regular market quotations or well functioning secondary market until the treasury bill market was set up in 1985. A rudimentary money market can be traced back to the late 1950s, but it was only in the 1970s that eurokrone, interbank and other money market instruments began to be more fully developed. Eitrheim and Klovland (2007) give an overview over the different markets which have been of most importance for the implementation of monetary policy since 1818. Today the Central Bank of Norway uses the interest rate on sight deposits as its key interest rate.

Central Bank of Norway's discount rates, end-of-month data from October 1818

The Central Bank of Norway became operational from 1817 onwards with its head office located in Trondheim, a medium-sized city located in mid-Norway, and with branches in Norway's capital, Christiania,¹³ as well as in Norway's largest city at the time, Bergen, located on the west coast, and also in a small city in the south, Christianssand.¹⁴ These four units enjoyed substantial autonomy and each branch decided its discount rate on discounting short-term bills and bill bonds. In the 1830s two more branches were established in expanding areas in the vicinity of Christiania and they received their lending quotas from the Christiania branch. Whereas there were no restrictions on discount rates on short-term bills and bill bonds, mortgage rates were subject to usury regulations that mandated a maximum interest rate of 4%. These usury regulations were removed around 1885. Central Bank of Norway lending was predominantly long-term during the first decades, in the form of mortgage lending, and not, as would be typical for a central bank, in short-term discount lending. It was in the 1860s that discount loans first became the dominant form of loans from the Central Bank of Norway.

From 1850 onwards, the Central Bank of Norway expanded its activities and established new branch offices in many cities. For all Central Bank of Norway branches we have recorded monthly data for their discount rates on short-term bills and bill bonds from the beginning of their operations. From 1893 onwards, the Central Bank of Norway became more centralised and a nationwide discount rate was

¹³ Named Kristiania from 1877 and Oslo from 1924.

¹⁴ Named Kristiansand from 1877.

implemented. In 1897, the Central Bank of Norway's head office was moved to the capital Christiania and on the eve of the First World War, the Central Bank of Norway had fully developed its regional branch network which then numbered 20 branches outside the capital. For the period 1818–92, a national average of the Central Bank of Norway's discount rates is available using the discount lending across branches as weights, see Eitrheim and Klovland (2007) for details.

Other interest rates

Historical data for interest rates on bank deposits and bank loans are available online from Statistics Norway's database on a quarterly basis from the fourth quarter of 1979. Annual data back to 1955 were published by Statistics Norway on the basis of annual reports from savings banks and commercial banks to the Central Bank of Norway. Before 1955, information about historical interest rates on deposits and loans is scarce. Deposit rates for some individual banks back to 1822 were reported in Eitrheim and Klovland (2007), whereas Tuveng (1961) reports deposit rates and loan rates for selected banks and life insurance companies from 1860 to 1960. Crude estimates of average deposit rates back to 1900 have been reported in Statistics Norway (1994).

4. Housing prices

Today there are two main house price indices (HPIs) which are published on a regular basis in Norway. One is a *sales-weighted* monthly HPI which is produced in a private partnership between the main association of real estate agents in Norway, Real Estate Norway, and a private bank-owned firm called Eiendomsverdi AS. The second is a *stock-weighted* quarterly HPI, which is published by Statistics Norway. The differences in the weighting procedures mean that the two HPIs follow different trajectories. Both HPIs have a relatively short history. The quarterly HPI from Statistics Norway starts in the first quarter of 1992 and the monthly HPI from Eiendomsverdi AS starts in the first month of 2003.

Composite annual historical HPIs are available for four of the five largest cities in Norway: Oslo, Bergen, Trondheim and Kristiansand. For the period 1819–1985, we use repeat-sales HPIs for these four cities. An aggregate HPI for the country is also available for this period. The historical HPIs prior to 1985 are implicitly sales-weighted.¹⁵ An aggregate HPI for the country as a whole is available for this period too. The composite HPIs combine HPIs from different sources presented in the subsection below. Graph 5 in Eitrheim and Jobst (2022) illustrates, in the case of Norway, the different trajectories of *sales-weighted* and *stock-weighted* aggregate HPIs, respectively, for the country as a whole.

The splicing of HPIs based on *sales-weights* involves the combination of five types of HPI starting with repeat-sales HPIs before 1985, which are combined with HPIs produced in changing private sector partnerships, first between the Real Estate Agents Association (NEF) and the Norwegian Building Research Institute (NBRI), later in a partnership with a consultancy company, Econ (see Econ (2004) for an overview). Mix-adjustment HPIs are available for the late 1980s. These are combined with two types of hedonic HPI, one available on a quarterly basis from 1990 to 1996 and one

¹⁵ See Eitrheim and Erlandsen (2004, 2005) for details.

available on a monthly basis from 1997 to 2013. Later, from 2014 onwards, we have used the SPAR-type HPI produced by Eiendomsverdi AS.

The splicing of HPIs based on *stock-weights* from 1985 onwards involves first the mix-adjustment HPIs for the late 1980s, which are spliced with the quarterly hedonic HPIs produced by Econ from 1989 to 1991, until Statistics Norway's quarterly hedonic HPI is available from 1992 onwards.

Historical sources

1819–1989, repeat-sales HPIs

For the period 1819–1989, a set of HPIs were constructed from primary observations of actual sales recorded in the real property registers in Oslo, Bergen, Trondheim and Kristiansand using the weighted repeat-sales method, see Eitrheim and Erlandsen (2004, 2005). The data set covered transactions for the period from 1819 to 1989 for the sample as a whole. For the period prior to 1935, the real property registers are stored physically at the location of the regional state archive in each city; hence, the registers are stored at different geographical locations.

However, as all data about individual real properties are organised spatially by individual property unit numbers, the ledgers contain information about all recorded sales, including sales prices and sufficient information about house characteristics to estimate repeat-sales indices. Individual property identification codes (cadastral unit numbers) were in use from 1838 on. From 1935, the property ledgers have been made electronically available from digitised protocols, which can be downloaded from the webpages of Norsk Eiendomsinformasjon AS (today Ambita AS). This greatly facilitated the collection of repeat sales information for the individual properties used in the city samples. Today, it is the Norwegian Mapping Authority which operates the national registry for public property information in Norway (the new cadastre and the land registry).

The samples for the four cities start in different years in the 19th century, and they all end in 1989. The Bergen sample spans the longest period with annual observations from 1819, while the Trondheim sample covers the shortest, starting in 1897. For each of the cities except Kristiansand we have collected two samples of real properties; a sample of real properties with transaction data for the period up to 1935, and another for the period 1935–89. The samples for the two subperiods for each city, hereafter denoted the "first period" and the "second period" samples, respectively, are overlapping in the 1930s. The Kristiansand sample consists of the same real properties in both periods. For each sample we have tried to construct a representative sample of real properties in the inner part of each city, where we define the inner part to be inside, or just by, the pre-Second World War boundaries of the four cities.

The way of choosing the samples has varied between cities and sample periods. The first period sample of Oslo consists of all real properties in some streets in different parts of the inner city, while the corresponding Bergen sample contains a set of randomly chosen real properties. The real properties in the first period Trondheim sample have been chosen as a mixture of the Oslo and Bergen procedures. For these cities the second period samples consist of all dwellings of some housing types in some inner city areas. The Kristiansand sample includes all real properties in nine streets of "Kvadraturen".

The samples consist mainly of residential buildings, although some non-residential buildings are also included in some of the samples. Many types of housing are represented, from rental apartment blocks of many dwellings to single-family houses. Note that, since prior to 1970 most rental apartment blocks were sold as one unit, they get the same weight in the sample as, for instance, a single-family house. However, in the early 1970s and, in particular, from the mid-1980s many rental apartment blocks were converted into multiple condominium units. Flats in housing co-operatives are not included in the samples, since transactions of these are not registered in the real property registers. The types of housing differ in the four cities, and they vary over time. The housing types of the samples differ correspondingly.

We have recorded all transaction prices of each property in the sample, in addition to information on the property's attributes. More specifically, we have registered the price and the date of all transactions of the property, its address, the size of its yard, and, when available, the year of construction. We also have information about the type of housing and special comments characterising the transaction, such as eg if the property is sold to family members or the transaction only concerns a small part of the property.

Statistics Norway have published crude average prices for registered sale transactions of properties in rural areas and cities back to 1835. These are considered to be only second-best relative to the quality-adjusted HPIs which we have available today. These HPIs are still valuable as a reference, however, to understand and interpret the differences between "first-best" and "second-best" methods to construct HPIs.

1985–2013, Mix-adjustment and Hedonic HPIs produced by NBRI/NEF and Econ Pöyry/NEF/EFF/FINN.NO

Quality-adjusted HPIs for Norway have been available since the mid-1980s. After the deregulation of credit and housing markets in Norway in the early 1980s there was a growing interest in the housing market in general and in house price developments in particular. The following boom-to-bust period spurred renewed interest in this area by policymakers and regulators. Mix-adjustment HPIs are available from 1985 onwards. The first hedonic HPIs appeared in 1989. From 1991 through 2013 these were constructed by Econ on the basis of transaction data collected by NEF, the Association of Real Estate Undertakings (EFF) and Finn.no. Both sales-weighted and stock-weighted HPIs are available from Econ for the 1990s until the early 2000s (Eitrheim (2022)). In addition to the annual HPIs there are also quarterly HPIs available from the first quarter of 1990 and monthly HPIs from the first month of 2002. We have break-adjusted the aggregate HPI for the country average in 1997. Available vintages of real-time data for HPIs (in levels) have shown backward revisions from 1997 to 2002 when the hedonic models were updated and re-estimated over an estimation period stretching back to 1997. The break-adjustment is obviously judgmental. Based on all of the available information, we decided to make an upward adjustment in the growth rate in housing prices from 1996 to 1997 from 9% to 14%.¹⁶

2003–22, Eiendomsverdi AS, SPAR-type HPIs

The private sector partnership changed in 2014. The company, Eiendomsverdi AS, owned by four of the largest banking constellations in Norway – DNB, Sparebank 1,

¹⁶ See Eitrheim (2022) for more details on break-adjustments in Norwegian HPIs.

Eika and Nordea – joined a new partnership with the Norwegian Association of Real Estate Agents, today Eiendom Norge (Real Estate Norway). They construct monthly HPIs using transaction data from the internet company Finn.no. They apply a different methodology, however, a variant of the SPAR-method in which appraisal values are replaced by predictions from hedonic models when forming sales prices to predicted price ratios (SPPPR HPIs). Eiendomsverdi AS also provides services like property valuation on the basis of their automatic valuation model (AVM). This AVM is used by real estate agents in Norway when they issue *e-appraisals*, which are required during a sales process or for refinancing purposes. Unfortunately, no publicly available technical documentation of these SPAR-type HPIs for Norway exist. The data are proprietary and only available subject to a licence agreement with Eiendom Norge and/or Eiendomsverdi AS.

1992–2022, Statistics Norway, Hedonic HPIs

Statistics Norway has, since 1992, published a quarterly stock-weighted nationwide hedonic HPI (Lillegård (1994)). From 2005 onwards, regional HPIs are also available for 10 regions and three housing types, plus aggregates of these. See Statistics Norway (2006) and Takle (2012) for documentation.

Where information is scarce

Our calculations of repeat-sales HPIs for the four cities Oslo, Bergen, Trondheim and Kristiansand are based on a relatively small number of transactions during the 19th century. Thus, there is the potential to improve the HPIs by including a larger sample of individual properties from the spatially organised ledgers and collecting more pairs of (repeat sale) price observations.

We have become aware that appraisal values for individual houses are available from the historical records of public and private mutual fire insurance companies (brannkasser), reportedly for all Norwegian cities starting in 1767. This may be a potentially underexplored source of information of relevance for gauging long-run trends in housing prices, in particular during periods for which no information is available on transaction prices and only scarce information exists on rents, land prices or building costs.

References

Alstadheim, R (2016): "Exchange rate regimes in Norway 1816-2016", *Norges Bank Staff Memo*, no 15.

Bordo, M, Ø Eitrheim, M Flandreau and J Qvigstad (2016): *Central banks at a crossroads: what can we learn from history?*, Cambridge University Press.

Brunnermeier, M and I Schnabel, (2016): "Bubbles and central banks: historical perspectives", in Bordo, M, Ø Eitrheim, M Flandreau and J Qvigstad (eds), *Central banks at a crossroads: what can we learn from history?*, Cambridge University Press.

Econ (2004): "Justeringer i Eiendomsmeglerbransjens boligprisstatistikk" [Adjustments in the housing price statistics by Norwegian Real Estate Agents Association], Econ-Notat, 2004-007 (public).

Egge, Å (1972): "Trekke av sparebankvesenet og sparebanklovgivningen i slutten av forrige århundre", in *Studier i sparing og sparebankvesen i Norge 1822–1972*, pp 101–53, Gyldendal.

Eitrheim, Ø (2022): "Revisions and break-adjustments in composite house price indices", Chapter 11 in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2022), "Historical monetary and financial statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.

Eitrheim, Ø and S Erlandsen (2004): "House price indices for Norway 1819–2003", in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2004), "Historical monetary statistics for Norway 1819–2003", *Norges Bank Occasional Papers*, no 35.

——— (2005): "House price indices for Norway 1819–1989", *Historical Monetary Scandinavian Economic History Review*, vol 53, no 3, pp 7–33.

Eitrheim, Ø and M Fevolden (2022a): "Norges Bank's international reserves, 1817–2020", Chapter 3 in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2022), "Historical monetary and financial statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.

——— (2022b): "Central government income, expenditures and debt", Chapter 6 in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2022), "Historical monetary and financial statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.

Eitrheim, Ø, M Fevolden and V Hvidsten (2022): "Norges Bank's balance sheet, income accounts and profits, 1817–2020", Chapter 2 in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2022), "Historical monetary and financial statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.

Eitrheim, Ø and C Jobst (2022): "Historical data on real estate prices", in: Borio, C, Ø Eitrheim, M Flandreau, C Jobst, J Qvigstad and R Thomas (eds) (2022): "Historical monetary and financial statistics for policymakers: towards a unified framework", *BIS Papers*, no 127.

Eitrheim, Ø and J Klovland (2007): "Short term interest rates in Norway 1818–2007", in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2007), "Historical monetary statistics for Norway – Part II", *Norges Bank Occasional Papers*, no 38.

——— (2022): Money and credit, composite data series spanning two centuries, Chapter 4 in Ø Eitrheim, J Klovland and J Qvigstad (eds) (2022), "Historical Monetary and Financial Statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.

Eitrheim, Ø, J Klovland and L Øksendal (2016): *A monetary history of Norway 1816–2016*, Cambridge University Press.

Eitrheim, Ø, J Klovland and J Qvigstad (eds) (2004): "Historical monetary statistics for Norway 1819–2003", *Norges Bank Occasional Papers*, no 35.

——— (2007): "Historical monetary statistics for Norway – part II", *Norges Bank Occasional Papers*, no 38.

——— (2022): "Historical monetary and financial statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.

Grytten, O (2007): "Professor Dr Ingvar B Wedervang's historical archive on wages and prices", in Ø Eitrheim, J Klovland and J Qvigstad (eds), "Historical monetary statistics for Norway – part II", *Norges Bank Occasional Papers*, no 38.

Hodne, F and O Grytten (2000): *Norsk økonomi i det 19. århundre*, Fagbokforlaget.

- Hvidsten, V (2022): "A glimpse into mortgage lending in Norway, 1820–1865", Chapter 5 in Ø Eitrheim, J Klovland and J Qvigstad (eds), "Historical monetary and financial statistics for Norway", *Norges Bank Occasional Papers*, forthcoming.
- Klovland, J (2004): "Bond markets and bond yields in Norway 1820–2003" in Ø Eitrheim, J Klovland and J Qvigstad (eds), "Historical monetary statistics for Norway 1819–2003", *Norges Bank Occasional Papers*, no 35.
- (2007a): "A reconstruction of the balance sheet of savings banks in Norway 1822–1875", in Ø Eitrheim, J Klovland and J Qvigstad (eds), "Historical monetary statistics for Norway – part II", *Norges Bank Occasional Papers*, no 38.
- (2007b): "A reconstruction of the balance sheet of commercial banks in Norway 1848–1900", in Ø Eitrheim, J Klovland and J Qvigstad (eds), "Historical monetary statistics for Norway – part II", *Norges Bank Occasional Papers*, no 38.
- Knutsen, S and G Ecklund (2000): *Vern mot kriser? Norsk finanstilsyn gjennom 100 år*, Fagbokforlaget.
- Lillegård, M (1994): "Prisindekser for boligmarkedet", *Statistics Norway*, rapporter no 7.
- Nymoen, R (2017): "Between institutions and global forces: Norwegian wage formation since industrialisation", *Econometrics*, vol 5, no 1, pp 1–54, doi:10.3390/econometrics5010006, www.mdpi.com/journal/econometrics.
- Schweigaard, A (1840): *Norges statistik. Første halvdel*, Christiania.
- Skånland, H (1967): "Det Norske kredittmarked siden 1900" [The Norwegian Credit Market since 1900], *Statistics Norway*, SØS 19.
- Sogner, K (2012): *Andresens - En familie i norsk økonomi og samfunnsliv gjennom to hundre år*, Pax.
- Statistics Norway (1994): "Historical Statistics 1994", NOS C 188, Statistics Norway.
- Statistics Norway (2006): "Construction price indices and house and property price indices 2006", *Official Statistics of Norway*, D 372.
- Takle, M (2012): "Boligprisindeksen. Dokumentasjon av metode", *Statistics Norway*, notater/documents 10/2012.
- Tuveng, M (1961): "Trek av renteutviklingen i Norge gjennom 100 år" [Interest rate developments in Norway 1860-1960], in *Livsforsikring gjennom hundre år [Life insurance over a century]*, Idun.
- Tveite, S (1963): "Hamburg og norsk næringsliv 1814–1860", *Historisk tidsskrift*, 42, pp 197–231.