

Historical monetary statistics for Sweden 1668-2008

Research overview and project plan

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by

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Introduction¹

The following paper has two aims. It provides a description of the research project "Historical monetary statistics for Sweden 1668-2008" and it presents a review of research in this field.

Many of the officially published series of monetary statistics at a disaggregated level do not go further back than to the 1980s or 1990s. Statistics Sweden does not take any overall responsibility for compiling or producing historical statistics. Historical monetary statistics have been compiled by individual researchers mainly within the subjects economic history and economics. The series that have been published are moreover seldom consistent with one another, and it often requires expertise in the field to know how to obtain these series. Not infrequently, the work of researchers is duplicated, since they do not have access to or know about one another's data.

The project "Historical monetary statistics for Sweden 1668-2008" means that the Riksbank takes an overall national responsibility for the collection and compilation of historical monetary statistics. The project was granted funding at the end of 2005 and will take place for the three-year period 2006-2008. At present, over ten researchers are involved from Göteborg, Lund and Stockholm (I have not written anything in this paper about the division of labour between these researchers, but the focus is on previous research and what is to be done within the project in general). In a first phase, a compilation is being made of existing monetary statistics primarily for the period 1668-2008. Certain new statistics are also being produced. This is intended to provide a database, which will be made available free of charge on the internet. Discussions have also taken place on publishing a book.

¹ Various parts of the content of this paper have been discussed with other researchers, who have provided advice on literature and suggested formulations. I would especially like to thank Göran Ahlström, Claes Berg, Jan Bohlin, Peter Englund, Øyvind Eitrheim, Bo Franzén, Klas Fregert, Sven Fritz, Karl Gratzner, Ola Grytten, Göran Hansson, Sven Hellroth, Rolf Henriksson, Per Hortlund, Tor Jacobson, Lars Jonung, Jan Klovland, Lars O. Lagerqvist, Mats Larsson, Svante Larsson, Thomas Lindh, Håkan Lobell, Johan Söderberg, Daniel Waldenström, Ulla Wikander, Svante Öberg and Anders Ögren. I would also like to thank Mira Barkå and Claudio Carillo at the Riksbank's archive who have assisted in finding historical statistics.

International compilations of monetary statistics

Internationally, compilations of monetary statistics have been made in a number of places. Various international collaboration projects have been launched to obtain more reliable and internationally comparable data.

A summary of historical series of the money supply and other monetary statistics has been made by Friedman and Schwartz (1971) for the United States for the period 1867-1960. Capie and Webber (1985) have compiled similar data for the United Kingdom for the period 1870-1982.

The present project has been partly inspired by a corresponding project for Norway. In the mid-1990s, an initiative was taken at Norges Bank (the Norwegian central bank) for a project to update the historical consumer price index series in Norway. This project was gradually expanded to construct general historical monetary statistics for Norway from 1819 (when Norges Bank became fully operational) until the present. This has resulted in the book *Historical Monetary Statistics for Norway 1819-2003* (2004) which published various monetary key variables for Norway, primarily on prices, GDP, money supply, bonds, exchange rates, stock exchange index, house prices and private banks. Altogether, seven authors have contributed to writing this book. This data is available on Norges bank's website. In the introductory chapter, Øyvind Eitrheim, Jan T. Klovland and Jan F. Qvistad explain that the focus of the book has been on the construction on the principles behind the construction of the data. The authors have deliberately avoided attempting to analyse and interpret the different time series.

Flandreau and Zumer (2004) have produced monetary statistics for 17 countries for the period 1880-1913, including central government debt, interest rates, prices and exchange rates. These data have been available on line in *Economic History Services* (<http://eh.net/databases/finance>). Marc Flandreau and the other researchers he collaborates with are now in the process of compiling and comparing interest rates in different countries for the period from the end of the middle ages up to the industrial breakthrough.

At *Economic History Services* (<http://www.eh.net>), it is also possible to find, for example, the exchange rate between the US dollar and the UK pound 1791-2004, gold prices 1257-2001 and the consumer price index 1264-2004.

The database *Global Financial Data* (<http://www.globalfinancialdata.com>) claims to have very extensive financial and monetary statistics dating all the way to the middle

ages although obtaining access to their data is quite expensive (8,000 dollars for an annual individual subscription).

The *International Institute of Social History* has taken the initiative to setting up an international network of researchers specialising in the history of prices. Price series for different countries and regions are published on the Institute's website (<http://www.iisg.nl/hpw/index.html>). The oldest series is for commodity prices in Babylon covering the period 385-61 BC. There are also prices for Stockholm for the period 1539-1620 compiled by Johan Söderberg on the Institute's website.

Arrangement of the Swedish project

The construction of historical statistics is especially problematic because definitions are changed over time. There are also various breaks in time series. Even without breaks in time series, the same variable can be defined differently in different historical periods. There is a great difference between compilation of continuous statistics, where it is often possible to obtain the statistical data sought after, and compilation of historical statistics where an attempt is made to use the data that happens to be available in the best possible way.² Linking of time series requires not least knowledge about relevant historical circumstances. It makes great demands on those compiling these series.

A large part of these projects will consist of removing various breaks in the time series that arise due to changed definitions and statistical rearrangements. To the greatest possible extent, the most recent classification and statistical method should be applied to older data. The series should be published at as disaggregated a level as possible and with as careful description of sources as possible. This makes it easier for new methods to be applied and for users to construct their own aggregated series to suit their needs.

A broad group of users will benefit from the project – government, banks, businesses, community planners, producers of statistics, analysts, decision-makers, authorities, researchers, teachers, students, school students, journalists, the interested general public, etc. There are substantial economic benefits for society if forecasts are based on consistent historical series which go a long way back in time compared with only the last 10-15 years being extrapolated into the future. To be able to assess major technological, monetary or financial revolutions, there are many historical lessons from the middle ages and onwards. There is also a demand for Swedish historical data internationally. The

² Myrdal (1933: p. 47).

benefit of the project, regardless of how it is measured, will be many times greater than its costs.

The project will consist of a number of sub-projects associated with one or more researchers. The Norwegian project takes its starting point in 1819, which was the year that the Norwegian central bank started its activity. It should be natural for the Swedish project to make its starting point 1668, the year that the Riksbank was established. As from the 1660s, all the present Swedish provinces belonged to Sweden. Calculations of different variables (e.g., the money supply) for Sweden within its present borders, for example, at the beginning of the seventeenth century must, on the other hand, include area which did not then belong to Sweden. The consumer price index extends back to 1516 in the Norwegian project, however, and data can be obtained all the way back to the middle ages for a number of variables in the Swedish project.

The following sub-projects will be included:

1) Exchange rates back to the early middle ages. Exchange rates apply to the listing of the Swedish currency against foreign currencies, but also exchange rates between different types of money and means of payment in Sweden for the period until the introduction of the krona.

2) Prices from the thirteenth to the twenty-first century. An annual consumer price index can be relatively quickly obtained for the period from 1410 onwards. For the period before 1410, notations are only available for certain years, although this gives an indication of the long-term price development. Monthly price data can also be obtained from the 1600s and onwards although it is probably more realistic to construct a monthly consumer price index from the early twentieth century and onwards.

3) Wages from the middle ages up to the present.

4) Annual data of the money supply from 1668 up to the present. It will be possible to present monthly data for later periods. Estimates also exist for particular years all the way back to the middle ages. It should be possible to obtain annual data on the stock of money based on minting from the sixteenth century and onwards.

5) The bank and credit sector. Data on private banks and the distribution of lending to different financial institutions is being produced for the period from 1870. Good data has already been published for the Riksbank of the bank's assets and liabilities from the end of 1668 onwards.

6) Central government loans. The state's borrowing activities are well-documented from the eighteenth century until the present although earlier information also exists.

7) Stock exchange index, interest rates and bond yields. Monthly and, if possible, a weekly stock exchange will be produced from the 1860s and onwards. Various interest rate series will be presented all the way to the back to the middle ages.

In a later stage of the project, the following will also be included:

8) Property and housing prices. It should be possible to obtain data back to the seventeenth century. Information is also available back to the middle ages. The longer development can be partly estimated from, for instance, tax assessment values. Reliable indicators for annual fluctuations will be different to obtain before 1952, however.

Earlier Riksbank publications on monetary statistics

The Riksbank has previously published and compiled historical monetary statistics. One of the project's aims will be to scan in and/or input this material, and make it available online.

Sveriges riksbank 1668-1918-1924: bankens tillkomst och verksamhet was published between 1918 and 1931 and deals with the history of the Riksbank and monetary conditions since the establishment of the Riksbank in 1668 (to some extent, the earlier history of Stockholms Banco is also taken up). This work was produced by the Riksbank's statistical department. Five volumes were published, altogether 2,832 pages. Volumes I-IV are arranged chronologically. Volume V contains a table annex of 221 pages, an overview of the composition of the board of governors and a history of coins and banknotes from the earliest coins until the present. Volume I also contains tables.³

The statistical table annex in Volume V consists of four parts: 1) statistics on the Riksbank 1668-1924, 2) exchange rates 1668-1924, 3) the private banks 1834-1924 and 4) the Swedish banks' position with regard to other countries. More specifically, the following data are presented:

1) The Riksbank

- The Riksbank's assets and liabilities, income and expenditure, capital and profit, banknote circulation and metal cash broken down by various items for the whole period 1668-1924.
- Annual data of the Riksbank's average discount for the years 1857-1924 and the bank's interest rates for certain years all the way back to 1668.

2) Exchange rates

³ See Fritz (2003) for a short history of the Riksbank.

- Annual exchange rates (both highest and lowest exchange rate and average) at Hamburg, London, Amsterdam and Paris for the whole period 1740-1924.
- Exchange rates in New York, Helsinki, Petrograd, Vienna, Copenhagen, Kristiania, Switzerland, Madrid, Vienna, Brussels, Milan and Prague only for later years.
- Exchange rates for dukats, riksdaler specie, carolines and öre courant for the period 1740-1767.
- Exchange rates between different coins and the relationship between different metals are discussed and presented from the early middle ages to the present in the history of banknotes and coins in Sweden.

3) Private banks

- Annual data on the assets and liabilities of the private banks, and their number, for the period 1834-1924. Only two private banks were reported in 1834.
- Annual bank on the deposits and lending of the private banks for the period 1875-1924.
- Annual data on the finances of the private banks (reserves at the start of the year, gross profit, operating expenses, depreciation, net balance and dividend) for 1871-1924.

4) The position of the Swedish banks with regard to other countries

- Annual data on the position of the Riksdag and the private banks with regard to other countries for the whole period 1877-1924.

Årsbok - Sveriges riksbank (Sveriges riksbank, 1909-1978) and *Statistisk årsbok - Sveriges riksbank* (Sveriges riksbank, 1979-2001) publish data on, among other things, exchange rates, foreign trade, share index, the Riksbank and private banks, and the circulation of banknotes and coins.

There is further material in the Riksbank's archive which has not been published, for instance, on exchange rates. The Riksbank's archive before the twentieth century is deposited at the National Archives in Arninge.

At present, the Riksbank published quite a lot of statistics on its website (balance of payments, interest rates, exchange rates, the Riksbank's assets and liabilities, etc.). However, these statistics do not extend backward before the beginning of the 1990s for most variables.

Exchange rates

In the Norwegian project, monthly exchange rates are presented from 1819 and onwards. It ought to be possible to obtain similar data for Sweden. However, the aim should be to obtain daily exchange rate listings, which would, among other things, make possible volatility calculations on a monthly basis. Both Swedish sources and international literature (e.g. *The Economist*) can be used. Different types of coins were used in older periods (e.g. daler silver coin, daler copper coin, dukats and marks) and the exchange rate between these could fluctuate sharply. Certain types of coins disappeared and were replaced by others. Data of these exchange rates should be obtained within the project.

For Sweden, exchange rates have been published in Sveriges Riksbank (1931) for the period 1740-1924, although these are not comprehensive. Sveriges Riksbank (1931) used as a base direct sources of daily listings, for the period 1732-1737 in *Stockholmske Handels Mercurius*, 1705-1767 *Stockholms stads priscouranter*, for the period 1768-1889 notifications in *Post- och inrikes tidningar (the Swedish Official Gazette)*, and for the period 1890-1924 the Riksbank's listings. There is underlying documentation for these statistics in the Riksbank's archive, including daily data on exchange rates from 1705 and onwards. From 1740 and onwards, this series is, in principle, unbroken. Monthly data on exchange rates has been published for the twentieth century in *Sveriges riksbank – årsbok*. There are also daily exchange rates for the period 1908-1940.

In his doctoral dissertation, Håkan Lobell (2000) has produced a number of exchange rates for the period 1834-1880, among other places, London, Hamburg and Amsterdam. He has also compiled daily rates for certain periods.

There are international databases on the Internet, which should be of assistance to the project. *FXConverter - 164 Currency Converter* (<http://www.oanda.com/convert/classic>) has published daily exchange rates for 164 currencies from 1990 and onwards. *Pacific Exchange Rate Service* (<http://fx.sauder.ubc.ca>) and *Penn World Table* (http://pwt.econ.upenn.edu/php_site/pwt61_form.php) publish annual exchange rates for the second half of the twentieth century. *Economic History Services* (<http://www.eh.net>) and *Global Financial Data* (<http://www.globalfinancialdata.com>) publish historical exchange rates that go back to the middle ages. International data can be used to calculate “cross exchange rates” for the Swedish krona and its predecessor. However, this is not a wholly unproblematic procedure, since estimated exchange rates do not really coincide

with market exchange rates in Sweden, a discrepancy which tends to be greater the further back in time we go. If direct Swedish sources exist, these are therefore preferable.

Exchange rates from different sources are not really comparable with one another and need to be adjusted to obtain comparability over time. From 1993 and onwards, the Riksbank publishes spot reference rates for different currencies. Selling and buying rates exist for earlier periods but these only extend backwards to the 1960s. The exchange rates on bills are often not spot exchange rates in earlier periods and these would need to be recalculated to spot prices with the aid of interest rate series. The different exchange rates should to the greatest possible extent be linked to the Riksbank's spot reference rates for recent years.

Exchange rates for the earlier period can be obtained, inter alia, from Schwerin (1903), Wallroth (1918), Swenne (1933), Wolontis (1936), Bjurling (1945) and Jörberg (1972). It is also possible to obtain the metal weight of different coins from Wallroth (1918) and Tingström (1972). Wolontis (1936) and Tingström (1972) also present monthly data for certain coins during shorter periods (among other things, the exchange rate of the riksdaler specie for mark copper coin in the years 1640-1685).

Johan Söderberg has recalculated nominal exchange rates to silver prices from the middle ages until the nineteenth century, which has not yet been published. A recalculation of this type makes it possible to compare Swedish coin units and prices with international currencies and prices during this period.

An index is also to be compiled within the project of the historical position of the Swedish currency with regard to currencies of foreign countries based on weights from the foreign trade of the different countries with Sweden. Overall, this index shall include currencies from trading partners to Sweden so that at least 95 per cent of the value of Sweden's total exports and import value according to the foreign trade statistics is covered by the index. To make this possible, information is needed about the composition of exports and imports.

Prices

In *Historical Monetary Statistics for Norway 1819-2003* (2004) Ola H. Grytten presents a consumer price index for Norway all the way back to 1516 (annual fluctuations in this price index only extend back to 1666). Grytten has moreover made a comprehensive revision of previously published consumer price indexes for Norway, in particular for the

nineteenth century. However, is not evident in the chapter what kind of money is being used for the older periods (which was based on Danish coin denominations), and the result would be different if the index had, for instance, be based on silver prices.

The two most common price indexes to measure price inflation are the consumer price index (CPI) and the GDP deflator at market price (deflators are used to convert current values into fixed price values and are also a kind of price index). The GDP deflator is a broader price index based on calculations of deflators for household consumption expenditure (private consumption), public consumption, investments, exports and imports.

The consumer price index (CPI) should not be confused with the deflator constructed for household expenditure (private consumption). These two are namely based, as is usually the case, on two different methods (see ILO, et al, 2004: p.58). In the Norwegian project, it is also the consumer price index which Ola H. Grytten presents differently from the deflator for household expenditure which is included as a component in the calculation of the GDP deflator, which, however, Grytten does not discuss. The deflator for household consumption expenditure is to cover all private consumption registered in the national accounts. No such demands are made for calculations of the consumer price index but a narrower range of goods and services can be included, and it can, for instance, only be based on towns. The consumer price index often covers a smaller number of households (e.g. the wealthiest households are sometimes excluded). It often includes imputed values for rents for own use, while imputed expenditure for agricultural goods for own use is often excluded. However, these are included in the national account calculations of the deflator for household consumption expenditure. The indexation principle is often different. While the consumer price index uses quantity weights from earlier periods, weights for later periods are used in the national accounts (for instance, in the form of a Paasche price index to obtain a Laspeyre volume index). The difference between the index principles is usually quite small if both the consumer price index and the national accounts are based on chain indexation.

While a consumer price index only measures price changes (for instance, for a basket of commodities), a living cost index shall in theory measure a constant standard of living (i.e. the composition of the basket of commodities can change with changed preferences). By regularly, for instance, annually, replacing the volume weights in the consumer price

index, a “chain index”, the consumer price index can be made to approximate a cost of living index.⁴

The focus of the project should be to produce a consumer price index. This can be extended backwards to at least the thirteenth century. The indexation principles should as far as possible be adjusted to those applied by Statistics Sweden today.

Gunnar Myrdal’s (1933) estimated cost of living index extends back to 1830 and is still used by Statistics Sweden (see Statistics Sweden, 2005). However, Myrdal’s index must be regarded as somewhat dated. There are quite a number of supplements that can be made to this index based on new price data which have been produced by various researchers.

Myrdal’s cost of living index is an annual index. Statistics Sweden (2005a) also presents monthly data for the consumer price index from and including June 1954 and quarterly data from and including September 1917. The Riksbank also published a monthly consumer price index for the period 1931-1949. However, it is fully possible to construct an uninterrupted cohesive monthly consumer price index at least back to the eighteenth century, even if the quality deteriorates the further back in time we go. Various daily newspapers have regularly reported price data for different goods for different cities, for instance, *Stockholms stads priscourant* and *Post- och Inrikes tidningar*. Åmark (1915) presents monthly grain prices for a shorter period, 1740-1742. However, going through daily newspapers would probably be altogether large a task for the project, although it could be a spin-off of the project in the future. However, some monthly statistics have been compiled, in particular for grain. Data on grain prices on a monthly basis have been kept from Uppsala akademi, which were published in Astrid Hegardt’s (1975) dissertation on the period 1665-1703 and in Håkan Lindgren’s dissertation (1971) for the period 1720-1790 (the period 1704-1719 is a gap in this context). Monthly grain prices can be found in Åmark (1924) for the period 1880-1913, in the Tariff Committee (1882) for the period 1860-1879 and in the Tariff Committee (1865) for the period 1838-1862. Monthly food prices for Stockholm have been published from and including 1906 in *Statistisk månadsskrift* (City of Stockholm Statistical Office, 1906-1936).

There are different consumer price indexes for the eighteenth century, which have been presented in Jörberg (1972) and Åmark (1921). Johan Söderberg has constructed a cost

⁴ ILO, et al (2004), p. 1-12.

of living index for Stockholm for the period 1539-1719 (see Arne Jansson, Lennart Andersson Palm och Johan Söderberg, 1991 and Söderberg, 2002). Prices and wages for Stockholm and Western Sweden for the period 1500-1770 can be found in Jansson, Andersson Palm and Söderberg (1991). Oscar Bjurling (1945: p.264) presents annual market price scales (markegångstaxor) for rye, barley and oats in Malmö for the period 1658-1731. Göran Hansson (2006) has recently made an extensive compilation of prices in Östergötland during the period 1590-1735. Bo Franzén and Johan Söderberg (2006) have price data in silver all the way back to the end of the thirteenth century. Prices for the middle ages can also be found, inter alia, in Hildebrand (1983), Lönnroth (1940) and Dovring (1947).⁵ These series cannot be used directly, but it is important to make adjustments in order to maintain consistency over time.

A producer price index that excludes commodity-related taxes could also be constructed. To avoid this becoming too time-consuming, it could be based on calculations of GDP from the production side, which, have, among other places, been presented in Edvinsson (2005a). Jonas Ljungberg (1990) has published in his dissertation annual series of wholesale and producer prices at a more detailed level for the period 1885-1969.

There are more up-to-date price lists in Edvinsson 2005a for the whole period 1800-2000, which are congruent with the calculations of GDP by expenditure. This work contains price indexes for the whole of the economy and separate indexes for private consumption, public consumptions, investments, exports and imports. Since Edvinsson (2005a) is based on agricultural production being reported for the year of consumption and not the year of harvest, in accordance with previously published historical national accounts, the agricultural price will be shifted a year. A new price index should therefore be constructed which does not have this lag. This would moreover facilitate international comparisons.

It is conceivable to produce a broader price index for all market transactions, which also includes wages, property purchases, share trading, etc. This could facilitate

⁵ The book *Vad kostade det?* (Lagerqvist and Nathorst-Böös, 2002), which is more of a popular science presentation, contains price information all the way back to the twelfth century, although it does not specify exactly which year the information originates from nor the source used, which unfortunately reduces the value of the book for academic research.

production of data on the velocity of money, since a large part of money transactions take place outside what is included in consumption and GDP respectively.

It should also be determined which unit the price is to be measured in for older periods (when the exchange rate between different kinds of coins and means of payment fluctuated greatly), for instance, if silver is to be used as a standard and in this case, up to which year. Alternatively, it would be of interest to produce a price index for different kinds of coins, so that it was possible, for example, to find out how much one mark or one daler kopparmynt in a particular year corresponded to in today's monetary values.

Wages

Statistics Sweden has good data on wages for the period after 1950. For the previous period, there is information in Bagge (1933), Jungenfelt (1966) and Jörberg (1972), among others. Salary data can also be obtained in Edvinsson 2005a (by dividing the wage totals by the number of employees or the hours worked by the employees). The consumer price index can be used for deflation to obtain the development of real wages.

Money supply and closely-related aggregates

The money supply is used to measure the liquid funds that circulate in the economy. This is usually defined as the possessions of debt instruments of the money issuing sector by the money holding sector. However, it is not given what money supply is and different definitions of the money aggregate are used. M0 is the narrowest and only comprises the public's (the holding sector's) holdings of coin and banknotes (but excludes the issuing sector's reserves), and M1, M2 and M3 the broader measures which mainly include different bank deposits. However, the definition of M0, M1, M2 and M3, despite the same notations being used, can vary greatly from country to country and change over time for the same country. In IMF (2000), an attempt has been made for the first time to design an international standard. This is in turn an adaptation to the definitions applied in *System of National Accounts 1993* (Inter-Secretariat Working Group on National Accounts, 1993). The major change compared with national definitions is that the issuing sector has been expanded (in accordance with SNA 1993) to not only consist of banks but also financial institutions which provide loans and receive deposits, which are jointly called monetary finance institutions.

The monetary base is defined during the metal standard as the quantity of monetary metal, while during the paper standard, it is defined as the quantity of central bank money (Fregert and Jonung, 2003: p.229). In both cases, this concerns the holdings of the general public and the reserves of the issuing sector. The monetary base is not a monetary aggregate (measure of money supply) since it also includes the issuing sector's reserves (IMF, 2000: p.64). The credit multiplier is the ratio of the money supply to the monetary base and is used, among other things, as a measure of the effect an expansion of the monetary base has on the money supply.

In *Historical Monetary Statistics for Norway 1819-2003* (2004) Klovland presents annual data on the money supply from 1819 and onwards, and monthly data from 1850 (M0 and M2 from 1819 onwards and M1 from 1913 onwards, although no historical series for M3).

Sveriges Riksbank has produced monthly data for M0 and M3 back to 1961. From 2003 onwards, the Riksbank has commissioned Statistics Sweden to produce financial market statistics (Statistics Sweden, 2006a). Series of M0, M3 and M3+ were produced until December 2005. M0 consists of banknotes and coin in circulation excluding holdings by the bank sector, while M3 also includes bank deposits and bank certificates. M3+ also includes holdings of T-bills and allemansspar by the Swedish public. No official series of M1 and M2 have been produced before 2006.

From 2006 onwards (see Statistics Sweden, 2006a) the Riksbank is applying a new definition of different monetary aggregates. This is a component of harmonisation with the European Central Bank's definitions (ECB, *The ECB's definition of euro area monetary aggregates*), which has been produced for the euro area, which is in turn an adaptation to IMF (2000) and SNA 1993. Statistics are produced for M0, M1, M2 and M3, but no longer for M3+.

According to the new definition, M1 includes, besides M0, overnight loans and deposits in transaction accounts (from the Swedish public). M2 includes, as well as M1, deposits with an agreed term of up to two years and deposits with a period of notice of up to three months (from the Swedish public). M3 is defined as M2 plus interest-bearing securities with a term of up to two years issued by Swedish monetary financial institutions and which are held by the Swedish public. According to the old definition of M3 (although not according to the new), deposits with an agreed term of over two years and deposits with a period of notice of over three months are also included. M3, according to the new definition, includes money market fund shares, money market

instruments and other securities with a term of up to two years, which are not included in the old definition of M3.

While M0 does not differ markedly according to the new definition, M3, at the end of January 2006, was at a 12 per cent higher level according to the new definition compared with the old definition. There are also breaks in the time series for certain years for series published before 2006, which are not, however, as serious as the change of definition in 2006. Statistics Sweden will only calculate according to the new definitions from January 1998 onwards. However, to achieve comparability over time, Statistics Sweden will continue to produce M0 and M3 according to the old definition.

Jonung (1975) contains a compilation of the money supply, monetary base, etc. for the period 1723-1971. Ögren, (2003) contains a summary of different monetary variables for the period 1834-1913. Per Hortlund (2005) has constructed monthly series based on different money supply measures mainly for the period 1870-1915. Riksbanken (1931) contains figures, among other things, on the composition of note circulation between 1701 and 1924. Lindgren (1968) contains a compilation of the composition of banknote circulation from 1668 and onwards.

Lars Jonung (1975) uses a money supply measure which, besides banknotes, also includes deposits at commercial banks, although not deposits at, for instance, savings banks; among other reasons, this is because the commercial banks have been the central credit institution in Sweden and because monthly data on deposits to the commercial banks is available all the way back to January 1871.

Anders Ögren (2003) presents different measures of the money supply. He includes public holdings of the Riksbank's and private banks' banknotes in M1. One important complement to previous series (Jonung's among others) is that Ögren calculates the value of the Riksbank banknotes held as reserves by the commercial banks on the basis of new sources. Ögren includes deposits at commercial banks in M2, which is similar to Jonung's broader money supply measure, and deposits at savings banks in M3. However, he does not include coins in circulation in any of his measures of money supply, since direct data on this is lacking and Ögren assumes that the share of money supply accounted for by coin is very small.

One problem for the project is that both Jonung's and Ögren's broader money supply measure is not wholly compatible with modern definitions. Ögren's M3 measure is probably the measure that most closely approximates to the Riksbank's older M3 measure (which is presented from 1961 onwards). Deposits at commercial banks and

savings banks respectively can be both M2 and outside M2 according to Statistics Sweden's and the Riksbank's new definition. To extend the Riksbank's old series on M3 to the period prior to 1961, some complementary data collection needs to be done to extend the Riksbank's old M3 series to the period prior to 1961. However, the most recent definitions of M1, M2 and M3 respectively can probably not be applied to the period before 1998, among other reasons, partly because these also include financial institutions outside the bank sector.

One problem is the coin in circulation, which is difficult to estimate for earlier periods. In *Sveriges Riksbank – årsbok*, the series on the coin in circulation does not go further back than to 1939. However, it should be possible to calculate the coin in circulation by indirect methods. Wallroth (1918) contains detailed data on the minting of coins for the whole period 1449-1917. Bertel Tingström (1972) presents similar information for the period 1521-1972. The Perpetual Inventory Method (PIM) is used for calculations of capital stocks on the basis of investment series, assuming an annual depreciation and scrapping respectively. This method is indirect, since reliable direct data on capital stocks is lacking. If, for example, PIM is used (with the assumption of lower depreciation for the first 5-10 years), it would be possible to obtain series of coin in circulation. These will not be exact figures but not much worse than capital stocks for the modern period. The amount of small change will also be obtained then.

Göran Ahlström (1972) has, in a similar way, estimated the silver coin in circulation for the period 1776-1788 (even if he does not assume any depreciation and does not estimate how large a part of the silver coin which was in circulation and not held by the Riksbank). Isidor Flodström (1912) makes an estimate of the coin in circulation and coin metal for 1885, 1898 and 1908. Bertel Tingström (1984: s 94-97) has made certain calculations of the quantity of plate coins in circulation during the first half of the eighteenth century.

It should also be possible to make an estimate of banknotes in circulation issued by the Riksbank's predecessor Stockholm Banco. Stockholm Banco issued the first banknotes in a modern sense in Europe in 1661. Platzbarzdis (1960) contains some information about Stockholm Banco's note issue between 1661 and 1668.

Kenneth Jonsson (2002) has made preliminary assessments of the money supply during the middle ages based on the extent of minting. Annual minting during the 1360s corresponded to around 1.5 coins (of a type with 50 per cent silver) per person. He draws the conclusion that there were large quantities of coin in circulation and that, at least in

the towns, most transactions could take place in coin. He also shows that the quantity of silver increased sevenfold between the two periods 1196-1250 and 1340-1354. Since the population did not increase by more than 50 per cent, and since GDP per capita was largely stagnant, this means that the ratio of money supply to GDP increased sharply (a clear indication of the monetarisation of the economy).

The definition of the money supply becomes particularly problematic when it is wished to construct money supply series for several hundred years. For example, no banking system existed in the middle ages and we do not have to take into consideration bank deposits as a component of the money supply. None the less, Bo Franzén (1998) in his doctoral dissertation finds that a surprisingly high proportion of credit transactions took place during the late middle ages. There were then other institutions that could guarantee that payment of credit actually took place.

Calculations of the money supply are also related to calculations of national wealth, since the money supply was part of financial assets and liabilities respectively.

The velocity of money measures how often money is used in economic transactions, and can be written as $V=PT/M$, where P is the price level, T the volume value of all economic transactions and M the money supply. PT will then be the nominal value of all economic transactions. Since T is very difficult to estimate, it is more common to replace T by Y instead, the volume value of gross domestic product (P then becomes the GDP deflator and PY the nominal value of GDP). $V=PY/M$ is called the income velocity of money (Fregert and Jonung, 2003: p.237). Different measures of M can, of course, also be used. The quantity of banknotes and coin in circulation (M0) in relation to GDP is usually used as an indicator of the use of cash (Sveriges Riksbank, 2005: p.73). In order to obtain the speed of income circulation, historical series of GDP are needed, which is an important argument for GDP also being included in the project.

If the relation between the nominal value of the economic transactions and GDP is constant, the income velocity of money, PY/M , will also be a good indicator of the velocity of money as PT/M . However, in the long term, large structural changes take place in the economy.⁶ In earlier periods, only a minor part of economic activity was for

⁶ In *Historical Monetary Statistics for Norway 1819-2003* (2004) Øyvind Eitrheim, Karsten Gerdrup and Jan T. Klovland consider that the (income) velocity of money in Norway fell sharply between 1830 and the early 1920s. This decline came at the same time as a sharp rise in the number of banks. However, after the Second World War, the velocity of money has been relatively constant. The decline in the velocity of

the market. A large part of earlier trade was furthermore barter. There are also transactions outside the market and it can be somewhat unclear what is to be included in T. The total value of all transactions is today a lot higher than GDP, not least if trade with currencies, shares and properties is included.⁷ However, it would be interesting to try to estimate the ratio between the total transaction value (however it is measured) and GDP, a ratio which, in all probability, has increased greatly over time.

The bank sector

In the Norwegian project, a chapter concerns the development of the bank and credit sector. Among other things, data is presented on the number of private banks, the distribution of lending to different financial institutions, etc.

In Sweden's case, Per Hortlund (2005) uses aggregated balance sheet data for the whole commercial banking sector from 1870 to 2000 as a basis. Riksbanken (1931) contains information, inter alia, on the bank's assets and liabilities between 1693-1924 and the position, assets and number of private banks. The Riksbank has published similar material in *Årsbok - Sveriges Riksbank* for the period after 1924.

Some bank statistics prior to 1950 – among others, on the Postal Savings Bank, mortgage institutions, and private savings banks – have been compiled in *Historisk statistik för Sverige: Statistiska översiktstabeller utöver i del I och del II publicerade t.o.m. år 1950* (Statistics Sweden, 1960). Extensive material on banks can be found in *Post- och inrikes tidningar, Sammandrag af enskilda bankernas kvartalsuppgifter* (1867-1912) and *Uppgifter om bankerna samt uppgifter om fondkommissionärer och fondbörs*, Bankinspektionen (1912-68), including on private banks. In his doctoral dissertation, Per Hortlund (2005) has used this material to analyse the historical development of the financial sector.

In his dissertation, Sven Fritz (1967) has studied the Swedish banking sector during the period 1772-1789. Besides the Riksbank and the Jernkontoret, Fritz studies the

money could, according to the authors, be explained by a monetarisation of the economy during the period in question. However, if PY/M fell sharply, PT/M may still have been relatively constant, if the ratio between the total value of all monetary transactions and GDP increased sharply. The latter is also what the authors seem to consider happened.

⁷ Compare, for instance, the GDP estimate in Statistics Sweden (2005c) with different estimates of transaction values in Sveriges riksbank (2005).

Manufacturers' Discounting Fund (Manufakturdiskontfonden) which included four new companies, which was a new phenomenon. Among other things, Fritz presents lending, deposit and loan interest rates and balance sheets.

Olle Krantz (1991) has compiled various bank data. For instance, Krantz estimates the bank sector's gross production and added value during the period 1800-1950.

I have myself annual data (which has not yet been published) on the number of employees in the bank financial and insurance sector for the whole period 1850-2000.

There is also a project led by Mats Larsson which aims to establish a database of bank statistics. This is part of a larger international collaboration.

Total national saving can be calculated as investments plus the current account balance. This assumes series of these variables, which can be obtained at least back to the eighteenth century (see, for instance, Edvinsson, 2005a and 2005b, and Ohlsson, 1969).

Central government loans

Fregert and Gustafsson (2005) have made an extensive compilation of central government debt, central government loans and central government finances for the whole period 1719-2003. This is partly based on the work carried out in Åmark (1961). The Riksbank's lending to the state is published, inter alia, in Sveriges Riksbank (1931).

Stock exchange prices and interest rates

In *Historical Monetary Statistics for Norway* (2004), Klovland presents monthly figures for interest rates back to the beginning of the 1820s. He also deflates the nominal interest rates by the consumer price index to analyse the development of the real interest rate over time. Klovland shows that the real interest rate on bonds has been at rather different levels during different periods. A lot indicates that the past two decades have many similarities with the period before the First World War in this respect. According to Klovland, this analysis shows that a study of the capital markets can be enriched by a longer historical perspective. In another chapter, Klovland presents a stock exchange index for the period 1914-2003. However, he does not present any new empirical material, but draws the conclusion that it is fully possible to design a stock exchange index for Norway extending as far back as the 1870s.

Various stock exchange indexes exist in different places for the twentieth century. Per Frennberg and Björn Hansson (1992) have published a monthly return index based on

Affärsvärlden's General Index, which includes dividends for the period 1919-1989. Daniel Waldenström (2003) has used these series complemented by Kommerskollegium's (Swedish Board of Trade) share index back to 1906. Waldenström also has a new database with weekly data from the Stockholm Stock Exchange and supplementary company information during the period 1901–1920. Moreover he has localised data from even earlier periods. The challenge is to link together these series to create greater consistency. Certain international weaknesses remain, however, such as the fact that before 1901 there was not really a stock exchange list but trade consisted mostly of auctions once a month or after 1895 once a week, where supply varied greatly. It is hardly worthwhile going back before the 1860s since Sweden only had a few dozen limited companies at this time, most of which were owned by a few persons.

Urban Bäckström (2004: p.45) mentions a stock exchange index constructed by Gabriel Oxenstierna (2002) which goes back to the 1870s, but this latter source has not been registered in LIBRIS.

Different industry indexes have also been constructed. There is, for example, an index of the development of the property sector in Grafund, A., (2001) for the period 1939-1998.

Profit rates according to corporate statistics are available at least for industrial companies as far back as to 1951 (Statistics Sweden, 1953-1966 and 1968-1997). Profit rates according to the national accounts exist for the entire period 1850-2000 in Edvinsson (2005a).

Return calculations should also take into consideration that companies can become bankrupt or be liquidated. Karl Gratzner has historical data over the number of bankruptcies, for Stockholm as far back as the beginning of the eighteenth century.

Sveriges riksbank (1931) contains information on various interest rates for the period 1668-1924, although only for some individual years for earlier periods. Interest rates for the seventeenth and eighteenth centuries can also be found in Hildebrand (1915).

Olle Krantz (1991) presents the commercial banks' interest rates on deposits and loans for the period 1857-1950. Prior to 1857, the setting of interest rates was not free, and a statutory maximum interest rate was applied.

The construction of different price indexes (primarily GDP deflators and consumer price indexes) also provide information about real interest rate levels and the real yield on the stock exchange return. It might also be possible to calculate different real interest rate levels and real yield levels based on different price indexes.

Uniform long series of bond yields exist for the major part of the twentieth century for Swedish perpetual central government loans (issued in 1888 och 1934). Loans with different maturities and thus information about the yield curve at different times are less easily available, however. These must be calculated with the aid of stock exchange data. Waldenström has certain data for this during the 1930s and 1940s.

Karl Åmark (1961: p.598-660) presents various interest rates on central government loans for the period 1719-1809.

Interest rates can also be found for the period prior to 1668. Bo Franzén (1998) reconstructs, for instance, interest rates in the Town Council notes of Arboga (Arboga stads tänkebok) for the period 1455-1515.

Housing and real estate prices

Housing and real estate prices shall also be included in a later phase of the project.

In the Norwegian project, housing prices have been obtained for four towns for the period 1819 and onwards. Øyvind Eitrheim and Solveig K. Erlandsen write in *Historical Monetary Statistics for Norway 1819-2003* (2004) that it is rare internationally with series that go so far back in time. Their material is based on an extensive empirical compilation, consisting of more than 21,000 sales. The index is still not national but only a weighted average for four towns.

Designing a price index for housing is complicated not least by the qualitative change being very difficult to measure. A price index shall preferably be based on constant qualities (which various hedonic price indexes attempt to take into consideration). Eitrheim and Erlandsen's series is based on comparing the price in sales of the same property, but at different times, (a "repeat sales house price index"). This is one of keeping quality constant. However, there are a number of problems with this method. All sales are given the same weight while a price index should give greater weight to a more expensive property. The quality of the same property changes over time as well. Qualitative changes take place, which increases its value (urban growth also means that a property located in a small town becomes located in a larger town, which can be regarded as an increase in quality, while a price index which assumes constant quality should keep the town's population constant). And also the property gets older, which reduces its

value.⁸ Eitrheim and Erlandsen hope that one effect cancels out the other. However, the latter assumption could be called into question, and it would possibly have been more appropriate to focus on some benchmarks for a more in-depth analysis of the change in quality for properties sold during the period. However, there is no simple solution to the problem.

No systematic study of the longer historical development of housing or real estate prices has been made for Sweden. Statistics Sweden's price index which is published on their website on different types of property extends back to 1975 (Statistics Sweden, *Statistikdatabasen*). Information on property prices for detached houses and apartment blocks has, however, been processed since 1952, and since 1932 for agriculture (Statistics Sweden, 2006b: p.144).

Statistics Sweden (2005b) uses different methods to calculate the price development of properties. There is no international standard in this field.

In the first place, Statistics Sweden's information is based on the Real Estate Price Index (FASTPI), which is calculated with the aid of the composition of the property stock and price information for properties sold, where the primary material is land registration statistics.

Another method which Statistics Sweden uses is based on calculations of the purchase price coefficient, which is calculated as the ratio of the purchase-price (i.e. the market price of the property) to the assessed value. This is a measure of how much prices have increased in relation to the level when real estate assessment took place. This index also reflects more the whole property stock unlike the Real Estate Price Index (FASTPI) which reflects the price trend for properties which have been sold. General real estate assessment, where the tax assessment is adjusted, takes place at intervals of some years. The latter method is probably the most suitable for constructing historical series.

Neither of the two methods used by Statistics Sweden correct for the effect of the property becoming older, which in this case could mean that the price index presented underestimates the annual change in price.

In his doctoral dissertation, Bo Sandelin (1977) has used Statistics Sweden's earlier material as a basis for calculating the annual development of real estate prices during the period 1952-56 and 1957-1974 respectively. He has then used the purchase coefficients

⁸ See, for instance, Englund, Quigley and Redfearn (1999) for a broader discussion of different models for construction of a real estate price index.

published by Statistics Sweden. He used the excess price percentage value (överprisprocenten) for the period 1952-56, which states how much the selling price exceeds the tax assessment value, which can be converted into a purchase price coefficient. Before 1952, information on the excess price percentage value only exists for agricultural properties. Since, according to Sandelin, there is no usable information about the increases in tax assessment value in 1957, it is not possible to construct a price index which runs without interruption from 1952 and on. Since calculations based on the purchase price coefficient do not take into consideration that the property in question becomes older, and otherwise changes qualitatively, Sandelin makes certain adjustments to take such effects into consideration. Sandelin's data, together with additional information on the price trend for 1956-57 and 1974-75 respectively, could be used to obtain an annual price index of real estates for the whole period from 1952.

For the period before 1952, it can be problematic to obtain good figures for the annual price development for properties. *Generalsammandrag öfver ... års bevillning* (1817-1922), *Skattetaxeringarna*, Statistics Sweden (1923-1944), *Skattetaxeringarna samt inkomstfördelningen inom yrkesgrupper*, Statistics Sweden (1945-1949), *Skattetaxeringarna samt fördelningen av inkomst och förmögenhet*, Statistics Sweden (1950-67) and *Taxeringsutfallet*, Statistics Sweden (1969-88) contain tax assessment values for agricultural properties and other property, including the land value, the value of the building and machinery value. Special studies of particular years, for example Kungl. Statistiska centralbyrån (1917), can be of interest to examine. Given information on the real building stock, which is contained in Edvinsson (2005a) for 1800-2000, it should be possible with this information to at least obtain the long-term trend for the development of property prices. However, tax assessments do not provide a wholly correct picture of the annual fluctuations and supplementary sources could be used here to obtain purchase price coefficients, although this may prove to require too much work within the frameworks of the current project. It could therefore be a spin-off from the project.

Rolf Adamson (1966) has estimated farm prices during the first half of the 1830s. One of his conclusions is that the ratio between the sales price and the tax assessment value could change a lot. Sture Martinius (1970) has made estimates of the price of agricultural properties for the period 1831-1892.

It would also be possible to obtain information about the long-term development of property prices before the nineteenth century, at least for agricultural properties. In his

dissertation, Lars Herlitz (1974) presents annual figures for land prices during the period 1720-1779 for a number of districts in the county of Skaraborg, and shows that land prices rose a lot more than grain prices during this period. Brännman (1950) contains information on purchases by the nobility of the land of the Crown in Swedish counties during the period 1622-1632. Bo Franzén has produced some data on land prices during the middle ages. Land prices during the middle ages are also discussed in Lönnroth (1940) and Dovring (1947).

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