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Monetary Trends and Business Cycles in Denmark 1875-2005

– New Evidence Using the Framework of Financial Accounts for Organising Historical Financial Statistics[1]

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Abstract

The paper constructs financial-account stock data for Denmark 1875-2005 on an annual frequency and explores the historical monetary and financial trends and cycles on the basis of the new data set.

The annual financial-account data constructed in the paper are based on a comprehensive range of historical financial statistics. The data set presented is broken down by 8 institutional sectors (central bank; commercial banks and savings banks; mortgage-credit institutes; life-insurance companies and pension funds; investment associations; central government; other residents; non-residents) and 6 main types of financial instruments (gold and SDR; currency; loans and deposits; bonds, shares and mutual funds shares; insurance technical reserves; capital and reserves).

Commercial banks, savings banks and mortgage-credit institutions played a significant credit-supplying role in the Danish economy already during the late 19th century and in the beginning of the twentieth century. A turning point emerged during the early 1930s, and by the middle of the 1950s the ratio of credit to GDP had declined substantially. Since then the trend has reversed but the pre-World War I level was not reached until the decade from the mid-1970s to the mid-1980s. To some extent real asset prices have displayed a similar pattern. There has been a massive growth in the assets under management by life-insurance companies and pension funds since the mid-1970s and by collective investment funds since the mid-1990s.

There has been a much stronger positive correlation between money and prices at the long-term frequencies (8-40 years cycles) than at the business cycle frequency (2-8 years), but in the post-World War II period prices seem to have led money at all frequencies. In the period 1875-1945 house prices led credit from mortgage-credit institutions with a considerable lead-time (6 years) in the long-term cycles – in the post World War II period the lead-time has been considerable shorter (1 year). During the whole period 1875-2005 real credit granted by banks and mortgage-credit institutions have been almost contemporaneous with real GDP, and the largest correlation coefficients have occurred in the long-term cycles.

The overall conclusion in the paper is that financial accounts are a useful framework for organising and analysing financial data even when data sources are somewhat fragmented and sparse, which is often the case in relation to historical financial statistics. Financial accounts can be useful in an attempt to paint a more coherent picture of the historical development of the financial system and the financial structure. Utilising accounting identities a system of financial accounts allows e.g. for the compilation of the net financial asset position of the non-financial private sector, even when no separate balance-sheet statistics covers this sector. To date projects related to historical national-accounts have – both in Denmark and

internationally – only focused on the real side of the economy. It would, however, be interesting if future projects would make an attempt to cover long-span time series of financial accounts as well, including both stock- and flow-data.

Key words: Financial accounts, historical financial statistics, financial sector development, financial markets history, monetary transmission, cycles, band-pass filters.
JEL Classification: C82; E3; G00; N23; N24.

Resumé (Danish summary)

I papiret konstrueres et sæt finansielle konti for Danmark 1875-2005 bestående af årlige beholdningsdata. Endvidere analyseres den strukturelle og cykliske monetære og finansielle udvikling i Danmark siden 1875 på baggrund af det nye datasæt.

De årlige finansielle konti, som konstrueres i papiret, er baseret på en omfattende mængde historisk finansiel statistisk. Der præsenteres data fordelt på 8 institutionelle sektorer (centralbanken; banker og sparekasser; realkreditinstitutter; livsforsikringsselskaber og pensionskasser; investeringsforeninger; staten; andre residenter; udlandet) og 6 hovedtyper af finansielle instrumenter (guld og SDR; sedler og mønt; lån og indskud; obligationer, aktier og investeringsforeningsbeviser; forsikringstekniske reserver; kapital og reserver).

Penge- og realkreditinstitutter spillede en vigtig kreditgivende rolle i dansk økonomi allerede i slutningen af det 19. århundrede og i begyndelsen af det 20. århundrede. Et vendepunkt indtraf i begyndelsen af 1930'erne, og i midten af 1950'erne var udlånet opgjort i forhold til bruttofaktorindkomsten faldet betydeligt. Siden er tendensen vendt, men niveauet fra før første verdenskrig blev først nået igen i tiåret fra midten af 1970'erne til midten af 1980'erne. Udviklingen i reale aktivpriser synes i en vis udstrækning at have vist et tilsvarende udviklingsmønster. Der har været en massiv vækst i formuen forvaltet af livsforsikringsselskaber og pensionskasser siden midten af 1970'erne og af investeringsforeninger siden midten af 1990'erne.

Der har været en meget højere grad af positiv samvariation mellem pengemængde og priser i lange økonomiske cykler (bølger med en periodelængde af 8-40 år) end i konjunkturcykler (med en varighed på 2-8 år), men i perioden efter anden verdenskrig synes bevægelser i priser at være gået forud for bevægelser i pengemængden uanset bølgelængde. I perioden 1875-1945 fandt svingninger i huspriser sted adskillige år (6 år) forud for bevægelser i realkreditinstitutternes udlån i de lange bølger – i perioden efter anden verdenskrig har periodeforskydningen været betydelig mindre (1 år). Gennem hele perioden 1875-2005 har bevægelsen i penge- og realkreditinstitutternes reale udlån være stort set sammenfaldende med bevægelsen i den reale bruttofaktorindkomst, og de største korrelationskoefficienter har været at finde i de lange cykler.

Den overordnede konklusion i papiret er, at finansielle konti er en nyttig ramme til at organisere og analysere finansielle data, selv når datakilderne er mere fragmenterede og sparsomme, hvilket ofte er tilfældet i relation til historisk finansiel statistik. Dette kan være nyttigt i et forsøg på at tegne et mere sammenhængende billede af den historiske udvikling i det finansielle system og den finansielle struktur. Ved at udnytte regnskabsmæssige identiteter muliggør finansielle konti fx udregning af den ikke-finansielle private sektors

finansielle nettoformue, selv om der ikke foreligger særskilt balancestatistik for denne sektor. Indtil nu har projekter med opstilling af historiske nationalregnskaber – såvel i Danmark som i andre lande – kun fokuseret på den reale side af økonomien. Det kunne være interessant, såfremt fremtidige projekter ville gøre et forsøg på at opstille lange tidsserier af finansielle konti omfattende såvel beholdnings- som transaktionsdata.

Table of contents

1. Introduction

Time series data on financial accounts with balance sheets stock- and flow-of-funds data covering each main sector of the economy is often viewed as the "final stage" of the monetary and financial statistical "infrastructure" in a country. Due to consistent concepts, classifications and general accounting rules a system of financial accounts constitutes a coherent and useful way to summarise the information content of a wide range of primary financial statistics. This enhances the analytical application of the data in relation to e.g. studies of the evolution of financial intermediation processes, portfolio behaviour, monetary transmission and financial stability.

Internationally, the origin of financial-accounts statistics can be attributed to the works of Morris A. Copeland in the late 1940s and early 1950s. In 1944, Copeland received an invitation by the National Bureau of Economic Research (NBER) to carry out a study of the money flows in the United States. Copeland's study was published by NBER in 1952 with annual flow-of-funds data covering the period 1936-1942. Copeland and his staff carried out the statistical work behind the study in office space of the Federal Reserve (FED) Board in Washington donated to the project by the Board. After the end of the project, Copeland's staff was absorbed into FED's own Research and Statistics Division whereby flow-of-funds accounts early became part of the official financial statistical framework of the United States. In 1955, the FED published a full set of annual stock- and flow-of-funds statistics covering the period 1939-1953, and in 1959 the FED began to publish flow-of-funds statistics on a quarterly frequency in its Federal Reserve Bulletin.[2]

The expansion of the official statistics with financial accounts occurred rather late in Denmark compared to other countries. In 2001, Statistics Denmark introduced financial-account stock- and flow-data as part of the annual national-accounts statistics for Denmark covering the period since end-1994.[3] Danmarks Nationalbank (the central bank of Denmark) began to publish quarterly financial-accounts statistics in 2004 with stock data going back to end-1998. Quarterly flow data followed in 2006.[4] These new sets of statistics have provided

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[2] For studies on the historical origin and evolution of stock- and flow-of-funds statistics, compilation methods and the analytical use of the data, cf. e.g. Roe (1973), Bain (1973), Galbis (edt.) (1991), Dawson (edt.) (1996), Green & Murinde (2000) and Stockton (2004). Dawson, *op. cit.,* includes a reprint of parts of Copeland's original 1952-study as well as reprints of many other "classical" stock- and flow-of-funds articles.

[3] Cf. Petersen (2001) and Statistics Denmark (2001a). The annual financial-accounts statistics compiled by Statistics Denmark are in principle reconciled with the non-financial part of the annual national-account statistics in order to get consistent net-lending figures. Statistics Denmark's financial-accounts statistics follows the methodological principles in the "European System of National Accounts 1995" (ESA95), i.e. the EU-version of United Nations' "A System of National Accounts 1993" (SNA93). SNA93 was the first United Nations national-accounts guidelines to include a fully specified system of financial accounts, including revaluation accounts, etc.

[4] Cf. Olesen & Svanholt (2004) and Danmarks Nationalbank (2004, 2006). Also the Nationalbank's quarterly financial-accounts statistics follows the methods laid out in the ESA95. However, the end-of-year figures from the Nationalbank's quarterly financial-accounts statistics are not fully consistent with the figures from Statistics

the users with a comprehensive and solid basis for monetary and financial analysis of the Danish economy, but only for the last decade or so.

So far projects on compilation of historical national-account statistics for Denmark have only focused on the real side of the economy.[5] However, a system of financial accounts may also be a valuable framework for organisation and analysis of financial data when data sources are more fragmented and sparse, which is often the case in relation to historical financial statistics. Here, the financial balance sheets offer a consistent framework into which the various bits and pieces of statistical information can be fed and processed in a systematic way. This can be of assistance in an attempt to paint an overall picture of the historical development of the financial structure of the economy. Utilising accounting identities a system of financial accounts allows e.g. for the compilation of the net financial asset position of the non-financial private sector, even when no separate balance-sheet statistics covers this sector.

This paper makes a crude attempt to construct a set of historical financial-account stock data for Denmark covering the period 1875-2005 on an annual frequency. Furthermore, a first exploratory analysis of the structural and cyclical financial and monetary development in Denmark since 1875 based on the new data is presented

The outline of the rest of this paper is as follows: Section 2 presents briefly the concepts of financial balance sheets and describes the main sources and methods used for the construction of the historical financial balance-sheet stock data for Denmark 1875-2005. An analysis of the main historical structural development trends of the financial system in Denmark based mainly on the new data set is offered in section 3 followed by a brief analysis of the short- and long-term cyclical correlation pattern between money, credit, prices and output using band-pass filters in section 4. Section 5 indicates areas for further research. Appendix A summarises the historical origin and development of financial institutions and financial markets in Denmark in order to provide the reader with some background information that might be useful when using the historical financial balance-sheet data. Sources and compilation methods used to construct the financial balance-sheet data is detailed in appendix B followed by a listing of all time series data in appendix C. A post-1994 comparison of the new historical balance-sheet stock data with figures from Statistics Denmark's financial-

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Denmark's annual financial-accounts statistics, mainly due to difference in the choice of primary statistical sources.

[5] For an overview of the available historical national-accounts figures in Denmark, cf. pp. 164-179 in Mogensen (1987), Hyldtoft (1993, 1994), Christensen, Hjerppe, Krantz & Nilsson (1995), and Nilsson (1991, 2004).

For selected periods other authors have previously compiled complete or partial financial-account stock- and/or flow-data for Denmark following different compilation methods, cf. Winding (1958) [data for 1955]; Balling (1967) [data for 1960 and 1965]; Blomgren-Hansen (1974) [data for 1955-1970]; Det Økonomiske Råd. Formandskabet (1985) [data for 1974-1984]; Sørensen (1978) [data for 1976]; Lauritzen (1988) [data for 1977-1987]; Pedersen (1989) [data for 1973-1987 - later updated by Statistics Denmark in relation to the macroeconomic model of the Danish economy, ADAM]; Hansen & Johansen (1994) [data for 1989]; Økonomiministeriet (1992) [data for 1980-1990]; Andersen, Lyngesen & Pedersen (1999) [data for 1980-1998]; and Danmarks Nationalbank (2003c) [data for 2002-2003].

accounts statistics is found in appendix D. Finally, appendix E outlines the main features of the Baxter-King filter used in section 4.

2. Compilation of financial balance-sheet stock data for Denmark 1875-2005

The last part of the 19th century was the period in which national financial markets in Denmark were being developed.[6] Before this period the financial markets were characterised by regional segmentation. The year 1875 – which also was the year when the krone was introduced as the Danish currency unit – has therefore been chosen as the stating year for the financial balance-sheet stock data constructed in this paper.

Table 1: Overview of the system of financial balance-sheet stock data for Denmark 1875-2005

	Residents							Non-residents (b)
	Financial sector					Central government	Other residents (i.e. "non-financial private sector and local governments")	
	Central bank	Commercial banks and savings banks	Mortgage-credit institutes	Life-insurance companies and pension funds	Investment associations			
Financial assets								
Gold and SDR	D							
Currency		D						
Loans (a)	D	D	D			D		
Bonds, shares and mutual funds shares	D	D				D		
Total financial assets				D	RV			
Financial liabilities								
Currency	D					D		
Deposits (a)	D	D				D		
Bonds	D	D	RV			D		
Mutual funds shares					D			
Insurance technical reserves				RV				
Capital and reserves	RV	RV						
Total financial liabilities								
Net financial assets	0	0	0	0	0	RV	RH	D

Notes:
Items marked with an "RV" have been calculated on a residual basis using a vertical accounting identity whereas the item marked with an "RH" has been calculated on a residual basis from a horizontal accounting identity. A "0" indicates that the item by definition is assumed to be zero or approximately close to zero.
(a) Covers both loans and deposits.
(b) Since the share of a domestic financial net liability not held by other residents by definition represents a corresponding net financial asset of non-residents, the absolute value of the net financial asset position for the non-resident sector is identical to the absolute value of Denmark's international investment position. A positive (negative) figure for non-residents' net financial asset position corresponds to a situation where the Danish economy has external liabilities (assets) on a net basis vis-à-vis the rest of the world.

The balance-sheet stock data have been compiled using a "building block" approach where only the major financial assets and liabilities have been taken into consideration, cf. table 1. For each sector a financial balance sheet for a given end-year provides an overview of the stock of financial assets and liabilities and the net financial wealth position. All the items marked with "D" in table 1 have been filled out with data. Items marked with an "RV" have been calculated on a residual basis using a vertical accounting identity whereas the item marked with an "RH" has been calculated on a residual basis from a horizontal accounting identity. A "0" indicates that the item by definition is assumed to be zero or approximately close to zero.

The rather detailed breakdown of the financial sector has been chosen in order make the financial balance-sheet data suitable for historical analysis of the structural development of the financial sector.

The data for the central bank's financial assets and liabilities are based on accounting statistics covering Danmarks Nationalbank. Coins in circulation are treated as a liability of the central bank during the period 1975-2005 (prior to 1975 coins in circulation represented a liability of the central government). The net financial asset position of the central bank is assumed to be zero and the liability item "capital and reserves" is calculated as the residual. Following statistical conventions it is assumed that the capital and reserves of the central bank is owned by the central government in the period since 1936 when the central bank became a self-governing institution whose profits after provisions were to be transferred to the central government, cf. appendix A. For the period prior to 1936 – when the central bank was a private joint stock company – the capital and reserves of the central bank is assumed owned by "other residents".

The private banking sector covers commercial banks and savings banks only. Credit co-operatives are not included, but they have newer played any significant credit-supplying role in the Danish economy, cf. appendix A. For the private banking sector the information on financial assets and liabilities is based on accounting statistics and financial statistics. The net financial asset position is assumed to be zero and the liability item "capital and reserves" is calculated as the residual. This reflects that the bank's net financial assets position in economic sense "in the end" constitutes an indirect financial liability to the non-resident and resident shareholders.

For the mortgage-credit institutes the outstanding amount of mortgage-credit loans (based on accounting statistics) is the only type of asset included in the balance sheets for this sector. The Danish mortgage-credit institutes have to comply with the so-called "balance principle" requiring a balance between the total payments received from the borrowers on loans and the total payments made to the bondholders via the bonds financing the loans, cf. appendix A. The net financial asset position of the sector has therefore by definition been set to zero and the total outstanding amount of mortgage-credit bonds on the liability side of the balance sheet has been set equal to the outstanding amount of mortgage-credit loans. This implies that the values stated for the outstanding amount of mortgage-credit bonds in the historical financial balance sheets are not identical to the market value of the bonds using stock-exchange prices.

For life-insurance companies and pension funds the total amount of insurance technical reserves is assumed to be equal to their total holdings of financial assets (based on accounting

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[6] Cf. e.g. Hansen & Johansen (1994).

statistics). Implicitly it is therefore assumed that the net financial wealth position of the sector is equal to zero and capital and reserves therefore owned by the insurance holders.

The total assets of investments associations is assumed to be equal to the value of the outstanding amount of mutual funds shares (based mainly on accounting statistics). This also implies that the net wealth position of the sector by definition is equal to zero and capital and reserves therefore owned by the holders of mutual fund shares.

The financial assets and liabilities of the central government is mainly based on accounting statistics and the net financial asset position is calculated as the residual.

The net financial asset position of non-residents is based on the statistics on Denmark's International Investment Position combined with historical studies of the net financial asset position of the Danish economy for the period before official statistics is available.

Finally, the net financial wealth position of the "non-financial private sector and local governments" has been calculated on a residual basis. By way of construction this sector also includes financial enterprises that are not covered by the financial sectors mentioned above. Examples include non-life insurance companies and financing companies.

The tables in appendix C list all the historical financial balance-sheet data for Denmark 1875-2005 whereas appendix B outlines in more details the sources and compilation methods used to construct the data. In order to evaluate the robustness of the approach used to construct the financial balance-sheet data in the paper at hand a post-1994 comparison with figures from Statistics Denmark's financial-accounts statistics is provided in appendix D.

Finally a word of caution is in order. Even though the use of the balance-sheet framework ensures a certain degree of comparability across sectors and over time, a number of judgements and estimations have been necessary, and differences in accounting standards and practices[7] over time and across sectors imply a certain amount of statistical uncertainty. Also, as mentioned, only the major financial assets and liabilities have been taken into consideration. The historical financial-balance-sheets data presented in this paper can therefore only be expected to give a rough picture of the distribution of net financial asset positions in the period since 1875.

3. Trends in financial structures in Denmark 1875-2005 – A first exploratory analysis

The financial system plays an important role for an efficient flow of funds to consumption and real investments and thereby to the monetary transmission process. Even though the causality can not be determined a priori, both theoretical and empirical studies also indicate a

[7] One of the most important changes in accounting principles applied in a large part of financial statistics during the last couple of decades is an increasing tendency to use market valuation for securities holdings.

link between financial-system development and long-span economic growth.[8] However, the financial-system structure is not static but changes over time. New institutions emerge and old disappear, production technologies and product compositions change, and the organisation of the financial system as well as the legal framework may vary in different periods and may have the potential to influence the economic development.[9]

Structural developments of the financial system are often to a large extent a gradual process and many of the main features of today's financial system in Denmark have deep roots in the past, cf. appendix A. The central bank of Denmark was founded in 1818 as part of the initiatives to rebuild a safe and secure currency system after the bankruptcy of the state towards the end of the Napoleon Wars, the foundation for the Danish mortgage-credit system based on the issuance of negotiable bonds was laid down in the 1850s, and some of the key principles in the current Danish banking legislation originated in the 1930s after the large number of bank failures during the 1920s. Due to e.g. fixed costs of setting up financial markets and infrastructures, financial system structures may vary significantly across countries with otherwise similar economic structures.[10] Studies of the emergence and historical development of the financial system may thus contribute to enhance our understanding of the current financial-system structure and the economic-historical development.

This section reviews briefly the main historical structural development trends of the financial system in Denmark based mainly on the new financial balance-sheet stock data for Denmark 1875-2005 presented in section 2.

Total financial assets and total credit

Figure 1 shows the total financial assets in per cent of GDP 1875-2005 by type of financial institution. Several noteworthy observations immediately leap to the eye.

First, both the banking sector and the mortgage-credit sector played a significant role in the Danish economy already in the beginning of the twentieth century with financial assets for each sector amounting to around 80-100 per cent of GDP. A turning point seems to have emerged during the early 1930s, and in the middle of the 1950s the ratio of financial assets to GDP had declined to about 30 per cent for mortgage-credit institutes and 60 per cent for commercial banks and savings banks. Since then the trend has reversed but the pre-World War I levels were not reached until the decade from the mid-1970s to the mid-1980s.

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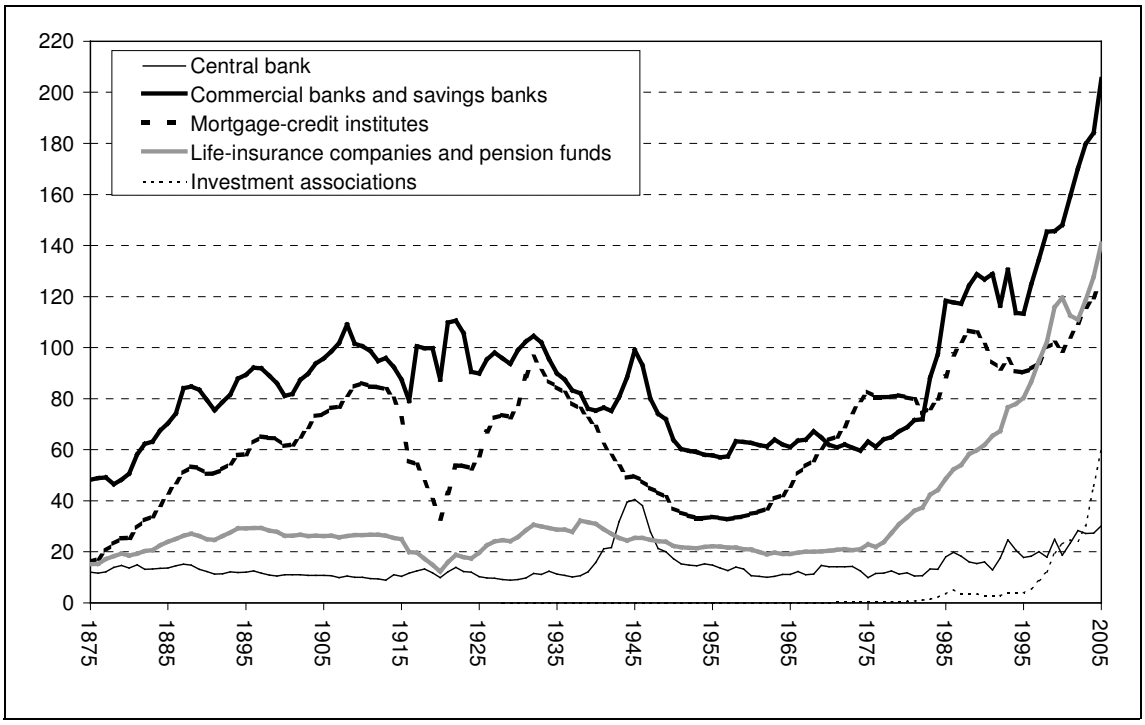
[8] Recent surveys on the finance-growth link are provided by e.g. Levine (1997) and Trew (2005). Rousseau (2003) offers a historical perspective through case studies of Amsterdam (1640-1794), England (1720-1850), United States (1790-1850) and Japan (1880-1913). Burhop (2006) analyses Germany 1851-1913.

[9] Cf. e.g. Dolar & Meh (2002), Ergungor (2005) and Bordo & Rousseau (2006).

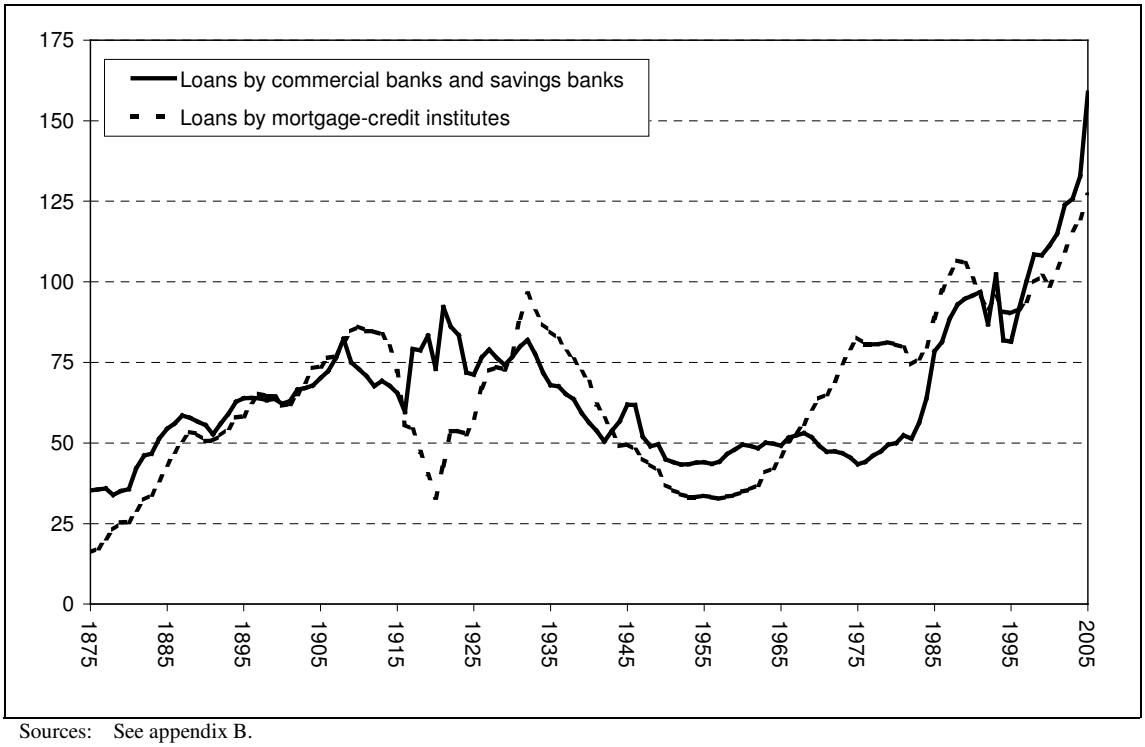
[10] Cf. e.g. Monnet & Quintin (2005).

Figure 1: Total financial assets by financial sector 1875-2005, per cent of nominal GDP at factor costs



Sources: See appendix B.

Figure 2: Outstanding amounts of loans granted by credit institutions 1875-2005, per cent of nominal GDP at factor costs

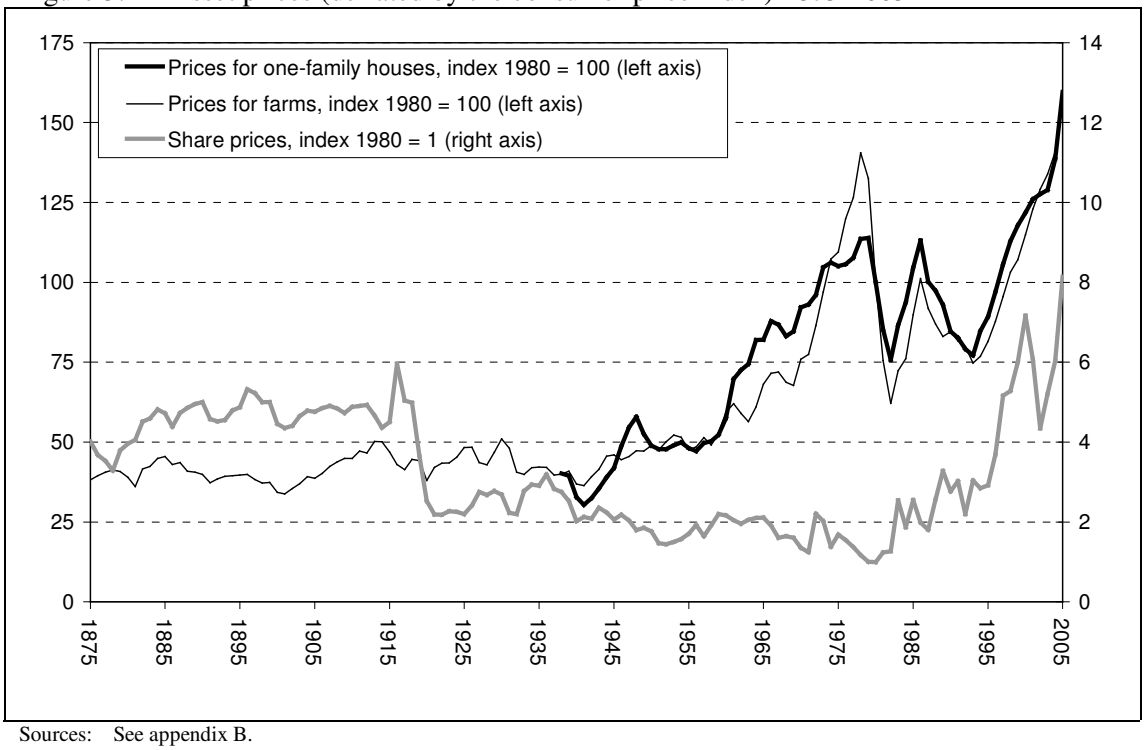


Sources: See appendix B.

The outstanding amounts of loans granted by credit institutions relative to GDP are shown in figure 2. Since the main activities of these institution is the extension of credit the main development trend is similar to the development in total financial assets shown in figure 1.[11]

Rajan & Zingales (2003) have studied the evolution in various indicators of financial development in a broad range of countries (including Denmark) for selected years during the period 1913-1999.[12] They found that by most of these measures most countries seemed to be more developed financially in 1913 than in 1980 and that only recently have the degree of financial development exceeded the 1913-level. Rajan & Zingales suggest that this may partly reflect resistance to competition in some areas in the financial sector and in industry that have only recently been overcome by deregulation of restrictions on cross-border trade and capital flows. The underlying argument put forward by Rajan & Zingales is that financial development facilitates entrance of new firms and thereby enhance competition.

Figure 3: Asset prices (deflated by the consumer price index) 1875-2005



Sources: See appendix B.

Figure 3 shows the development in share prices and property prices (all series deflated by the CPI). To some extent real asset prices display a pattern similar to the development in

[11] For mortgage-credit institutes the total financial assets are by calculation methods assumed to be identical to the outstanding amount of loans, cf. section 2 and appendix B.

[12] Rajan & Zingales present four indicators: (i) The ratio of commercial bank and savings bank deposits to GDP; (ii) the ratio of the market value of equity of domestic companies to GDP; (iii) the number of domestic companies listed on the domestic stock exchange relative to the population size; and finally (iv) the ratio of funds raised through public equity offerings by domestic companies relative to gross fixed capital formation. The years chosen are 1913, 1929, 1938, 1950, 1970, 1980, 1990 and 1999.

financial total assets and credit relative to GDP. The long-term development trends in total financial assets and credit relative to GDP may therefore to some degree simply reflect the price development and turnover of real assets in the economy. For instance might an increase in the households' wealth caused by rising house prices be used as collateral for loans at banks and mortgage-credit institutions ("mortgage equity withdrawal"). The turnover of real assets such as houses may in periods of rising asset prices also in itself tend to increase the overall outstanding amount of credit and deposits in the economy since the buyer will have to finance an asset acquisition at a price exceeding the outstanding mortgage debt of the seller.

The second major observation that can be made from figure 1 is the massive growth in the assets under management by life-insurance companies and pension funds since the middle of the 1970s. The government involvement in providing old-age pension has had a significant influence on the development in the Danish life-insurance and pension-fund industry. The establishment of a public tax-financed old-age pension scheme in 1891 and a tax-subsidised disability insurance system in 1921 reduced the need for private funded pension insurance. During the 1950s and 1960s funded occupational pension schemes became more common, mainly among white-collar workers, but especially during the last two decades or so privately funded labour market pension schemes have increased significantly. Furthermore, the growth in the assets of the pension funds relative to GDP has been stimulated by the establishment of a number of funded social security funds, mainly the Danish Labour Market Supplementary Pension Fund (ATP, founded in 1964) and the Employees' Wage Indexation Fund (LD, established in 1980), cf. appendix A.[13]

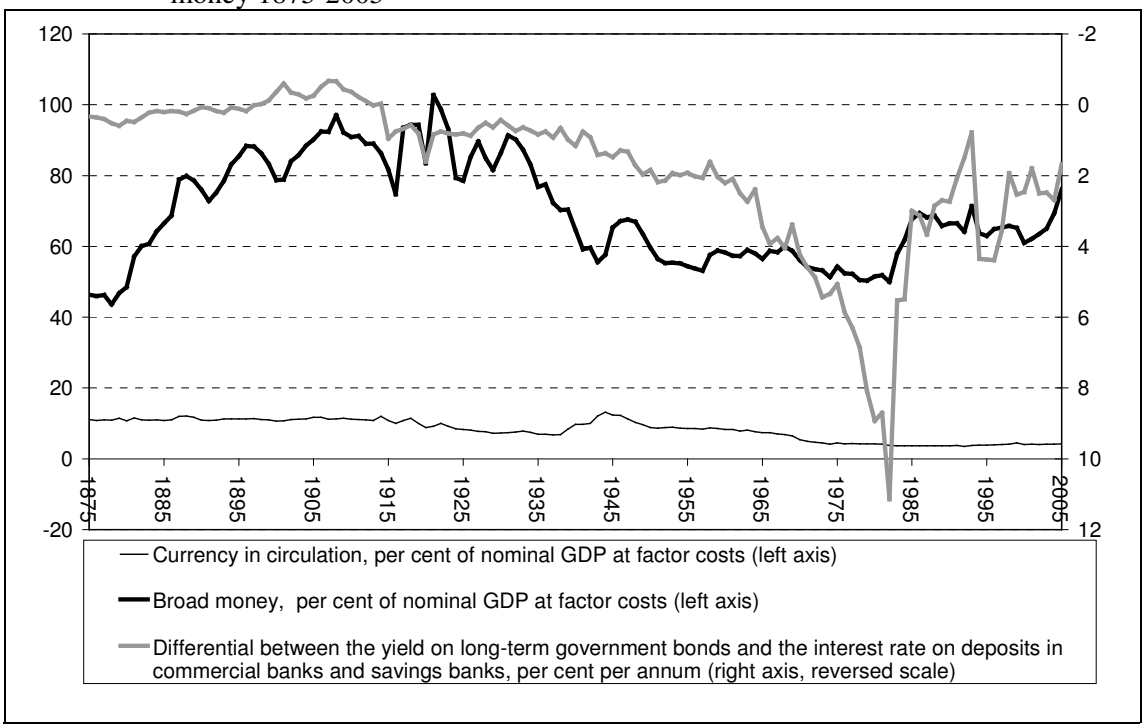
The third major trend visible from figure 1 is the rapid growth in assets managed by collective investment funds since the mid-1990s. However, one should take into account that the particular strong increase since 2003 can partly be attributed to the establishment of investment associations related to pension funds, e.g. LD and ATP.

Finally, one may notice the relatively small amount of assets managed by the central bank in most of the period since 1875. During the late 19th century private banks and mortgage-credit institutes had already developed into significant credit-supplying institutions, and the central bank could therefore concentrate on being banker to the banks and (from 1914) the central government, cf. appendix A. Only the years around World War II show significant fluctuations in the level of central-bank assets relative to GDP. This temporary increase in the balance sheets were caused by the German occupation forces expenditures in Denmark during the years 1940-1945 that were compulsorily financed via German accounts at the central bank against a guarantee from the Danish central government.

Money

Figure 4 shows the ratio of the stock of broad money relative to nominal GDP 1875-2005. This broad cash ratio can be seen as the reciprocal value of the velocity of broad money. The stock of broad money grew faster than nominal GDP until the early 1920s even though the opportunity costs of holding money (proxied by the differential between the long-term government bond yield and the deposit rate) remained broadly constant. Since the early 1920s the ratio of broad money to GDP has in general shown a declining trend.[14]

Figure 4: Currency in circulation, broad money stock and the opportunity costs of holding money 1875-2005



Sources: See appendix B.

The implied U-shaped pattern of the long-run velocity of broad money is also a typical finding in studies covering other countries.[15] This development may to some extent reflect an increased degree of monetisation of the economy until the early 1920s followed by an increased degree of sophistication of the public's management of their liquidity (e.g. via cheque accounts and later electronic debit cards), the development of close substitutes to money offered by the banking system (e.g. giro and overdraft facilities) and the emergence of non-bank financial intermediaries such as investment funds.

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[13] When assessing the relative growth of the pension fund industry in Denmark one has to take into account the right to deduct contributions to most private and occupational pension schemes from the taxable income. Pension benefits are then subsequently subject to taxation when benefits are paid out, cf. Møller & Nielsen (2000).

[14] Cf. also the study of the Danish money demand 1875-1985 in Kærgård (1991).

[15] Cf. e.g. Ireland (1991), Bordo & Jonung (2003) and Eitrheim et al. (eds.) (2004).

Taking a closer view on the post-1930 period in figure 4 one might also sense a slightly downward trend in the broad cash ratio until the early 1980s followed by a slightly upward trend. This pattern seems to mirror the development in the opportunity costs of holding money.

The ratio of currency in circulation relative to GDP in figure 4 has generally shown a downward trend during most of the post-1875 period reflecting the increased significance of bank money relative to notes and coins.

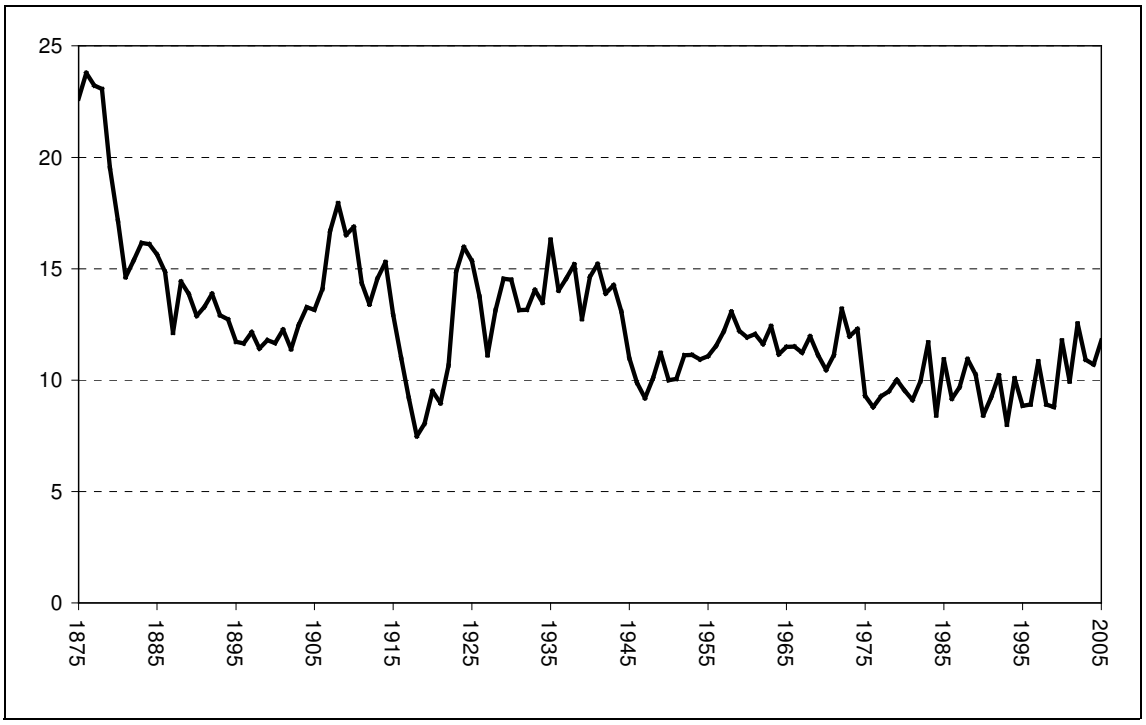
The capital ratio of the banking system

Figure 5 shows the amount of capital and reserves in commercial banks and saving banks in per cent of their outstanding amount of financial assets. Even though these data must be treated with caution[16] they indicate that the capital ratio of the Danish banking system has declined over time. In particular it is worth to notice that the capital ratio was rather high even before the first Danish Commercial Bank Act in 1919 laid out provisions on capital requirements for commercial banks, cf. appendix A. This finding is consistent with the findings in e.g. Hansen (1991), Andersen (2004) and Kjeldsen (2004) covering Danish commercial banks only.

According to Hansen, *op.cit.*, the high capital ratio in the initial stages of the commercial banking system in Denmark to some degree can be attributed to an underestimation of the potential scope of deposits from the public. However, a decline in bank's capital ratio over time is also found in e.g. the USA where the ratio fell from just below 55 per cent in the 1840 to around 6-8 per cent in the period 1940-1993, cf. Berger et al. (1995). In the early 1860s the market-determined capital ratio had already declined significantly to below 40 per cent. Berger, *op.cit.*, explains this development with reduced risk of bank failures due to the introduction of clearinghouses and improved market integration. The regulation of banks contained in the National Banking Act of 1863 limited the amount of risks that banks were allowed to assume and the capital ratio fell gradually to around 15 per cent in 1914. The creation of the Federal Reserve System in 1914 and the regulatory initiatives in the Emergency Banking Act of 1933 (deposit insurance and maximum interest-rate payments on deposits) led to a further decline in the solvency ratio of the US banking system. It seems plausible that the gradually tighter regulation of the Danish banking sector during the 20th century in a parallel way might have contributed to the observed downward trend in the capital ratio in figure 5.

[16] Due to the fact that the item "capital and reserves" used in figure 5 has been compiled on a residual basis and that only the major financial assets and liabilities – and no fixed assets – have been taken into consideration in the calculations. Furthermore, as mentioned in section 2 accounting standards and practices are not fully comparable over time.

Figure 5: Capital and reserves of commercial banks and saving banks 1875-2005, per cent of total financial assets

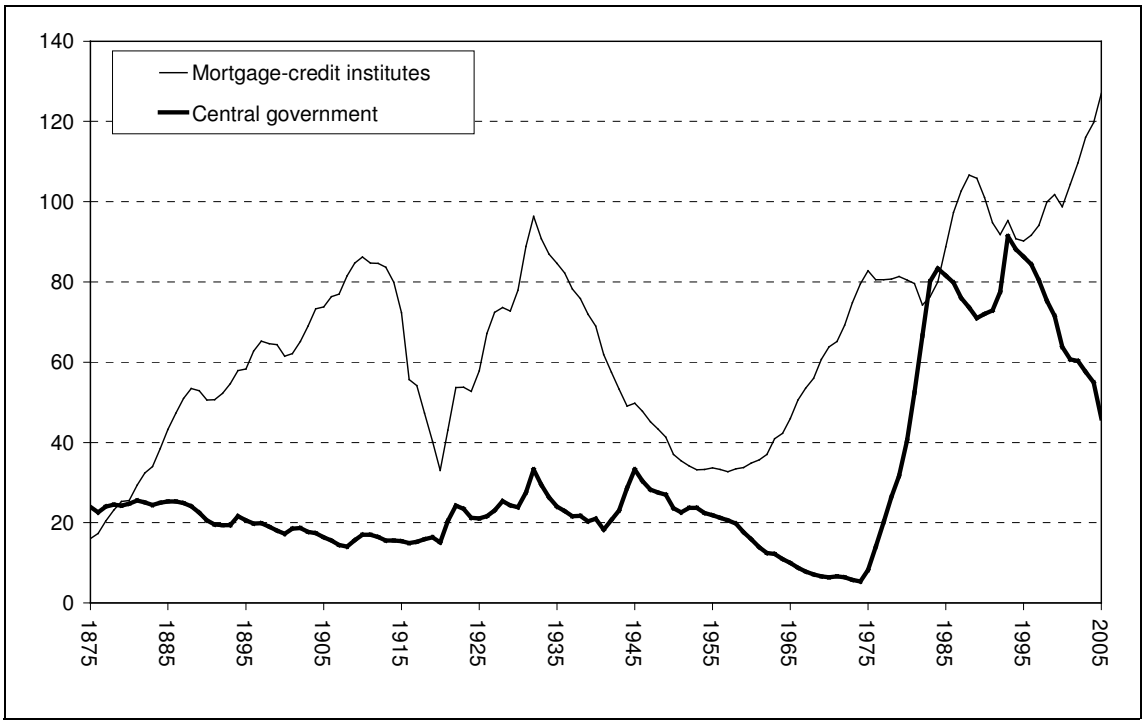


Sources: See appendix B.

Capital markets and interbank activity

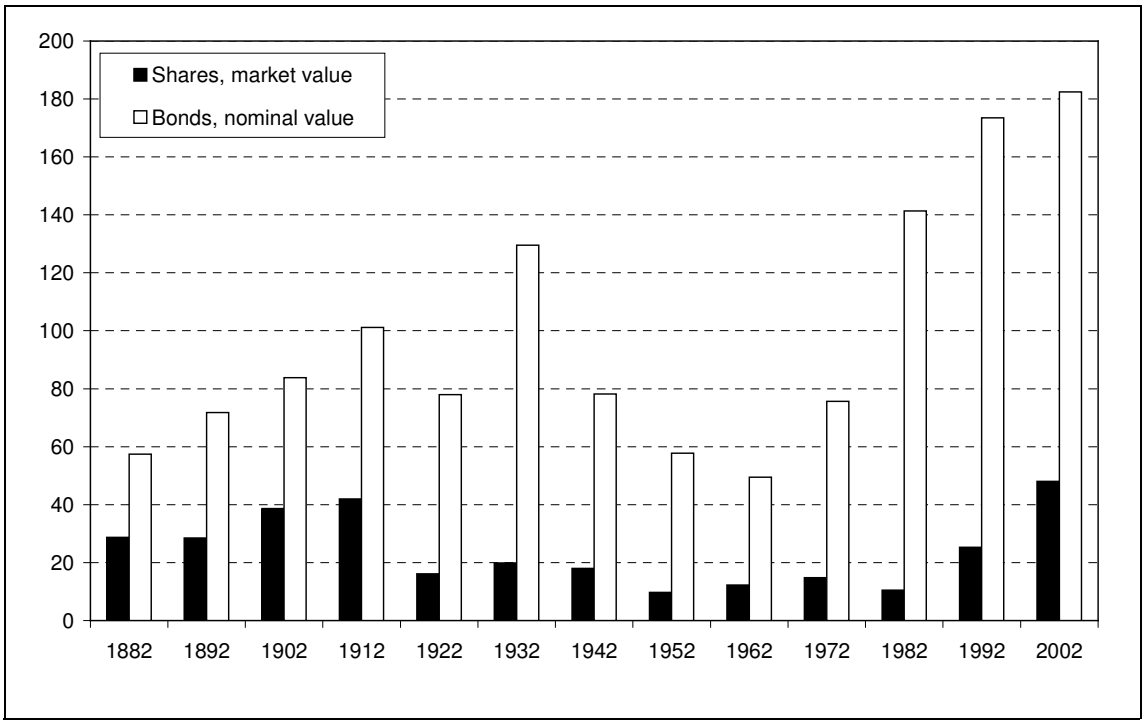
Figure 6a shows the outstanding amount of bonds issued by Danish mortgage-credit institutes and the Danish central government in per cent of GDP. The Danish market for mortgage bonds goes back to the late 18th century, cf. appendix A. The expansion of the mortgage-credit system for the financing of real property in Denmark after 1850 laid the foundation for the development of a large market for mortgage bonds. The outstanding amount of government bonds was relatively small compared to the mortgage bond market until the mid-1980s. Long-term callable mortgage-credit annuity bonds served therefore as the market "benchmark" until the early 1990s where this role was taken over by 10-year government bullet bonds.

Figure 6a: Outstanding amount of bonds by main issuer 1875-2005, per cent of nominal GDP at factor costs



Sources: See appendix B.

Figure 6b: Size of the Danish capital market 1882-2002, outstanding amount in per cent of nominal GDP at factor costs



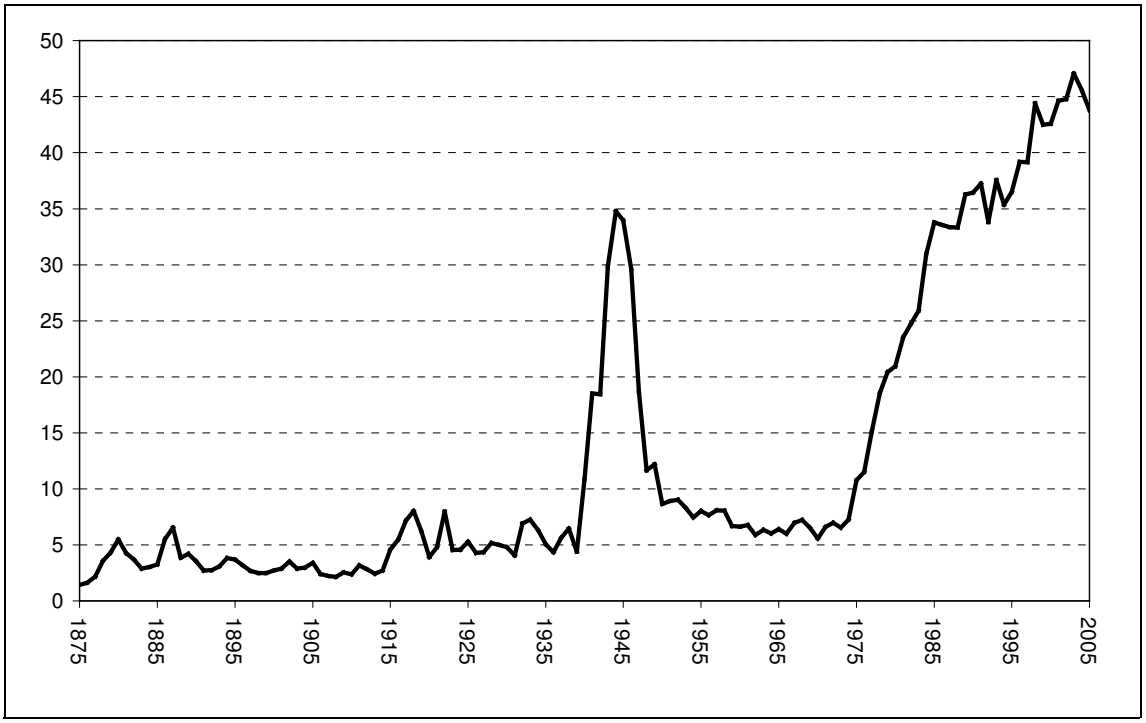
Notes: Covers Danish shares listed on the Copenhagen Stock Exchange and the total amount of bonds issued by Danish commercial banks, savings banks, mortgage-credit institutes and the Danish central government. Share capital is stated at nominal values prior to 1922.

Sources: Hansen & Svendsen (1968), Parum (1997), Copenhagen Stock Exchange (2005) and appendix C.

The size of the Danish stock market has always been relatively small compared to the Danish bond market, cf. figure 6b. This should be viewed in light of the large mortgage-credit sector that also finance buildings acquired by the Danish firms (including agricultural properties). The literature on financial structures often focuses on the degree to which a financial system is market-based or intermediate-based. Although the size of the direct issues of exchange-listed bonds and shares by the Danish non-financial corporate sector has always been relatively modest the financial system is actually to a high degree "indirectly" market based due to the large bond-financed mortgage-credit sector.

Figure 6c shows an indicator for the share of interbank funding in the Danish banking sector. The figures include deposits held by non-residents, of which a large amount comes from non-resident banks. Disregarding the special liquidity situation around World War II the level of interbank activity was relatively moderate until the early 1970s. An organised krone-denominated interbank market was established in Denmark in 1970 when a money-market broker began his activity.[17] Since 1970 the significance of interbank funding has increased markedly.

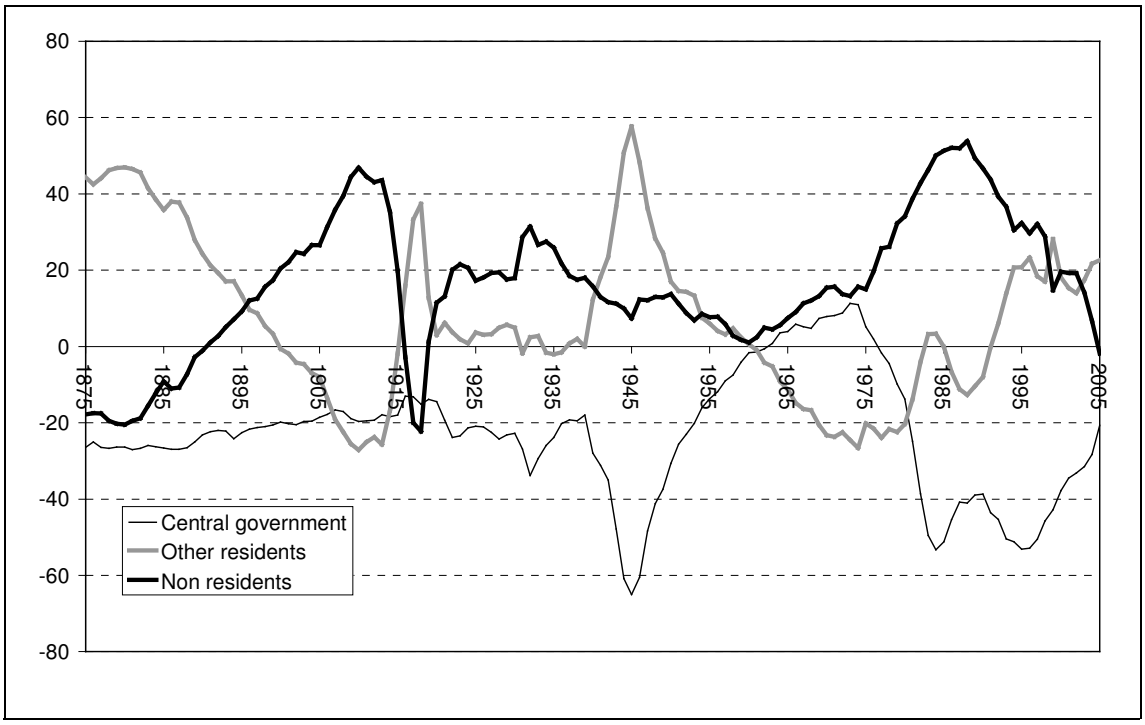
Figure 6c: An indicator for development in interbank funding (including deposits by non-residents) 1875-2005, per cent of total assets in commercial banks and savings banks



Notes: Interbank funding is compiled from the tables in appendix C as total deposits in commercial banks and savings banks + currency in circulation – broad money – currency held by commercial banks and savings banks. The figures include therefore non-resident deposits in Danish commercial banks and savings banks as well as non-monetary deposits in Danish commercial banks and savings banks made by residents.
Sources: See appendix B.

[17] Cf. page 191 in Mikkelsen (1993).

Figure 7: Net financial assets by main sector 1875-2005, per cent of nominal GDP at factor costs



Sources: See appendix B.

Net financial asset positions

Figure 7 shows the net financial assets by main sector 1875-2005 in per cent of GDP. During most of the period non residents have had a positive net financial asset position vis-à-vis Danish residents, i.e. Denmark has had an external debt on a net basis.[18]

In the pre-World War II period the central government had consistently a negative net financial asset position equivalent to around 15-30 per cent of GDP and the large fluctuations in Denmark's external debt was mirrored by large fluctuations in the net financial asset position of other residents.[19]

During World War II the net financial asset position of the central government deteriorated markedly reflecting the German occupation forces expenditures in Denmark during the years 1940-1945 compulsorily financed via German accounts at Danmarks Nationalbank against a

[18] For long-span studies on the development of the current account on the Danish the balance of payments and Denmark's international investment position, one may refer to Gelting (1972) and Hansen, E. D. (1996). Christensen & Hald (2000) and Pedersen (2003) cover the most recent decades.

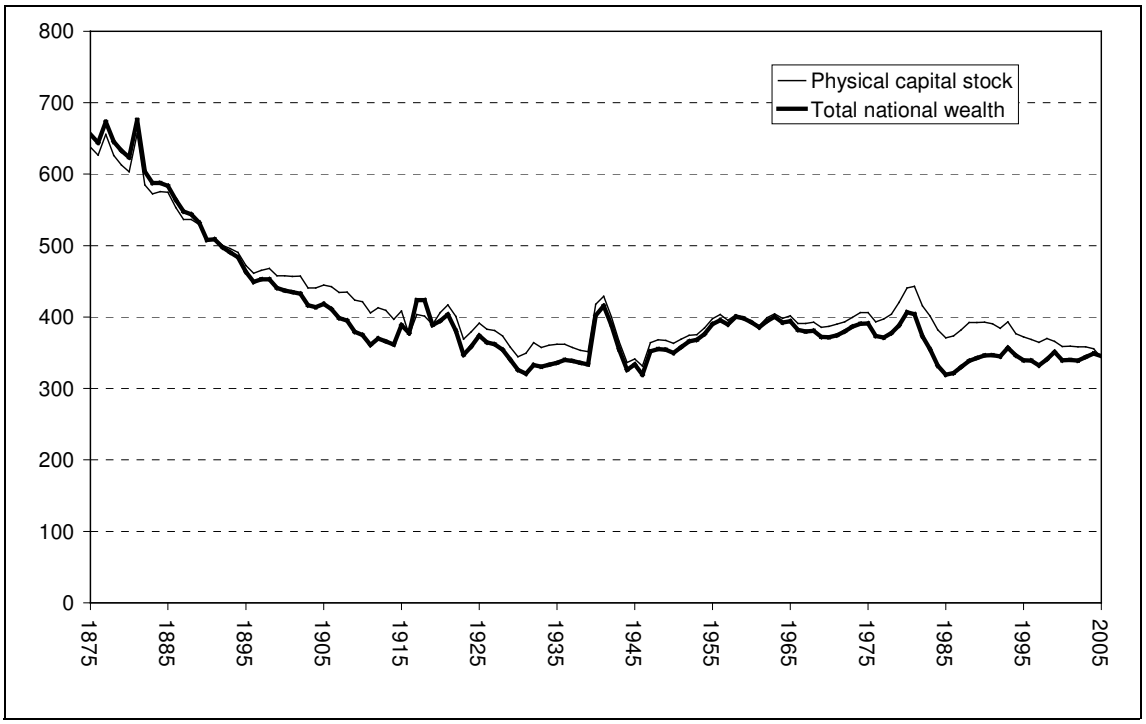
[19] Long-span studies on the development of the public finances in Denmark are found in e.g. Rasmussen (1972), Norstrand (1977) and Abildgren (2005d). To the knowledge of the author of the paper at hand no long-span studies on the development of private sector net financial assets in Denmark are available. However, for the most recent decades one may refer to e.g. Ølgaard (1992). Furthermore, for selected periods other authors have previously compiled complete or partial financial-accounts data for Denmark that may highlight this issue, cf. the references referred to in section 1.

guarantee from the Danish central government.[20] Since there was a general shortage in the supply of goods the net financial asset position of other residents improved significantly.[21]

Since the end of World War II there have been substantial swings in the net financial asset position of the central government relative to GDP and these have to a high degree been mirrored in the net financial asset position of other residents.

During the whole post-1875 period there has been a negative correlation between the central government's and other resident's net financial asset position relative to GDP.[22] Whether this "stylised fact" is the result of the principle of Ricardian Equivalence[23] or just reflect automatic stabilisers[24] is naturally open for debate, cf. e.g. page 485 and forward in Sørensen & Whitta-Jacobsen (2005) for a discussion hereof in a Danish context covering the most recent decades.

Figure 8: Physical capital stock and national wealth 1875-2005, per cent of GDP at factor costs



Sources: See appendix B.

[20] These amounts are included in the central government liabilities as they occurred in the period 1940-1945, cf. appendix B.

[21] Cf. also the regime-classification discussion of the Danish economy during World War II within the framework of fixed-price models (quantity rationing models) in Topp (1986).

[22] The correlation coefficient is -0.5 in the period 1875-1939 and -0.7 in the period 1940-2005.

[23] According to the Ricardian Equivalence Theorem an increased level of government debt will – under the assumption of rational expectations – be meet by increased wealth accumulation in the private sector in order to able to pay higher future taxes when the government debt has to be paid off.

[24] The line of reasoning is the following: If an increase in private sector savings surplus and wealth accumulation causes slow economic growth and increased unemployment the government's expenditures on unemployment benefits will increase and the government's direct and indirect tax revenue will decline and thereby reduce the government savings surplus and wealth accumulation.

The national wealth

Figure 8 shows the physical capital stock and national wealth since 1875 in per cent of GDP at factor costs. The figures for the physical capital stock represent the replacement value of non-financial assets used in production[25], and the national wealth is compiled as the sum of the physical capital stock and the net financial asset position of the Danish economy.[26]

During the last quarter of the 19th century and the first quarter of the 20th century the national wealth declined from around 650 to 350 per cent of GDP, mainly as a result of a lower capital-output ratio. Since then the national wealth have been broadly constant relative to GDP. During the whole post-1875 period the net financial asset position have been relative insignificant compared to the value of the physical capital stock.

The downward trend in the capital-output ratio in the period 1875-1910 may seem somewhat surprising since several authors have placed the "industrial break-through" in Denmark to this period, cf. e.g. the review in Kristensen (1989). According to Kærgård (1991) – the source behind the physical capital stock in the pre-1965 period – the capital-output ratio has also been more stable in e.g. the USA and Germany during the same period. However, one should also take into account that the capital-output ratio in figure 8 uses value added as the output measure. If one instead uses production value as the output measure and a narrower sectoral delimitation, the capital-output ratio has been more stable in the period 1875-1910, cf. the calculations for the non-agricultural sector on page 145 in Kærgård, *op. cit.* The downward trend in the capital-output ratio in the period 1875-1910 may therefore partly reflect a shift in the economy towards less capital-intensive sectors (service industries).

4. The cyclical variation in money, credit, prices and output in Denmark 1875-2005 – A few stylised facts from band-pass filters

The comovements between money and credit aggregates, prices and output belong to the "classical" themes in studies on the transmission mechanism between the financial and real sectors of the economy, and filtering methods are commonly used in an attempt to uncover the more or less "pure" stylised facts and empirical regularities of the cyclical movements and comovements of the variables. While the results of such filtering exercises are purely descriptive and do not explain the underlying economic causal relationships they may serve as a useful starting point and guidance for a structural interpretation of the monetary and financial development.

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[25] The delimitation of the capital stock follows the definitions from the national-account statistics. This implies that the capital stock includes residential buildings but not e.g. consumer durable goods.

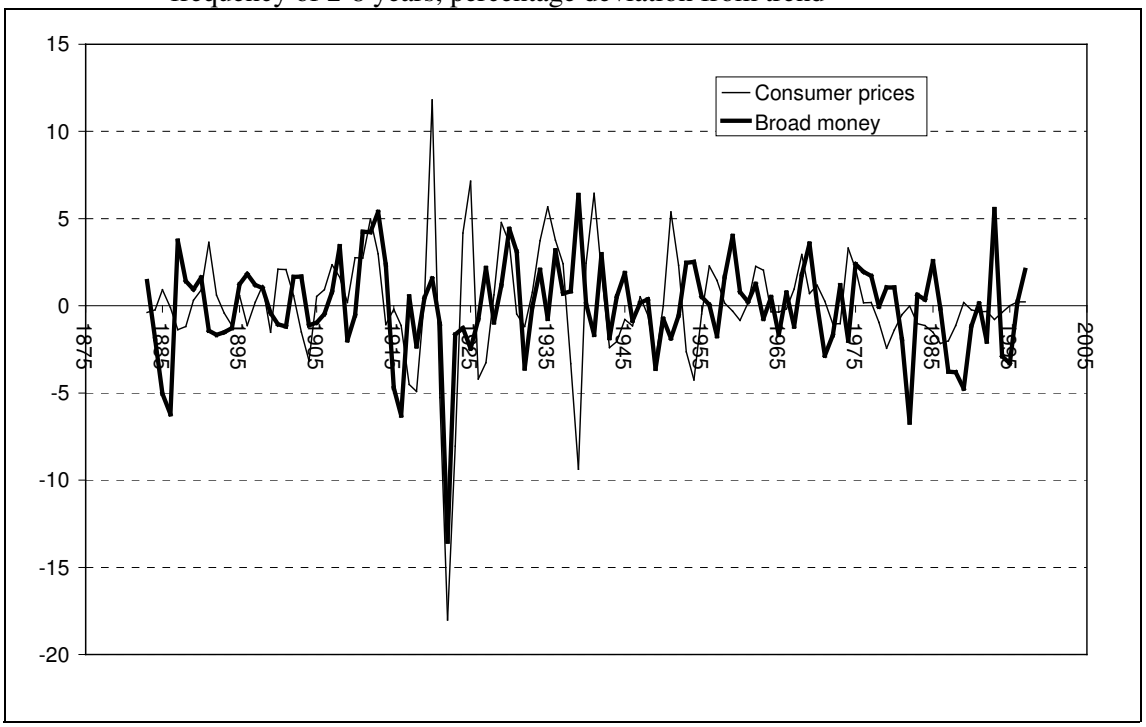
[26] It could of course, theoretically, be argued to include consumer durable goods and certain other items (e.g. the capitalised value of land taxes and human capital) in the national-wealth figures. For studies on the national wealth in Denmark, cf. Sørensen (1978) and Kærgård (1992) and references therein.

This section reviews briefly the short- and longer-term cyclical correlation pattern between money, credit, prices and output using the Baxter-King band-pass filter on some of the main time series presented in section 2 and 3. Business cycles will be delimited to 2-8 years and long-term cycles to 8-40 years. Naturally, such limitations are more or less arbitrary, but the chosen definition of the business cycle frequency follows more or less those applied in the literature, see also the discussion in appendix E.

Broad money and prices

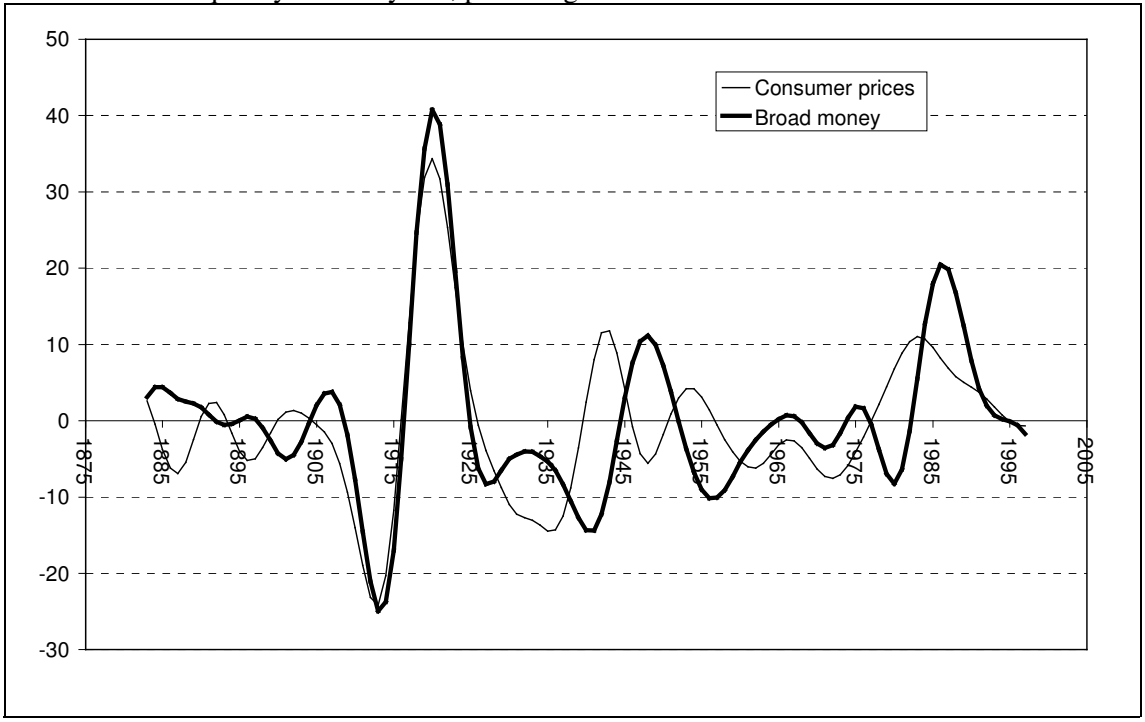
Figure 9a shows the extracted business cycle components from consumer prices and the stock of a broad monetary aggregate whereas figure 9b covers the long-term cyclical components extracted from the two series. All the cyclical components are expressed as deviations from the trend measured in per cent. A range of dynamic cross-correlations with attached significance probabilities is reported in table 2a.

Figure 9a: Broad money and consumer prices 1875-2005, cyclical components with frequency of 2-8 years, percentage deviation from trend



Sources and calculation methods: See main text and appendix E.

Figure 9b: Broad money and consumer prices 1875-2005, cyclical components with frequency of 8-40 years, percentage deviation from trend



Sources and calculation methods: See main text and appendix E.

Table 2a: Broad money (M) and consumer prices (P), dynamic cross-correlations of cyclical components

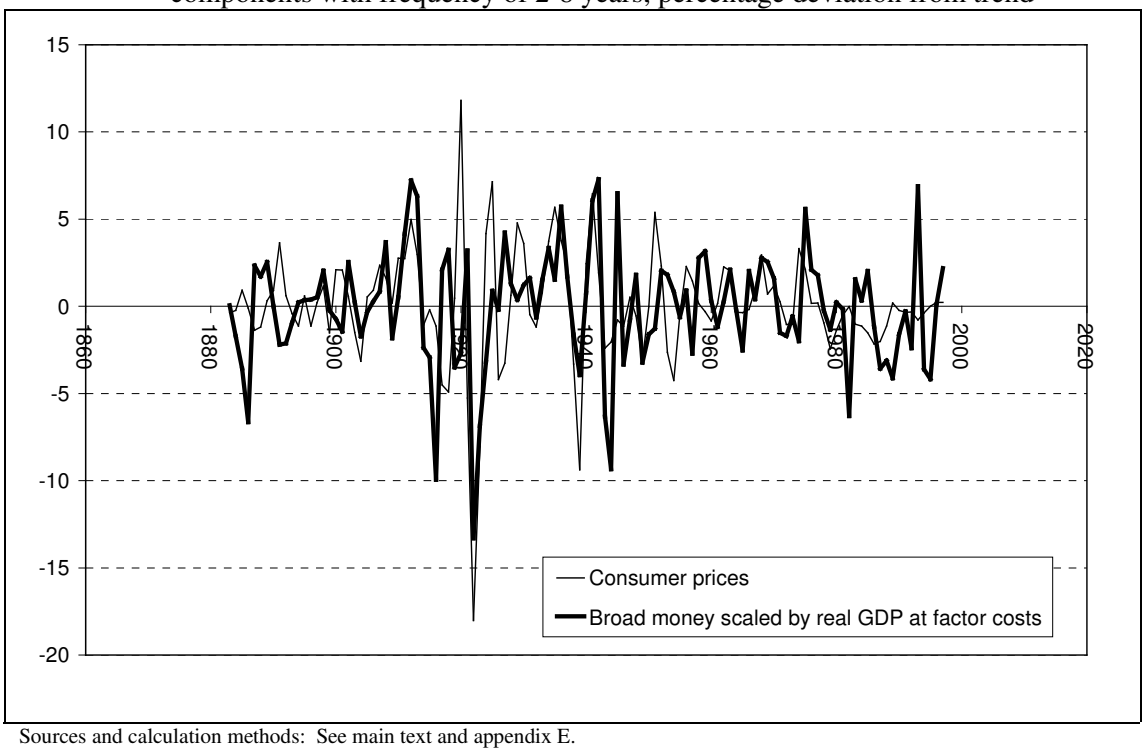
	1875-2005		1875-1945		1946-2005	
	Correlation coefficient between P(t) and M(t+j)	Significance probability	Correlation coefficient between P(t) and M(t+j)	Significance probability	Correlation coefficient between P(t) and M(t+j)	Significance probability
Cycles of 2-8 years						
j = -2	-0.010	0.9168	-0.006	0.9630	-0.034	0.8137
j = -1	0.162	0.0857	0.224	0.0795	-0.059	0.6824
j = 0	**0.264**	**0.0043**	**0.355**	**0.0043**	-0.063	0.6567
j = 1	0.223	0.0169	0.234	0.0667	0.208	0.1435
j = 2	0.048	0.6163	-0.037	0.7798	**0.380**	**0.0066**
Cycles of 8-40 years						
j = -8	-0,320	0,0008	-0,455	0,0005	0,108	0,4863
j = -7	-0,277	0,0038	-0,416	0,0014	0,182	0,2311
j = -6	-0,190	0,0478	-0,314	0,0175	0,246	0,0998
j = -5	-0,058	0,5460	-0,149	0,2649	0,289	0,0487
j = -4	0,111	0,2451	0,064	0,6307	0,308	0,0329
j = -3	0,301	0,0013	0,300	0,0200	0,307	0,0319
j = -2	0,486	0,0000	0,528	0,0000	0,297	0,0360
j = -1	0,638	0,0000	0,713	0,0000	0,298	0,0334
j = 0	0,731	0,0000	0,821	0,0000	0,325	0,0188
j = 1	**0,747**	**0,0000**	**0,829**	**0,0000**	0,372	0,0072
j = 2	0,682	0,0000	0,734	0,0000	0,432	0,0018
j = 3	0,548	0,0000	0,551	0,0000	0,492	0,0003
j = 4	0,370	0,0001	0,310	0,0169	0,539	0,0001
j = 5	0,176	0,0657	0,054	0,6862	**0,560**	**0,0000**
j = 6	-0,004	0,9695	-0,171	0,2033	0,550	0,0001
j = 7	-0,148	0,1260	-0,333	0,0121	0,504	0,0004
j = 8	-0,246	0,0107	-0,419	0,0015	0,425	0,0040

Notes: The significance probability relates to the slope parameter in an OLS-regression between the cyclical components of money and prices and a constant included. The Null hypothesis is zero correlation. Bold numbers indicates peak cross-correlations in the table.
Sources and calculation methods: See main text and appendix E.

At the business cycle frequency the correlation coefficients have in general been relatively small, and table 2 indicates that correlation patterns may have changed over time. In the pre-1946 period the contemporaneous correlation seems to have been positive and significant at a 5 per cent level. In the post-World War II period the contemporaneous correlation coefficient is negative and not significant different from zero. In this period the peak correlation is also positive, but prices seem to have led money with 2 years.[27]

At the long-term frequency the contemporaneous correlation between money and prices has in general been positive and much higher than at the business cycle frequencies. However, measured by the peak correlations prices seem to lead money, and the lead-time have been somewhat longer in the post-World War II (5 years) period than in the pre-1946 period (1 year).

Figure 9c: Broad money scaled by real GDP and consumer prices 1875-2005, cyclical components with frequency of 2-8 years, percentage deviation from trend



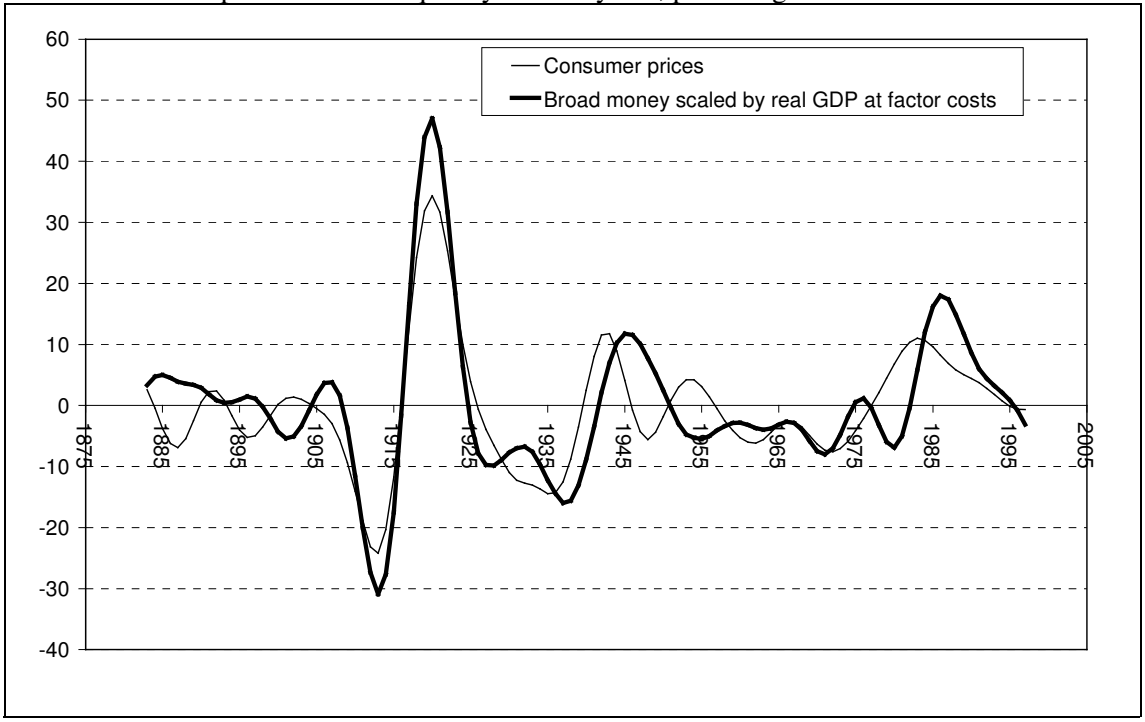
Sources and calculation methods: See main text and appendix E.

[27] Naturally it is somewhat arbitrary to split the total sample 1875-2005 in two (pre-1946 and post-World War II). However, looking at figure 9b and figure 9d correlation patterns seem to have changed around the decades immediately prior to and after World War II.

A division of the total sample in more than 2 periods would of course be desirable, but one have to take into account the low data frequency (yearly observations) and the choice of K=8 in the Baxter-King band-pass filter (cf. appendix E) which causes a loss of observations in the beginning and the end of the time series being filtered.

It could be argued to exclude the periods around World War I and II from the sample due to large movements in nominal variable in those periods. However, when studing long-run relationships between nominal variables such "shocks" are in fact particularly interesting.

Figure 9d: Broad money scaled by real GDP and consumer prices 1875-2005, cyclical components with frequency of 8-40 years, percentage deviation from trend



Sources and calculation methods: See main text and appendix E.

Table 2b: Broad money scaled by real GDP (M/Y) and consumer prices (P), dynamic cross-correlations of cyclical components

	1875-2005		1875-1945		1946-2005	
	Correlation coefficient between P(t) and M(t+j)/Y(t+j)	Significance probability	Correlation coefficient between P(t) and M(t+j)/Y(t+j)	Significance probability	Correlation coefficient between P(t) and M(t+j)/Y(t+j)	Significance probability
Cycles of 2-8 years						
j = -2	0.026	0.7876	0.046	0.7263	-0.127	0.3807
j = -1	0.062	0.5101	0.112	0.3878	-0.121	0.3987
j = 0	0.393	0.0000	**0.450**	**0.0002**	0.154	0.2766
j = 1	**0.397**	**0.0000**	0.400	0.0013	**0.412**	**0.0027**
j = 2	-0.020	0.8339	-0.091	0.4874	0.280	0.0489
Cycles of 8-40 years						
j = -8	-0,357	0,0002	-0,463	0,0004	0,114	0,4620
j = -7	-0,310	0,0011	-0,409	0,0018	0,201	0,1844
j = -6	-0,207	0,0304	-0,288	0,0301	0,267	0,0734
j = -5	-0,047	0,6263	-0,099	0,4611	0,307	0,0359
j = -4	0,160	0,0926	0,144	0,2776	0,327	0,0234
j = -3	0,389	0,0000	0,409	0,0012	0,337	0,0180
j = -2	0,606	0,0000	0,655	0,0000	0,353	0,0119
j = -1	0,772	0,0000	0,837	0,0000	0,396	0,0040
j = 0	**0,856**	**0,0000**	**0,918**	**0,0000**	0,474	0,0004
j = 1	0,843	0,0000	0,886	0,0000	0,571	0,0000
j = 2	0,733	0,0000	0,742	0,0000	0,658	0,0000
j = 3	0,548	0,0000	0,512	0,0000	0,721	0,0000
j = 4	0,323	0,0005	0,236	0,0723	**0,749**	**0,0000**
j = 5	0,093	0,3328	-0,040	0,7680	0,742	0,0000
j = 6	-0,108	0,2621	-0,269	0,0431	0,699	0,0000
j = 7	-0,261	0,0065	-0,426	0,0011	0,624	0,0000
j = 8	-0,355	0,0002	-0,504	0,0001	0,520	0,0003

Notes: The significance probability relates to the slope parameter in an OLS-regression between the cyclical components of money and prices and a constant included. The Null hypothesis is zero correlation. Bold numbers indicates peak cross-correlations in the table.
Sources and calculation methods: See main text and appendix E.

Figure 9c-9d shows the extracted business cycle components from consumer prices and the stock of broad money scaled with the level of real GDP at factor costs.[28] Dynamic cross-correlations are reported in table 2b. When one takes into account the level of economic activity there seems to be an even closer relationship between money and prices. Prices still seem to have led money in the post-World War II period measured by the peak correlations. However, at the lowest frequencies (8-40 years cycles) there appear also to be several large and significant positive correlation coefficients between prices and the lagged values of broad money.

Long-span studies for other countries tend also to find a much stronger positive correlation between money and prices in the longer run than in the short run.[29] Regarding the stability of the correlation patterns the findings seem to be more mixed. However, for most other countries money seems to be contemporaneous with or to lead prices measured by peak correlations, although exceptions occur.

The results from such filtering exercises may of course be affected by the choice of filtering methods and the general uncertainty surrounding the estimation of the cyclical components, the definition of the frequency bands and the applied concept of prices and monetary aggregate. Furthermore, the data frequency (annual, quarterly or monthly) is likely to be of importance, particularly regarding the short-run relationship between money and prices.[30] Also the type of monetary regime and the degree of openness of the economy (including the extent of restrictions on cross-border capital mobility) can play an important role.

However, the finding in the study at hand – that prices measured by peak correlations seem to lead money at all frequencies in the post-World War II period, even if one takes into account the level of economic activity – is certainly not what one would have expected following conventional quantity-theoretical wisdom. Still, in a Danish context this finding may not be very controversial. Risbjerg (2006b) studies medium-term and long-term cycles with duration of respectively 1.5-8, 8-20 and 20-40 years in Danish money growth and inflation using the Christiano & Fitzgerald (2003b) filter. His results also seem to indicate that inflation have tended to lead money growth in the most recent decades rather than vice versa. Knudsen (1988) studies the correlation between money and inflation in Denmark in the 1970s and 1980s. He reports that no significant link from growth in money to inflation can be found

[28] The underlying philosophy behind this scaling is the classical equation of exchange: MV = PY where M denote the nominal stock of broad money, V the velocity of money, P the price level and Y real output. Figure 9c-9d and table 2b thus study the relationship between M/Y and P.

[29] Cf. e.g. Christiano & Fitzgerald (2003a), Dewald & Haug (2004) and Benati (2005).

[30] In a study covering more than century there is naturally also a question regarding data quality to consider. The time series for consumer prices is based on data for the private consumption deflator before 1915, cf. appendix B. These figures come from Kærgård (1991) and are based on the historical national accounts in Hansen (1983). The earliest national account statistics compiled by the Danish central bureau of statistics covers only the period since 1930, cf. Det Statistiske Departement (1948). The figures for the private consumtion deflator prior to 1915 may therefore be surrounded by a certain amount of uncertanity.

using statistical causality tests. Furthermore, Knudsen *op.cit.* notes that the introduction of fixed-exchange-rate policy in the early 1980s seems to have caused a negative contemporaneous link between money and prices. The fixed-exchange-rate policy and a general decline in the international inflation levels were followed by lower Danish inflation levels and also by a flattening of the Danish yield curve which increased the demand for money. Money and prices are thus both endogenous variables that may be determined by a number of other background variables and therefore not subject to any simple direct causality, and the degree of correlation at various lags between these endogenous variables may depend on the nature of the shocks driving the economy at a given time.

However, this does not exclude that information extracted from the development in alternative definitions of money (e.g. residuals from money demand equations – "excess liquidity") might serve as useful supplementary information in a broad-based coherent assessment of the overall inflationary pressure in an economy, in particular if one is able to detect structural shifts in money demand and analyse money demand on a sectral rather than an agregated level, cf. e.g. the comprehensive assessment in Klöckers & Willeke (eds.) (2001). Furthermore, information extracted from monetary aggregates and the counterparts of these (e.g. credit to the private sector) might be useful indicators of development in other economic variables than prices such as economic activity.

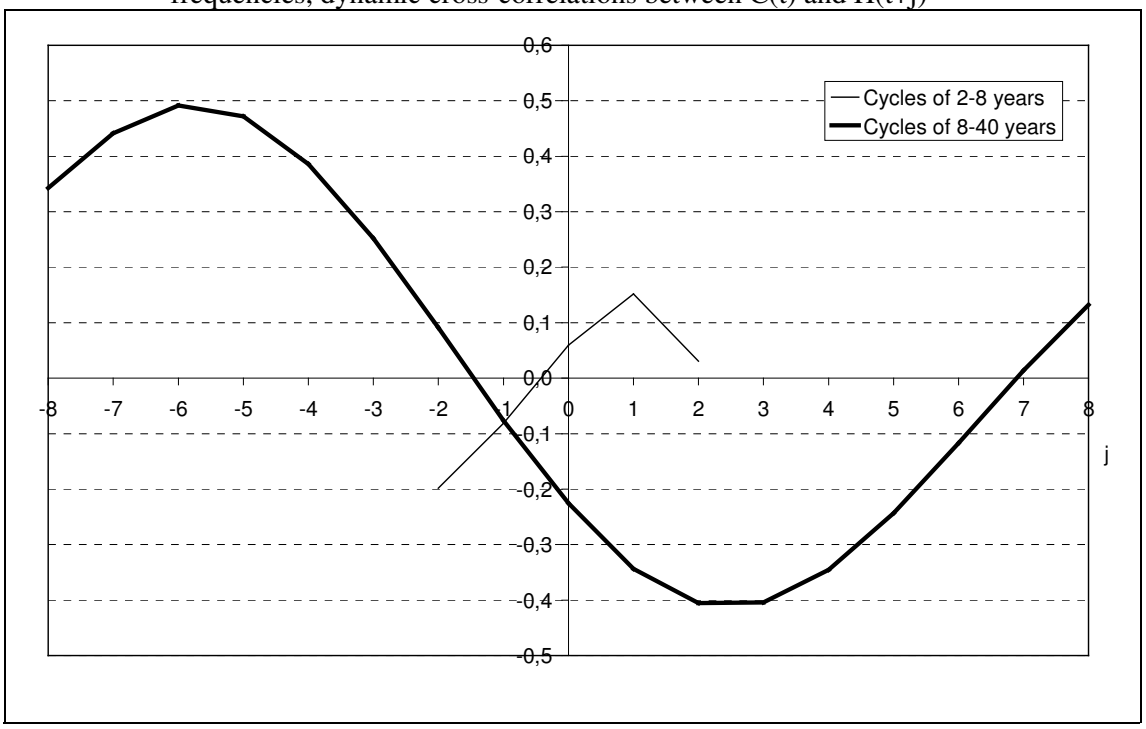
House prices and credit from mortgage-credit institutes

Figure 10a shows the dynamic cross-correlations between nominal house prices and the nominal value of credit granted by mortgage-credit institutions at different cyclical frequencies for the pre-1946 period.[31] Figure 10b covers the post-World War II period.

The correlation pattern seems to be very different in the two subperiods. Prior to the end of World War II house prices have led credit with a considerable lead-time (6 years) in the long-term cycles. The peak correlation coefficient at the business cycle frequency is not significantly different from zero in this period. In the post World War II period house prices have been contemporaneous with credit at the business cycle frequency and in the medium-term and longer-term cycles the lead-time of house prices relative to credit seems to have been considerable shorter (1 year) than in the pre-1946 period.

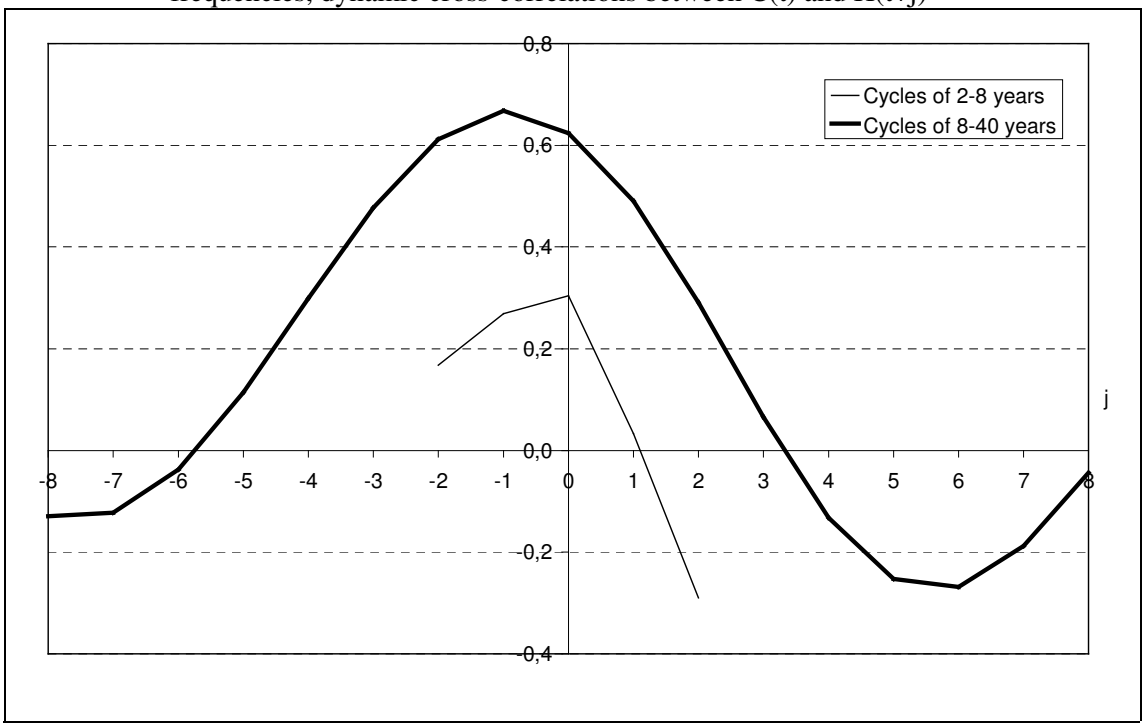
[31] No house-price index for single-family houses exist prior to 1938. A price index for farms has therefore been used prior to 1938. In the post-1938 period there has been a quite close correlation between the two series, cf. figure 3.

Figure 10a: House prices (H) and credit (C) 1875-1945, cyclical components at different frequencies, dynamic cross-correlations between C(t) and H(t+j)



Notes: C denotes the stock of credit granted by mortgage-credit institutes. H denotes a price index for one-family houses (since 1938) and farms (prior to 1938). All peak correlations (except for cycles of 2-8 years) are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

Figure 10b: House prices (H) and credit (C) 1946-2005, cyclical components at different frequencies, dynamic cross-correlations between C(t) and H(t+j)



Notes: C denotes the stock of credit granted by mortgage-credit institutes. H denotes a price index for one-family houses. All peak correlations are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

Rising house prices may stimulate housing investments (cf. Tobin's Q-Theory). Furthermore, rising house prices may affect private consumption though a wealth effect. According to the Life-Cycle Theory of consumption an improvement in household's wealth position will have a positive effect on consumption throughout the lifetime of the household and may partly be financed via credit from mortgage-credit institutes through mortgage equity withdrawal, at least for the most recent decades with relatively liberal access to mortgage financing. Following these lines of reasoning it seems therefore plausible that house prices are positive correlated with credit from mortgage-credit institutes both in the short run and in the longer run.

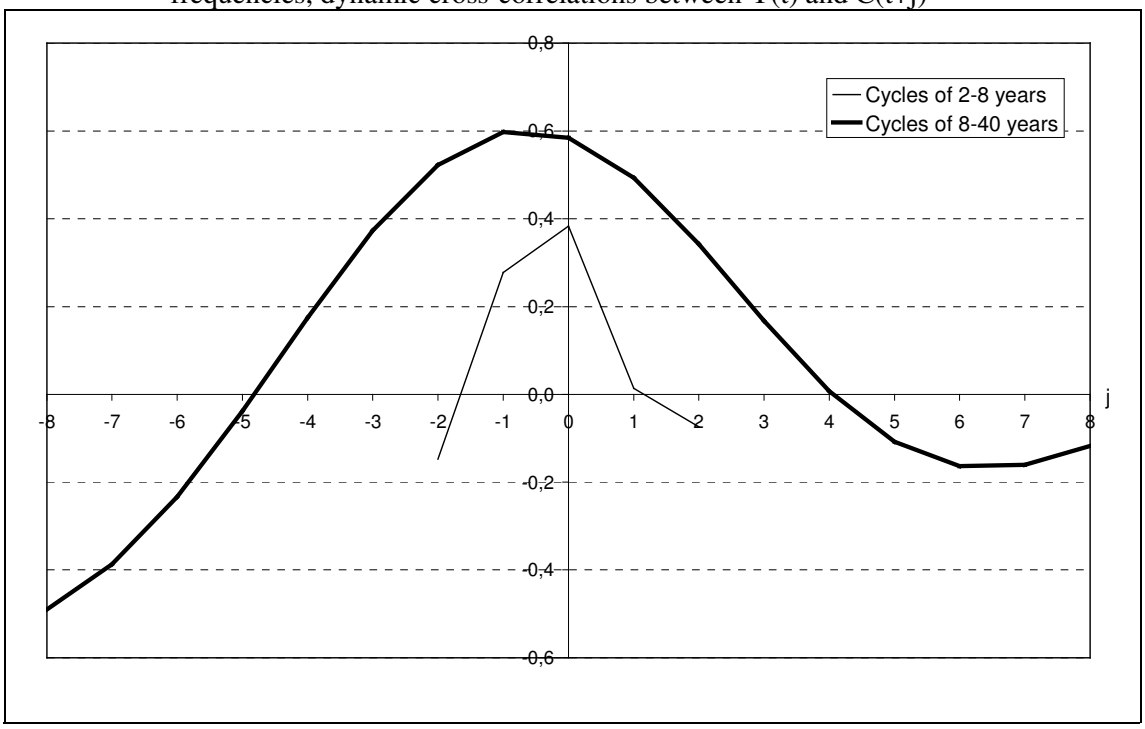
Theoretically it may be argued that rising house prices does not really increase the wealth position of homeowners since the higher house prices will be fully reflected in higher future imputed rents in owner-occupied housing, cf. e.g. Pedersen (1998) and Danmarks Nationalbank (2003b). However, even in this case rising house prices may be followed by increased lending by mortgage-credit institutes in the medium and longer run in step with the turnover of existing owner-occupied houses (at the new higher price level) in the economy. Furthermore, if homeowners are subject to credit rationing rising house prices may also increase the household's borrowing from the mortgage-credit sector using the house as collateral.

The relative short lead-time between house prices and credit in the post-World War period might partly be the result of a gradual easing of the access to raise supplementary loans against free mortgageable value in owner-occupied houses during the most recent decades, cf. appendix A. Furthermore, during the high inflation in the 1970s and first half of the 1980s the real interest rate after tax were negative due to a nominal tax system with high marginal tax rates and full tax deductibility of interest payments. This may have given an incentive to mortgage equity withdrawal in step with rising house prices – particularly because the yield of savings in pension schemes were untaxed until the early 1980s, cf. Ejerskov (2000) and Pedersen (2001).

Real credit and real GDP

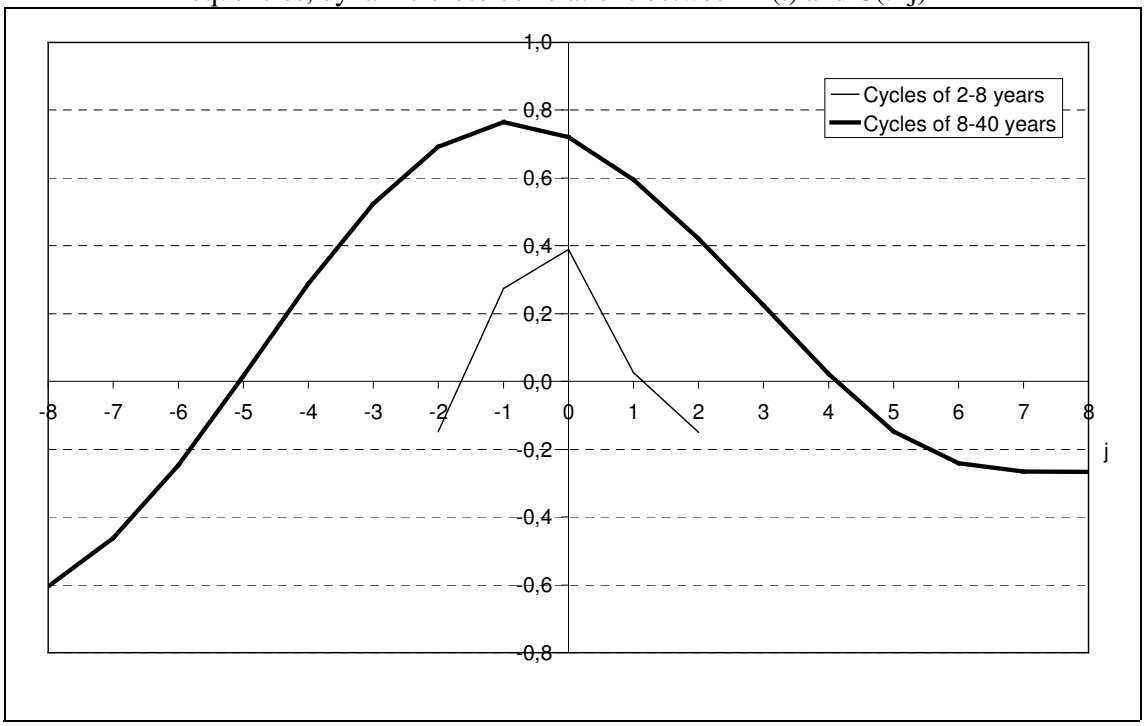
Figure 11a shows the dynamic cross-correlations between total credit granted by banks and mortgage-credit institutions (deflated by the CPI) and real GDP at factor costs at different cyclical frequencies for the whole period 1875-2005. Figure 11b and figure 11c cover the two sub-periods 1875-1945 and 1946-2005 respectively. Real credit seems in general to have been almost contemporaneous with real GDP, and the largest correlation coefficients occur in the long-term cycles. The correlation patterns between real credit and real output seems to have been fairly stable over time.

Figure 11a: Real credit (C) and real GDP (Y) 1875-2005, cyclical components at different frequencies, dynamic cross-correlations between Y(t) and C(t+j)



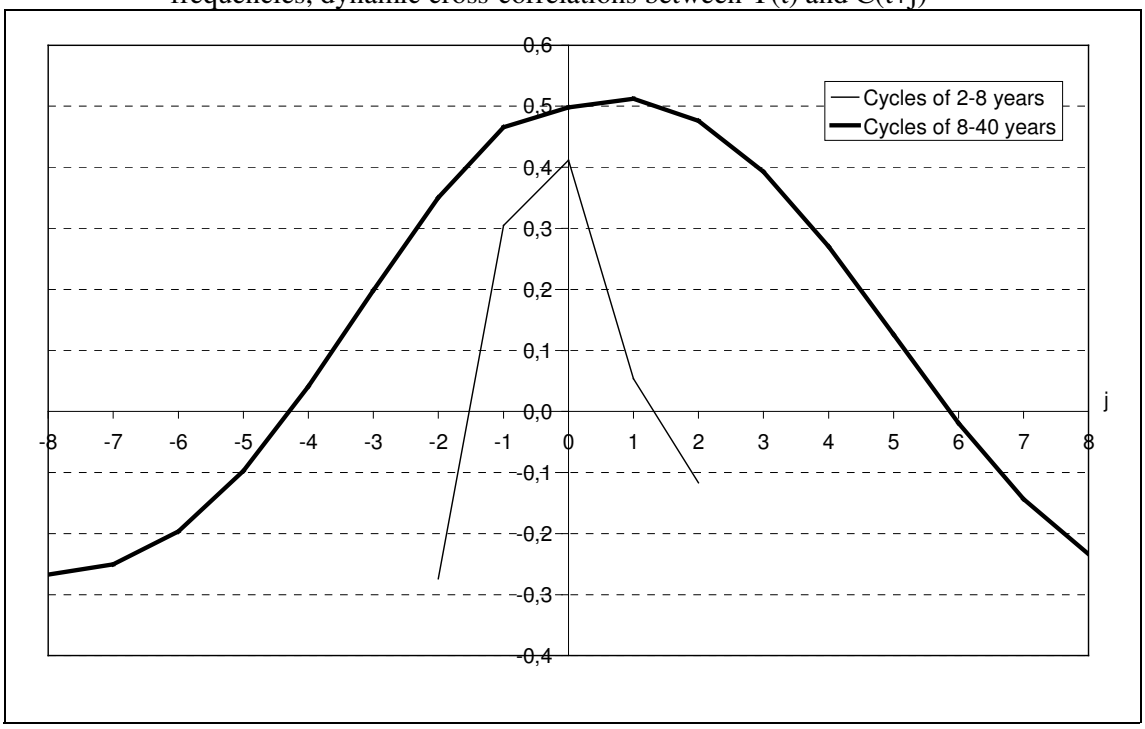
Notes: Y denotes real GDP at factor prices while C denotes the total stock of credit granted by commercial banks, savings and mortgage-credit institutes (deflated by CPI). All peak correlations are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

Figure 11b: Real credit (C) and real GDP (Y) 1875-1945, cyclical components at different frequencies, dynamic cross-correlations between Y(t) and C(t+j)



Notes: Y denotes real GDP at factor prices while C denotes the total stock of credit granted by commercial banks, savings and mortgage-credit institutes (deflated by CPI). All peak correlations are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

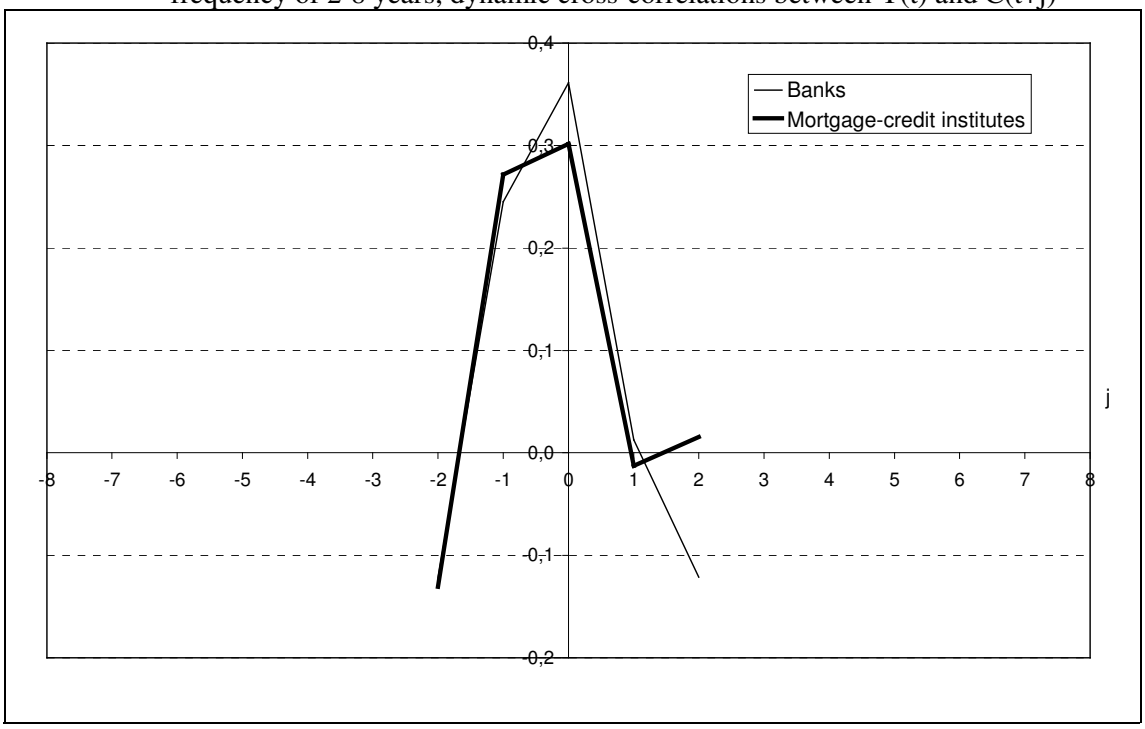
Figure 11c: Real credit (C) and real GDP (Y) 1946-2005, cyclical components at different frequencies, dynamic cross-correlations between Y(t) and C(t+j)



Notes: Y denotes real GDP at factor prices while C denotes the total stock of credit granted by commercial banks, savings and mortgage-credit institutes (deflated by CPI). All peak correlations are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

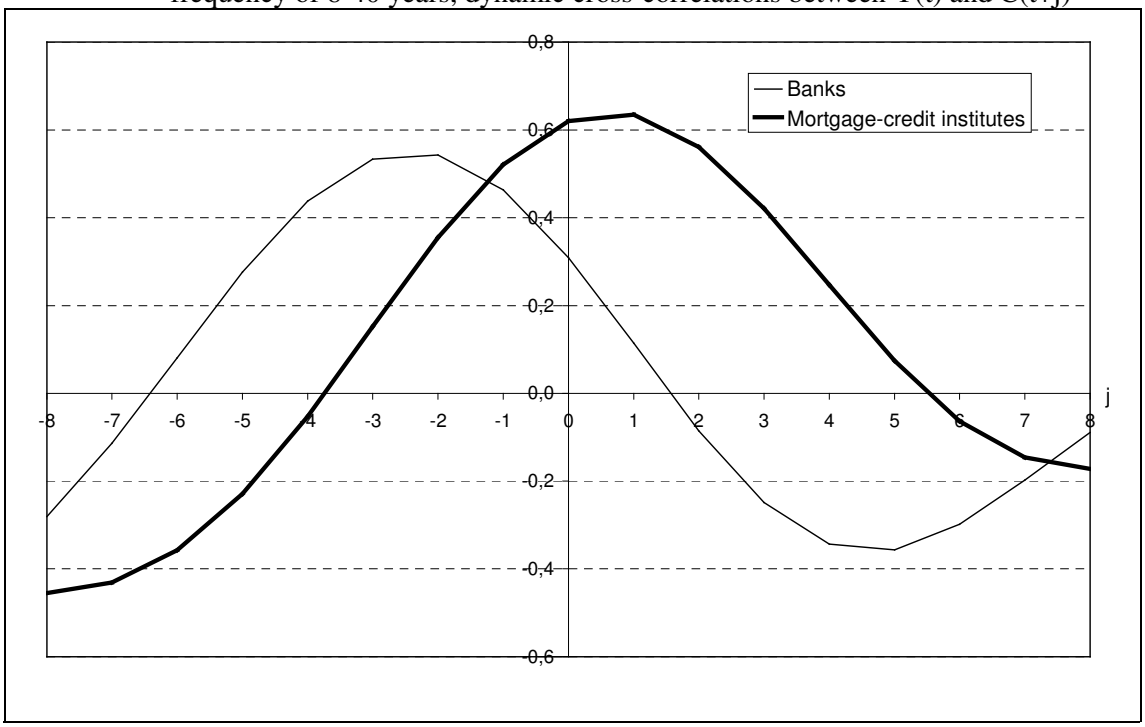
Figure 11d-11e shows the dynamic cross-correlations between real credit granted by respectively banks and mortgage-credit institutions and real GDP at factor costs at different cyclical frequencies for the whole period 1875-2005. It seems that real bank credit has tended to lead real GDP by a couple of years at the lower frequencies (8-40 years) whereas real credit from mortgage-credit institutes at the same frequencies has been contemporaneous with real GDP or slightly lagging. At the business cycle frequency the pattern of the dynamic correlations seems to have been very similar for banks and mortgage-credit institutes, both indicating that real credit at this frequency has been contemporaneous with real GDP.

Figure 11d: Real credit (C) and real GDP (Y) 1875-2005, cyclical components with frequency of 2-8 years, dynamic cross-correlations between Y(t) and C(t+j)



Notes: Y denotes real GDP at factor prices while C denotes the stock of credit granted by respectively banks or mortgage-credit institutes (deflated by CPI). All peak correlations are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

Figure 11e: Real credit (C) and real GDP (Y) 1875-2005, cyclical components with frequency of 8-40 years, dynamic cross-correlations between Y(t) and C(t+j)



Notes: Y denotes real GDP at factor prices while C denotes the stock of credit granted by respectively banks or mortgage-credit institutes (deflated by CPI). All peak correlations are significant different from zero at a 5 per cent level.
Sources and calculation methods: See main text and appendix E.

It may be difficult to interpret why cycles in real GDP occur at the long-term frequencies at all.[32] One possible explanation could be that long swings in house prices affect domestic demand, cf. the section on "House prices and credit from mortgage-credit institutes" above. Other traditionally mentioned factors relate to investments in capital-producing sectors or long waves in technological innovations.[33] However, one should also keep in mind that an attempt to track very long cycles (with a duration of up to 40 years) may be questionable even in a data sample covering a time span of more than 130 years. But if long-term cycles are present in real GDP it seems plausible that one should find cycles at the same frequencies in real credit as well as indicated by figure 11a-11c and 11e.

5. Finalising remarks and scope for further research

To date projects on compilation of historical national-account statistics for Denmark have only focused on the real side of the economy. This paper has made a first crude attempt to overcome this data shortage by constructing a set of historical financial-account stock data for Denmark covering the period 1875-2005 at an annual frequency.

However, the financial balance-sheet data presented in this paper have only taken the major financial assets and liabilities into consideration, and only stock figures have been compiled. It would therefore be interesting if future projects on historical-national accounts statistics in Denmark would make an attempt to cover a more complete set of financial accounts, including both stock as well as flow data. One of the most challenging issues concerns the differences in accounting standards and practices over time and across sectors. If changes in valuation of financial assets and liabilities can be assessed with a reasonable degree of precision, net-lending figures from such a set of historical financial accounts could in principle also be compared with net lending figures compiled from non-financial data. Flow data from a set of historical financial accounts could thereby also shed light on the reliability of non-financial historical national-account statistics in Denmark, particularly if the latter were broken down into institutional sectors.[34]

Internationally there has been a long-standing tradition for compilation of historical national account statistics. However, to the knowledge of the author of this paper no attempts have

[32] There is also a question regarding data quality to consider in relation to real GDP. The time series real GDP prior to 1949 comes from the historical national accounts in Hansen (1983). As mentioned the earliest national account statistics compiled by the Danish central bureau of statistics covers only the period since 1930, cf. Det Statistiske Departement (1948). The figures for real GDP prior to 1930 may therefore be surrounded by a certain amount of uncertainty.

[33] Chapter 6 in Kærgård (1991) offers a short overview of the "classical" literature on short-term and long-term cycles in economics and the Danish contributions in this area. Chapter 3 in Freeman & Loucã (2001) offers a more elaborated survey.

been made to compile long-span historical time series on financial-accounts. The paper at hand has illustrated that a system of financial accounts can be a powerful framework for organisation of financial data when data sources are more fragmented and sparse, which is often the case in relation to historical financial statistics. There is therefore probably also scope for interesting future projects on historical time series of financial accounts in other countries as well.

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[34] None of the existing versions of Danish historical national-account statistics covering the pre-1971 period include a full split of the total economy into institutional sectors – not even a general government sector and a private sector – with corresponding net-lending figures, cf. Abildgren (2005d).

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Appendix A: The historical origin and development of financial institutions and financial markets in Denmark – An overview

Central banking, currency and exchange-rate policy[35]

Due to large military expenditures during the Great Nordic War 1700-1720 the central government introduced "authorised bank notes" in 1713. The notes were partly made legal tender for private transactions and for payments to and from the central government. The notes were not convertible into coins, but they could be exchanged for government bonds with interest and instalments paid in coins. These authorised bank notes were withdrawn from circulation again in 1728.[36]

The first note-issuing bank within the Danish-Norwegian monarchy, Kurantbanken[37], was established in Copenhagen as a private joint stock company in 1736. The bank was created the initiative of Kommercekollegiet[38] in order to support the expansion of trade and industry by granting loans to such activities. In the introduction to the regulation establishing the Kurantbank it was stated the bank "... could be extremely useful with a view to promoting commerce and manufacturing as well as for the safe and steady maintenance of a equitable credit system..."[39]. Kurantbanken was granted the privilege to issue bank notes that could be used for all payments to the central government. However, the notes of the Kurantbank were not made legal tender (compulsory means of payment) in general, and the denomination of the notes were quite large (10 rigsdaler and upward). The Kurantbank was not subject to any rules regarding the reserve backing of its bank notes issues, but its notes were redeemable on demand into silver coins.

Convertibility of the Kurantbank notes was temporary suspended in 1745-1747 during the latter part of the War of the Austrian Succession and again in 1757 during the Prussian Seven Years War, this time de facto on a permanent basis. Hereby Denmark in practice adopted a paper standard and the notes of the Kurantbank were made legal tender within the Kingdom of Denmark-Norway (but not within the Royal Duchies Schleswig and Holstein). In 1762 the lowest denomination of Kurantbank notes was lowered to 1 rigsdaler.

From 1760 more than half of the outstanding amounts of loans made by the Kurantbank were claims on the central government and in 1773 the Kurantbank was taken over by the central government.

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[35] The history of the Danish central banking system is covered by Svendsen (1962, 1963), Wilcke (1927, 1929, 1930), Rubow (1918, 1920), Ussing (1926), Hansen & Svendsen (1968), Hoffmeyer & Olsen (1968), Mikkelsen (1993) and Hoffmeyer (1993).
[36] The authorised bank notes are covered in more details by Nielsen (1907).
[37] The official name of the bank was "Den Kiøbenhavnske Assignation-, Vexel- og Laane-Banqve". The history of the Kurantbank is covered by Rasmussen (1950, 1955).
[38] In English: The Department of Trade and Manufactures.
[39] The English translation of this quote from the regulation is from Zeuthen (1993).

Due to Hamburg's importance to Danish foreign trade, the value of the Danish currency (kurant) was normally measured in relation to the Hamburg monetary unit of account (banco[40]). The silver parities implied a par exchange rate of 122.50 rigsdaler kurant per 100 rigsdaler banco. During the period 1737-1782 the Danish exchange rate for Kurantbank notes vis-à-vis Hamburg banco fluctuated between 112 and 132. However from 1782 to 1787 the exchange rate depreciated from 132 to 141, which initiated a reorganisation of the Danish monetary system.

The reorganisation was first implemented in the Royal Duchies Schleswig and Holstein. In 1788 the note issuing Schleswig-Holstein Specie Bank was founded as a governmental institution in Altona. It took over the responsibilities of the Kurantbank in the Royal Duchies Schleswig and Holstein whereby Schleswig-Holstein became a separate currency area within the Danish monarchy. The notes of Schleswig-Holstein Speciebank were convertible into speciedaler silver coins (with a silver content equivalent to Hamburg banco), and Danish kurant silver coins as well as Danish Kurantbank notes were prohibited from the currency of circulation in the Duchies. The par rate between speciedaler silver coins and kurant silver coins were fixed at 125 rigsdaler kurant per 100 rigsdaler specie.[41] However, Kurantbank notes could not be exchanged for notes from the Schleswig-Holstein Speciebank at this rate, but only at the current market rates.

The Schleswig-Holstein Specie Bank was subject to strict rules regarding the reserve backing of its banks notes issues and its lending activities. The notes of Schleswig-Holstein Specie Bank also turned out to be fairly stable around par vis-à-vis the Hamburg banco in the whole period up to the monetary reform in 1813, cf. below.

The Kurantbank notes continued to depreciate and reached a level of 162 rigsdaler kurant per 100 rigsdaler banco in 1789. Part of the reason was probably that a large amount of the Kurantbank notes withdrawn from the Royal Duchies was not destroyed but re-circulated in Denmark-Norway. A new note-issuing bank for Denmark-Norway, the Danish-Norwegian Specie Bank, was established in Copenhagen in 1791[42] and was organised as a private joint stock company. Its notes and coins were based on the speciedaler whereby the monetary unity within the Danish monarchy was restored. The Danish-Norwegian Specie Bank could freely decide whether it wanted to redeem its notes into silver coins or into Kurantbank notes at the current market rates. The notes issued by the Danish-Norwegian Species Bank could be used

[40] The Hamburg banco was not a coin but simply a specifically defined amount of fine silver.
[41] As mentioned, the silver parities implied par exchange rate of 122.50 rigsdaler kurant coins per 100 rigsdaler banko. To this a 2 per cent mint cost was added. Rounding the figures gives the par rate of 125:100. The notes issued by the Schleswig-Holstein Specie Bank had a dual denomination in both kurant and specie rigsdaler at the ratio 125:100.
[42] At the same time the Kurantbank was closed for new business activities. The circulating amount of Kurantbank notes were not to be increased, and the Kurantbank notes were planned to be gradually withdrawn from circulation

for all payments of taxes to the central government, but they were not made compulsory means of payments for private transactions. In contrast to the Kurantbank the reserve backing of the banks notes issue of the Danish-Norwegian Speciesbank was strictly regulated.

In 1794 the Kurantbank notes returned to par vis-à-vis Hamburger banco. However, during the Napoleon Wars the huge central governments deficits was to a large extent financed by a massive issuing of kurant-denominated bank notes through Depositokassen founded in 1799.[43] The result was a period with hyperinflation and a collapse of the Danish monetary system. The exchange rate of kurant denominated bank notes reached 1,760 rigsdaler kurant per 100 rigsdaler specie by the end of 1812.

By a monetary reform in January 1813 the two existing note-issuing banks within the Danish monarchy were closed and a new temporary state-owned bank, the Rigsbank, was established. The Rigsbank was granted the privilege to issue rigsbankdaler-denominated bank notes with the status of being the sole legal tender within Denmark, Norway and in the Royal Duchies Schleswig and Holstein. At the same time Kurantbank notes in circulation was written down by being exchanged for the new Rigsbank notes in the ratio 6 to 1. The same ratio was applied to kurant-denominated central-government debt. The central government had already suspended payment of instalments on its debt in 1811 and interest rate payments in silver in 1812. The monetary reform were therefore given the nickname "the bankruptcy of the state".[44]

The note issuance of the Rigsbank was subject to a maximum limit at 46 million rigsbankdaler. The notes were backed by a 6 per cent first-priority mortgage in the value of all properties in Denmark ("the bank mortgage"), and the par rate between rigsbankdaler and speciedaler were fixed at 200:100.[45] This implied a par rate between rigsbankdaler and kurant at 200:125 and a silver par exchange rate of 200 rigsbankdaler per 100 rigsdaler banco.[46]

In February 1813 the exchange rate were around 286 rigsbankdaler per 100 rigsdaler banco. However the Rigsbank could not initially ensure convergence towards the par value (200) of the new rigsbankdaler notes. The market value of rigsbankdaler notes vis-à-vis silver reached a low point of 2,250 equivalent to 9 per cent of the par value in the middle of September 1813. By end-1813 the exchange rate was quoted at 800 and by end-1814 at 575. The

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during a period of 20 years. In 1797 the Danish-Norwegian Specie Bank established a branch in Christiania in Norway.

[43] Depositokassen granted loans funded by issuing Kurantbank notes with a "D" printed on it.

[44] The monetary reform in 1813 is described in more details in e.g. Hansen, S. Aa. (1990).

[45] The notes issued by the Schleswig-Holstein Speciebank were being exchanged for new Rigsbank notes in the ratio 1 to 2 reflecting the fact that the notes of Schleswig-Holstein Specie Bank had been fairly stable around par vis-à-vis the Hamburg banco in the whole period up to 1813.

[46] As mentioned the Kurantbank notes in circulation was written down by the monetary reform by being exchanged for the new Rigsbank notes in the ratio 6 to 1. However, the market value of Kurantbank notes was far below par just before the monetary reform. Kurantbank notes were thus by and large written down according to the market rates by the monetary reform in 1813, cf. page 248 in Olsen (1962).

Rigsbank began to withdraw notes from circulation in 1814, but the market value of rigsbankdaler notes did not pass a level above 30-40 per cent of the par value in the nearest following coupe of years. The weakness of the rigsbankdaler notes in these years should be viewed in light of the reestablishment of Schleswig-Holstein as a separate currency area within the Danish monarchy in October 1813[47] and the separation of Denmark and Norway after the peace settlement in Kiel in January 1814[48]. These events limited the area of circulation for the rigsbankdaler notes but without a corresponding reduction of the bank notes in circulation.

A regulation in 1813 included a promissory clause stating that the Rigsbank would be restructured into a private joint stock company. This promise was fulfilled when the Nationalbank[49] was established in 1818. The Nationalbank replaced the state-owned Rigsbank and was organised as a private joint stock company. The Royal Privilege of the Nationalbank had duration of 90 years. The Nationalbank was granted monopoly right to issue bank notes and it was to be independent of the government in its implementation of monetary policy. In § 1 of the charter of 1818 it was thus stated that the neither the monarch nor his successors in government should "... ever have any direct or indirect effect on the bank's management whose competence is set out solely by its charter and rules..."[50]. The primary objective of the Nationalbank was to "... provide a safe and secure currency system..."[51] (§2). A secondary objective was to "... promote currency circulation, facilitate production and trade through the extension of credit..."[52] (§5). The management of the Nationalbank consisted of a Board of Directors with 15 members[53] and a Board of Governors with 5 members[54]. A Royal Bank Commissioner[55] was to monitor the bank's compliance with its privilege.

In 1818 the primary objective of the Nationalbank was translated into an immediate task of bringing the value of the currency (rigsbankdaler notes) back to parity in relation to silver coins as soon as possible. During the first decades after its establishment the Nationalbank therefore focused on withdrawing bank notes in order to increase the value of the currency. Parity of the rigsbankdaler notes vis-à-vis silver coins was achieved in 1838, and in 1845 the

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[47] Riksbankdaler ceased to be legal tender in Schleswig-Holstein in October 1813. In practice the area of circulation for the rigsbankdaler notes was even smaller due to the use of silver coins as the preferred means of payments rather than rigsbankdaler notes in large parts of Jutland, cf. page 160-162 in Hansen & Svendsen (1968).
[48] Eitrheim (2005) covers the monetary development in Norway before and after the separation from Denmark in 1814.
[49] The official name of the bank was "Nationalbanken i Kiøbenhavn".
[50] The English translation of this quote from the charter is from Zeuthen (1993).
[51] Translated to English from the reprint of the charter in Rubow (1918).
[52] Translated to English from the reprint of the charter in Rubow (1918).
[53] Self-elective but originally appointed by a group selected by the King from among the stakeholders, i.e. people subject to "the bank mortgage" and persons who had bought ownership shares in the Nationalbank.
[54] The King appointed one member whereas the Board of Directors appointed the other four members.
[55] In 1818 the Minister of Justice. Later the function as Royal Bank Commissioner has rested at various ministers, currently (1 March 2006) the Minister for Economic and Bussiness Affairs.

notes were made convertible into silver coins on demand.[56] Hereafter the Nationalbank could direct its attention to the conduct of ordinary banking activities. Branches were opened in the provinces in 1837 (in Aarhus[57]) and 1844 (in Flensborg[58]), and the Nationalbank granted loans to the business sector by rediscounting bills of exchange.

However, more restrictive rules regarding a minimum of 50 per cent silver reserve backing and a fixed upper limit at 16.5 million rigsbankdaler for the bank notes issued was introduced in 1845[59] restricting the Nationalbank's lending activity and the opening of new branches.[60] In step with the development of a private credit market via banks and mortgage credit institutes the Nationalbank switched gradually from direct lending to business towards loans to the banks. Hereby the Nationalbank could concentrate on the "classical" central bank role as banker to the banks. In 1914 the Nationalbank also became sole banker of the central government, and in 1991 most of the tasks in the National Debt Office of the Ministry of Finance was transferred to the Nationalbank. Credits to private enterprises, e.g. by discounting bills of exchange, were only greatly reduced over time. The last private enterprises relationships were terminated in 1967. The last branches (in Odense and Aarhus) were closed in 1989.

The Coin Act of 1873 changed the monetary standard in Denmark from silver to gold. At the same time, the act implied a transition from the rigsdaler to the krone as the Danish currency unit.[61] From 1875 the Danish krone and the Swedish krona had the same gold content in accordance with the agreement on the Scandinavian Currency Union from 1872. The Norwegian krone joined the Union with effect from 1877.

The Nationalbank's Royal Privilege of 1818 was extended for another 30 years period in 1907 with only few material changes. The banknote coverage rules were changed to a pure proportional reserve system where 50 per cent of the outstanding amount of banknotes had to be covered by gold. In addition, the number of Governors by Royal Appointment was raised from 1 to 2, of which the one had to have knowledge of agriculture. Furthermore, the Nationalbank had to inform the government prior to adjustments of the discount rate.

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[56] In 1859 the Nationalbank furthermore became subject to an obligation to purchase silver bars at a fixed price.
[57] The establishent and operation of the branch in Aarhus during its first decade is covered by Märcher (2005).
[58] The establishment of the branch in Flensborg is covered by Hornby (1975).
[59] The limit was raised in 1847 and 1854. In 1859 the reserve backing system was changed to a subscription system which allowed for a certain amount of notes in circulation without silver backing (fiduciary money) and full silver backing of the rest of the notes issued. In 1854 the name of the Danish currency changed from "riksbankdaler" to "rigsdaler".
[60] Later the Nationalbank established branches in Ålborg (1881), Nykøbing Falster (1882), Kolding and Odense (1901).
[61] 1 rigsdaler was exchanged for 2 kroner. At the same time, the decimal system was introduced with 1 krone being equivalent to 100 øre. The transition from silver to the Gold Standard was partly "prepared" in 1872 where the Nationalbank was allowed to use gold rather than silver as part of the assets backing the notes in circulation. Furthermore, the Nationalbank's obligation to purchase silver bars at a fixed price was suspended. For fact-oriented chronology of the Danish foreign exchange rate policy since 1875, see Abildgren (2004a).

However, interest rate decisions rested with the Board of Governors of the Nationalbank, irrespective of the government's position.

Denmark – like many other countries – left the Gold Standard at the outbreak of the World War I in 1914. In January 1927 the Danish krone returned to the Gold Standard at the pre-war parity. However, Denmark left the Gold Standard again in 1931, shortly after the UK went of gold, and in 1932 a comprehensive exchange-control system was introduced. Apart from a major Danish devaluation in 1933, the Danish krone was pegged rather closely to the British pound most of the remaining period until the outbreak of World War II.

In 1936 the Nationalbank was transformed from a private joint-stock company into a self-governing institution whose profits after provisions were to be transferred to the central government.[62] The most important institutional changes were related to the management of the bank. The Board of Directors was expanded with 10 new members to a total of 25 members. Two of the new members were to be appointed by the government and the remaining eight by the Parliament from among its members. Furthermore a Committee of Directors with 7 members[63] was added. Finally the Board of Governors was reduced from 5 to 3. The Chairman of the Board of Governors was to be appointed by the government and the two other members were to be elected by the Board of Directors. The responsibility for monetary policy formulation and implementation remained with the Board of Governors of the Nationalbank.[64] According to the act the Nationalbank's objective is "... to maintain a safe and secure currency system and to facilitate and regulate the traffic in money and the extension of credit"[65]. Fundamentally the primary objectives of the Nationalbank therefore remained unchanged compared to the legislative basis from 1818: Price stability and financial stability. At the first reading of the bill Trade Minister Hauge remarked that "... A safe and secure currency system means that exchange rates will be kept stable in so far as this is possible for the bank and the society..."[66]. Both prior to and since the Nationalbank Act in 1936 it has been a strongly rooted tradition in Denmark to fulfil the objective of price stability by pegging the Danish currency to one or more countries that pursue a low-inflation economic policy.

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[62] At the same time the official name of the bank was changed to "Danmarks Nationalbank".

[63] The two governmental appointed members of the Board of Directors were to be permanent members of the Committee of Directors. The Board of Directors was to select from among itself the other 5 members of the Committee of Directors.

[64] In 1998 the European Monetary Institute and the European Commission made an assessment of the statutes of the Nationalbank. They found that the statutes are compatible with the requirement for central-bank independence in the Maastricht Treaty.

[65] §1 in the Nationalbank Act of 7 April 1936. The English translation of this quote is from page 114 in Danmarks Nationalbank (2003a).

[66] The English translation of this quote from the Deliberations of the Folketing (the Parliament) is from page 114 in Danmarks Nationalbank (2003a).

In the period 1946-1971 Denmark participated in the Bretton Woods fixed-exchange-rate system established under the auspices of the International Monetary Fund. The US dollar was the anchor currency of the system. During the Bretton Woods period some capital-account transactions (mainly in relation to short-term commercial credits, financial loans and non-financial direct investments) were liberalised but most portfolio investments to and from Denmark still required permission from the Danish monetary authorities.

After the breakdown of the Bretton Woods system in the beginning of the 1970s, the Danish exchange-rate policy became part of the European exchange-rate co-operation, first within the "Currency Snake" founded in 1972 and subsequently from 1979 within the European Exchange Rate Mechanism (ERM). The post-1971 period also saw a gradual process with deregulation of the remaining Danish restrictions on capital-account transactions. The last restrictions on capital account transactions in Denmark were removed in October 1988.

The history of foreign-exchange-rate fixing in Denmark can be summarised as follows[67]: Prior to 1787 the Royal Exchange Commissioner notified foreign-exchange rates to the Police Headquarters. In 1787 an Exchange Rate Committee was established by Royal Regulation to officially determine and publish current exchange rates of foreign bills of exchange twice a week. In 1811 the Royal Banking Office (the Exchequer) got a seat in the fixing committee and with the establishment of the Nationalbank in 1818 a governor of the bank obtained a seat as well. From 1880 the exchange rate fixing were based on reports from commercial banks on the rates applied in their actual foreign-exchange trading. Since 1940 most of the major foreign exchange dealers participated at a daily fixing session of foreign-exchange rates at the Nationalbank. Up to 1981 these rates were binding sales rates. However, the during the 1980s and early 1990s the importance of the fixing gradually diminished due to the development on the foreign-exchange markets with trading throughout the day at fluctuating exchange rates and a low level of turnover in connection with the fixing sessions. In 1991 the daily fixing of foreign-exchange rates in the Nationalbank was discontinued. Instead, the Nationalbank began to publish a daily list of informative exchange rates.

***Commercial banks, savings banks and credit co-operatives*[68]**

The first private savings bank[69] in Denmark[70] was established in 1810 on the Holsteinsborg estate. During the 1820s and 1830s around 20 more savings banks were founded. These first

[67] Cf. Andersen (1991).

[68] The historical development of the private banking sector in Denmark is covered by e.g. Andersen & Ronit (eds.) (1997), Bisgaard (1910), Drejer (1966), Eskesen (1989), Hansen, P. H. (1991, 1994, 1995, 1996, 2001a, 2001b), Hansen, S. Aa. (1970, 1982, 1996), Hansen (1987), Krogstrup (1955) and Johansen (1988, 1991, 1994).

For a comparative study of the origin of the banking system in Denmark and other countries, cf. e.g. Hansen (1960), Nielsen (1923) and Grossman (2001).

savings banks acted primarily as depository institutions for poor people. The funds of the savings banks were therefore mainly placed as deposit with the Treasury or as deposits with the Nationalbank rather than as loans to the business sector. However during the late 1840s and the 1850s the saving banks involved into significant credit-supplying institutions in the Danish economy, mainly via mortgage loans to agriculture.[71] In 1857 Sparekassen Bikuben[72] – which later became the largest savings bank in Denmark – was founded, and by 1880 the number of savings banks had reached a total number of 443. This figure includes a large number of small sognesparekasser[73].

As a response to a several failures among saving banks in 1877-1878, a Savings Bank Commission was set up in 1878 to propose a bill concerning regulation of the saving banks. The result was a Savings Bank Act in 1880. According to the act all savings banks had to be publicly registered. The act prohibited the savings banks from paying dividends to their owners, which was the reason why the majority of savings banks became organised as private foundations. The act also included provisions on capital adequacy, on auditing, on valuation of assets and on presentations and publications of accounts. Finally, the act established a Saving Bank Supervisory Office under the Ministry of the Interior.

The first private commercial bank in Denmark was Centralkassen i Kjøbenhavn founded in 1831 via a restructuring of Det Østersøiske Handelskompagni. Centralkassen's lending activities were concentrated on loans against inventories as collateral, and the bank closed for business in 1859. The first private deposit-taking commercial bank – Fyens Diskonto Kasse[74] – was founded as a joint stock company in Odense in 1846. The banking business of Fyens Diskonto Kasse was originally aimed at discounting bills of exchange financed by its relatively large amount of share capital. During the next couple of decades a number of deposit-taking banks were also founded.

In 1880 the number of commercial banks had risen to 41, and the basic structure of the Danish banking sector for the next century had taken its form. It was a universal banking system[75] characterised by a few large Copenhagen based banks which gradually opened branches all over the country. Furthermore, it included a number of minor provincial banks that used the main banks as correspondent banks, and a large amount of savings banks of

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[69] Sparekassen for Grevskabet Holsteinsborg og Omegn.
[70] I.e. within the current borders of Denmark. The first private savings bank within the Danish-Norwegian monarchy (including the Royal Duchies Schleswig and Holstein) was founded in Kiel in 1796, cf. Bisgaard (1910). The savings bank in Kiel also served as a pawnshop.
[71] In 1835 the savings banks' deposits with the Treasury accounted for 63.2 per cent of the saving banks' total assets. In 1854 the corresponding figure was only 8.2 per cent, cf. page 170 in Hansen (1960).
[72] Originally the name of the savings bank was "Dansk Spare- og Præmie og Børne- og Alderdomsforsørgelses-Forening". The history of Bikuben is covered by Bramsnæs (1957).
[73] In English: parish savings banks.
[74] Hansen, P. H. (1990) and Lunde (1996) cover the history of Fyens Disconto Kasse.
[75] I.e. a system where the (major) banks perform both commercial and investment banking activities.

which the great majority were small parish savings banks. The three main banks were Privatbanken[76] (founded in 1857), Den Danske Landmandsbank[77] (founded in 1871), and Handelsbanken[78] (founded in 1873). In 1900 (respectively 1939 and 1970) these three main banks together accounted for 21 (respectively 26 and 36) per cent of the total amounts of deposits in all commercial banks and savings banks.

Gradually the market share of commercial banks on the Danish deposit market increased at the expense of the savings banks. The commercial banks in total accounted for 35 (respectively 54 and 69) per cent of the total amounts of deposits in all commercial banks and savings banks in 1900 (respectively 1939 and 1970). The total number of commercial banks were 86 (respectively 161 and 87) in 1900 (respective 1939 and 1970) while the corresponding numbers of savings banks was 512, 517 and 334.

The first Danish credit co-operative[79], Den danske Andelsbank[80], was founded in 1914. However, credit co-operatives never came to play any major role in the Danish-banking sector. The size of their total assets was rather insignificant and the number of credit co-operatives never exceeded 100.

Following the banking crisis in 1907/08 and the reconstruction of a major savings bank in 1909[81] the parliament appointed a Savings Banks and Bank Committee in 1910 to prepare a bank act and revise the legislation on savings banks. The work in the committee led to the first Danish Commercial Bank Act in 1919. The law included provisions on publication of accounts, auditing, minimum share-capital requirements, liquidity, and restrictions related to possession of own shares and the granting of loans against own shares as collateral. Furthermore the act established the Bank Supervisory Authority.[82]

At the same the Savings Bank Act was revised. The Savings Banks Act of 1919 was more restrictive than the Commercial Bank Act. The main activity of savings banks was supposed to be collection of saving deposits from common people, and the saving banks were not allowed to carry out banking business. The content of "banking business" was not clearly

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[76] Shortly after its establishment Privatbanken played an important credit-supplying role during the international financial crises of 1857 where a major credit-provider to Danish commercial firms and banking connection to the Danish central government and Danish central bank – the Hamburg-based merchant banker H. Pontoppidan & Co. – experienced liquidity problems, cf. p. 96 forward in Lange (2006). Cohn (1957, 1958) and Schovelin (1907) cover the history of Privatbanken.

[77] The full name was "Den Danske Landmandsbank, Hypotek- og Vekselbank". In addition to traditional banking activities the bank provided mortgage (without joint liabilities of the borrowers) funded by the issuance of securities. Schovelin (1921) and Hansen & Mørch (1997) cover the history of Landmandsbanken.

[78] The founding of Handelsbanken is covered by e.g. Pedersen (1969).

[79] I.e. local credit institutes operating on a basis of joint responsibility (mutual institutions). The history of the Danish credit co-operatives is covered by Guinnane & Henriksen (1998).

[80] The history of Den danske Andelsbank is covered by Drejer & Thorsen (1950).

[81] Den Sjællandske Bondestands Sparekasse. Skrubbeltrang (1959) covers the history of Den Sjællandske Bondestands Sparekasse.

[82] In 1963 a united Banks and Savings Bank Supervisory Authority was established. In 1988 the Danish Financial Supervisory Authority was created by a merger of the Bank and Savings Bank Supervisory Authority and the Insurance Company Supervisory Authority.

defined, but the act explicitly prohibited the savings banks from investing in shares without separate permission from the supervisory authorities.

A severe crisis stroke the Danish banking sector in the years 1920-1933 where all of the five main banks ran into troubles:

- Landmandsbanken was reconstructed three times in the period 1922-1928 with help from the Nationalbank and the central government.[83]
- Københavns Disconto og Revisionsbank was reconstructed in 1922 and had to be liquidated in 1924.
- Den danske Andelsbank was liquidated in 1925.
- Privatbanken suspended its payments in 1928 and was reconstructed with capital from the Nationalbank and a syndicate of private banks.
- Handelsbanken experienced liquidity problems in 1931 and was assisted by a declaration of liquidity-support from the Nationalbank.

During the period 1920-1933 the banking sector experienced in total 39 liquidations, 21 mergers and 34 reconstructions. These figures should be compared with a total number of banks of 210 in the beginning of 1920. Large amounts of lending to a single borrower had been a main cause of many of the bank failures during the 1920s.[84] In 1930, a revised Commercial Bank Act therefore restricted the lending to a single borrower to 35 per cent of the bank's equity capital or 50 per cent if approved by the board of directors.

The Savings Bank Act was revised in 1937. The act clearly stated that savings banks were not allowed to discount bills of exchange or assist companies in raising capital through the issuing of shares – these areas of business were reserved for commercial banks. Furthermore, the revised act prevented savings banks from investing in foreign securities without separate permission from the supervisory authorities. With the Savings Bank Act of 1959 savings banks were permitted to invest in exchange quoted shares without prior approval from the supervisory authorities. A new Commercial Bank and Savings Bank Act effective from 1975 removed the legal boundaries between the business activity of commercial banks and savings banks, whereby the savings banks were allowed to carry out the same business activities as commercial banks. Furthermore, in 1989 it became possible for savings banks to convert themselves into joint stock companies. This abolished the last formal distinction between commercial banks and savings banks. In 1989, the first savings bank (Sparekassen Bikuben) converted into a joint-stock company.

The use of electronic data processing was introduced in the Danish banking sector in the 1960s. Handelsbanken acquired her own computer system in 1963[85] and Haandværkerbanken

[83] Mørch (1986) offers a detailed description of the crisis of Landmandsbanken in the 1920s.
[84] 26 of the failed banks during the period 1920-1933 had advanced more than 50 per cent of their capital to a single borrower, cf. page 157 in Hansen, P. H. (1996).
[85] Cf. page 265 in Heide (1996).

purchased a computer system in 1964[86]. Only the major savings banks acquired their own computer system, e.g. Bikuben in 1966. The minor savings banks made use of a mutual computer centre (Sparekassernes Datacentral SDC founded in 1963). In 1968 a total of 75 savings banks made use of SDC.[87]

In 1987 a deposit guarantee scheme was implemented in Denmark. Under the scheme ordinary deposits for an amount of up to 250,000 kroner per customer[88] were to be covered by the Deposit Guarantee Fund if a bank suspended its payments. The Deposit Guarantee Fund was based on contributions from all Danish banks according to their share of the total deposits covered by the scheme.

The 1990s saw a number of domestic mergers that led to an increased concentration in the Danish banking sector. Den Danske Bank[89], Handelsbanken and Provinsbanken merged in 1990 into a new Den Danske Bank. At the same time Unibank was created by a merger of Privatbanken, Andelsbanken and Sparekassen SDS. By end-1990 these two "mega-banks" accounted for 59 per cent of the total amounts of deposits in all commercial banks and savings banks. In 2001 the last major merger solely involving domestic banks took place when Danske Bank merged with BG Bank. Danske Bank remained the parent company of the Group.

During the 1980s and the beginning of the 1990s a number of banks came into financial distress[90], but the situation was far less severe than the banking crisis of the 1920s. In most cases larger banks took over smaller troubled banks, and only a few minor banks were liquidated. In 1992 a rumour emerged that the second largest Danish bank, Unibank, was going to suspend its payments. However, the situation was normalised by a declaration from the Financial Supervisory Authorities that the rumours had no substance and the submission of a press release[91] from the Nationalbank with a commitment to supply the necessary liquidity to Unibank, if needed.

One of the main structural tendency in the Danish banking sector during the most recent decades has been the creation of several large bank-based financial conglomerates, i.e. the establishment of financial groups carrying out a number of different financial business (banking, mortgage credit, insurance etc.). In 1993 the two largest Danish banks established their own mortgage-credit institutes (Danske Bank established Danske Kredit and Unibank formed Unikredit) and in 1994 the two largest mortgage-credit institutes established cooperations agreements with banks in order to extend loans and sell their bonds via a

[86] Cf. page 12 in Hansen (1967).
[87] Cf. page 265 in Heide (1996).
[88] Later raised to 300,000 kroner.
[89] The former Landmandsbanken had changed its name to Den Danske Bank of 1871 in 1976.
[90] Cf. Danmarks Nationalbank (1994), Økonomiministeriet (1995) and Andersen & Dalsgaard (2005).
[91] Reproduced as annex 4 in Danmarks Nationalbank, *Report and Accounts for the Year 1992*.

network of bank branches. In 1997 Realkredit Danmark (mortgage-credit institute) and BG Bank (bank) established a new mortgage-credit institute, BG Kredit, and in 1998 a merger between BG Bank and Realkredit Danmark resulted in a joint holding company Kapital Holding, RealDanmark. In 2000 Danske Bank (bank) merged with RealDanmark, thereby forming the second largest Nordic financial conglomerate at the time. In 1999 Unibank (bank) and Unikredit (mortgage-credit institute) merged with Tryg-Bantica (insurance) and formed a mutual holding company Unidanmark.

With the gradually deregulation of restrictions on cross-border capital movements in many countries during the 1970s and 1980s the Danish banking sector has also become more internationally oriented.[92] In 1975 the first foreign banks established units in Denmark. By the end of 1990 the number of branches and subsidiaries of foreign banks has reached 8 in total, but they accounted for less than 1 per cent of the total lending and deposits of the Danish-banking sector. However, the second half of the 1990s saw a number of major cross-border bank mergers into the Danish banking sector that led to increased international integration. In 1997, the Swedish Nordbanken and the Finnish Marita Bank formed a group into which the Danish Unibank and the Norwegian Christiania Bank were included in 2000. In 2001 the group was renamed "Nordea". Nordea has considerable market shares in Denmark, Norway, Sweden and Finland. Furthermore, in 2001 Svenska Handelsbanken acquired the Danish Midbank, which was transformed into a branch of Handelsbanken the subsequent year. By end-2004 there were around 35 foreign banking subsidiaries and branches of foreign banks in Denmark. Their market share for lending to and deposits from Danish residents amounted to around 30 per cent, and the majority of foreign banks in Denmark had a parent company in another Nordic country.[93]

In 1911 and 1912 Landmandbanken established banks in Paris and London in co-operation with banks from Norway and Sweden. During the 1960s Landmandsbanken set up banks in Geneva and London in co-operation with other banks from Scandinavia and Denmark, and in the early 1970s the bank opened representative offices in Tokyo and New York. The last couple of decades have also seen an increased cross-border integration of the Danish banking sector though the establishment abroad of branches and subsidiaries of Danish banks. By the end of 1980 the Danish banks had 8 units abroad and a decade later the corresponding number was 39. The international orientation of the Danish banking sector has persisted during the most recent decade.[94] For example Danske Bank acquired Östgöta Enskilda Bank in Sweden 1997, Focus Bank in Norway in 1999, National Irish Bank in Ireland in 2004, Northern Bank in Northern Ireland in 2004 and Sampo Bank in Finland in 2006.

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[92] Cf. Thomsen (2005).
[93] Cf. Lund (2006).

In 2005 the total number of commercial banks, savings banks and credit co-operatives in Denmark had decreased to 161. In 1935 the corresponding number was 762.

The development of the payment services progressed gradually in parallel with the evolution of the market for savings and loans[95]:

- The Danish postal authorities introduced money orders in 1851 where the payer could pay in a cash amount at a post office. The recipient could then cash the money at another post office by presented a money order received by mail.
- Privatbanken introduced interest-bearing current accounts with cheque facilities in Denmark in 1857, and legislation on cheques was implemented in Denmark in 1897. Landmandsbanken introduced pocket-sized cheques in 1910. In 1927 the Nationalbank and the major banks entered into an agreement on cheque clearing and net settlement with the Nationalbank acting as settlement bank. In 1979 electronic cheque truncation[96] was introduced and in the early 1980s the clearing of cheques became totally electronic.
- In 1920 the Danish postal cheque service (the National Postal Giro) was established.[97]
- During the 1960s it became common for wages and salaries to be paid directly to the employee's bank account. In 1969 a joint electronic salary system (Multiløn) was created enabling payment of wages from the bank of the employer to the banks of the employees.
- An electronic direct debit payments system, Betalingsservice, was introduced in 1974
- In 1981 the Nationalbank established a Real-Time Gross Settlement system for its account holders, i.e. mainly banks. The system allowed the account holders to transmit high-value payment to other account holders for individually and immediately settlement.
- In 1983 the Dankort was introduced. The Dankort is an electronic nation-wide debit card that can be used for payments in stores and for cash withdrawal at automatic teller machines. In 1998 it became possible to use the Dankort for payments via the Internet.
- The prepaid and reloadable electronic Danmønt cash card was introduced in 1992.[98] However, it never became a success and was phased out in 2005.
- In 1997/1998 three members of the Savings Bank Data Centre (SDC) launched the first full-service Internet banks in Denmark.[99]

Mortgage-credit institutes[100]

The first Danish mortgage credit institute – Kreditkassen for Husejere i Kjøbenhavn[101] – was founded in 1797. The background was the demand for housing finance to rebuild Copenhagen after the great fire in 1795 where around one third of the buildings in city was destroyed. Kreditkassen for Husejere i Kjøbenhavn was governed by the creditors and provided loans

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[94] Cf. Madsen (2006).
[95] Cf. also Danmarks Nationalbank (2005).
[96] I.e. the paying bank keeps the cheque while the information on the cheque is transferred electronically to the account-holding bank.
[97] In 1986, the National Postal Giro became an independent unit under the leadership of the Danish Postal and Telegraph Authorities (P&T), and in 1988 it became a state-owned company. In 1991 the National Postal Giro was restructured into a commercial bank (GiroBank). In 1995 GiroBank and Sparekassen Bikuben merged into BG Bank. The history of the National Postal Giro is covered by Gregersen & Sundorph (1989) and Wind (1993).
[98] Cf. Thorndal (1994).
[99] Cf. Andersen, Bjørn-Andersen, Larsen & Schou (2004).
[100] The historical development of the Danish mortgage credit system is covered by e.g. Glud (1951), Bendix (1974), Møller & Nielsen (1997a, 1997b) and Realkreditrådet (1997).
[101] The history of Kreditkassen for Husejere i Kjøbenhavn is covered by Thalbitzer (1922) and Andersen (1947).

secured by mortgage on real property financed by the issuance of negotiable debt securities. The lending by Kreditkassen for Husejere i Kjøbenhavn was subject to the prevailing maximum-interest-rate regulations of loans secured by real property. The debt securities were partly exempted from stamp duty, partly guaranteed by the central government[102] and were terminable at par subject to a one-year notice from either the creditors or the debtors.

In 1850 a Mortgage Credit Act introduced the legal basis for debtor-managed mortgage-credit institutes and the first two of these institutions[103] was founded in 1851. The debtor-managed mortgage-credit institutes offered credit secured by first mortgage on real property financed by the issuance of exchange-quoted bearer bonds which the borrowers themselves had to sell at market rates.[104] Loans raised through mortgage-credit institutes were exempted from the maximum-interest-rate provisions, exempted from stamp duty and subject to a principle of joint and several liabilities of the debtors. The loans were limited to 60 per cent of the property value. The Mortgage Act did not contain any provisions regarding the maturity of loans, but the loans had to be amortised on an ongoing basis and a 60-year maturity soon developed as the market standard.

The mortgage-credit institutes had to comply with the so-called "balance principle" requiring a balance between the total payments received from the borrowers on an individual loan and the total payments made to the bondholders via the bonds financing the loan. This implied that the assets and liabilities of a mortgage credit institute were matched in terms of interest rates and maturity. The mortgage-credit loans were terminable at par by the debtors. In the case of early redemption the mortgage credit bonds were called at par by the mortgage-credit institute whereby the balance principle was ensured. The mortgage-credit institutions were subject to supervision by the Ministry of the Interior[105] and had to publish their accounts.

In 1861 the Mortgage Credit Act was amended. The mortgages and bonds were divided into series and the principle of joint and several liabilities was limited to the members of the individual series. Furthermore the act stated that every new establishment of mortgage credit

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[102] The loans were subject to a principle of joint and several liabilities of the debtors as well as the creditors. The creditor had to cover 50 per cent of losses. The government guaranty applied only to the debtors' 50 per cent share, i.e. the guaranty would only become effective if the debtors' could not cover their 50 per cent. The government guaranty was abolished in 1888.

[103] Kreditforeningen af jydske Landejendomsbesiddere and Kreditforeningen af Grundejere i Sjællands Stift.

[104] In this way the market risk is not absorbed by the mortgage-credit institutes but traded in the market between the borrowers and the bond investors. Furthermore, the use of collateral implies that no price-discrimination is made between borrowers with different credit risks.

[105] In 1972 the supervision of loan allocations *etc*. by mortgage-credit institutes was placed with the Association of Danish Mortgage Banks (Realkreditrådet) supplemented by representatives from the Ministry of Housing, the Income Tax Directorate and the Nationalbank. In 1981 the Ministry of Housing took over the supervisory responsibility related to mortgage-credit institutes. In 1990 the Danish Financial Supervisory Authority assumed the supervisory responsibility related to mortgage-credit institutes.

institutes required approval by the parliament. By 1870 the number of mortgage-credit institutes was 7 in total.

In 1880 two smallholders' credit associations[106] were established. Their main activity was related to the parcelling out and establishment of new smallholdings. The lending by the smallholders' credit associations were financed by the issuing of double-currency denominated bonds with government-guaranteed interest rate. The double-currency denomination (Danish kroner and British pounds) made it easier to place the bonds with foreign investors.

In 1895 the first Danish hypothec association[107] was founded. It was funded by the issuance of bonds but without exemption from stamp duty. However, in 1897 a legal framework for hypotec associations based on bond issuance exempted from stamp duty was introduced. According to the act the hypotec associations were allowed to grant loans against second mortgage up to 75 per cent of the property value. The act on hypotec associations was amended in 1936. Hereby the hypotec associations became subject to supervision by the Ministry of the Interior.

In 1959 mortgage funds were introduced in Denmark.[108] The Mortgage funds were self-governing institutions that granted loans for housing purposes against third mortgage up to 75 per cent of the property value. The mortgage funds did not apply a principle of joint and several liabilities of the borrowers. In stead the bonds issued by the mortgage funds was – in addition to the mortgage – secured by guarantee capital provided by financial institutions.

In 1970 a major mortgage credit reform was implemented. The reform implied a changeover from a three-tier to a two-tier system, and all mortgage credit institutions were now allowed to grant both first and second mortgage loans. Maximum lending maturity was fixed at 40 years for the financing of social housing and 30 years for other housing financing. The first mortgage lending limits were lowered to 40 of the property value. Furthermore, the 1970-reform introduced so-called criterion on economic need for the establishment of new mortgage-credit institutes. In the future new mortgage credit institutions were only to be approved if the Minister of Housing found that there was such a need.

The 1970-reform lead to a wave of mergers between Danish mortgage credit institutions. In 1970 the number of institutes was 24. The concentration continued during the next decades. In 2005 the number of institutes had declined to a number of 8.

During the 1970s and the 1980's the Mortgage Credit Act was amended several times. On several occasions the terms of the mortgage-credit loans were used as a tool in the macroeconomic stabilisation policy.

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[106] Jydske Husmandskreditforening and Østifternes Husmandskreditforening.
[107] Hypothek-Laaneforeningen for København og Omegn.

In 1980 the mortgage-credit legislation was simplified by a changeover from a two-tier to a one-tier system for residential property. A limit of 80 per cent of the property value applied for the financing of new owner-occupied housing, and in 1982 the upper limit for change-of-ownership loans for properties for year-round habitation was raised from 40 to 80 per cent of the property value.

In 1982 the mortgage-credit institutes were also allowed to grant inflation-index-linked loans funded by the issuing of inflation-index-linked bonds. The market for index-linked bonds was originally rather thin. The market conditions for the new bonds improved later in 1982 when a political agreement on a new permanent tax on the yield on pension saving was concluded, exempting inflation-index-linked bonds. However, the market for index-linked bonds in Denmark never achieved a high degree of liquidity.[109]

As part of the so-called Potato Packages of Economic Measures in 1986 mixed loans with a maximum maturity of 20 years became compulsory in relation to the financing of ownership changes (30 years for new owner-occupied housing). Mixed loans were a combination of 60 per cent annuity loans and 40 per cent serial loans, and the aim of the package was to increase the element of saving in the economy via the serial-loan element in the mixed loans.

During the late 1980s and early 1990s the mortgage-credit legislation was liberalised gradually, which enabled the mortgage-credit institutes to supply a wider range of products.

In 1988 the mortgage-credit institutes were allowed against a fee to offer forward cover to borrowers against the price risk between the date of a loan offer and the actual settlement date of the loan.

In 1989 a major mortgage credit reform was implemented. The reform removed the restrictions on establishing new mortgage credit institutions in order to meet the requirements of European Union directives. New mortgage credit institutions were to be public limited-liability companies with a minimum capital of 150 million kroner. The existing mortgage-credit institutes were given the opportunity to convert into public limited-liability companies. Furthermore, the balancing principle was relaxed in order to allow more flexibility in the financing of mortgage-credit loans. Previously the balancing principle had to be applied on an individual-loan basis. In the new rules the balancing principle was related to the total payments from the borrowers and the total payments to the bondholders, and some minor mismatches in the cash flows were allowed. Further flexibility in the balancing principle was introduced in 2000.

In 1992 the mortgage-credit institutes' access to grant supplementary mortgage loans irrespective of purpose was extended, and the borrowers were allowed to extend the maturity

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[108] Byggeriets Realkreditfond, Provinsbankernes Realkreditfond and Landsbankernes Reallånefond.
[109] Cf. Topp (1996) and Hansen (2004).

of existing loans. Furthermore, in 1993 the mortgage-credit institutes were once again allowed to grant 30-years pure annuity loans for the financing of owner-occupied housing. By an amendment of the Mortgage Credit Act in 1995, mortgage-credit institutes were allowed to establish subsidiaries conducting banking and insurance activities.

In 1996 several Danish mortgage-credit institutes for the first time obtained credit ratings from international rating agencies in order to attract more international bond investors. This should be viewed against the fact that many international investors have limits on the share of bonds without international ratings allowed in their portfolios.

In 1993 the two largest Danish banks established their own mortgage-credit institutes and the period since the mid-1990s has been characterised by increasing competition on new loan types.[110] This development has transformed the Danish mortgage-credit system from a system based mainly on long callable fixed-interest rate loans to a system with a diversified range of both simple and rather complex products as well as a high degree of adjustable-rate loans:

- In 1996 a new type of adjustable-rate mortgage-credit loans were introduced. The loans were mainly financed by the issuing of non-callable fixed-rate bullet bonds with maturities of 1 to 11 years. The new adjustable-rate loans quickly became very popular. By the end of 2000 they accounted for 9 per cent of the total volume of outstanding domestic mortgage-credit loans and at end-2005 the corresponding figure was 49 per cent.
- The Mortgage Credit Act was amended in 2003. The changes allowed the mortgage credit institutes to offer mortgage fixed-rate or adjustable-rate loans with deferred amortisation for up to 10 years for the financing of owner-occupied housing. By the end of 2005 around 19 per cent of the total volume of outstanding domestic mortgage-credit loans had deferred amortisation.
- In 2000 interest-rate guarantees for adjustable-rate loans were introduced. An interest-rate guarantee implies that the borrower – against a premium – gets a limit (a cap) on the interest rate on the loan in connection with refinancing of the entire adjustable-rate loan. In 2004 most mortgage-credit institutes began to offer adjustable-rate mortgage loans with an embedded cap on interest rates for up to 30 years.

In 2004 banks began to offer a new type of loans against real property as collateral. These loans compete mere directly with loans from mortgage-credit institutions and have there contributed to increased cross-sector competition for customers in the Danish financial sector.

Life-insurance companies and pension funds[111]

The historical origin of life insurance and pension schemes in Denmark has roots back to the guild system in the Middle Ages. Governmental and private widow pensions schemes and life insurances were established during the eighteenth century, and all private life-insurance companies and pension funds became subject to royal supervision by a regulation in 1810.

[110] Cf. Hansen & Thuesen (2006) and Risbjerg (2006a).
[111] The historical development of Danish life-insurance companies and pension funds is covered by e.g. Grosen (2006), Hoffmeyer (1960), Jørgensen (1935), Møller & Nielsen (2000) and Thomsen (1963).

However, the regulation was repealed again in 1861. The activities of life-insurance companies and pension funds became later regulated again by respectively act of 1904 and act of 1935.

The government involvement in providing old-age pension has had a significant influence on the development in Danish the life insurance and pension fund industry. The establishment of a public tax-financed old-age pension scheme in 1891 and a tax-subsidised disability insurance system in 1921 reduced the need for private funded pension insurance.

Unfunded pension schemes for central-government civil servants dates back to the middle of the nineteenth century (acts of 1851 and 1858). The first major funded occupational pension scheme for private-sector employees was established in 1900.[112] During the 1950s and 1960s funded occupational pension schemes became more common, although mainly among white-collar workers.[113] However, during the last two decades or so privately funded occupational pension schemes have increased significantly. At the collective bargaining in 1991 it was agreed to introduce funded occupational pension schemes for private-sector employees without such schemes.[114] The contribution rate to these so-called "Labour Market Pension Schemes" was fixed at 0.9 per cent of the salary in 1993 and was to be increased to 9 per cent over a ten-year period. Since then, the contribution rate has been further increased. The introduction of Labour Market Pension Schemes thus led to a marked increase in the assets managed by the pension fund industry.

During the last five decades a number of funded social security funds has also been established:

- The Danish Labour Market Supplementary Pension Fund (Arbejdsmarkeds TillægsPension, ATP) was established by act in 1964.[115] The ATP-scheme covers all workers with more than a 9 hours working week. The average contribution to ATP has been around 1 per cent of the average wage.
- The Supplementary Pension (Supplerende Pensionsopsparing, SP) was established in 1999. The contribution rate to SP amounts to 1 per cent on the gross salary, but became subject to temporary suspension in 2004.
- The Employees' Wage Indexation Fund (Lønmodtagernes Dyrtidsfond, LD) was established by act in 1980 in order to manage the so-called "frozen cost-of-living allowances" from the years 1977-1979.[116] In stead of being paid out to the employees as wages during the late 1970s these cost-of-living allowances were to be paid out as supplementary lump sum pensions upon retirement.

[112] Pensionskassen for Værkstedsfunktionærer i Jernindustrien i Danmark, cf. Christensen (1925, 1950).
[113] Cf. Petersen (2002).
[114] Cf. Green-Pedersen (2003).
[115] The history of ATP is covered by Nelson (1984).
[116] The history of LD is covered by Lønmodtagernes Dyrtidsfond (2005).

Investment associations[117]

Collective investments in Denmark can be traced back to the late 1920s, but real mutual investment funds emerged first in the late 1960s. The liberalisation of cross-border portfolio investments[118] during the late 1970s and 1980s increased the amounts of assets managed by the investment fund industry.

Before 1982 there was no separate regulation of investment associations. In 1982 an act on investment associations was introduced. The design of the act followed the main principle in the draft proposal for the UCITS-directive, which at the time was under negotiation in the EU-system.

A revised act on investment association came into force in 1998. The new act introduced a legal framework for so-called special purpose associations:

- Placement associations may make larger investment in securities from a single issuer than ordinary investment associations.
- SME associations must primarily invest in unlisted companies.
- Money market associations must primarily invest in money-market-related securities.[119]
- Fund-of-funds may invest in shares of other investment associations or special purpose associations.

The major difference between a special purpose association and an ordinary investment association is that the former is subject to special placement rules.

In 2004 a new act on investment associations entered into force, allowing for the establishment of limited-membership associations. These types of investment associations receive funds from a few large investors such as pension funds and not from the general public. Since 2004 several pension funds (including LD, SP and ATP) have established investment associations.

In 2005 a legal framework for the regulation of hedge associations (hedge funds) was introduced. Hedge funds are investment associations that are allowed freely to determine their risk profile and investment strategy, including gearing of their investments by raising loans or short-selling assets.[120]

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[117] The history of investment associations is covered by e.g. Hemme & Schlegel (1995) and Danske Invest (1998).
[118] For a review of the liberalisation of cross-border capital movements in Denmark in the period 1950-1985, cf. Hald & Jensen (1986) and Chapter II in Det Økonomiske Råd. Formandskabet (1985).
[119] Prior to 1998 investment associations were only allowed to hold a small fraction of their assets in money market instruments.
[120] Cf. Thuesen (2005)

Copenhagen Stock Exchange and securities trading[121]

Off-exchange trading in stocks in Denmark can at least be traced back to the late 17th century and stock-prices are regularly reported in newspapers from 1759. Trading in stocks on the Copenhagen Stock Exchange (CSE)[122] can be dated back to the 1780s and trading in government bonds to the first decade in the 19th century. A Regulation on Brokers of 1808 required the brokers to supply information on stock and bond prices.

Around the mid-1830s a floor-based open-outcry auction system seems to have been well established on the CSE. During the auction sessions an auction leader called out each listed security one by one and the members of the exchange could indicate their buy and sell orders. In case of matching buy and sell orders trades were completed. When there were no more matching orders the auction leader went on to the next security. After the auction session individual trades could be made until the closing time. Only personal licensed security brokers[123] and from 1866 personal licensed security dealers[124] were approved as members of the exchange and thus allowed to trade on the exchange.

These basic principles – i.e. floor-based trading and the personal licensed brokers'/dealers' monopoly – were to characterise the stock exchange for more than a century until the reform in the mid-1980s, cf. below. The following summary statistics outline the main development on the CSE during the last two centuries:

- In 1815 only six shares were traded regularly on the exchange and the number of companies listed on the CSE was rather limited until the 1870s where the industrialisation took off. In 1883 shares from 78 companies was quoted on the exchange. It increased to just below 350 in 1952 and 1962 but has since declined. In 2004 the number of shares listed on CSE was 185.
- In 1811 only 5 bonds were traded on the CSE and in 1844 the number had declined to two. The development of a Danish mortgage-credit system after 1850 based on the issue of bonds laid the foundation for the development of a relatively large bond market in Denmark. In 1883 45 bonds were quoted on the exchange. In 2004 the number of bonds listed on CSE was 2,232.
- In 1891 52 brokers or dealers were authorised to trade on the CSE. In the 1960s the number had declined to 35 and in the mid-1980s – just before the Stock market reform – the number of authorised brokers and dealers was 27. In 2004 the number of members of the CSE connected to trading in shares was 41 while the corresponding number connected to trading in bonds was 24.

Following episodes of massive speculation in the period around World War I[125] a Stock Exchange Act was implemented in 1919. According to the act membership of a stock

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[121] The historical development of the Danish security markets is covered by e.g. Gejl (1989), Hansen (1999), Jennergren & Sørensen (1988), Knudsen & Sand (2004), Nielsen (2004), Parum (1997), Stancke (1971) and Statistics Denmark (1969).
[122] The Copenhagen Stock Exchange was originally established in 1624 as a commodity exchange.
[123] I.e. individuals buying and selling securities on the account of others vis-à-vis a fee.
[124] I.e. individuals buying and selling securities on their own account.
[125] Even though the Copenhagen Stock Exchange was officially closed during World War I the Stock Exchange was still operating unofficially.

exchange (named stock-exchange dealers) was exclusively reserved for existing members of a stock exchange or those who were approved by the Stock Exchange Board (heavily influenced by the securities dealers). The Stock Exchange Act of 1919 allowed for the existence and establishment of other stock exchanges than the CSE provided the fulfilment of certain requirements regarding organisation. However, the only other exchange in Denmark (Aarhus Stock Exchange founded in 1872) closed in 1920. De facto, therefore, the CSE enjoyed a monopoly status, and by a revised Stock Exchange Act of 1972 the CSE was granted legal monopoly.

On the securities markets outside the CSE banks gradually became the dominant players, and in the mid-1980s only 10 per cent of the turnover in shares and 3 per cent of the turnover in bonds took place at the CSE. By the Stock Exchange Reform I in 1986 the personal licensed stock exchange traders' monopoly of stock exchange transactions were terminated. After the reform stock-exchange broker companies (and the Nationalbank) were now to have the sole dealing right. The only requirement for access to dealing on the CSE was thus the establishment of joint-stock stock-exchange broker company with a minimum equity capital of kroner 5 million, and a stock-exchange broker company could be a subsidiary of a bank.

The transition to trading through an electronic trading system (ELECTRA) on the Copenhagen Stock Exchange commenced in the autumn of 1987 and was completed in the beginning of 1989. Security trading outside the electronic trading system (i.e. trading by telephone) was still dominating after the reform, but all trades made by members of the CSE had to be reported to the CSE within short deadlines.

In the autumn of 1988 trading of options and futures with a central counterparty was introduced at the CSE. The contracts are subject to a guarantee from the Guarantee Fund for Danish Options and Futures. However, the turnover in stock-exchange-listed futures and options has until now (2004) been relatively modest.

A Stock Exchange Reform II in 1995 abolished the legal monopoly of the CSE and the following year the CSE was restructured into a limited liability company primarily owned by the securities traders. Furthermore, the Stock Exchange Reform II introduced the concept of "authorised market places" and established a Securities Market Council with the authority to carry out the detailed regulation of the securities markets and approve rules issued by a stock exchange.

The first Danish collateralised mortgage obligations (CMOs) were listed on CSE in 1995. Via a special corporate structure, CMOs can be issued to purchase mortgage credit bonds, and the payments from these bonds are distributed to the investors. CMOs are constructed on order to accommodate different investor's preferences with regards to interest rate risk, credit risk and conversion risk.

In 1997 the CSE and the Stockholm Stock Exchange entered into a formalised co-operation, NOREX, with the aim to establish a joint Nordic securities market. CSE adopted the Swedish electronic trading system SAXESS for stock trading in 1999 and for bond trading in 2000. In 2005 the Swedish Company OMX AB acquired the CSE resulting in a new company OMX Group which owns the stock exchanges in Copenhagen, Stockholm, Helsinki, Tallinn, Riga and Vilnius. The CSE is still domiciled in Denmark and subject to Danish regulation and supervision.

Despite the introduction of electronic trading at the CSE in the late 1980s most trades in Danish bonds was still done by telephone in the early 2000s. In late 2003 the wholesale market[126] for domestic Danish Treasury notes and bonds was moved to a new electronic trading platform, MTS[127]. At the same time the Danish central government introduced a primary dealer scheme where a number of banks had an obligation to quote simultaneous bid and offer prices in MTS for a range of domestic Danish government securities within predefined spreads and amounts (electronic market making). Furthermore, in 2003 it became possible for private individuals and small investors to trade Danish government securities in an electronic retail market on a special electronic trading platform at the Copenhagen Stock Exchange where a number of banks acted as market makers.[128]

During most of the 19th and 20th century stocks and bonds existed in physical form. However, in the 1970s trade in securities trading increased markedly whereby the physical handling became more cumbersome. In order to ensure efficiency and safety in the settlement process the Danish Security Centre (Værdipapircentralen, VP) was established by act in 1980. In 1983 all physical bonds were replaced by a centralised electronic registration and settlement with the Security Centre, and all payments derived from the bonds were now automatically transferred to a bank account or stockbroker named by the holder. In 1988 also Danish shares and investment certificates was transferred from paper to electronic registration. In 2000 VP was restructured from a private self-governing institution to a limited liability company.

[126] I.e. secondary interdealer trading as well as the central governments' primary issues and buy backs.
[127] Treasury Bill followed in 2005.
[128] The changes in the market structure for Danish government securities in 2003 are covered in details in by Andersen & Bærtelsen (2004).

Appendix B: Data sources and calculation methods

Central bank

Sources:

Various issues of: Danmarks Nationalbank, *Report and Accounts*; Danmarks Nationalbank, *Balance sheet at 31 December*. Other sources: Johansen (1985); Mikkelsen (1993); and Mordhorst (1968).

Comments:

(1) 1875-1899: Financial assets and liabilities at end of July. Since 1900: Financial assets and liabilities at end of December. (2) Only the major financial assets and liabilities have been taken into consideration. (3) The net financial asset position is assumed to be zero and the liability item "share capital" is calculated as the residual. Following statistical conventions it is assumed that the share capital of the central bank is owned by the central government in the period since 1936 when the central bank became a self-governing institution. For the period prior to 1936 the share capital of the central bank is assumed owned by "other residents". (4) All foreign assets (excluding monetary gold and SDR) are included among "Bonds and shares". (5) Since 1996 are loans and deposits related to settlement accounts shown on a net basis (equal to zero) in order to avoid "artificial" gross inflation of assets and liabilities. (6) Coins in circulation are treated as a liability of the central bank during the period 1975-2005. Prior to 1975 coins in circulation represented a liability of the central government. (7) The central bank's loans to and deposits from the central government are treated on a net basis. A positive central government net position vis-à-vis the central bank is stated as a liability of the central bank while a negative net position is stated as an asset of the central bank. (8) The German occupation forces expenditures in Denmark during the years 1940-1945 – compulsorily financed via German accounts at Danmarks Nationalbank against a guarantee from the Danish central government – were newer paid by Germany. The amounts are included in the central government liabilities vis-à-vis the central bank as they occurred in the period 1940-1945. They are therefore not treated as a part of the foreign assets of the central bank. (9) The item "Gold and SDR" includes also silver in 1875.

Commercial banks and savings banks

Sources:

Various issues of: Danmarks Nationalbank, *Financial Statistics*; Danmarks Nationalbank, *Monetary Review*; Danmarks Nationalbank, *Report and Accounts*; Finanstilsynet, *Beretning fra Finanstilsynet. Bilag pengeinstitutter*; Finanstilsynet, *Hovedtal fra Finanstilsynet*;

Finanstilsynet, *Markedsudviklingen for pengeinstitutter*; Statistics Denmark, *Statistical ten-year review*; Statistics Denmark, *Statistical Yearbook*; and Statistics Denmark, *Statistiske Meddelelser*. Other sources: Danmarks Nationalbank (1972, 1978); Hoffmeyer (1960); Hoffmeyer & Olsen (1968); Johansen (1985); Olsen (1962); and Statistics Denmark (1969).

Comments:

(1) Only the major financial assets and liabilities have been taken into consideration. (2) Commercial banks: End of the accounting year, end of calendar year or end of December. Savings banks: End of March the following year, end of calendar year or end of December. (3) The net financial asset position is assumed to be zero and the liability item "capital and reserves" is calculated as the residual. This reflects that the bank's net financial assets position "in the end" constitutes an indirect financial liability to the shareholders. (4) The National Postal Giro was established in 1920. In 1991 the National Postal Giro was restructured into a commercial bank. Adjustment for break in series has been made so the National Postal Giro is included among financial assets ("Bonds, shares and mutual funds shares") and liabilities ("deposits") during the whole period since 1920. (5) The memorandum item "Broad money" consists of non-bank holdings of bank notes, coins and giro as well as domestic non-bank deposits in commercial banks and savings banks. (6) Most of the series have been adjusted in several years due to changes in financial statistics and accounting statistics. Adjustments have also been made so that none of the figures include FIH, which with effect from 2001 was converted into a bank.

Mortgage-credit institutes

Sources:

Various issues of: Danmarks Nationalbank, *Financial Statistics*; and Danmarks Nationalbank, *Report and Accounts*. Other sources: Andersen, Lyngesen & Pedersen (1999); Johansen (1985); and Statistics Denmark (1969).

Comments:

(1) Only the major financial assets and liabilities have been taken into consideration. (2) 1875-1971: End of the accounting year. Since 1972: End of calendar year. (3) Covers first-mortgage credit institutes (1875-1971), second mortgage institutes (1896-1971), mortgage funds (1960-1971) and since 1972 all mortgage credit institutes. Adjustment for break in series in 1972 has been made based on the circulating amount of mortgage-credit bonds at nominal values. (4) The mortgage-credit institutes has to comply with the so-called "balance principle" requiring a balance between the total payments received from the borrowers on loans and the total payments made to the bondholders via the bonds financing the loans. The

net financial asset position of the sector has therefore by definition been set to zero, and the total outstanding amount of mortgage-credit bonds on the liability side of the balance sheet has been set equal to the outstanding amount of mortgage-credit loans (to non-MFIs). This implies that the values stated for the outstanding amount of mortgage-credit bonds in the historical financial balance sheets are not identical to the marked value of the bonds using stock-exchange prices. (5) Adjusted for break in series in 1993.

Life-insurance companies and pension funds

Sources:

Various issues of: Danmarks Nationalbank, *Report and Accounts*; and Finanstilsynet, *Hovedtal fra Finanstilsynet*; Other sources: Bramsnæs (1957); Danmarks Nationalbank (1978); Hansen & Svendsen (1968); Hoffmeyer (1960); Jeppesen (1969); and Østrup (1989, 1995).

Comments:

(1) Only the major financial assets and liabilities have been taken into consideration. (2) End of the accounting year, most often equal to end of the calendar year. (3) Covers life insurance companies (since 1875) and pension funds (since 1938). Furthermore, the following funded social pensions funds are included: Arbejdsmarkedets TillægsPension, ATP[129] (since 1964) and Den Særlige Pensionsopsparing, SP[130] (since 1999). Finally, the following special institutions are included: Overformynderiet[131] (since 1875), Bikubens forvaltningsafdeling (since 1895) and Lønmodtagernes Dyrtidsfond[132] (since 1980). (4) The total amount of insurance technical reserves is assumed to be equal to the outstanding amount of financial assets, thereby implicitly assuming that the net financial wealth position of the sector is equal to zero.

Investment associations

Sources:

Various issues of: Danmarks Nationalbank, *Financial Statistics*; Danmarks Nationalbank, *Report and Accounts*; and Finanstilsynet, *Hovedtal fra Finanstilsynet*. Other sources: Danske Invest (1998); Hemme & Schlegel (1995); and Østrup (1989).

Comments:

[129] In English: Labour Market Supplementary Pension Fund.
[130] In English: The Special Pension Fund.
[131] Overformynderiet (in English: The Public Trustee's Office) was established by regulation in 1619.
[132] In English: The Employees' Wage Indexation Fund.

(1) Only the major financial assets and liabilities have been taken into consideration. (2) The total assets of investments associations are assumed to be equal to the value of the outstanding amount of mutual funds shares. This also implies, that the net wealth position of the sector by definition is equal to zero. (3) For the years 1928-1983 the value of the outstanding amount of mutual funds shares has been estimated by geometric interpolation on the basis on the value of the total financial assets of investments associations for the years 1928, 1929, 1938, 1948, 1958, 1958, 1976, 1979, 1980 and 1983. (4) The large increase in the assets under management by investment associations since 2003 can partly be attributed to the establishment of investment associations related to LD, SP and ATP.

Central government

Sources:

Various issues of: Danmarks Nationalbank, *Danish Government Borrowing and Debt*; Danmarks Nationalbank, *Report and Accounts*; Danmarks Nationalbank, *Monetary Review*; Finansministeriet, *Statens låntagning og gæld*; and Statistics Denmark, *Statistical ten-year review*. Other sources: Hansen (1970); Johansen (1985); Mikkelsen (1993); Mordhorst (1968); and Statistics Denmark (1969).

Comments:

(1) Only the major financial assets and liabilities have been taken into consideration. The central government's ownership shares of corporations located in the private non-financial sector are not included among the financial assets. (2) "Loans" and "Deposits" are treated on a net basis. A positive net position is stated as an asset while a negative net position is stated as a liability. The "Loans" and "Deposits" items have been adjusted for several breaks in series during the post-1996 period. (3) The asset item "Bonds and shares" consists of the assets in the Social Pension Fund (since 1970) and the share capital of the central bank (since 1936). (4) For the period 1875-1977 data on a fiscal-year basis have been converted to calendar-year basis. (5) The German occupation forces expenditures in Denmark during the years 1940-1945[133] – compulsorily financed via German accounts at Danmarks Nationalbank against a guarantee from the Danish central government – were newer paid by Germany. The amounts are included in the central government liabilities as they occurred in the period 1940-1945. (6) Coins in circulation are treated as a liability of the central government during the period 1875-1974. In the period since 1975 coins in circulation represent a liability of the central bank. (7) For the period 1875-1928 coins in circulation has been interpolated on the

[133] The amounts in million kroner were the following: 1940: 804.6; 1941: 852.6; 1942: 701.7; 1943: 1902.5; 1944: 2728.0; and 1945: 574.1

basis of estimates for the coins in circulation in the years 1875, 1880, 1885, 1890, 1900, 1913 and 1929.

Other residents (i.e. "non-financial private sector and local governments")

Comments:

(1) Calculated on a residual basis.

Non residents

Sources:

Various issues of: Danmarks Nationalbank, *Financial Statistics*; Danmarks Nationalbank, *Monetary Review*; and Danmarks Nationalbank, *Report and Accounts*. Other sources: Abildgren (2005d); Christensen & Hald (2000); Hansen, E. D. (1996); Hansen & Henriksen (1984); Hansen & Svendsen (1968); Johansen (1985); Jones & Obstfeld (2001); and Statistics Denmark (2001b).

Comments:

(1) For the years 1914-1915 the net financial asset have been estimated on the basis of the end-1913 net financial asset figure, the Danish surplus on the balance of payments 1914-1915 and the Danish exports of non-monetary gold[134] 1914-1915. (2) For the year 1917 the net financial asset have been estimated on the basis of the end-1916 net financial asset figure, the Danish surplus on the balance of payments in 1917, the Danish exports of non-monetary gold in 1917 and the proceeds from the sale of the Danish West Indies (87 million kroner) in 1917. (3) For the year 1919 the net financial asset have been estimated on the basis of the end-1918 net financial asset figure, the Danish surplus on the balance of payments 1919 and the Danish exports of non-monetary gold in 1919. (4) The German occupation forces expenditures in Denmark during the years 1940-1945 were newer paid by Germany. They are therefore not included in the net financial asset figures (i.e. the amounts are treated as instantaneous debt write-off by the Danish central government).

Nominal Gross Domestic Product (GDP) at factor costs

Sources:

Other sources: Hansen (1983); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website.

[134] The available pre-World War II figures for the surplus of the balance of payment in Denmark does not include net exports of non-monetary gold, cf. Jones & Obstfeld (2001).

Comments:

(1) Since 1921: Including Sønderjylland (the northern part of the old Duchy of Schleswig). (2) Adjusted for break in series 1966.

Consumer Price Index (CPI)

Sources:

Various issues of: Danmarks Nationalbank, *Monetary Review*. Other sources: Abildgren (2005c).

Comments:

(1) Private consumption deflator before 1915.

Index for Real Gross Domestic Product (GDP) at factor costs

Sources:

Other sources: Hansen (1983); Statistics Denmark (1995); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website (www.dst.dk).

Comments:

(1) 1876-1948: Based on annual growth in real GDP from national-account figures in constant 1929-prices. Since 1922: Based on annual growth in real GDP including the northern part of the old Duchy of Schleswig. (2) 1949-1966: Based on annual growth in real GDP from national-account figures in constant 1980-prices. (3) Since 1967: Based on annual growth in real gross value added from national-account figures in constant chain-weighted 2000-prices.

Physical capital stock

Sources:

Other sources: Kærgård (1991); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website (www.dst.dk).

Comments:

(1) The physical capital stock consists of non-financial assets used in production. The delimitation of the capital stock follows the definitions from the national-account statistics. This implies that the capital stock includes residential buildings but not e.g. consumer durable goods. (2) Data for 2005 compiled as the capital stock at end 2004 plus net investment in 2005. (3) Adjusted for break in series in 1965.

National wealth

Comments:

(1) The national wealth of Denmark is compiled as the sum of the physical capital stock and the net financial asset position of the total economy.

Share price index

Sources:

Various issues of: Danmarks Nationalbank, *Monetary Review*. Other sources: Cohn (1957, 1958); Jennergren & Sørensen (1988); Parum (1998).

Comments:

(1) Index for stock price development excluding dividends. The series does therefore not represent the development in the total return on shares including dividend pay out. (2) 1875-1913: Beginning of year. 1914-1923: Annual average. Since 1924: End of year. (3) The stock price index for the period 1875-1913 has been calculated as a geometric weighted average of the price development (bid prices) for the 7 largest companies listed on Copenhagen Stock Exchange (Nationalbanken i København founded in 1818, Privatbanken i København founded in 1857, Den Danske Landmandsbank founded in 1871, Københavns Handelsbank founded in 1873, Det Forenede Dampskibsselskab founded in 1866, De danske Sukkerfabrikker founded in 1872 and Burmeister & Wain founded in 1872). The weighting basis is the paid-in equity capital as of 1 January 1890. (3) Adjusted for break in series in 1914, 1924 and 1997. (4) For the period 1900-1909 (based on 21 shares) and 1910-1919 (based on 22 shares) the annual average increase in the share price index compiled by Hansen (1976) is respectively 0.52 and 6.31 per cent per annum. For the same periods the share price index compiled in the paper at hand shows an annual average increase of respectively 0.26 and 7.04 per cent per annum.

Average interest rate on deposits in commercial banks and savings banks

Sources:

Various issues of: Danmarks Nationalbank, *Monetary Review*. Other sources: Abildgren (2005b).

Comments:

(1) Annual averages. (2) Weighted average interest rates on outstanding deposits in savings banks and commercial banks.

Yield on long-term government bonds

Sources:

Various issues of: Danmarks Nationalbank, *Monetary Review*. Other sources: Abildgren (2005b).

Comments:

(1) Annual averages. (2) 1875-1985: Yield to maturity on long central government bonds. Since 1986: Yield to maturity on 10-year central government bonds.

Index for property prices, one-family houses

Sources:

Various issues of: Danmarks Nationalbank, *Monetary Review;* and Statistics Denmark, *Statistical ten-year review*. Other sources: Økonomiministeriet (1966).

Comments:

(1) Annual averages. (2) Covers the cash-price development for one-family houses in ordinary free trade. (3) Adjusted for several break in series.

Index for property prices, farms

Sources:

Various issues of: Statistics Denmark, *Statistical ten-year review*; and Statistics Denmark, *Statistical Yearbook.* Other sources: Det Statistiske Departement (1958); Hansen & Svendsen (1968); and Statistics Denmark, *StatBank Denmark*, Statistics Denmark's website (www.dst.dk).

Comments:

(1) Annual averages. (2) 1875-1959: Covers the cash-price development (per unit of land valuation based on estimated productivity) for farms in ordinary free trade. 1960-1967: Covers the cash-price development per ha in ordinary free trade for all sizes of farms. 1968-1975: Covers the cash-price development per ha in ordinary free trade for farms of a size of 10-100 ha. Since 1976: Covers the cash-price development per ha in ordinary free trade for farms of a size of 15-60 ha. (3) Adjusted for several break in series.

Appendix C: Data

Table A.1: Financial balance sheet, central bank, end-of-year 1875-2005, million kroner

Year	Financial assets				Financial liabilities					Net financial assets
	Gold and SDR	Loans	Bonds and shares	Total	Currency	Deposits	Bonds	Capital and reserves	Total	
1875	31	44	16	91	59	6	0	26	91	0
1876	32	43	16	91	60	8	0	23	91	0
1877	31	47	11	89	55	7	0	27	89	0
1878	34	50	16	100	53	13	0	34	100	0
1879	36	46	23	105	57	15	0	33	105	0
1880	39	37	32	108	60	16	0	32	108	0
1881	45	39	34	118	67	17	0	34	118	0
1882	38	37	30	105	64	13	0	28	105	0
1883	39	40	30	109	66	13	0	30	109	0
1884	40	39	28	107	64	12	0	31	107	0
1885	40	38	28	106	62	13	0	31	106	0
1886	44	39	30	113	61	14	0	38	113	0
1887	44	29	45	118	68	19	0	31	118	0
1888	47	28	42	117	69	15	0	33	117	0
1889	45	25	40	110	70	10	0	30	110	0
1890	44	28	40	112	69	9	0	34	112	0
1891	44	24	40	108	72	5	0	31	108	0
1892	47	26	35	108	72	6	0	30	108	0
1893	49	25	41	115	75	9	0	31	115	0
1894	49	24	38	111	73	6	0	32	111	0
1895	51	22	44	117	78	9	0	30	117	0
1896	54	28	43	125	80	9	0	36	125	0
1897	52	30	38	120	84	7	0	29	120	0
1898	52	26	41	119	87	6	0	26	119	0
1899	54	38	29	121	91	6	0	24	121	0
1900	68	54	15	137	97	5	0	35	137	0
1901	67	45	31	142	100	8	0	34	142	0
1902	69	49	27	144	103	6	0	35	144	0
1903	74	55	20	149	108	7	0	34	149	0
1904	77	54	21	152	108	9	0	35	152	0
1905	86	52	20	159	119	6	0	33	159	0
1906	92	59	13	164	123	7	0	34	164	0
1907	66	87	10	163	123	7	0	33	163	0
1908	69	90	17	176	125	16	0	35	176	0
1909	68	82	23	173	129	10	0	33	173	0
1910	68	85	28	181	131	14	0	36	181	0
1911	69	83	34	186	140	10	0	36	186	0
1912	73	77	41	191	146	10	0	35	191	0
1913	73	86	35	194	152	8	0	35	194	0
1914	91	117	54	262	207	20	0	36	262	0
1915	111	92	78	282	220	27	0	34	282	0
1916	160	108	146	413	285	93	0	35	413	0
1917	174	92	208	473	338	98	0	37	473	0
1918	195	192	213	599	450	106	0	44	599	0
1919	227	275	147	649	489	108	0	51	649	0
1920	228	348	109	685	557	72	0	57	685	0
1921	228	376	86	691	471	159	0	61	691	0
1922	228	445	40	713	459	186	0	68	713	0
1923	210	448	40	697	473	156	0	69	697	0
1924	210	471	62	742	478	193	0	71	742	0
1925	209	284	101	594	438	110	0	47	594	0
1926	209	268	34	511	386	79	0	45	511	0
1927	182	203	104	488	354	85	0	49	488	0
1928	173	148	149	470	360	58	0	52	470	0
1929	172	183	129	484	368	64	0	53	484	0
1930	172	167	151	490	360	75	0	55	490	0
1931	144	265	84	494	347	83	0	64	494	0
1932	133	256	169	558	332	158	0	68	558	0
1933	133	318	129	580	375	125	0	81	580	0
1934	133	412	155	700	386	226	0	87	700	0
1935	118	454	110	683	384	202	0	96	683	0
1936	118	496	64	678	399	139	0	141	678	0
1937	118	425	146	689	417	125	0	146	689	0
1938	118	306	329	752	441	170	0	141	752	0
1939	117	545	265	927	600	191	0	137	927	0
1940	115	934	233	1282	742	407	0	133	1282	0
1941	98	1598	256	1952	842	932	0	178	1952	0
1942	98	1964	184	2246	983	1080	0	183	2246	0
1943	97	3457	189	3743	1359	2199	0	185	3743	0
1944	97	4837	224	5158	1658	3306	0	193	5158	0

Table A.1 (continued): Financial balance sheet, central bank, end-of-year 1875-2005, million kroner

Year	Financial assets				Financial liabilities					Net financial assets
	Gold and SDR	Loans	Bonds and shares	Total	Currency	Deposits	Bonds	Capital and reserves	Total	
1945	83	4866	371	5320	1561	3604	0	155	5320	0
1946	83	4842	378	5303	1633	3524	0	146	5303	0
1947	71	3817	373	4260	1641	2434	0	185	4260	0
1948	70	3078	405	3553	1614	1758	0	181	3553	0
1949	70	2944	547	3560	1627	1712	0	221	3560	0
1950	69	2858	600	3527	1709	1634	0	185	3527	0
1951	69	2557	733	3360	1817	1353	0	190	3360	0
1952	69	2173	1225	3467	1966	1301	0	200	3467	0
1953	69	2148	1424	3640	2118	1286	0	237	3640	0
1954	68	2639	1270	3977	2145	1564	0	269	3977	0
1955	68	2694	1244	4007	2217	1554	0	236	4007	0
1956	68	2672	1191	3931	2372	1323	0	235	3931	0
1957	68	2384	1466	3918	2432	1240	0	246	3918	0
1958	68	2518	1898	4485	2642	1065	524	253	4485	0
1959	68	2204	2430	4703	2892	1041	450	320	4703	0
1960	68	1891	2089	4049	3006	477	245	320	4049	0
1961	68	2289	2056	4413	3318	459	381	255	4413	0
1962	68	2524	2195	4787	3504	448	589	246	4787	0
1963	68	1323	3810	5201	3835	448	592	326	5201	0
1964	68	813	5526	6407	4117	1272	618	400	6407	0
1965	68	970	6118	7156	4442	1700	674	340	7156	0
1966	68	1686	6882	8636	4906	2701	512	517	8636	0
1967	68	1357	7080	8505	5084	2059	481	881	8505	0
1968	68	1141	8396	9605	5444	1598	1711	852	9605	0
1969	666	1825	11738	14229	5816	5155	1742	1516	14229	0
1970	614	2436	12016	15066	5387	7272	1552	855	15066	0
1971	812	2146	13771	16729	5382	8237	1899	1211	16729	0
1972	1028	3360	14767	19155	5874	10142	1755	1384	19155	0
1973	1385	4267	16993	22645	6523	13394	1011	1717	22645	0
1974	1114	5229	16258	22601	6732	12184	1463	2222	22601	0
1975	1074	1196	17543	19813	8904	8593	1176	1140	19813	0
1976	1052	2099	23376	26527	9682	14881	53	1911	26527	0
1977	1258	4552	23887	29697	11044	16690	30	1933	29697	0
1978	1243	5095	28901	35239	12016	22541	14	668	35239	0
1979	1405	5085	28368	34858	13254	18875	4	2725	34858	0
1980	4205	2516	32795	39516	14151	17315	0	8050	39516	0
1981	7068	2796	29027	38891	15288	10704	0	12899	38891	0
1982	6264	8150	30832	45246	15939	13845	0	15462	45246	0
1983	6714	7973	47658	62345	17045	26382	0	18918	62345	0
1984	7781	11581	48503	67865	18716	23650	0	25499	67865	0
1985	7628	26203	66547	100378	20155	32295	23816	24112	100378	0
1986	6794	42863	66958	116615	21339	66052	7907	21317	116615	0
1987	5860	18178	89740	113778	22809	66537	0	24432	113778	0
1988	6334	1755	95771	103860	23870	54095	0	25895	103860	0
1989	6663	25917	74388	106968	25045	48498	0	33425	106968	0
1990	5822	15054	95628	116504	26983	58743	0	30778	116504	0
1991	5139	7318	85662	98119	28208	38654	0	31257	98119	0
1992	4187	29131	106319	139637	28020	72376	5743	33498	139637	0
1993	3762	81724	111567	197053	29656	103916	27812	35669	197053	0
1994	5438	61845	107919	175202	32688	71847	25979	44688	175202	0
1995	4908	49753	102712	157373	34656	48404	33813	40500	157373	0
1996	4469	43637	121003	169109	36613	62269	30885	39342	169109	0
1997	5842	26261	161993	194096	38680	61552	52738	41126	194096	0
1998	6585	35765	134475	176825	41014	56131	34752	44928	176825	0
1999	6174	40193	210536	256903	46382	63869	99896	46756	256903	0
2000	5084	30321	172320	207725	44798	66939	51874	44114	207725	0
2001	7010	68233	193801	269045	47299	66290	113620	41836	269045	0
2002	5777	85608	241377	332762	47655	76777	160664	47666	332762	0
2003	5723	52009	270886	328618	49685	72229	157279	49425	328618	0
2004	5559	76047	261139	342745	52039	80604	160379	49723	342745	0
2005	5784	139620	252844	398248	56217	84479	207582	49970	398248	0

Table A.2: Financial balance sheet, commercial banks and savings banks, end-of-year 1875-2005, million kroner

Year	Financial assets				Financial liabilities				Net financial assets	Memo:
	Currency	Loans	Bonds, shares and mutual funds shares	Total	Deposits	Bonds	Capital and reserves	Total		Broad Money
1875	11	269	88	368	284	0	83	368	0	353
1876	11	279	94	383	292	0	91	383	0	360
1877	10	261	86	358	275	0	83	358	0	337
1878	10	242	79	332	255	0	76	332	0	311
1879	10	251	84	345	278	0	67	345	0	335
1880	11	282	107	400	332	0	69	400	0	384
1881	11	333	115	459	392	0	67	459	0	452
1882	11	369	119	499	423	0	77	499	0	481
1883	11	382	123	516	433	0	83	516	0	496
1884	11	407	117	534	448	0	86	534	0	508
1885	11	420	112	543	458	0	85	543	0	514
1886	11	432	130	573	488	0	85	573	0	530
1887	12	456	188	656	576	0	80	656	0	615
1888	12	458	202	672	575	0	97	672	0	633
1889	12	476	213	701	604	0	97	701	0	660
1890	12	505	206	723	630	0	93	723	0	691
1891	13	500	203	716	621	0	95	716	0	691
1892	13	531	201	745	642	0	103	745	0	711
1893	13	556	200	769	670	0	99	769	0	739
1894	13	586	220	819	715	0	104	819	0	776
1895	14	625	236	875	772	0	103	875	0	837
1896	14	639	266	919	812	0	107	919	0	881
1897	15	660	275	949	834	0	115	949	0	911
1898	15	689	265	970	859	0	111	970	0	940
1899	16	730	240	986	870	0	116	986	0	955
1900	17	775	219	1010	892	0	118	1010	0	980
1901	17	814	226	1058	928	0	130	1058	0	1019
1902	18	875	256	1149	1019	0	131	1149	0	1105
1903	19	923	293	1236	1082	0	154	1236	0	1180
1904	20	946	340	1306	1133	0	173	1306	0	1232
1905	22	1029	355	1406	1221	0	185	1406	0	1323
1906	23	1108	378	1509	1296	0	213	1509	0	1417
1907	23	1252	392	1667	1389	0	278	1667	0	1513
1908	24	1375	422	1820	1494	0	326	1820	0	1620
1909	25	1291	432	1748	1459	0	289	1748	0	1587
1910	25	1320	474	1819	1513	0	307	1819	0	1646
1911	27	1366	513	1906	1632	0	274	1906	0	1760
1912	28	1376	521	1925	1667	0	258	1925	0	1809
1913	29	1501	547	2077	1775	0	302	2077	0	1929
1914	36	1612	554	2202	1866	0	337	2202	0	2055
1915	37	1780	562	2380	2072	0	308	2380	0	2222
1916	45	2116	642	2803	2495	0	309	2803	0	2653
1917	51	2984	756	3791	3442	0	348	3791	0	3526
1918	65	3536	876	4477	4141	0	335	4477	0	4233
1919	69	4570	830	5469	5029	0	440	5469	0	5171
1920	77	5087	930	6094	5515	0	579	6094	0	5815
1921	66	5258	941	6265	5703	0	562	6265	0	5863
1922	64	4384	1183	5631	5031	0	600	5631	0	5029
1923	65	4738	1194	5998	5106	0	892	5998	0	5289
1924	66	4441	1093	5600	4705	0	894	5600	0	4908
1925	60	4127	1019	5207	4408	0	799	5207	0	4551
1926	53	3989	922	4964	4282	0	683	4964	0	4440
1927	49	3958	903	4909	4364	0	546	4909	0	4491
1928	49	3908	946	4902	4258	0	644	4902	0	4348
1929	50	4053	1012	5115	4370	0	744	5115	0	4461
1930	49	4123	1150	5322	4551	0	772	5322	0	4636
1931	47	4043	1091	5181	4499	0	681	5181	0	4618
1932	45	3944	1045	5035	4372	0	663	5035	0	4340
1933	51	4022	1222	5295	4551	0	744	5295	0	4524
1934	53	4030	1286	5369	4645	0	724	5369	0	4675
1935	53	4083	1267	5402	4521	0	881	5402	0	4614
1936	55	4258	1205	5517	4744	0	773	5517	0	4887
1937	57	4381	1158	5596	4781	0	815	5596	0	4865
1938	61	4499	1251	5811	4927	0	884	5811	0	4973
1939	81	4539	1203	5824	5082	0	742	5824	0	5388
1940	99	4572	1446	6117	5221	0	896	6117	0	5248
1941	113	4952	1982	7047	5975	0	1072	7047	0	5454
1942	131	5239	2437	7807	6723	0	1084	7807	0	6192
1943	178	6335	2960	9474	8122	0	1351	9474	0	6532
1944	217	7398	3917	11532	10023	0	1509	11532	0	7519

Table A.2 (continued): Financial balance sheet, commercial banks and savings banks, end-of-year 1875-2005, million kroner

Year	Financial assets				Financial liabilities				Net financial assets	Memo:
	Currency	Loans	Bonds, shares and mutual funds shares	Total	Deposits	Bonds	Capital and reserves	Total		Broad Money
1945	205	8143	4664	13012	11582	0	1430	13012	0	8589
1946	215	8600	4144	12959	11678	0	1281	12959	0	9335
1947	217	7972	4068	12256	11131	0	1126	12256	0	10352
1948	214	8143	3976	12333	11089	0	1244	12333	0	11139
1949	216	8829	3756	12800	11365	0	1435	12800	0	11305
1950	226	9151	3626	13003	11703	0	1300	13003	0	12151
1951	240	9710	3340	13290	11955	0	1336	13290	0	12442
1952	260	10202	3560	14022	12464	0	1558	14022	0	13008
1953	279	10853	3635	14768	13123	0	1645	14768	0	13841
1954	218	11432	3444	15095	13445	0	1650	15095	0	14357
1955	265	11915	3459	15639	13907	0	1731	15639	0	14715
1956	295	12577	3595	16468	14570	0	1898	16468	0	15505
1957	311	13600	3756	17667	15515	0	2152	17667	0	16341
1958	344	14927	4987	20258	17611	0	2647	20258	0	18420
1959	336	16925	4986	22247	19530	0	2717	22247	0	20744
1960	379	18906	4632	23917	21065	0	2852	23917	0	22247
1961	437	20969	4998	26404	23219	0	3185	26404	0	24527
1962	503	23142	5651	29296	25892	0	3404	29296	0	27410
1963	566	25210	6451	32227	28223	0	4004	32227	0	29703
1964	566	28601	6488	35655	31674	0	3981	35655	0	33346
1965	685	31673	6912	39270	34755	0	4515	39270	0	36300
1966	766	36345	7606	44717	39572	0	5145	44717	0	41362
1967	766	40370	8105	49241	43713	0	5528	49241	0	44960
1968	1006	45077	10986	57069	50245	0	6824	57069	0	50956
1969	1074	50072	11559	62705	55734	0	6971	62705	0	56787
1970	1368	52509	12300	66177	59250	0	6927	66177	0	60019
1971	1017	55969	15154	72140	64117	0	8023	72140	0	64205
1972	1030	63984	18878	83892	72819	0	11073	83892	0	72363
1973	1431	73695	20764	95890	84421	0	11469	95890	0	83819
1974	1511	81731	23864	107106	93929	0	13177	107106	0	91998
1975	1363	87099	38185	126647	114864	0	11783	126647	0	108784
1976	1326	102137	38085	141548	129104	0	12444	141548	0	121188
1977	1330	117535	44378	163243	148101	0	15142	163243	0	133052
1978	1486	133449	47742	182677	165346	0	17331	182677	0	141958
1979	2047	153221	53029	208297	187431	0	20866	208297	0	156089
1980	1880	167812	61203	230895	208871	0	22024	230895	0	172823
1981	1786	192606	68801	263193	239210	0	23983	263193	0	190790
1982	1739	218349	85956	306044	273793	1800	30451	306044	0	212299
1983	1645	263216	147419	412280	362181	1900	48199	412280	0	270766
1984	2316	329383	169659	501358	457336	1800	42222	501358	0	318546
1985	2555	435919	218455	656929	580594	4500	71835	656929	0	376209
1986	2539	478584	211423	692546	621879	7200	63467	692546	0	408283
1987	2409	550279	176627	729315	647352	11400	70563	729315	0	424509
1988	1970	603557	201584	807111	692391	26400	88320	807111	0	445282
1989	1945	655734	233227	890906	755255	44325	91326	890906	0	455155
1990	3383	696580	221995	921958	796165	48157	77636	921958	0	483889
1991	4300	734695	238336	977331	844268	42800	90263	977331	0	504212
1992	3600	688403	231962	923965	796718	32800	94447	923965	0	508598
1993	4400	813256	219814	1037470	931962	22524	82984	1037470	0	567591
1994	4200	694000	265000	963200	851949	14051	97200	963200	0	540026
1995	4600	720000	277000	1001600	892925	20075	88600	1001600	0	557254
1996	5600	844000	302000	1151600	1018857	30143	102600	1151600	0	598602
1997	6100	968000	327000	1301100	1108283	51717	141100	1301100	0	631492
1998	7100	1072000	359000	1438100	1255578	54422	128100	1438100	0	650913
1999	10300	1118000	375000	1503300	1276216	94784	132300	1503300	0	673466
2000	7900	1236380	400399	1644679	1341101	109826	193751	1644679	0	677643
2001	9100	1315124	499625	1823849	1487925	154765	181159	1823849	0	711786
2002	9300	1455517	535035	1999852	1603503	145437	250911	1999852	0	746243
2003	9400	1518748	642007	2170154	1766440	166733	236982	2170154	0	785293
2004	9000	1662446	633693	2305139	1876545	181818	246776	2305139	0	868720
2005	9800	2092488	603369	2705657	2141872	245154	318631	2705657	0	1003935

Table A.3: Financial balance sheet, mortgage-credit institutes, end-of-year 1875-2005, million kroner

Year	Financial assets		Financial liabilities		Net financial assets	Year	Financial assets		Financial liabilities		Net financial assets
	Loans	Total	Bonds	Total			Loans	Total	Bonds	Total	
1875	122	122	122	122	0	1945	6539	6539	6539	6539	0
1876	136	136	136	136	0	1946	6654	6654	6654	6654	0
1877	149	149	149	149	0	1947	6917	6917	6917	6917	0
1878	165	165	165	165	0	1948	7207	7207	7207	7207	0
1879	181	181	181	181	0	1949	7355	7355	7355	7355	0
1880	202	202	202	202	0	1950	7539	7539	7539	7539	0
1881	232	232	232	232	0	1951	7809	7809	7809	7809	0
1882	259	259	259	259	0	1952	8044	8044	8044	8044	0
1883	278	278	278	278	0	1953	8297	8297	8297	8297	0
1884	304	304	304	304	0	1954	8638	8638	8638	8638	0
1885	334	334	334	334	0	1955	9105	9105	9105	9105	0
1886	365	365	365	365	0	1956	9593	9593	9593	9593	0
1887	397	397	397	397	0	1957	10058	10058	10058	10058	0
1888	423	423	423	423	0	1958	10686	10686	10686	10686	0
1889	444	444	444	444	0	1959	11909	11909	11909	11909	0
1890	460	460	460	460	0	1960	13323	13323	13323	13323	0
1891	481	481	481	481	0	1961	15226	15226	15226	15226	0
1892	495	495	495	495	0	1962	17697	17697	17697	17697	0
1893	515	515	515	515	0	1963	20596	20596	20596	20596	0
1894	540	540	540	540	0	1964	24323	24323	24323	24323	0
1895	571	571	571	571	0	1965	29527	29527	29527	29527	0
1896	626	626	626	626	0	1966	35622	35622	35622	35622	0
1897	674	674	674	674	0	1967	41220	41220	41220	41220	0
1898	704	704	704	704	0	1968	47552	47552	47552	47552	0
1899	738	738	738	738	0	1969	58749	58749	58749	58749	0
1900	766	766	766	766	0	1970	68223	68223	68223	68223	0
1901	803	803	803	803	0	1971	77219	77219	77219	77219	0
1902	857	857	857	857	0	1972	93521	93521	93521	93521	0
1903	950	950	950	950	0	1973	117908	117908	117908	117908	0
1904	1021	1021	1021	1021	0	1974	142668	142668	142668	142668	0
1905	1083	1083	1083	1083	0	1975	165869	165869	165869	165869	0
1906	1170	1170	1170	1170	0	1976	186346	186346	186346	186346	0
1907	1260	1260	1260	1260	0	1977	205296	205296	205296	205296	0
1908	1361	1361	1361	1361	0	1978	227125	227125	227125	227125	0
1909	1458	1458	1458	1458	0	1979	252090	252090	252090	252090	0
1910	1560	1560	1560	1560	0	1980	270129	270129	270129	270129	0
1911	1637	1637	1637	1637	0	1981	293204	293204	293204	293204	0
1912	1721	1721	1721	1721	0	1982	315593	315593	315593	315593	0
1913	1813	1813	1813	1813	0	1983	357001	357001	357001	357001	0
1914	1905	1905	1905	1905	0	1984	412154	412154	412154	412154	0
1915	1966	1966	1966	1966	0	1985	493005	493005	493005	493005	0
1916	1975	1975	1975	1975	0	1986	572767	572767	572767	572767	0
1917	2042	2042	2042	2042	0	1987	638763	638763	638763	638763	0
1918	2122	2122	2122	2122	0	1988	692004	692004	692004	692004	0
1919	2208	2208	2208	2208	0	1989	732415	732415	732415	732415	0
1920	2300	2300	2300	2300	0	1990	735374	735374	735374	735374	0
1921	2456	2456	2456	2456	0	1991	718633	718633	718633	718633	0
1922	2733	2733	2733	2733	0	1992	728204	728204	728204	728204	0
1923	3054	3054	3054	3054	0	1993	758100	758100	758100	758100	0
1924	3260	3260	3260	3260	0	1994	769700	769700	769700	769700	0
1925	3351	3351	3351	3351	0	1995	797800	797800	797800	797800	0
1926	3498	3498	3498	3498	0	1996	846300	846300	846300	846300	0
1927	3629	3629	3629	3629	0	1997	909400	909400	909400	909400	0
1928	3771	3771	3771	3771	0	1998	988100	988100	988100	988100	0
1929	3978	3978	3978	3978	0	1999	1051400	1051400	1051400	1051400	0
1930	4187	4187	4187	4187	0	2000	1097800	1097800	1097800	1097800	0
1931	4492	4492	4492	4492	0	2001	1194100	1194100	1194100	1194100	0
1932	4638	4638	4638	4638	0	2002	1289100	1289100	1289100	1289100	0
1933	4707	4707	4707	4707	0	2003	1400900	1400900	1400900	1400900	0
1934	4885	4885	4885	4885	0	2004	1499000	1499000	1499000	1499000	0
1935	5084	5084	5084	5084	0	2005	1675300	1675300	1675300	1675300	0
1936	5183	5183	5183	5183	0						
1937	5266	5266	5266	5266	0						
1938	5371	5371	5371	5371	0						
1939	5510	5510	5510	5510	0						
1940	5599	5599	5599	5599	0						
1941	5706	5706	5706	5706	0						
1942	5972	5972	5972	5972	0						
1943	6267	6267	6267	6267	0						
1944	6400	6400	6400	6400	0						

Table A.4: Financial balance sheet, life-insurance companies and pension funds, end-of-year 1875-2005, million kroner

Year	Financial assets	Financial liabilities		Net financial assets	Year	Financial assets	Financial liabilities		Net financial assets
	Total	Insurance technical reserves	Total			Total	Insurance technical reserves	Total	
1875	116	116	116	0	1945	3348	3348	3348	0
1876	120	120	120	0	1946	3540	3540	3540	0
1877	126	126	126	0	1947	3788	3788	3788	0
1878	131	131	131	0	1948	4025	4025	4025	0
1879	139	139	139	0	1949	4273	4273	4273	0
1880	146	146	146	0	1950	4531	4531	4531	0
1881	153	153	153	0	1951	4797	4797	4797	0
1882	163	163	163	0	1952	5077	5077	5077	0
1883	169	169	169	0	1953	5368	5368	5368	0
1884	178	178	178	0	1954	5703	5703	5703	0
1885	185	185	185	0	1955	6011	6011	6011	0
1886	193	193	193	0	1956	6361	6361	6361	0
1887	205	205	205	0	1957	6663	6663	6663	0
1888	214	214	214	0	1958	6918	6918	6918	0
1889	220	220	220	0	1959	7419	7419	7419	0
1890	227	227	227	0	1960	7977	7977	7977	0
1891	234	234	234	0	1961	8517	8517	8517	0
1892	249	249	249	0	1962	9115	9115	9115	0
1893	259	259	259	0	1963	9943	9943	9943	0
1894	272	272	272	0	1964	11023	11023	11023	0
1895	285	285	285	0	1965	12373	12373	12373	0
1896	292	292	292	0	1966	13895	13895	13895	0
1897	304	304	304	0	1967	15442	15442	15442	0
1898	309	309	309	0	1968	17035	17035	17035	0
1899	320	320	320	0	1969	19509	19509	19509	0
1900	329	329	329	0	1970	21846	21846	21846	0
1901	341	341	341	0	1971	24648	24648	24648	0
1902	352	352	352	0	1972	28517	28517	28517	0
1903	361	361	361	0	1973	32540	32540	32540	0
1904	367	367	367	0	1974	37834	37834	37834	0
1905	385	385	385	0	1975	46001	46001	46001	0
1906	404	404	404	0	1976	50900	50900	50900	0
1907	422	422	422	0	1977	60800	60800	60800	0
1908	438	438	438	0	1978	77000	77000	77000	0
1909	459	459	459	0	1979	95400	95400	95400	0
1910	480	480	480	0	1980	112400	112400	112400	0
1911	515	515	515	0	1981	132800	132800	132800	0
1912	543	543	543	0	1982	158800	158800	158800	0
1913	571	571	571	0	1983	198000	198000	198000	0
1914	607	607	607	0	1984	228000	228000	228000	0
1915	677	677	677	0	1985	270400	270400	270400	0
1916	708	708	708	0	1986	307300	307300	307300	0
1917	743	743	743	0	1987	335900	335900	335900	0
1918	777	777	777	0	1988	378188	378188	378188	0
1919	819	819	819	0	1989	413583	413583	413583	0
1920	853	853	853	0	1990	450358	450358	450358	0
1921	912	912	912	0	1991	496105	496105	496105	0
1922	961	961	961	0	1992	533633	533633	533633	0
1923	1018	1018	1018	0	1993	608795	608795	608795	0
1924	1079	1079	1079	0	1994	661057	661057	661057	0
1925	1138	1138	1138	0	1995	710858	710858	710858	0
1926	1180	1180	1180	0	1996	800028	800028	800028	0
1927	1207	1207	1207	0	1997	916220	916220	916220	0
1928	1258	1258	1258	0	1998	1011449	1011449	1011449	0
1929	1322	1322	1322	0	1999	1196683	1196683	1196683	0
1930	1390	1390	1390	0	2000	1329802	1329802	1329802	0
1931	1437	1437	1437	0	2001	1287348	1287348	1287348	0
1932	1472	1472	1472	0	2002	1302580	1302580	1302580	0
1933	1554	1554	1554	0	2003	1432418	1432418	1432418	0
1934	1646	1646	1646	0	2004	1600152	1600152	1600152	0
1935	1724	1724	1724	0	2005	1856049	1856049	1856049	0
1936	1806	1806	1806	0					
1937	1877	1877	1877	0					
1938	2285	2285	2285	0					
1939	2417	2417	2417	0					
1940	2519	2519	2519	0					
1941	2657	2657	2657	0					
1942	2802	2802	2802	0					
1943	2985	2985	2985	0					
1944	3197	3197	3197	0					

Table A.5: Financial balance sheet, investment associations, end-of-year 1875-2005, million kroner

Year	Financial assets	Financial liabilities		Net financial assets	Year	Financial assets	Financial liabilities		Net financial assets
	Total	Mutual funds shares	Total			Total	Mutual funds shares	Total	
1875	...	...	...	...	1945	12	12	12	0
1876	...	...	...	...	1946	13	13	13	0
1877	...	...	...	...	1947	13	13	13	0
1878	...	...	...	...	1948	14	14	14	0
1879	...	...	...	...	1949	14	14	14	0
1880	...	...	...	...	1950	15	15	15	0
1881	...	...	...	...	1951	15	15	15	0
1882	...	...	...	...	1952	16	16	16	0
1883	...	...	...	...	1953	16	16	16	0
1884	...	...	...	...	1954	17	17	17	0
1885	...	...	...	...	1955	17	17	17	0
1886	...	...	...	...	1956	18	18	18	0
1887	...	...	...	...	1957	18	18	18	0
1888	...	...	...	...	1958	19	19	19	0
1889	...	...	...	...	1959	23	23	23	0
1890	...	...	...	...	1960	28	28	28	0
1891	...	...	...	...	1961	34	34	34	0
1892	...	...	...	...	1962	40	40	40	0
1893	...	...	...	...	1963	49	49	49	0
1894	...	...	...	...	1964	59	59	59	0
1895	...	...	...	...	1965	71	71	71	0
1896	...	...	...	...	1966	86	86	86	0
1897	...	...	...	...	1967	104	104	104	0
1898	...	...	...	...	1968	126	126	126	0
1899	...	...	...	...	1969	150	150	150	0
1900	...	...	...	...	1970	178	178	178	0
1901	...	...	...	...	1971	211	211	211	0
1902	...	...	...	...	1972	251	251	251	0
1903	...	...	...	...	1973	298	298	298	0
1904	...	...	...	...	1974	354	354	354	0
1905	...	...	...	...	1975	421	421	421	0
1906	...	...	...	...	1976	500	500	500	0
1907	...	...	...	...	1977	737	737	737	0
1908	...	...	...	...	1978	1086	1086	1086	0
1909	...	...	...	...	1979	1600	1600	1600	0
1910	...	...	...	...	1980	2000	2000	2000	0
1911	...	...	...	...	1981	2962	2962	2962	0
1912	...	...	...	...	1982	4388	4388	4388	0
1913	...	...	...	...	1983	6500	6500	6500	0
1914	...	...	...	...	1984	11800	11800	11800	0
1915	...	...	...	...	1985	20200	20200	20200	0
1916	...	...	...	...	1986	30500	30500	30500	0
1917	...	...	...	...	1987	22100	22100	22100	0
1918	...	...	...	...	1988	22600	22600	22600	0
1919	...	...	...	...	1989	24400	24400	24400	0
1920	...	...	...	...	1990	20300	20300	20300	0
1921	...	...	...	...	1991	21500	21500	21500	0
1922	...	...	...	...	1992	22500	22500	22500	0
1923	...	...	...	...	1993	30409	30409	30409	0
1924	...	...	...	...	1994	32419	32419	32419	0
1925	...	...	...	...	1995	34390	34390	34390	0
1926	...	...	...	...	1996	52535	52535	52535	0
1927	...	...	...	...	1997	84704	84704	84704	0
1928	1	1	1	0	1998	119833	119833	119833	0
1929	1	1	1	0	1999	203300	203300	203300	0
1930	2	2	2	0	2000	257000	257000	257000	0
1931	2	2	2	0	2001	282100	282100	282100	0
1932	3	3	3	0	2002	284100	284100	284100	0
1933	3	3	3	0	2003	364000	364000	364000	0
1934	4	4	4	0	2004	571800	571800	571800	0
1935	5	5	5	0	2005	789600	789600	789600	0
1936	6	6	6	0					
1937	7	7	7	0					
1938	9	9	9	0					
1939	9	9	9	0					
1940	10	10	10	0					
1941	10	10	10	0					
1942	11	11	11	0					
1943	11	11	11	0					
1944	12	12	12	0					

Table A.6: Financial balance sheet, central government, end-of-year 1875-2005, million kroner

Year	Financial assets			Financial liabilities				Net financial assets
	Loans	Bonds and shares	Total	Currency	Deposits	Bonds	Total	
1875	6	0	6	25	0	182	207	-201
1876	6	0	6	25	0	177	202	-196
1877	7	0	7	25	0	175	200	-193
1878	9	0	9	25	0	175	200	-191
1879	10	0	10	25	0	174	199	-189
1880	12	0	12	25	0	196	221	-209
1881	13	0	13	24	0	202	226	-214
1882	10	0	10	24	0	201	224	-214
1883	10	0	10	23	0	199	223	-212
1884	13	0	13	23	0	198	220	-207
1885	12	0	12	22	0	195	217	-206
1886	11	0	11	24	0	195	219	-208
1887	9	0	9	25	0	194	219	-210
1888	8	0	8	27	0	191	218	-210
1889	7	0	7	28	0	189	217	-210
1890	7	0	7	30	0	187	217	-210
1891	4	0	4	31	0	185	216	-212
1892	6	0	6	31	0	184	215	-209
1893	5	0	5	32	0	182	214	-209
1894	8	0	8	32	0	202	234	-226
1895	13	0	13	33	0	201	234	-221
1896	14	0	14	33	0	197	230	-216
1897	19	0	19	34	0	205	239	-220
1898	13	0	13	34	0	207	241	-229
1899	6	0	6	35	0	207	242	-236
1900	3	0	3	35	0	215	250	-247
1901	16	0	16	39	0	239	278	-261
1902	18	0	18	42	0	245	287	-270
1903	18	0	18	46	0	244	289	-271
1904	19	0	19	49	0	242	291	-273
1905	20	0	20	53	0	240	293	-273
1906	22	0	22	57	0	238	295	-273
1907	24	0	24	60	0	236	297	-273
1908	13	0	13	64	0	234	298	-286
1909	12	0	12	68	0	270	337	-325
1910	23	0	23	71	0	307	379	-356
1911	26	0	26	75	0	328	403	-376
1912	20	0	20	78	0	335	414	-394
1913	32	0	32	82	0	337	419	-387
1914	12	0	12	79	0	371	450	-438
1915	5	0	5	75	0	420	495	-489
1916	139	0	139	72	0	531	603	-464
1917	145	0	145	69	0	574	642	-497
1918	101	0	101	65	0	714	779	-678
1919	196	0	196	62	0	898	959	-763
1920	104	0	104	58	0	1050	1109	-1005
1921	118	0	118	55	0	1165	1220	-1102
1922	72	0	72	52	0	1237	1289	-1217
1923	53	0	53	48	0	1334	1383	-1330
1924	34	0	34	45	0	1312	1357	-1322
1925	48	0	48	42	0	1218	1260	-1212
1926	65	0	65	38	0	1126	1164	-1099
1927	64	0	64	35	0	1157	1192	-1128
1928	86	0	86	32	0	1300	1331	-1245
1929	90	0	90	28	0	1331	1359	-1269
1930	87	0	87	29	0	1281	1310	-1223
1931	60	0	60	30	0	1390	1420	-1360
1932	4	0	4	30	0	1601	1631	-1627
1933	36	0	36	32	0	1526	1559	-1523
1934	61	0	61	34	0	1483	1517	-1456
1935	47	0	47	36	0	1443	1479	-1432
1936	66	141	207	38	0	1446	1483	-1276
1937	53	146	199	39	0	1456	1495	-1295
1938	54	141	195	41	0	1534	1575	-1379
1939	89	137	226	44	0	1557	1601	-1375
1940	0	133	133	48	649	1706	2404	-2271
1941	0	178	178	55	1310	1685	3050	-2872
1942	0	183	183	57	1614	2143	3814	-3631
1943	0	185	185	61	3031	2714	5806	-5621
1944	0	193	193	67	4327	3732	8125	-7932

Table A.6 (continued): Financial balance sheet, central government, end-of-year 1875-2005, million kroner

Year	Financial assets			Financial liabilities				Net financial assets
	Loans	Bonds and shares	Total	Currency	Deposits	Bonds	Total	
1945	0	155	155	71	4269	4366	8706	-8552
1946	0	146	146	76	4261	4230	8567	-8421
1947	0	185	185	82	3178	4333	7593	-7408
1948	0	181	181	88	2379	4577	7044	-6863
1949	0	221	221	88	2000	4801	6890	-6669
1950	0	185	185	91	1529	4809	6429	-6245
1951	0	190	190	95	762	4988	5846	-5655
1952	45	200	245	101	0	5563	5665	-5420
1953	761	237	998	105	0	5925	6031	-5033
1954	1502	269	1771	109	0	5836	5944	-4173
1955	2092	236	2327	113	0	5925	6038	-3710
1956	2591	235	2826	118	0	6130	6248	-3422
1957	3460	246	3706	134	0	6330	6464	-2758
1958	3827	253	4081	141	0	6342	6483	-2402
1959	4569	320	4889	143	0	6209	6352	-1463
1960	5273	320	5594	142	0	6066	6208	-614
1961	5274	255	5529	214	0	5915	6129	-600
1962	5648	246	5894	236	0	5960	6196	-302
1963	6467	326	6793	255	0	6137	6392	401
1964	8229	400	8629	273	0	6309	6582	2047
1965	8883	340	9223	302	0	6428	6730	2492
1966	10074	517	10591	326	0	6192	6518	4073
1967	9514	881	10395	360	0	6063	6423	3972
1968	9569	852	10421	384	0	6057	6441	3980
1969	12385	1516	13901	408	0	6411	6819	7082
1970	14560	1109	15668	443	0	6785	7228	8441
1971	15940	1983	17922	488	0	7874	8362	9561
1972	18193	2903	21096	527	0	8682	9209	11887
1973	22990	4352	27342	567	0	9040	9607	17735
1974	23014	6816	29829	614	0	9544	10158	19671
1975	18449	8420	26870	...	0	16473	16473	10397
1976	24418	12443	36861	...	0	32378	32378	4483
1977	30723	16467	47190	...	0	51544	51544	-4354
1978	41731	19871	61602	...	0	74260	74260	-12658
1979	40735	26733	67468	...	0	98086	98086	-30618
1980	34854	55050	89904	...	0	136103	136103	-46199
1981	29524	71716	101240	...	0	192897	192897	-91657
1982	35641	83205	118846	...	0	283128	283128	-164282
1983	49724	93782	143506	...	0	375006	375006	-231500
1984	46966	108011	154977	...	0	429515	429515	-274538
1985	55358	113523	168881	...	0	453582	453582	-284701
1986	86571	116351	202922	...	0	470003	470003	-267081
1987	93670	125190	218860	...	0	472586	472586	-253726
1988	79055	132119	211174	...	0	477733	477733	-266559
1989	77254	144801	222055	...	0	491573	491573	-269518
1990	93606	149225	242831	...	0	524465	524465	-281634
1991	65849	156965	222814	...	0	553347	553347	-330533
1992	89727	165692	255419	...	0	614981	614981	-359562
1993	151081	174044	325125	...	0	726424	726424	-401299
1994	122066	191520	313586	...	0	747562	747562	-433976
1995	101477	191906	293383	...	0	763365	763365	-469982
1996	102452	188114	290566	...	0	779225	779225	-488659
1997	101295	187947	289242	...	0	777310	777310	-488068
1998	103514	188531	292045	...	0	744758	744758	-452713
1999	108031	188396	296427	...	0	738604	738604	-442177
2000	106232	183670	289902	...	0	709204	709204	-419302
2001	116821	182931	299752	...	0	694782	694782	-395030
2002	129852	189028	318880	...	0	708643	708643	-389763
2003	126551	188139	314690	...	0	694856	694856	-380166
2004	147268	186587	333855	...	0	688487	688487	-354632
2005	147975	185889	333864	...	0	607160	607160	-273296

Table A.7: Financial balance sheet, other residents, end-of-year 1875-2005, million kroner

Year	Net financial assets	Year	Net financial assets
1875	337	1945	7584
1876	333	1946	6720
1877	321	1947	5552
1878	330	1948	4704
1879	334	1949	4367
1880	371	1950	3460
1881	368	1951	3198
1882	365	1952	3364
1883	339	1953	3322
1884	304	1954	1959
1885	277	1955	1630
1886	293	1956	1175
1887	294	1957	962
1888	267	1958	1500
1889	234	1959	857
1890	220	1960	213
1891	202	1961	-409
1892	183	1962	-2049
1893	161	1963	-2661
1894	160	1964	-5258
1895	131	1965	-7243
1896	96	1966	-10438
1897	90	1967	-12673
1898	59	1968	-14185
1899	38	1969	-19886
1900	-8	1970	-24931
1901	-24	1971	-28042
1902	-55	1972	-30435
1903	-64	1973	-38600
1904	-97	1974	-47804
1905	-117	1975	-40385
1906	-207	1976	-49802
1907	-314	1977	-61065
1908	-374	1978	-60894
1909	-440	1979	-69425
1910	-491	1980	-68107
1911	-484	1981	-50951
1912	-483	1982	-17428
1913	-558	1983	15159
1914	-401	1984	16911
1915	-50	1985	-433
1916	564	1986	-39146
1917	1252	1987	-69686
1918	1678	1988	-82617
1919	697	1989	-71882
1920	205	1990	-58144
1921	352	1991	-1467
1922	192	1992	47562
1923	105	1993	110299
1924	47	1994	174976
1925	212	1995	183982
1926	159	1996	214659
1927	163	1997	178068
1928	250	1998	167713
1929	310	1999	290177
1930	262	2000	201302
1931	-91	2001	175030
1932	115	2002	164763
1933	141	2003	210166
1934	-90	2004	271632
1935	-122	2005	298296
1936	-98		
1937	54		
1938	140		
1939	-4		
1940	995		
1941	1675		
1942	2429		
1943	4307		
1944	6633		

Table A.8: Financial balance sheet, non residents, end-of-year 1875-2005, million kroner

Year	Net financial assets	Year	Net financial assets
1875	-136	1945	968
1876	-137	1946	1701
1877	-128	1947	1856
1878	-139	1948	2159
1879	-145	1949	2302
1880	-162	1950	2785
1881	-154	1951	2457
1882	-151	1952	2056
1883	-127	1953	1711
1884	-97	1954	2214
1885	-71	1955	2080
1886	-85	1956	2247
1887	-84	1957	1796
1888	-57	1958	902
1889	-24	1959	606
1890	-10	1960	401
1891	10	1961	1009
1892	26	1962	2351
1893	48	1963	2260
1894	66	1964	3211
1895	90	1965	4751
1896	120	1966	6365
1897	130	1967	8701
1898	170	1968	10205
1899	198	1969	12804
1900	255	1970	16490
1901	285	1971	18481
1902	325	1972	18548
1903	335	1973	20865
1904	370	1974	28133
1905	390	1975	29988
1906	480	1976	45319
1907	587	1977	65419
1908	660	1978	73552
1909	765	1979	100043
1910	847	1980	114306
1911	860	1981	142608
1912	877	1982	181710
1913	945	1983	216341
1914	839	1984	257627
1915	539	1985	285134
1916	-100	1986	306227
1917	-756	1987	323412
1918	-1000	1988	349176
1919	66	1989	341400
1920	800	1990	339778
1921	750	1991	332000
1922	1025	1992	312000
1923	1225	1993	291000
1924	1275	1994	259000
1925	1000	1995	286000
1926	940	1996	274000
1927	965	1997	310000
1928	995	1998	285000
1929	959	1999	152000
1930	961	2000	218000
1931	1451	2001	220000
1932	1512	2002	225000
1933	1382	2003	170000
1934	1546	2004	83000
1935	1554	2005	-25000
1936	1374		
1937	1241		
1938	1239		
1939	1379		
1940	1276		
1941	1197		
1942	1202		
1943	1313		
1944	1299		

Table A.9: Gross Domestic Product (GDP) at factor costs, current prices, 1875-2005, million kroner

Year	GDP	Year	GDP
1875	761	1945	13148
1876	784	1946	13911
1877	728	1947	15328
1878	714	1948	16635
1879	715	1949	17796
1880	791	1950	20361
1881	790	1951	22042
1882	801	1952	23532
1883	818	1953	24993
1884	790	1954	26012
1885	772	1955	27038
1886	771	1956	28861
1887	779	1957	30768
1888	792	1958	32005
1889	840	1959	35258
1890	909	1960	38167
1891	949	1961	42737
1892	947	1962	47816
1893	942	1963	50366
1894	932	1964	57520
1895	979	1965	64320
1896	997	1966	70394
1897	1033	1967	77050
1898	1090	1968	84973
1899	1146	1969	96754
1900	1245	1970	106946
1901	1292	1971	118476
1902	1315	1972	135126
1903	1377	1973	157657
1904	1393	1974	179484
1905	1467	1975	200427
1906	1532	1976	231306
1907	1638	1977	254836
1908	1670	1978	281384
1909	1722	1979	309914
1910	1810	1980	335531
1911	1932	1981	368076
1912	2033	1982	424879
1913	2167	1983	467634
1914	2382	1984	515226
1915	2719	1985	555579
1916	3548	1986	588479
1917	3770	1987	622104
1918	4489	1988	648999
1919	5483	1989	691997
1920	6966	1990	727665
1921	5705	1991	758706
1922	5092	1992	793284
1923	5679	1993	795099
1924	6184	1994	847850
1925	5795	1995	884237
1926	5207	1996	923502
1927	5009	1997	966539
1928	5121	1998	988812
1929	5465	1999	1032880
1930	5373	2000	1111428
1931	5057	2001	1144437
1932	4815	2002	1174977
1933	5186	2003	1207433
1934	5620	2004	1252155
1935	6009	2005	1318925
1936	6301		
1937	6726		
1938	7077		
1939	7654		
1940	8119		
1941	9221		
1942	10379		
1943	11754		
1944	13045		

Table A.10: Consumer price index (CPI), annual average 1875-2005, 1980=100

Year	CPI	Year	CPI
1875	4.915	1945	13.71
1876	4.931	1946	13.61
1877	4.766	1947	14.00
1878	4.453	1948	14.35
1879	4.352	1949	14.70
1880	4.719	1950	16.03
1881	5.095	1951	17.91
1882	4.555	1952	18.31
1883	4.500	1953	18.21
1884	4.328	1954	18.56
1885	4.187	1955	19.79
1886	3.999	1956	20.78
1887	3.890	1957	21.03
1888	3.921	1958	21.23
1889	4.054	1959	21.67
1890	4.148	1960	22.17
1891	4.305	1961	23.16
1892	4.164	1962	24.69
1893	4.054	1963	25.98
1894	3.929	1964	26.92
1895	3.913	1965	28.65
1896	3.812	1966	30.58
1897	3.890	1967	32.86
1898	3.999	1968	35.48
1899	3.984	1969	36.71
1900	4.211	1970	39.14
1901	4.266	1971	41.42
1902	4.234	1972	44.14
1903	4.164	1973	48.24
1904	4.109	1974	55.57
1905	4.281	1975	60.91
1906	4.320	1976	66.40
1907	4.406	1977	73.82
1908	4.391	1978	81.20
1909	4.320	1979	89.02
1910	4.422	1980	100.00
1911	4.446	1981	111.67
1912	4.657	1982	123.00
1913	4.798	1983	131.51
1914	5.040	1984	139.77
1915	5.839	1985	146.40
1916	6.878	1986	151.69
1917	7.966	1987	157.78
1918	9.302	1988	165.00
1919	11.034	1989	172.90
1920	13.162	1990	177.40
1921	11.183	1991	181.70
1922	9.500	1992	185.50
1923	9.896	1993	187.83
1924	10.49	1994	191.58
1925	10.19	1995	195.57
1926	8.66	1996	199.73
1927	8.36	1997	204.08
1928	8.31	1998	207.85
1929	8.26	1999	213.04
1930	7.87	2000	219.25
1931	7.42	2001	224.40
1932	7.37	2002	229.83
1933	7.57	2003	234.65
1934	7.87	2004	237.47
1935	8.16	2005	241.74
1936	8.26		
1937	8.56		
1938	8.66		
1939	8.91		
1940	11.08		
1941	12.72		
1942	13.16		
1943	13.26		
1944	13.56		

Table A.11: Index for real GDP at factor costs 1875-2005, 1980=100

Year	Real GDP	Year	Real GDP
1875	4.811	1945	23.659
1876	4.908	1946	27.353
1877	4.770	1947	28.877
1878	4.960	1948	29.836
1879	5.123	1949	31.658
1880	5.242	1950	33.489
1881	5.290	1951	34.298
1882	5.487	1952	34.649
1883	5.669	1953	36.611
1884	5.698	1954	37.830
1885	5.735	1955	38.454
1886	5.973	1956	38.764
1887	6.177	1957	40.944
1888	6.229	1958	41.998
1889	6.307	1959	45.279
1890	6.686	1960	48.065
1891	6.812	1961	51.878
1892	6.979	1962	55.102
1893	7.109	1963	56.284
1894	7.258	1964	61.540
1895	7.666	1965	64.782
1896	7.948	1966	66.364
1897	8.137	1967	69.127
1898	8.267	1968	72.709
1899	8.624	1969	77.436
1900	8.917	1970	78.485
1901	9.292	1971	81.350
1902	9.515	1972	84.783
1903	10.075	1973	88.151
1904	10.298	1974	88.178
1905	10.469	1975	86.932
1906	10.766	1976	91.370
1907	11.163	1977	93.320
1908	11.519	1978	95.423
1909	11.961	1979	99.485
1910	12.325	1980	100.000
1911	12.982	1981	99.627
1912	12.986	1982	103.502
1913	13.472	1983	105.974
1914	14.318	1984	110.476
1915	13.327	1985	114.619
1916	13.891	1986	118.546
1917	13.067	1987	119.837
1918	12.640	1988	121.072
1919	14.266	1989	122.463
1920	14.942	1990	125.019
1921	14.511	1991	126.580
1922	15.975	1992	128.799
1923	17.659	1993	129.536
1924	17.716	1994	135.751
1925	17.311	1995	140.081
1926	18.327	1996	143.494
1927	18.682	1997	147.832
1928	19.318	1998	150.593
1929	20.611	1999	154.931
1930	21.843	2000	161.735
1931	22.081	2001	162.927
1932	21.499	2002	163.456
1933	22.191	2003	164.470
1934	22.856	2004	166.606
1935	23.371	2005	171.096
1936	23.950		
1937	24.529		
1938	25.126		
1939	26.319		
1940	22.628		
1941	20.390		
1942	20.852		
1943	23.161		
1944	25.577		

Table A.12: National wealth, end of year 1875-2005, million kroner

Year	Physical capital stock	Net foreign assets	Total national wealth	Year	Physical capital stock	Net foreign assets	Total national wealth
1875	4853	136	4989	1945	44877	-968	43909
1876	4910	137	5047	1946	46124	-1701	44423
1877	4772	128	4900	1947	55777	-1856	53921
1878	4467	139	4606	1948	61246	-2159	59087
1879	4377	145	4522	1949	65372	-2302	63070
1880	4771	162	4933	1950	73953	-2785	71168
1881	5187	154	5341	1951	81355	-2457	78898
1882	4681	151	4832	1952	88127	-2056	86071
1883	4677	127	4804	1953	93748	-1711	92037
1884	4547	97	4644	1954	100053	-2214	97839
1885	4436	71	4507	1955	107480	-2080	105400
1886	4264	85	4349	1956	116369	-2247	114122
1887	4180	84	4264	1957	121668	-1796	119872
1888	4249	57	4306	1958	128990	-902	128088
1889	4446	24	4470	1959	140987	-606	140381
1890	4608	10	4618	1960	150239	-401	149838
1891	4840	-10	4830	1961	165761	-1009	164752
1892	4737	-26	4711	1962	190866	-2351	188515
1893	4668	-48	4620	1963	203814	-2260	201554
1894	4575	-66	4509	1964	228844	-3211	225633
1895	4620	-90	4530	1965	258258	-4751	253507
1896	4599	-120	4479	1966	275256	-6365	268891
1897	4810	-130	4680	1967	301244	-8701	292543
1898	5103	-170	4933	1968	333790	-10205	323585
1899	5248	-198	5050	1969	373111	-12804	360307
1900	5700	-255	5445	1970	413857	-16490	397367
1901	5903	-285	5618	1971	462113	-18481	443632
1902	6013	-325	5688	1972	531528	-18548	512980
1903	6068	-335	5733	1973	629899	-20865	609034
1904	6136	-370	5766	1974	729000	-28133	700867
1905	6526	-390	6136	1975	813979	-29988	783991
1906	6777	-480	6297	1976	909567	-45319	864248
1907	7112	-587	6525	1977	1011917	-65419	946498
1908	7258	-660	6598	1978	1136451	-73552	1062899
1909	7298	-765	6533	1979	1303452	-100043	1203409
1910	7627	-847	6780	1980	1479030	-114306	1364724
1911	7833	-860	6973	1981	1629904	-142608	1487296
1912	8399	-877	7522	1982	1766071	-181710	1584361
1913	8872	-945	7927	1983	1876277	-216341	1659936
1914	9450	-839	8611	1984	1968745	-257627	1711118
1915	11107	-539	10568	1985	2059837	-285134	1774703
1916	13303	100	13403	1986	2198952	-306227	1892725
1917	15214	756	15969	1987	2375826	-323412	2052414
1918	18014	1000	19014	1988	2547188	-349176	2198012
1919	21367	-66	21301	1989	2713557	-341400	2372157
1920	28299	-800	27499	1990	2858102	-339778	2518324
1921	23775	-750	23025	1991	2960890	-332000	2628890
1922	20412	-1025	19387	1992	3048743	-312000	2736743
1923	20952	-1225	19727	1993	3127819	-291000	2836819
1924	23466	-1275	22191	1994	3191996	-259000	2932996
1925	22677	-1000	21677	1995	3289290	-286000	3003290
1926	19939	-940	18999	1996	3404585	-274000	3130585
1927	19080	-965	18115	1997	3522476	-310000	3212476
1928	19128	-995	18133	1998	3657451	-285000	3372451
1929	19561	-959	18602	1999	3780796	-152000	3628796
1930	18494	-961	17533	2000	3988998	-218000	3770998
1931	17663	-1451	16212	2001	4111365	-220000	3891365
1932	17539	-1512	16027	2002	4210742	-225000	3985742
1933	18526	-1382	17144	2003	4324710	-170000	4154710
1934	20260	-1546	18714	2004	4450038	-83000	4367038
1935	21736	-1554	20182	2005	4528169	25000	4553169
1936	22798	-1374	21424				
1937	24026	-1241	22785				
1938	25008	-1239	23769				
1939	26905	-1379	25526				
1940	33925	-1276	32650				
1941	39540	-1197	38343				
1942	41548	-1202	40346				
1943	42994	-1313	41680				
1944	43855	-1299	42555				

Table A.13: Share price index, end of year 1875-2005, 3 July 1989=100

Year	Share price index	Year	Share price index
1875	3.95	1945	5.66
1876	3.63	1946	5.94
1877	3.36	1947	5.70
1878	2.93	1948	5.15
1879	3.30	1949	5.43
1880	3.74	1950	5.66
1881	4.13	1951	5.25
1882	4.10	1952	5.29
1883	4.14	1953	5.47
1884	4.17	1954	5.84
1885	3.95	1955	6.76
1886	3.51	1956	7.99
1887	3.68	1957	6.92
1888	3.81	1958	8.15
1889	4.01	1959	9.53
1890	4.15	1960	9.61
1891	3.94	1961	9.45
1892	3.77	1962	9.68
1893	3.69	1963	10.68
1894	3.76	1964	11.29
1895	3.81	1965	12.07
1896	4.05	1966	11.69
1897	4.06	1967	10.52
1898	4.00	1968	11.69
1899	3.98	1969	11.79
1900	3.75	1970	10.62
1901	3.71	1971	10.32
1902	3.73	1972	19.48
1903	3.87	1973	19.48
1904	3.93	1974	15.33
1905	4.07	1975	20.51
1906	4.19	1976	20.51
1907	4.32	1977	20.31
1908	4.25	1978	19.06
1909	4.09	1979	17.82
1910	4.32	1980	19.99
1911	4.36	1981	27.69
1912	4.59	1982	31.19
1913	4.47	1983	66.84
1914	4.40	1984	52.19
1915	5.26	1985	74.62
1916	8.20	1986	60.29
1917	8.03	1987	56.87
1918	9.27	1988	84.76
1919	8.06	1989	113.26
1920	6.64	1990	98.17
1921	4.88	1991	109.96
1922	4.15	1992	81.57
1923	4.49	1993	114.02
1924	4.72	1994	108.86
1925	4.49	1995	114.23
1926	4.18	1996	147.17
1927	4.60	1997	210.55
1928	4.44	1998	219.34
1929	4.59	1999	255.69
1930	4.23	2000	313.90
1931	3.31	2001	272.45
1932	3.24	2002	199.49
1933	4.20	2003	244.35
1934	4.61	2004	286.66
1935	4.75	2005	393.52
1936	5.27		
1937	4.85		
1938	4.77		
1939	4.49		
1940	4.49		
1941	5.39		
1942	5.47		
1943	6.26		
1944	6.07		

Table A.14: Average interest rate on deposits in commercial banks and savings banks 1875-2005, per cent per annum

Year	Deposit interest rate	Year	Deposit interest rate
1875	4.00	1945	2.27
1876	4.02	1946	2.26
1877	4.09	1947	2.32
1878	3.98	1948	2.39
1879	3.71	1949	2.46
1880	3.67	1950	2.68
1881	3.59	1951	2.94
1882	3.72	1952	3.14
1883	3.83	1953	3.17
1884	3.82	1954	3.29
1885	3.80	1955	3.63
1886	3.67	1956	3.66
1887	3.41	1957	3.69
1888	3.29	1958	3.61
1889	3.36	1959	3.36
1890	3.53	1960	3.89
1891	3.65	1961	4.58
1892	3.55	1962	4.74
1893	3.47	1963	4.38
1894	3.50	1964	4.83
1895	3.31	1965	5.04
1896	3.33	1966	5.06
1897	3.49	1967	5.45
1898	3.52	1968	4.98
1899	3.77	1969	6.31
1900	4.14	1970	6.83
1901	4.21	1971	5.91
1902	3.90	1972	5.57
1903	3.80	1973	6.39
1904	3.79	1974	8.79
1905	3.81	1975	7.32
1906	4.08	1976	8.32
1907	4.30	1977	9.42
1908	4.36	1978	8.62
1909	4.11	1979	8.47
1910	4.07	1980	11.45
1911	3.97	1981	10.85
1912	4.03	1982	10.97
1913	4.18	1983	9.02
1914	4.28	1984	8.62
1915	4.25	1985	8.34
1916	4.14	1986	7.08
1917	4.20	1987	7.62
1918	4.32	1988	7.02
1919	4.38	1989	7.00
1920	4.70	1990	7.90
1921	4.68	1991	7.20
1922	4.14	1992	7.50
1923	4.19	1993	6.50
1924	4.47	1994	3.50
1925	4.46	1995	3.90
1926	4.38	1996	2.80
1927	4.45	1997	2.70
1928	4.42	1998	3.10
1929	4.46	1999	2.40
1930	4.22	2000	3.20
1931	4.16	2001	3.30
1932	4.26	2002	2.55
1933	3.49	2003	1.83
1934	3.22	2004	1.60
1935	3.43	2005	1.70
1936	3.62		
1937	3.62		
1938	3.62		
1939	3.65		
1940	3.76		
1941	3.44		
1942	3.13		
1943	2.96		
1944	2.61		

Table A.15: Yield on long-term government bonds 1875-2005, annual averages, per cent per annum

Year	Government bond yield	Year	Government bond yield
1875	4.33	1945	3.75
1876	4.38	1946	3.55
1877	4.50	1947	3.65
1878	4.50	1948	4.10
1879	4.30	1949	4.43
1880	4.13	1950	4.53
1881	4.08	1951	5.13
1882	4.08	1952	5.28
1883	4.05	1953	5.10
1884	4.00	1954	5.28
1885	4.00	1955	5.55
1886	3.85	1956	5.68
1887	3.60	1957	5.75
1888	3.55	1958	5.23
1889	3.53	1959	5.40
1890	3.60	1960	6.10
1891	3.75	1961	6.68
1892	3.73	1962	7.24
1893	3.70	1963	7.11
1894	3.58	1964	7.23
1895	3.43	1965	8.49
1896	3.50	1966	8.98
1897	3.50	1967	9.21
1898	3.50	1968	9.03
1899	3.65	1969	9.69
1900	3.78	1970	11.07
1901	3.60	1971	10.50
1902	3.55	1972	10.44
1903	3.50	1973	11.83
1904	3.60	1974	14.13
1905	3.55	1975	12.39
1906	3.58	1976	14.19
1907	3.63	1977	15.71
1908	3.70	1978	15.48
1909	3.68	1979	16.57
1910	3.70	1980	20.38
1911	3.75	1981	19.55
1912	3.93	1982	22.11
1913	4.20	1983	14.55
1914	4.25	1984	14.12
1915	5.20	1985	11.33
1916	4.90	1986	10.20
1917	4.88	1987	11.29
1918	4.90	1988	9.87
1919	5.20	1989	9.70
1920	6.30	1990	10.63
1921	5.53	1991	9.27
1922	4.90	1992	8.99
1923	5.00	1993	7.28
1924	5.30	1994	7.85
1925	5.28	1995	8.27
1926	5.25	1996	7.19
1927	5.10	1997	6.26
1928	4.93	1998	5.03
1929	5.10	1999	4.94
1930	4.65	2000	5.66
1931	4.75	2001	5.09
1932	5.00	2002	5.05
1933	4.13	2003	4.31
1934	3.95	2004	4.29
1935	4.28	2005	3.38
1936	4.38		
1937	4.55		
1938	4.28		
1939	4.63		
1940	4.93		
1941	4.20		
1942	4.05		
1943	4.38		
1944	3.98		

Table A.16: Indices for property prices 1875-2005, 1995=100

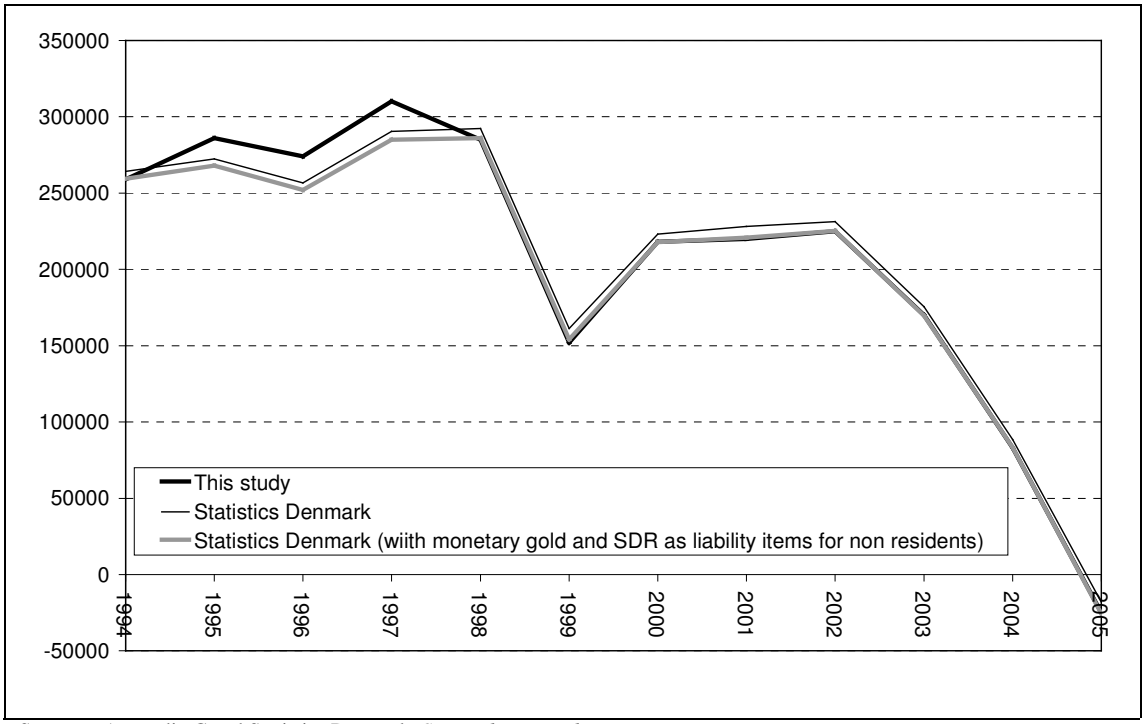
Year	One-family houses	Farms	Year	One-family houses	Farms
1875		1.18	1945	3.28	3.96
1876		1.22	1946	3.79	3.79
1877		1.21	1947	4.38	4.00
1878		1.15	1948	4.76	4.26
1879		1.11	1949	4.43	4.35
1880		1.15	1950	4.49	4.91
1881		1.15	1951	4.90	5.34
1882		1.19	1952	5.01	5.75
1883		1.19	1953	5.12	5.95
1884		1.22	1954	5.30	5.99
1885		1.19	1955	5.45	5.90
1886		1.08	1956	5.62	6.32
1887		1.06	1957	5.98	6.77
1888		1.00	1958	6.12	6.54
1889		1.03	1959	6.49	7.19
1890		1.04	1960	7.30	8.25
1891		1.00	1961	9.25	9.00
1892		1.00	1962	10.26	9.12
1893		1.00	1963	11.07	9.18
1894		0.97	1964	12.63	10.29
1895		0.97	1965	13.46	12.23
1896		0.95	1966	15.39	13.72
1897		0.93	1967	16.32	14.82
1898		0.93	1968	16.89	15.29
1899		0.93	1969	17.79	15.58
1900		0.90	1970	20.67	18.63
1901		0.90	1971	22.08	20.10
1902		0.94	1972	24.29	23.92
1903		0.97	1973	28.93	29.34
1904		1.01	1974	33.79	37.38
1905		1.04	1975	36.66	41.80
1906		1.09	1976	40.18	49.91
1907		1.17	1977	45.53	58.58
1908		1.21	1978	52.84	71.52
1909		1.22	1979	58.06	73.94
1910		1.24	1980	57.27	62.70
1911		1.32	1981	54.53	52.89
1912		1.36	1982	53.36	47.92
1913		1.51	1983	65.14	59.58
1914		1.58	1984	75.07	66.67
1915		1.72	1985	87.58	82.50
1916		1.85	1986	98.26	96.25
1917		2.07	1987	90.53	90.83
1918		2.60	1988	92.00	90.00
1919		3.06	1989	92.00	90.00
1920		3.13	1990	86.00	94.00
1921		2.95	1991	86.00	93.00
1922		2.58	1992	84.00	93.00
1923		2.70	1993	83.00	88.10
1924		2.98	1994	93.00	92.30
1925		3.09	1995	100.00	100.00
1926		2.63	1996	110.90	109.90
1927		2.28	1997	123.50	122.30
1928		2.24	1998	134.40	134.50
1929		2.43	1999	143.70	143.00
1930		2.52	2000	153.00	157.90
1931		2.24	2001	162.00	172.90
1932		1.88	2002	168.00	186.00
1933		1.89	2003	173.20	196.90
1934		2.07	2004	188.60	209.70
1935		2.16	2005	220.90	241.58
1936		2.18			
1937		2.13			
1938	1.99	2.17			
1939	2.02	2.28			
1940	2.08	2.56			
1941	2.21	2.90			
1942	2.45	3.23			
1943	2.69	3.45			
1944	3.02	3.87			

Appendix D: A post-1994 comparison with Statistics Denmark's financial-accounts statistics

The historical financial-balance-sheets data in appendix C does not make use the official financial-account statistics that are available from Statistics Denmark (since end-1994) or from the Nationalbank (since end-1998), cf. section 1. This appendix compares the figures for the net financial asset positions of three main sectors in the historical financial-balance-sheets presented in section 2 with the corresponding figures from Statistics Denmark's financial-accounts statistics.

Figure 12 shows the net financial asset position of the non-resident sector and the differences between the two sets of statistics are in general small. The main conceptual differences between the two curves can be attributed to the treatment of monetary gold and SDR. In Statistics Denmark's financial accounts monetary gold and SDR are treated as financial assets without a corresponding liability while the historical financial balance sheets follows the treatment in the statistics on Denmark's International Investment Position and assign "non residents" as the counterpart sector. Furthermore, before 2000 institutional units at the Faroe Islands and Greenland are treated as non-residents in Statistics Denmark's financial accounts while they – following the pre-2000 statistics on Denmark's International Investment Position – are treated as Danish residents in the historical financial balance sheets.

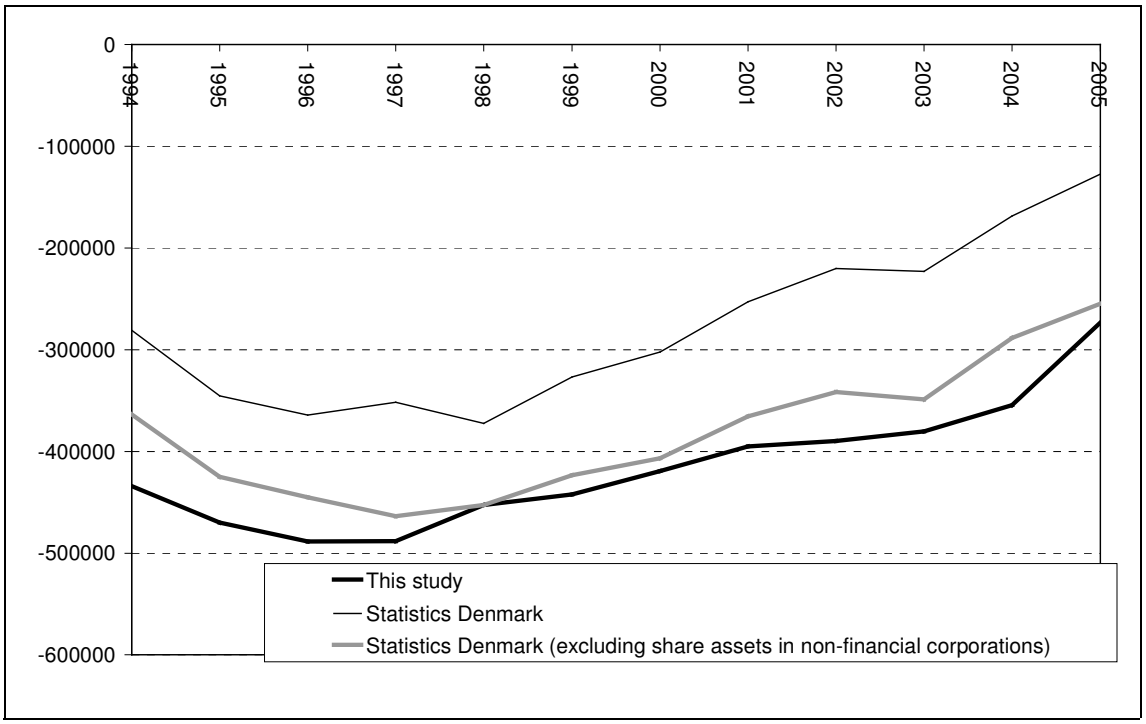
Figure 12: Net financial asset position of the non-resident sector, end 1994-2005, million kroner



Sources: Appendix C and Statistics Denmark, *StatBank Denmark*.

Figure 13 shows the net financial asset position of the central-government sector. The main differences between the two curves can be attributed Statistics Denmark's inclusion of the central government's ownership shares of non-financial corporations located in the private non-financial sector. These shares are not included among the central government's financial assets in the historical data set from appendix C. A minor difference can be attributed to Statistics Denmark's inclusion of the National Church in the central government sector. In the historical financial balance sheets from section 2 the National Church is included among "other residents". The development trends in the series from the two sets of statistics are quite close.

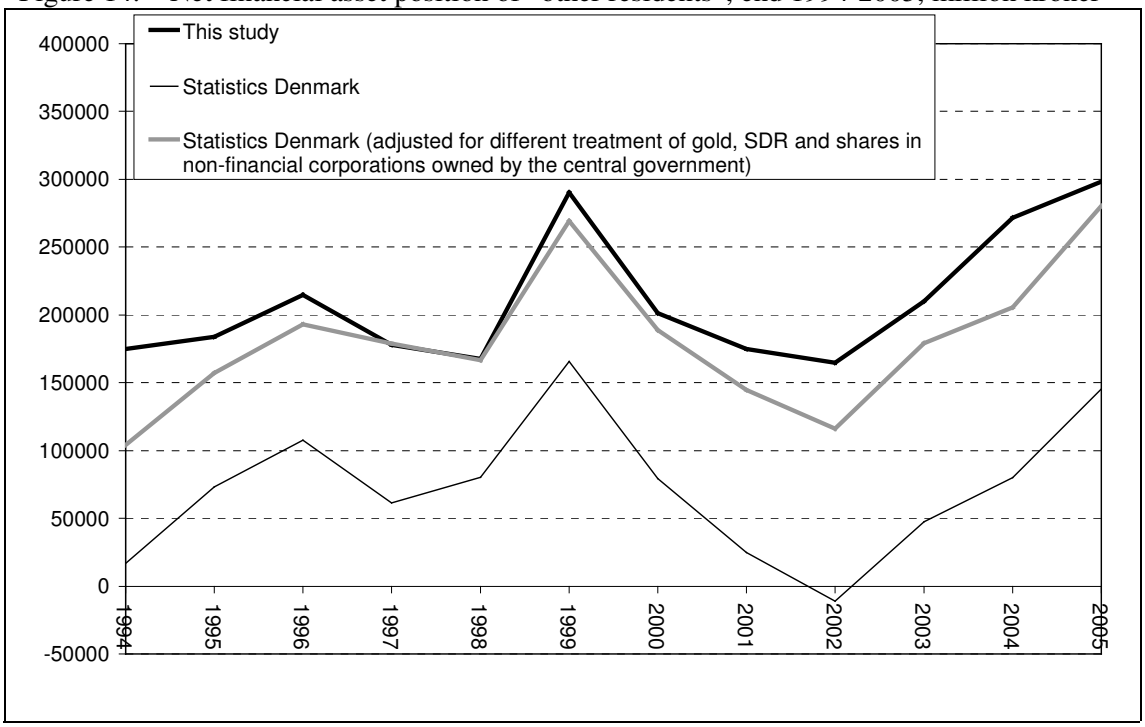
Figure 13: Net financial asset position of the central-government sector, end 1994-2005, million kroner



Sources: Appendix C and Statistics Denmark, *StatBank Denmark*.

Finally, figure 14 shows the net financial asset position of "other residents". The sector "other residents" covers all residents excluding the central government and the differences between the series from the two sets of statistics naturally mainly mirrors the differences regarding the central-government sector.

Figure 14: Net financial asset position of "other residents", end 1994-2005, million kroner



Notes: The sector "other residents" covers all residents excluding the central government.
Sources: Appendix C and Statistics Denmark, *StatBank Denmark*.

Appendix E: The Baxter-King approximate band-pass filter[135]

Filtering is a commonly used method to isolate cyclical components from macroeconomic time series. The Baxter-King band-pass filter allows one to extract both business cycles and longer-term cycles from the data.

The Baxter-King filter converts an input series y_t into another (filtered) output series y_t^F via a finite centered linear moving average of the following form:

$$[E.1]\ y_t^F = \sum_{i=-K}^{K} w_i \cdot y_t$$

The filter is based on results from the spectral analysis where a time series are regarded as the composed of a number of components with different frequencies. If one wishes to extract the cyclical component with a duration from a to b years, the filter coefficient used in the Baxter-King filter are found as:

$$[E.2]\ w_i = w_i^* - (2 \cdot K + 1)^{-1} \cdot \sum_{j=-K}^{K} w_j^*$$

where:

$$[E.3]\ w_i^* = \begin{cases} \pi^{-1} \cdot \left[\dfrac{2 \cdot \pi}{a} - \dfrac{2 \cdot \pi}{b} \right] & \text{for } i = 0 \\ (i \cdot \pi)^{-1} \cdot \left[\sin\left(\dfrac{2 \cdot \pi}{a} \cdot i \right) - \sin\left(\dfrac{2 \cdot \pi}{b} \cdot i \right) \right] & \text{for } i = \pm 1, \pm 2, \ldots, \pm K \end{cases}$$

The filtered series are de-trended. The adjustment of the filter coefficients in [E.2] ensures that the filtered time series becomes stationary in order to avoid spurious cycles. The filter coefficients (w_i) are symmetric which ensure that the filtered series has no phase shifts compared to the input series.

The number of filter coefficients (determined by K) influences the degree to which the filter approximates an ideal band-pass filter. The Baxter-King filter is thus identified by a, b and K. The higher K the better approximation, but a high K also means loss of observations.

In the paper at hand business cycles are delimited to 2-8 years[136] and long-term cycles to 8-40 years. Recently Dewald & Haug (2004) has analysed the short-term and long-term effects of money growth on nominal and real output growth and inflation on an annual frequency for the period 1880-2001 in 11 countries (including Denmark) using band-pass filters. Their

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[135] Cf. Baxter & King (1999).

[136] According to the NBER US business cycles has on average been around 5 years for the post-1854 period and a little more than 6 years in the post-1970 period. Hansen & Knudsen (2004) and Hansen (2005) indicate – using both the Baxter-King filter and the Hodrick-Prescott filter – that the post-1974 business cycles in Denmark have been somewhat longer. An upper limit of 8 years therefore seems suitable. The reason for 2 years as the lower limit (and not zero) is the wish to exclude very short-term random fluctuations from the business cycle component.

results illustrate that with a choice of K=8 the gain function from the Baxter-King filter gives good approximation to that of an ideal band pass filter when the sample size is around 120 years of annual observations and the cyclical period is 8-40 years. For K less than 8 the approximation is poor and for K larger than 8 only little improvement is obtained. In the paper at hand K=8 is therefore applied.

By transforming a trended input series by natural logarithms before filtering, the cyclical component extracted from the data can be interpreted as the deviation from the trend measured in per cent. This facilitates the economic interpretation of the filtered time series data. In the paper at hand all the time series have therefore been transformed by natural logarithms before filtering.

Like most – if not all filters – the Baxter & King filter has its strengths and weaknesses, and different filters with different choices of parameters can produce very different results.[137] However, the Baxter & King filter still belongs to the group of popular filtering methods in applied economics.

[137] Cf. e.g. Gencay, Selcuk & Whitcher (2002) and Mills (2003) for an overview of a broad range of filtering methods applied in economics and finance.