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Swedish National Wealth Database (SNWD): Appendix*

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Contents:

Appendix A Introduction and overview of previous investigations

A1. Introduction

The Swedish National Wealth Database (SNWD) contains aggregate balance sheets for Sweden as a nation and different societal sectors during the period 1810–2010. Definitions of all variables in the database follow the U.N.'s System of National Accounts, SNA 2008 (United Nations, 2009) and to a large extent also Eurostat's European System of Accounts ESA 2010 (Eurostat, 2013).[1] The overall analytical and definitional framework is adopted from the study of Piketty and Zucman (2014), see also their appendix in Piketty and Zucman (2013). This appendix document contains an introduction to the database. It discusses methods, sources and problems and it also makes a number of comparisons with previous investigations. For analyses of the SNWD series and further discussions about its strengths and weaknesses, see Waldenström (2015a, 2015b).

Balance sheets consist of two sides, one showing assets and the other showing liabilities and net worth. The asset side consists of two main categories: *non-financial assets* (or real assets) and *financial assets*. The non-financial assets, in turn, are generally divided into produced assets, which are outputs from a production process (e.g., dwellings, constructions, roads), and non-produced assets that appear naturally (mainly gardens, farmland, parks and forestry). Financial assets, and *financial liabilities*, are claims, held and issued, that are payable in everything from the (sometimes very) short-run (e.g., currency, deposits) and longer-run (stocks, bonds). *Net wealth*, finally, or net worth, is the balancing item of a balance sheet. It is defined as the difference between assets and (non-equity) liabilities. For the national economy, the net wealth is thus equal to the national wealth of the economy.[2]

There are different sectors in the economy and they are all represented in the SNWD. Private sector wealth is estimated yearly since 1810 and contains of households (including non-profit institutions serving households, NPISH) and corporations. The calculation of corporate net wealth is not based on a full balance sheet account of the corporate sector, but instead measured as the total value of household-owned equity of non-financial and financial corporations. Although this i principle captures all of corporate net wealth in market values, there can be a deviation of this value from the corporate net assets defined as the difference between corporate assets and corporate non-equity liabilities. To the extent that there are deviations this "residual" corporate wealth component is then simply reflecting the difference between firms' market value and the replacement value of their firm net assets, i.e., Tobin's Q.[3] Public sector wealth consists in Sweden of the sum of net assets of the central government (the state) and the local governments (counties and municipalities). Like in the case of private wealth, public wealth is computed from official statements of balance sheets, tax-assessed values of public land holdings, the value of outstanding public debt etc.

[1] There are some discrepancies between SNA 2008 and ESA 2010, as well as differences in how countries implement these systems in their own practices. An important new feature in ESA 2010 is that costs for research and development (R&D) are redefined from running expenses (i.e., consumption) to investments, which implies that R&D is to be included in the capital stock. In this paper, however, I follow the practice of Piketty and Zucman (2014) for comparative purposes and do not treat R&D as investment but instead as expenses, thus following the older routine in ENS 1995 (the Swedish version of ESA 1995).

[2] For corporations, however, one can also use the concept "own funds", which measures the sum of net wealth and equity and investment fund shares as liabilities (ESA 2013, paragraph 7.07).

[3] While this assumption is not always true in reality, but as shown empirically below for the only period for which we can actually compute this variant of Q for Sweden (1980–2010) it appears to be roughly in accordance with the actual evidence.

There are numerous well-known problems associated with the construction of household balance sheets over long time periods. In the extensive cross-country surveys of historical national balance sheets, Goldsmith (1985, 1987) and Piketty and Zucman (2014 and its appendices) point out several pressing measurement problems. One of the biggest difficulties is the valuation of assets (and sometimes liabilities). Throughout the guidelines of SNA and ESA are followed which stipulate that assets should always be market-valued, at current market price levels. Since many of the non-financial assets are only recorded in tax-assessed values, which typically – but not always – differ from market values (sometimes explicitly stipulated in tax legislation), considerable efforts are spent on converting tax-assessed values to market-values by creating market-to-tax value ratios.

Another challenge concerns the sectoral decomposition. In brief, today's sectors (public, non-financial and financial corporate, households including nonprofit institutions serving households) have not always formed the basis for how statistical evidence are presented. Some sources, e.g., banking statistics and property tax sources, often lump together households and firms into one joint, private, category. Drawing on different objective and subjective pieces if of evidence about the shares of household and firm assets or liabilities, a homogenous household sector has been created for all series. These and several other problems are discussed and adjustments proposed for each asset class and time period in the appendices below.

A2. Previous investigations of Swedish national balance sheets

There are a number of previous works to characterize the size and structure of Swedish household wealth. These investigations cover shorter periods and in some cases even single years, but they are yet crucial inputs to the reconstruction of the long-run series presented in this study.

During the first half of the 19th century, there were two separate national wealth investigations made for Sweden. The first, and earliest known, one was that in 1800 which was based on data from a comprehensive wealth tax assessment in Sweden and Finland. According to a retrospective treatment of these in Fahlbeck (1890, p. 88), the total taxable wealth in 1800 was about 800 million SEK in current prices (or 200 million *riksdaler specie*, the monetary unit used at the time). Adding non-taxable wealth, such as inventories and livestock, the Swedish national wealth in 1800 was acclaimed to be well above one billion SEK.[4] For the years around 1810, there was a second estimate done by Hyckert (1815, pp. 28ff). This estimate was yet another relatively rough and sketchy calculation, combining tax sources and capitalized flows. Its estimated gross national wealth was 2,218.6 million SEK (or 1,479,117 *riksdaler banco*), but Fahlbeck (1890, p. 88) criticizes this number for being both badly documented and for not sufficiently accounting for liabilities of the various sectors.

A second wave of national wealth investigations appeared in the end of the 19th century. These estimates were updated, relying on more "modern" templates for constructing wealth totals using sectoral decompositions and a richer balance sheet structure. Karl Daniel Bollfras made two surveys, one for the year 1875 (Bollfras, 1878) and another one for 1880 (Svensk Trävarutidning 1885). A third estimate was made for 1885 by Pontus Fahlbeck (Fahlbeck

[4] Soltow (1985) examines the 1800 wealth census in a study of personal wealth distribution, but only includes a sample of households and therefore lands at smaller aggregate values.

1890) and a fourth one, essentially updating his previous numbers, was made for 1898 by Fahlbeck (1901, pp. 453ff). These were all systematic and ambitious investigations of the total stock of wealth. Several asset classes were included, e.g., forestry, financial assets, inventories, infrastructure and communication equipment. Private and public—mainly foreign—debt was also assessed for the first time. Unfortunately for our purposes, no decomposition was made between public and private sectors and, of course, not for households.

The arguably most comprehensive investigation of Sweden's national wealth before the 1980s is Isidor Flodström's large-scale inquiry of the national wealth in year 1908 (Flodström 1912). In this extensive and detailed work, Flodström collected information about the whole population of private firms, associations, and public bodies. The household wealth is mainly reaped in a smaller survey of estates, which was adjusted to reflect the wealth of the living using mortality multipliers. Despite this breadth of data, Flodström's investigation suffers from a few beauty spots from our point of view. In particular, the sectoral decomposition is not identical with today's system; most importantly, Flodström reported households and firms in one and the same category. Another problem is that no detailed balance sheets are reported for households, but instead that their wealth is reported only as the net marketable wealth (at death).

A follow-up on Flodström's study was made for 1952 by Englund (1956). This study was not very ambitious, however, and its numbers did not undergo the same level of scrutiny as earlier and latter investigations. In the 1970s, Roland Spånt published an ambitious study of the evolution of the Swedish household wealth distribution since 1920 (Spånt 1979). The basis of Spånt's analysis was information about household assets and debts from the Swedish Censuses of 1935, 1945 and 1951. Complementary data was collected from smaller surveys made in 1958 (a savings survey), 1966 (public estate and wealth tax return surveys), 1970 (a public household budget survey) and 1975 (a wealth tax return survey). Among Spånt's most important contributions is that he for each these data points provides detailed compositional evidence of the household wealth. Furthermore, he reports assets in both tax-assessed and (approximate) market values.

Another important contribution is Lennart Berg's estimations of annual household balance sheets made for the period 1950 onwards (Berg 1983, 1988, 2000 and later updates). The basis for Berg's pre-1970 series is Spånt's investigation, but he extends these data in a number of important ways not only by constructing annual estimates but also by adding estimates of the stock of consumer durables and pension assets. Berg's post-1970 data are based on the financial information in the Financial Accounts (of Statistics Sweden). Information on real assets is retrieved from other official data series at Statistics Sweden. The consumer durable series are constructed using annual consumption data and the perpetual inventory method. While these data are to a large extent the state of the art they suffer from the deficiencies of the material underlying Spånt's analysis.

In an attempt to reconcile the financial assets and liabilities of all sectors in society, Werin (1993) collected a unique database spanning the period 1945–1990. The series are basically an extended version of the financial accounts. While the project is impressive in its scope, there is no documentation for much of the pre-1970 part of the series, which make them problematic for subsequent use. Furthermore, the project disregarded—deliberately—the real assets on the balance sheet.

In the late 1980s and early 1990s, Statistics Sweden constructed an official series of national

wealth statistics in Sweden (Tengblad 1992; Statistics Sweden 1995). The ambition was to generate a set of stocks for the entire economy, and the result was annual estimates over the period 1980–1994, to date the only available official national wealth series made for Sweden. These stocks represent invaluable benchmarks for the series reported in the current study.

The most recent contributions to the analysis of Swedish household assets and liabilities are the studies of Bergman, Djerf and Lindström (2010) and Bergman (2015), Waldenström (2015) which uses the SNWD, and also by and Lindmark and Andersson (2014). In Bergman et al. (2010), a comprehensive examination of the evolution of household balance sheets between 1970 and 2008 is presented. The point of departure is the Financial Accounts of Statistics Sweden which covers balances and transactions of all financial assets and debts of all sectors. Then the authors add estimated stocks of non-financial assets based on the national wealth project (Statistics Sweden 1995) and additions thereof for both earlier and subsequent years using housing price developments. Bergman (2015) extends these data and discusses the financial approach to national accounts, where the corporate sector is incorporated into the other sectors of society with no net worth of its own. Lindmark and Andersson (2014) investigate series from tax assessments, fire insurance compilations and some other sources to discuss a number of issues in measuring the size of the capital stock.

In addition to the studies of aggregate wealth, the creation of the SNWD has benefited tremendously from the previous literature on historical national accounts on Sweden and other Nordic countries.[5] Among the important contributions for Sweden, one important project is the one started in the 1970s and 1980s by, among others, Lennart Schön and Olle Krantz. Their work has generated several versions of historical series on income and production, both for economy as a whole and for its sectors, and summaries are available in Krantz and Schön (2007) and Schön and Krantz (2012, 2015). Another important piece of work on the Swedish historical national accounts is also that of Edvinsson (2005, 2014). Edvinsson series comprise the primary source of the national income series used in the SNWD it contains historical series on GDP by expenditure, which is the main GDP concept used by Piketty and Zucman (2014) and today also by Statistics Sweden.[6]

A3. A brief overview of the balance sheets in the SNWD

Household wealth represents the central part of the SNWD construction of private wealth and will receive the most detailed treatment in this appendix. Sections B, C and D cover household assets and liabilities. Household non-financial assets mostly consist of dwellings, gardens, farmland and forestry. They are generally adjusted stocks from tax assessments and not generated by accumulating past investments through the perpetual inventory method. A challenge in this historical investigation has been to retain the division between produced and non-produced assets throughout the studied time period. The prime reason is that the central source, tax assessments, has not always reported separate values for produced (dwellings, other buildings, livestock) and non-produced (land, farmland, forestry) assets of the household sector.

[5] For work on other Nordic countries, see, e.g., Hansen (1974), Hjerppe (1996), Hodne and Grytten (2000), Johansen (1986), Jonsson (1999), Grytten (2004) and, for an overview, Christensen et al. (1995).

[6] Waldenström (2015, section F) examines the Swedish wealth-income ratio changes if one switches national income series coming from the different sources. The results suggest overall small effects, but since the recent upgradings of both historical (e.g., adding home production) and current GDP have raised GDP, the main wealth-income ratio is somewhat lower than the ones where other national income series are used.

Financial assets and liabilities are claims, held and issued, that are payable in everything from the (sometimes very) short-run (e.g., currency, deposits) and longer-run (stocks, bonds). Liabilities include mortgage debt, consumer debt and all other household debt. Detailed descriptions of how these items are calculated are provided below. Note that the balance sheet is unconsolidated, which means that financial assets and matching liabilities are not netted out within sectors by, e.g., cancelling out all informal lending of households to other households. Instead the assets held by households are matched by liabilities of other households as well as of other sectors (corporations, public agencies or foreigners).

Memorandum categories contain items that are not part of the standard balance sheet definitions but still relevant to consider. The stock of *consumer durables* is one such memorandum category in the SNWD. It is not part of households' fixed assets according to the standard accounting framework of the system of national accounts. The reason is that all consumed goods are assumed to be consumed away within one year, and consumption is therefore not part of the production process and thus cannot result in fixed asset formation. However, many durables arguable last more than one year, e.g., cars, boats or electronic equipment, and for this reason some countries (e.g., the United States) do include durable consumer goods in household balance sheets. Historically, consumption goods like china, furniture, and even clothing were important parts of household inventories and were inherited along with other assets. I estimate the stock of durable consumer goods using flow data on consumption and the perpetual inventory method, assuming an annual depreciation rate of 15 percent, to calculate annual stocks (see further the discussion on the construction of the stock of consumer durables in Appendix A).

Furthermore, condominiums are moved from the financial asset side to the housing stock on the non-financial asset side. The motivation is that condominiums are essentially housing assets, even if they legally are (financial) ownership shares in the condominium association (see further the discussion in Appendix A).

Unfunded pension assets are another memorandum category in the system of national accounts. The SNWD presents series of different kinds of pension wealth, differing by being either *defined contribution,* i.e., part of the funded pension insurance system, or *defined benefit*, i.e., part of the unfunded system. While the funded pensions are included in standard wealth concepts the latter is not. These pensions also differ depending on if they are run privately, such as part of employer-run occupational pensions but also in the form of employee- or labor union-run thrifts, or if they belong to the public sector's pension system.

Illicitly moved wealth to offshore jurisdictions, typically tax havens, is another memorandum category in the SNWD. The estimates of the size of this kind of private wealth are highly uncertain and they seem to vary considerably both over time and across estimation methodologies. But judging from some recent estimates the total value of offshore wealth may be considerable, ranging from one seventh to one twentieth of all household financial assets.

Appendix B Household sector: Non-financial assets

Non-financial assets constitute a core component in households' balance sheets. The System of National Accounts (SNA) divides them into two major categories: *Produced assets*, which are outputs from a production process such as buildings and inventories, and *Non-produced assets*, which are assets that appear naturally such as gardens, farmland and forestry. Durable consumption goods are not included the household balance sheet, following the recommendations of the SNA. The reason is that these durables emanate from consumption and are therefore by construction assumed to depreciate away within one year, which does not allow for the formation of a stock.[7] However, it is well-known that some consumption goods do last for considerably longer than one year, e.g., cars or boats, and SNA has therefore put consumption durables in a memorandum category attached to the main balance sheet. In this study, the stock of consumer durables is also estimated for Swedish households over the entire period, but reported separately (see further below).

The main source used to estimate the Swedish stock of non-financial assets is the property tax assessments. These assessments are reported annually by the Swedish tax authorities since 1813.[8] This means that our non-financial asset series are based on assessed running stock values instead of estimated stocks based on the perpetual inventory method (PIM). In short, PIM uses investments that are accumulated over time to generate a stock value accounting from an assumed certain rate (or sometimes several rates) of depreciation. Whether to use stocks from the tax assessments or PIM-generated stocks based on investment flows and assumed depreciation rates is an open question that researchers and statisticians have discussed for a long time. In their recapitulation of the main pros and cons with the respective methods, Piketty and Zucman (2014) point out that although no approach is without flaws the problems with PIM tend to be more difficult to handle than the problems with assessed stocks. For this reason, they recommend using stocks over PIM estimates. Note that the official national wealth estimates of Statistics Sweden made for the period 1980–1994 (Statistics Sweden, 1995) is based on PIM estimates and below I discuss the instances where those series differ from the ones presented in this study.

There are several adjustments of the raw tax assessment data needed to make it useful as basis for calculating stock values of non-financial assets. Below is a brief listing of them, but they are all reported and discussed in further detail in the following sections.

Adjustment 1: Division between produced and non-produced assets. The sources for property tax assessments did for long not divide assets into produced and non-produced assets. Instead the assessments did separate agricultural from non-agricultural real estate, both of which contained both produced assets (e.g., buildings, livestock) and non-produced assets (e.g., farmland, forestry). From the 1920s, the value of buildings was started to be reported separately and similar estimates are available in some of the earlier individual national wealth estimates. Using this evidence, a subdivision between produced and non-produced assets is presented for the whole period.

[7] Described in corporate terms, the consumption of durables is regarded as a running expense and not as an investment which accumulates to a stock. However, the SNA has placed the stock of consumer durables as a memorandum item on household balance sheets.

[8] The tax assessments were called *bevillning* during the 19th and early 20th centuries and *fastighetstaxeringarna* thereafter. See further details on the property assessments below under the subsection describing produced non-financial assets.

Adjustment 2: Converting tax values to market values. All assets in this study are reported in current market values. The main strategy to convert the Swedish tax-assessed property values to current market values is to use sales price ratios ("köpeskillingskoefficienter") defined as sales price of an estate divided by its tax-assessed value. A sales price ratio of 1.25 thus expresses that the property's market value is 25 percent higher than its reported tax value. Throughout, sales price ratios are used for this conversion, and the sources for these ratios are both the official statistics and different studies using historical evidence. In some cases, particularly following very share tax reassessments, this adjustment is not very smooth as the sales price ratios are based on sales of a subset of the assessed property. As a consequence, there are some instances of sudden jumps in the market values of assets which are entirely an artefact of the mismatch between changes in sales price ratios and reassessed property values.

A problematic part of the conversion of tax values to market values is also related to the fact that the reported annual tax values in between tax assessments are not fully representative. Swedish general property tax assessments were typically made every fifth-eight year with smaller special assessments sometimes made with higher frequency. Most of the times, however, tax values were often left unchanged in the years between general assessments regardless of the underlying value developments. In the postwar era, annual sales price ratios are supposed to account for most this annual variation (as changing sales price ratios reflect changing market values if tax values are constant). For earlier years, however, annual values are typically interpolated linearly in between the assessments. For produced and non-produced agrarian assets between 1820 and 1860, however, reported tax values arguably deviate more from plausible levels and additional adjustments were made.

Adjustment 3: Separation between household and non-household private sectors. As discussed in the main text, the focus of this paper lies on the private sector wealth as reflected in the household sector balance sheet. Assets and liabilities of households incorporate the privately and domestically owned net worth of the corporate sector through the market value of shares in incorporated and unincorporated firms. Therefore assets and liabilities held by corporations are excluded from the stocks reported in the sources used. Most important is this separation in the cases of non-agricultural fixed produced and non-produced assets (i.e., excluding commercial real estate).

Adjustment 4: Currency adjustments. Before the installment of the Swedish krona (SEK) in 1873, there were several different currencies circulating in Sweden, and even the official statistics was not uniform in terms of reporting in one of these currencies, less so over time. All numbers in the final database are in current million SEK, and exchange rates between the precursor currencies riksdaler riksgälds, riksdaler specie, riksdaler banco and riksdaler riksmynt are taken from Edvinsson (2010).

Data quality varies considerably over time. In general, data from the earlier periods, especially before the 1860s, data become increasingly uncertain. Tax assessments were reorganized and modernized in the early 1860s and contemporary writers state that the comparability of statistics before and after that change is quite low (Fahlbeck, 1890, p. 94). One main reason is the fact that information on tax returns was controlled and collected by local authorities, and the literature indicates that there was local variation in both how assets were valued and in the routines for collection and reporting values. I have tried to meet these differences in various ways, constantly strived to homogenize all series with respect to get market-valued household-owned assets that harmonize with today's reporting standards.

Figure B1 shows the structure of non-financial assets, dividing them into agricultural assets and housing, both of which include land and buildings. Agricultural assets were totally dominant until the late 19th century and still represented half of all non-financial assets in 1930 when the growth of private housing became too large and housing become the dominant household non-financial asset in household portfolios. The fact that agrarian assets remained in such dominance decades into the 20th century underscores the image of Sweden as a late-industrializing Western economy.

[Figure B1 about here]

Table B1 collects the estimated shares and sales price ratios of the various assets in the category of produced assets owned by Swedish households. The table presents decennial averages in order to be more easily accessible.

[Table B1 about here]

B1. Produced non-financial assets

B1.1 Fixed produced assets

Tangible fixed produced assets represent the main part of produced assets. It includes *buildings and constructions* which are divided into i) agricultural assets, ii) machinery and equipment and iii) non-agricultural assets and. The first category is the by far most important, especially concerning the role of dwellings. Machinery is of little relevance for the household sector, included primarily in the form of machinery in the agrarian sector.

Property tax assessments are the main source used for estimating the stock of produced non-financial assets. General Assessments were made with some years in between, typically every sixth to eight year, with less comprehensive Special Assessments being made annually in the years in between. Assessed values are reported annually by the Swedish tax authorities since 1813. For the year 1810, tax-assessed values were collected and reported by Åkerman (1967, bilaga 1) for eighteen South and Middle-Swedish counties representing four fifths of the country's total land value. From 1813, data exist for the whole country and between 1813 and 1862, national tax tables were published annually by the national Debt Office (*Riksgäldskontoret*).[9] The Swedish property tax assessments are traditionally centered at two main categories: agrarian property (*jordbruksfastighet*) and non-agrarian property (*annan fastighet*). In order to get a division between produced (buildings) and non-produced (land) assets, one therefore needs to adjust each of the reported categories with respect to information about data on the value of buildings, land and so forth. This adjustment is described below in the cases of agrarian and no-agrarian property, respectively.

[9] See the publication "General-Sammandrag öfver 18XX års bevillning", series "Öfverdrag från Sammandragen öfver Taxeringslängderne N:ris 1, 2 och 3 för 18XX" (with XX naturally denoting different years). Tax values for the property items "Hemman" (homesteads) and "Lägenheter" (farm dwellings) were included in agricultural real estate. To link the estimates for 1810 and 1813, I use information on values for the counties reported in 1810 that are also available for subsequent years. Between 1810 and 1813 the average value increase was 43 percent, and this number together with the total for 1813 is used to compute the total value of 1810. There are gaps in the archives and for the years where no information was found, 1811–1812, 1814–1815 and 1817–1818, values are linearly interpolated.

B1.1.1 i) Agricultural fixed produced assets

Agricultural assets constitute historically the largest asset class in Swedish household portfolios. Like most other countries, Swedish farms are traditionally run as unincorporated family businesses. Following SNA 2008, this means that that they as a whole should be included in the household sector.[10] Main components of agricultural assets are farmland, forestry, buildings and livestock.[11]

As already discussed, the raw agricultural tax returns data need to be adjusted in several ways. First, the reported totals need to be divided into produced and non-produced assets. Up until the mid-1970s there is no continuous information about this division, but a few historical estimates exist. The earliest useful information available is a sketchy calculation for 1885 in Fahlbeck's investigation.[12] Fahlbeck (1890, pp. 11–14) uses fire insurance statements of the total insured value of fixed items and from this he estimates the approximate value of buildings in agrarian estates in 1885 to 1,387 million SEK, but then adjusts this to the round number of 1,500 million SEK. As total tax value of agrarian property in this year was 2,242 million SEK the estimate suggests that buildings represented some 67 percent (1,500/2,242) of the total. Another estimate is provided by Flodström's estimation of market values of agricultural land and buildings in 1908. His estimates, based on farm output and adjusted fire insurance values of buildings, suggest that produced assets represented 79 percent of total farm assets excluding timber tracts (Flodström 1912, pp. 138–143). He finds the total tax value of farmland to be 508 million SEK (21 percent of the total) and the total value of farm buildings to be 1,912 million SEK (79 percent of the total). Next, Englund (1956, p. 503f) updates Flodström's estimates for the year 1952 and assuming that farmland represents one third of the total value at 4,300 million SEK, and agricultural buildings to two thirds at 8,800 million SEK. Finally, from 1975 onwards there are reports of annual tax valuations of agricultural land and buildings in the official statistic of Statistics Sweden.[13] On average during 1975–1979, farmland represented 44 percent and buildings 56 percent of total agricultural tax-assessed property. In between these years, we linearly interpolate the relative shares for the calculation of annual numbers. Furthermore, we use the same sales price ratios for produced and non-produced agricultural assets, thus assuming that their relative shares of the total property is the same in tax-assessed and market values.

Convert into SEK: Currencies are recalculated into and expressed in today's Swedish currency unit, krona (denoted SEK, which was made official currency in 1873). This adjustment mainly affects tax assessments up to 1858 which were predominantly reported in riksdaler banco. The banco was a local currency with an exchange rate of 1:(2/3) to the subsequently

[10] An alternative would be to count the farms as incorporations, thus placing them in the corporate sector. This would imply that only the running business equity (net assets) should be added to household portfolios. In practice, however, the share of incorporated family farms in Sweden has been basically zero up until the 1990s when it started increasing slowly, reaching a level of about five percent in 2010 (Swedish Board of Agriculture, 2011, pp. 10ff).

[11] The definition of agrarian property (*jordbruksfastighet*) has been relatively constant over time. The 19th century tax ordinance ("Bevillningsförordningen", fifth paragraph) defines agricultural as consisting of "all Swedish land (including growing timber, buildings) except urban dwellings and plots legally defined as 'other property', communication installations, crown lands, mines and iron ore reserves, and fishing waters. See Fahlbeck (1890, pp. 8f) for a further description.

[12] In Finanskommittén (1863, Table XXXI, p. CXXII), there is an even earlier observation for the value of buildings in the country side, suggesting the value to have been 505 million SEK in 1858. The source for this estimate, however, is unclear at when compared to the total (estimated) agricultural property value of 1,700 million SEK the share is only one third of the total. Due to this uncertainty this early observation is left out of the investigation.

[13] The data come from Statistical Yearbook of Agriculture (*Jordbruksstatistisk årsbok*), various years.

used currency riksdaler riksgälds, that later was transformed at a rate 1:1 to the krona.

From tax to market values: A second adjustment is to convert tax-assessed values into current market values. This is a crucial adjustment since the published tax values at times depart quite substantially from the (estimated) true market values. However, the conversion is made difficult for several reasons, the main being the general scarcity of reliable information about current market prices of land as well as their relation to tax-assessed values.[14] A number of tax reassessments were carried through during the period, updating tax values often with respect to newly surveyed market values.[15] In between these events, however, the ambitions to match tax values to market values varied. As for the earliest decade, the 1810s, there are some attests by 19th century scholars reporting that tax values in these years were close to, though not precisely at, market values.[16] This was because the tax laws in the 1810s stipulated that assessments should aim at valuing assets at their market prices. However, political pressures soon forced legislators to abandon this ambition, and the period between roughly 1820 and 1862 saw an increasing wedge between tax and market values.[17] A major turning point was the tax ordinance of 1861 ("1861 års bevillningsförordning", SFS 1861:34) which set new principles for the valuation and collection of land and real estate values. From this date, tax values were again aimed at corresponding to market values, and between 1861 and 1862 agricultural tax values increased by 280 percent, reflecting the long lag in updating tax values.[18] Additional evidence rejecting the constant level of agricultural estate values during 1820–1861 is the increasing agricultural estate prices (since 1840) reported for one Swedish region reported by Martinius (1970).[19] Furthermore, several sources state that the tax values of city dwellings were much more in line with true market values than was the case for agricultural real estate.[20] Based on this indication, the yearly progression of agricultural tax values are imputed econometrically using the evidence on agricultural property purchase prices reported annually by Martinius (1970, p. 70) and reported tax-values of agricultural property in the beginning and the end of the period.[21]

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[14] The role of property tax rates represents another concern. The level of taxation influence market prices, and therefore the ratio of market to tax values, as well as the incentives to report truly about one's amenities. According to Seth (1863, p. 21), the property tax rate ("bevillning för fast egendom") was constant in most of the sensitive period up to the new tax ordinance of 1861.

[15] Major tax reassessments, called General Assessments ("allmän fastighetstaxering"), of all non-public real estate property, both agricultural and non-agricultural, were carried out every third years before 1898 (especially large assessments were made in 1862, 1879, 1884, and 1898) and every fifth between 1898 and 1988 (especially large assessments were made in 1918, 1922, 1952, 1957, 1965, 1970, 1975 and 1981). From 1988, the new property tax law (1979:1152) stipulated that the general assessments are made every sixth year for each property class after a rolling scheme (with three such classes, assessments are made every second year).

[16] See Fahlbeck (1890, p. 6–7) and Seth (1865, p. 21).

[17] Both Fahlbeck (1890, p. 7) and Adamsson (1966, pp. 122–128) describe the evolution of the property tax legislation and the gradually lowered ambition to report true market values in the tax assessments ("Bevillningsförordingar") with important changes occurring in 1818, 1823, 1830 and 1841. Nilsson (2008, p. 207) also cites contemporary sources stating that farmland tax values were (erroneously) constant during 1840s and 1850s.

[18] That this increase reflects a valuation update is confirmed by the summary of the quinquennial county reports (Statistics Sweden, 1868, p. 119). But according to Fahlbeck (1890, p. 104), the tax values of 1862 were still most likely too low. This opinion is shared by Seth (1865).

[19] Martinius (1970, ch. 4) studies a large sample of farms in a Southern county, Skaraborg. His investigation of agricultural estate prices between 1833 and 1892 shows that prices were unchanged up to around 1840, then doubled to 1850 and then more doubled up to 1860.

[20] There was no break in this series at all in 1862. See further Seth (1865, p. 25), Statistics Sweden (1868, p. 119).

[21] The Stata program ipolate was run, using information about agricultural property values in 1810–1823 and 1862, and non-agricultural property values in the missing years.

Sales price ratios ("köpeskillingskoefficienter"), defined as the ratio of market values to tax-assessed values, are multiplied to tax values in order to attain market values. For the most part, these ratios are based on actual data on surveyed contemporary purchase prices but for the early period they rest on a combination of actual observations and subjective assessments. For the 19th century, there exist a few investigations of this issue and they are used for constructing the sales price ratios. Martinius (1970, Table 31–32, p. 81) presents market and tax values in a region in Western Sweden, both for some hundreds (*härader*) and for the county (*län*) as a whole. He finds that the sales price ratio of the hundreds in 1842 was 1.40. In 1862, he finds that the ratio was 1.04 for the same hundreds and 1.08 at the county level, suggesting a correction upwards of the ratio for the hundreds. Assuming the same correction in 1842, the county-level sales price ratio is 1.45, which will be assumed to be valid for the country as a whole.[22] As already discussed, agrarian tax assessments in the first half of the 19th century were aimed at being close to the market values but in practice this was not always the case. During this period, there was also a generally acknowledged increase in agrarian prices (Pettersson, 1987; Magnusson, 1983). To get at an annual variation in these agrarian prices between 1810 and 1842, I use the deflator for the agricultural sector computed by Pettersson (1987, pp. 8-17), chaining from the 1842 benchmark back in time. In 1810 and 1811, sales price ratios are below one and then we set them to one. For the year 1860, Seth (1863, pp. 26–27) presents numbers, landing at a purchasing price coefficient of about 3 of the raw tax values. Using the interpolation-adjusted values, the coefficient is about 1.5. In the report Statistics Sweden (1863, p. 69), the ratio is said to be around 2 but this number is not backed by any actual numbers and therefore less credible than the estimate of Seth (1863). Altogether, I use the coefficient of Martinius for the early period. For the period 1862–1876, a coefficient of 1.25 is used. Sidenbladh (1878, p. 116) presents an investigation of the relationship for the year 1876, landing at a coefficient of 1.5. However, Fahlbeck (1890, p. 22n) criticizes this estimate arguing for a coefficient of 1.25, which in retrospect appears to be a more sensible estimate and therefore the coefficient 1.25 is used here. Flodström (1912, Table B, p. 137) presents a thorough investigation of market-to-tax value ratios collected from individual transactions across the country made in the year 1908, which he finds to be 1.19.[23] The Swedish Parliament ordered a survey of agrarian property transactions during the 1920s, generating estimates of sales price ratios between 1.55 in 1921 down to 1.11 in 1929 (with an average of 1.23).[24] In Spånt (1979, Appendix B) reports a ratio of 1.11 for 1935 and 1.43 for 1945. For the period 1938–1944, Statistics Sweden (1945) reports purchasing price coefficients based on large samples of purchases and corresponding tax values. All years in between, coefficients are linearly interpolated. From 1952 onwards, purchasing price coefficients are reported annually by Statistics Sweden.[25] The sales price ratios are presented in Table B2.

[Table B2 about here]

Removing private non-household shares: Households have been the predominant owners of private farms and forests in Sweden throughout the period studied. Still, there have also been

[22] Martinius (1970, p. 81) estimates the market value for property in a number of hundreds in 1842, 1862 and 1892. In 1842 the tax-assessed values (million SEK), market values (million SEK) and sales price ratio were the following for hundreds around: Alvhem (denoted "Pu" in table), 5.4, 7.6 and 1.41; Haga (denoted "Cu" in table), 11.8, 16.6 and 1.41; Storeberg (denoted "Ru" in table), 4.6, 6.5 and 1.41.

[23] See also Flodström, 1912, Bil. A. Taxeringsvärden och köpeskillingar å fastigheter, pp. 299–303.

[24] Swedish Parliament (1930), "Särskilda utskottets utlåtande nr 2", bilaga B, p. X. The studied counties were Malmöhus, Östergötland, Skaraborg, Västmanland, Gävleborg and Västerbotten.

[25] Statistics Sweden's publications: Statistical Yearbook, Statistical Messages (series J) and Yearbook of Housing and Building Statistics (*Bostads- and byggnadsstatistisk årsbok*).

non-households (incorporated family farms, banks, other corporations, thrifts etc.) owning agricultural assets. Their share needs to be removed from the totals, but doing this is not simple because of a general lack of information about ownership shares across sectors. Flodström (1912) finds that in 1908, non-government entities, mainly banks, held about 15 percent of total private agricultural assets.[26] Since the 1930s, there are some tabulations of the ownership of agricultural property and forests made in relation to general tax assessments, most of them expressed in terms of amounts of land (hectars) but some also in terms of tax-assessed value. For farm property, physical persons (including estates) have held almost exactly 90 percent of the agricultural land surface since the 1930s, and between 84 and 94 percent of its taxed values.[27] For this reason, the household share of all fixed agricultural property is set to 90 percent for the whole period, including the 19th century.

A specific challenge concerns Sweden's period of very high inflation and deflation levels during the end for World War I and immediately thereafter. Consumer prices doubled between 1916 and 1919, and peaked in 1920. While annual price levels, and current incomes, co-vary relatively well, the nominal tax-assessed assets are more sluggish and do not fully adjust from year to year. As a consequence, real asset values plummet during periods of extreme inflation (as during 1916–1919) and soar during periods of extreme deflation (1919–1921). An alternative approach to generate stock values is to use the perpetual inventory method, PIM, which uses annual investment flows that continuously reflect actual price levels and thereby move more quickly along with nominal fluctuations.[28] In the case of non-agricultural housing, Edvinsson (2005) reports values generated using PIM for the period around and immediately after World War I in Sweden.[29] In comparison with the tax-assessed stocks, the PIM-generated stocks are 20 percent higher in 1916 and then increases to +29 percent (1917), +53 percent (1918), +80 percent (1919), +78 percent (1920), and +45 percent (1921), whereas they are roughly equal both before and afterwards. Which one of these stocks should one prefer: the sluggish tax-assessed stocks, which experience a sharp devaluation during the high inflation, or the PIM-stocks which do not? One potentially exogenous check is to look at the sales-price based valuation of Swedish agricultural property made by Åmark (1923) in a thorough investigation of three agriculturally important Southern counties spanning the period 1877–1919.[30] I compare Åmark's estimated land values for the three counties with the national stocks generated from either tax assessments or the PIM. Over the pre-WWI period, the national total is almost twice as large as the stock of the three countries. Then

[26] In 1908, total private (taxable) farm land value was 3,022 million SEK. That year, 454 million SEK (15 percent) was held by non-households such as local thrifts, banks, corporations (Flodström, 1908, pp. 681, 697, 727, 743).

[27] For share of land surface: Statistics Sweden (1959, tab. E.4, p. 35) showing 89 percent in 1937 and 90 percent in 1944 and 1951; Statistics Sweden, Statistical Yearbook of 1982, tab. 82, p. 102, showing 88 percent in 1975, and Statistics Sweden, Statistikdatabasen (table "Allmän fastighetstaxering för lantbruk efter ägarkategori, tabellinnehåll och år") showing 91 percent each of the years 1998, 2005, 2008 and 2014. For the share of tax values: Statistics Sweden, Yearbook of Agricultural Statistics (Jordbruksstatistisk årsbok) of 1970, showing shares between 84 and 96 percent between 1945 and 1969 and shares are 89 percent during 1998–2014 using the same source as above.

[28] Recall that the critique against the perpetual inventory method is primarily concerned with its problems to accurately account for true deflation of the value of some goods (old computers are valued too high). Short-term variations may thus be correctly reflected but over time the method returns too high stock values.

[29] I use Edvinsson's series "Residential buildings" in appendix K. "Net (capacity) stock of various types of produced assets (in current, purchasers' prices, million SEK), aggregate economy, and the total net stock of produced assets of the aggregate economy, of the private sector and of manufacturing and handicrafts (1st of January each year)".

[30] Åmark samples a large set of prices of land, grain, timber from the counties Halland, Skaraborg and Östergötland. He distinguishes between agricultural property dominated by plains/farmland and property dominated by forestry/timber.

during 1915–1920, the difference is still about twice as large when using the tax assessments (land values still more than double in nominal terms) but it is more than three times as large when the PIM-adjusted stocks are used. From this simple check, I decide to stick to the strategy of the rest of the paper, basing the stocks on tax assessments instead of on the PIM.

Livestock is also included in the fixed produced agricultural assets according to SNA 2008. Market-valued totals for livestock are therefore constructed and added to the other agricultural assets. While livestock are at times neglected in modern estimations, they are important from an historical point of view; livestock represented between 10 and 15 percent of all real assets up to the First World War and about five percent up until the Second World War. During the 19th century, horses were the most important livestock, representing between 30 and 40 percent of the total value of livestock followed by cows whose share increased from one fifth to one third. By contrast, in the 20th century cows overtook the role as most important livestock measured in terms of aggregate market value.

The estimation of the current market value of livestock done by multiplying the total number of animals of each type by assessed average market prices at each point in time. Fortunately there exists relatively detailed information about both of these items as well as some attempts to calculate national totals. The number of animals at Swedish farms have been carefully counted and reported by Statistics Sweden.[31] For the period up to 1914, market prices of most livestock types are collected from Jörberg (1972). Furthermore, detailed estimations of the national value of livestock exist for the following years: 1885 in Fahlbeck (1890, pp. 41–42), 1898 and 1908 in Flodström (1912, pp. 143, 148) and 1952 in Englund (1956, p. 504). These values are used to complement and amend the values retrieved from the other sources in the early period. A recent investigation of Swedish agricultural production in 1810 by Linde and Andersson Palm (2014) has revised the previous statistics, suggesting that the number of livestock perhaps two thirds higher than previously suggested. I deem their new series credible and adjust the older annual statistics upwards but phase it out gradually until 1914.

For the period from 1914 up to 1982, data come from historical tables published in Statistics Sweden (1960, p. 111), up to 1950, and after that annually in Statistical Yearbook, where average market values are drawn from livestock reinsurance values. After that, information is less accessible and instead the livestock value is assumed to be eight percent of the total value of other agricultural assets, the average share it had during the 1970s up to 1982. Figure B2 shows the development of the aggregate value of the stocks of agricultural assets and livestock relative to national income during the full study period.

[Figure B2 about here]

The estimation of the current market value of livestock done by multiplying the total number of each type of animal by assessed average market prices at each point in time.

[31] Up to 1950, Statistics Sweden (1959, pp. 61–64) showing the number of different kinds of livestock (e.g., horses, cows, oxen, young cattle, pigs, sheep) are used. For the period from 1950 onwards, I use livestock insurance data, published annually since the 1920s in Statistics Sweden (1960, p. 111) and thereafter in Statistical Yearbook. These insurance data report both the number of livestock and their (insurance) values though only for cows and horses. From the 1980s onwards, there is no information on annual average prices or livestock insurance. Instead I assume the value of livestock to be of equal share of agricultural property as it was in the late 1970s (about five percent).

B1.1.2 ii) Machinery and equipment (in agriculture)

The role of agricultural machinery, equipment and tools ("dead inventories") is not fairly marginal. These values are added to the other property values in our series since they are not included in the tax assessments.

The first known estimate is made for 1858 by Finanskommittén (1863, Table XXXI), suggesting a value of 51 million SEK, amounting to roughly 2.5 percent of total agricultural property. Fahlbeck (1890, pp. 42–43) refers to the "well-known fact among professionals" that the total value of machinery, equipment and livestock amounts to one fourth of the total agricultural property, from which he finds that the value of machinery and equipment is 139 million SEK, about 5.2 percent of the total property. Flodström (1912, pp. 148–150) makes even more careful estimations, finding that it amounts to 322 million SEK, or 9.2 percent of total agricultural property. Englund (1956), finally, finds a slightly lower relative level for 1952.[32]

From these estimates, it is plausible to assume that the value of machinery and equipment in Swedish agriculture has hovered around a level of 5 percent of total property values, and this is also assumed to be true for the entire period of study.

B1.1.3 iii) Non-agricultural fixed produced assets (housing)

Besides fixed agricultural assets, the other large category of fixed produced assets is *non-agricultural real estate*, denoted "Other property" ("Annan fastighet") on Swedish tax returns. This summary concept contains several items, e.g., owner-occupied housing, vacation housing, rental apartments, condominiums, inventories and plains. According to the 19th century tax ordinance ("Bevillningsförordningen"), other property consists of urban dwellings, including garden and buildings, and other buildings and constructions that are not associated with the agricultural sector.[33] Notably, historically this included almost all private non-agricultural property, such as factories, mills, sawmills and ironworks.[34]

Condominiums represent a special case. Being apartments in which people live, and thus ideally part of the stock of dwellings within produced non-agricultural assets, condominiums are treated as financial assets and reported as such in the Financial Accounts by Statistics Sweden. The reason for this classification is that condominiums, formally, are apartments owned by a non-financial corporation (the condominium association) while the households own shares in this condominium. However, in this study condominiums are treated as non-financial assets, as part of the housing stock. If one considers that all households need somewhere to live, and that a condominium apartment is just one of several housing alternatives, it should be relatively uncontroversial to treat condominiums as such housing assets instead of as financial assets. A practical implication of this choice is that the tax-assessed property needs no further adjustment as it also includes condominium apartment buildings. Of course, the value of condominiums in the Financial Accounts ("tenants ownership rights") is removed from the stock of financial assets.[35]

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[32] Englund (1956) estimates not machinery separately but in combination with inventories, finding a total share of 17.8 percent of agricultural property (to be compared to 22.5 percent in 1908 and 20.2 percent in 1885).
[33] For further descriptions, see Fahlbeck (1890, pp. 30f) and Flodström (1912, pp. 112ff).
[34] In the Swedish historical tax tables, these are called "Bergverk" (mines, ironworks), "Manufacturer, Fabriker och inrättningar" (factories, manufactures), "Qvarnar" (mills). They are only reported separately up during 1813–1861, and during this period they represented approximately one third of the total tax-assessed non-agricultural property values.
[35] See item FA5190 "Andra ägarandelar".

The source for the non-agricultural property is the same as for agricultural real estate, the "General-Sammandrag öfver 18XX års bevillning" collected for the period 1813–1861. The series used are "Hus, Tomter, Stadsjord m.m.", "Frälseräntor", "Bergverk", "Manufacturer, fabriker och inrättningar" and "Qvarnar" reported in "Sammandrag öfver Taxeringslängderne N:o 1". For 1810 this publication does not exist, and instead the same principle as for agricultural assets is used, namely to implement a 43 percent value increase up to 1813. From 1862 onwards, the values for "Bevillningsskyldig annan fastighet" are used, reported in Statistical Yearbooks of Statistics Sweden.[36]

Separating produced and non-produced non-agricultural assets: The first adjustment is to set the shares for produced assets (dwellings) and non-produced assets (plots) in the non-agricultural property tax assessment totals. For the 19th century, there are no reports in the examined historical sources on this issue and the earliest estimate is the one for 1908 made by Flodström (1912, pp. 113–119). On the other hand, this estimate is based on a very ambitious investigation of a large sample of urban properties with and without buildings, matched with fire insurance values of each property. He finds that the value of garden land with and without buildings amount to 433 million SEK in Stockholm, 357 million SEK in other towns and in total for the whole country 940 million SEK. In relation to the total assessed property value of 3,831 million SEK, this means that the urban gardens represent 25 percent while urban buildings and constructions represent 75 percent of total non-agricultural estate. I assume that this share for produced assets, 75 percent, is true for the entire 19th century as well. Possibly this is an overstatement of the true share because of the increased housing qualities, in particular thanks to stone houses, emerging in the latter part of the 19th century. From 1935 onwards Statistics Sweden reports the non-agricultural property values divided into buildings ("byggnadsvärde") and gardens ("markvärde" or "tomtvärde"), and these values form the basis for dividing the total property into produced and non-produced assets.[37] The share of buildings in total non-agricultural property hovers around 80 percent between the 1930s and 1970s, going down to 75 percent in the 1980s and 1990s but then decreases sharply down to 60 percent in the 2000s.

Adding farm dwellings: Throughout the period the assessed agricultural property has also included the homes of farming families. In the statistics, there is only information about this since 1975 and in this later era housing represented about 70 percent of the total building value in the assessed farm property. However, in order to avoid attributing too large values to housing especially in the early period, the share of personal homes in farm building property is set 50 fifty percent over the entire period.

From tax to market values: The adjustment of tax values to generate market values is done as in the case of agrarian property, using sales price ratios (estimated and observed). Until recently there were no data on Swedish real estate prices before 1952, when Statistics Sweden started an annual house price index. Sandelin (1977) has examined and adjusted this index to be fully homogenous and nationally representative over time. For the period before 1952, an

[36] See, e.g., Statistics Sweden, Statistical Yearbook of 1917, Table 222, p. 244: "Bevillningstaxeringarna åren 1862–1916", where the series "Uppskattat värde, kr., å bevillningsskyldig fastighet", "Annan fastighet" was used.

[37] The sources are: Statistic Sweden (1960, tab 238, p. 226) for the period 1922–1949, Statistical Yearbook of Agriculture (*Jordbruksstatistisk årsbok*) for the period 1950–1974 and Statistical web database (*Statistiskdatabasen, Fastighetstaxering för lantbruk*) for the period 1975–2010.

ongoing research project at the Swedish Riksbank has generated two carefully executed studies of historical real estate prices in Sweden stretching back to 1875. In Söderberg, Blöndal and Edvinsson (2014), a newly constructed real estate price index for Stockholm during 1875–2011 is presented, and Bohlin (2014) contains a similar housing price index for Gothenburg 1875–1952. Both these latter studies follow a common methodology, in which thousands of sold properties are followed over time, linking individual properties and making adjustment for assumed investments and depreciation. All of these studies also present annual sales price ratios for small houses and apartment buildings for the entire period. I use these new series as basis for converting tax-assessed values of non-agricultural dwellings to market values up to 1952. From 1957 onwards, I use the national sales price ratios for small houses reported annually in the Statistical Yearbook of Statistics Sweden.[38] For the period before 1875, I assume that the sales price ratio was equal to an unweighted average of sales price ratio (1.12) in Stockholm and Gothenburg during the decade 1875–1884. The sales price ratios for 1903 and 1908 also coincide with comparing the with Flodström's national estimates.[39]

Removing private non-household shares: Another adjustment is that of removing non-household non-agricultural produced assets, i.e., constructions owned by mainly the corporate sector. Again, there is not much information about this in the historical statistics. The share of households was very high in the 19th century, which is natural due to the small size of the incorporated business sector. I assume it to be at the same level as agricultural property (see above), 90 percent. A first detailed account is possible to make for 1908, using Flodström's data on non-agricultural property holdings in the balance sheets of the corporate sector. These items amount to 1,072 million SEK, which is 72 percent of the total tax-assessed value of non-agricultural property in 1908.[40] From 1975 onwards, Statistics Sweden report annual tax-assessed private property values by categories, and then it is possible to estimate the precise value of owner-occupied houses, summer cottages and all land adhering to private individuals.[41]

As a rough consistency check, I compare in Figure B3 the SNWD series "Building value in non-agricultural real estate", which consists of market-valued tax-assessed stocks, with the "Net (capacity) stock of residential buildings" generated by Edvinsson (2005) from investments in residential buildings and accumulated into stock values by using the perpetual inventory method. The figure shows the ratio of the SNWD stock to the Edvinsson (2005) stock and over the long run there seems to be a relatively close connection between the two. The ratio hovers around unity, with an arithmetic average of 0.92. In some periods, the deviation is larger; during the high-inflationary First World War-period the tax-assessed stocks dipped relative to the investment-generated stocks that were faster to pick up the price increases, producing a ratio of 0.5.

[38] The period 1952–1957 is linearly interpolated. I use data for permanent, one- or two-family houses and for latter years also including townhouses ("rad- och kedjehus"). The years 2001–2002 have sales price ratios that result in abnormal market-valued stocks when combined with the reported tax-valued stocks, and these two years are instead linearly interpolated.

[39] Flodström (1912), Bil. A. "Taxeringsvärden och köpeskillingar å fastigheter, som gått i köp under tiden mellan 1903 och 1908 års taxeringar", pp. 299–303.

[40] In Flodström (1912), Bil. P, "Svenska aktiebolag och solidariska bankbolag jämte några grupper enkla bolag (handelsbolag) eller föreningar": Table 1A, p. 727 shows 1,063 million SEK for joint-stock companies and unlimited banking companies and Table 2A, p. 742 shows 8 million SEK for smaller incorporated firms.

[41] In all these years, I use the sum of values for constructions (*byggnad*) and land (*mark*). Before 1998, 200+ (small houses) and 300+ (rental houses, excluding non-housing localities) categories in the are used and from 1998 categories 200+, 300+ , 500+ owner-apartments (ägarlägenheter) and 600+ (unbuilt land) are used.

[Figure B3 about here]

Similarly, Figure B4 compares the same SNWD housing series with two equivalent series from Statistics Sweden: one with only the building value of the residential housing stock (generated from PIM) and the other also including the value of condominiums as reported in the Financial Accounts. The two ratios suggest an increasing resemblance between the different series, with almost perfect balance in 2013 when including condominiums. Overall, the relatively close resemblance between the two series, and lack of any trend in deviation between the two, represents a signal of consistency of the housing data in the SNWD.

[Figure B4 about here]

B1.2 Inventories

The stock of inventories is mainly related to farmland and timber inventories. Included in the agrarian inventories are crop and feed grains, and slaughter animals. Timber inventories include sawed timber and pulp wood. These values are added to the other property values in our series since they are not included in the tax assessments.

The value of inventories has been estimated for a few years. Fahlbeck (1890, pp. 53f) emphasizes that this value is difficult to assess because of the considerable variations over a year's span. He lands at estimating the value of inventories to be equivalent to half the annual revenues of the agricultural sector, or 400 million SEK in 1885 which is 15 percent of total agricultural property value. Flodström (1912, pp. 150–152) makes a similar estimation, landing at a value of 475 million SEK, equivalent to 13 percent of property values. Englund (1956) estimated the sum of machinery and inventories to be 4,000 million SEK in 1952, or 24 percent of the total agricultural property value. Finally, in the period 1980–1994 Statistics Sweden (1995) estimated inventories worth about seven percent of agricultural property.

Based on these examinations, we assume that agricultural inventories represented values equivalent to 15 percent of total market-valued agricultural property in the period up to 1950 and seven percent thereafter.

B2. Non-produced non-financial assets

The second large group of non-financial assets is *non-produced assets*, which consists of three categories: *agricultural land*, *timber tracts*, *other land* and *subsoil assets*. In this study where focus lies on the household balance sheet, only the first two are included. Although subsoil assets are indeed part of non-financial corporate sectors, the private wealth total is captured via the net wealth of corporations as held by household in the form of shares in business equity.[42]

[42] In Statistics Sweden's national wealth project there was some subsoil assets ascribed to households, but they amounted to less than half a percent of all household-owned non-produced assets (Tengblad, 1993, Table B). Historically, however, subsoil assets such as metal and iron ore reserves have been important in the private sector balance sheets, and a complete analysis of the national wealth should naturally include them *in extentio*.

B2.1 Agricultural land

The estimation of agricultural land values rests on almost the exact same sources and methodologies used to estimate the value of agricultural produced assets. In fact, the presentation above shows that many of the estimates for agricultural buildings are derived from inquiries in land values. The following description of agricultural land value estimates is therefore held deliberately brief. For further details about the adjustments and calculations, see section A1 above.

Tax assessments of agricultural property (*jordbruksfastighet*) are the basis for these estimations. As these assessments lump together agricultural property/farms and timber tracts, a first adjustment is to make a separation of these two asset categories. Furthermore, the agricultural property consists of both land and buildings, and a second adjustment therefore needs to separate between these two classes.[43] This division is based on investigations by among others Sidenbladh (1878), Fahlbeck (1890), Englund (1956) and the official tax statistics published by Statistics Sweden. Market values are achieved using the same sales price ratios as used for agricultural buildings (see the table above).

B2.2 Timber tracts

Forests and timber tracts are an important part of non-produced non-financial assets, representing historically about one third of the total value of non-produced agricultural property but trending downwards from around 40 percent in the 19th century and down to around 20 percent in recent years. Timber tracts are defined so as to contain both the value of forest land and the value of standing timber in these forests.[44]

The household share of timber tract values is estimated from the historical tax statistics, typically using the same sources as used for other agricultural property discussed in previous sections. Between the 1930s and the early 1990s, households held roughly two thirds of the forest area and then this share was sharply reduced down to just over half. Looking at the share of values, households had a share around three fourths in the 1930s through 1970s and then a share around 60 percent thereafter.[45] I assume that household shares of forest values was declining for various institutional reasons and set a share of 90 percent before 1920, 75 percent during 1920–1980 and 60 percent thereafter.

The valuation of timber tracts differs somewhat from agricultural land. There is to begin with much less historical information about the value of timber tracts and this affects the construction of sales price ratios for timber tracts. The first source found that addresses this issue is Sidenbladh (1878), but even if his calculations are quite detailed they never really land at an explicit ratio between market and tax values. Flodström (1912) emphasized that the valuation of timber tracts is insufficient in Swedish tax assessments, presenting two special inquiries

[43] Many of the early investigations divided agricultural land into field (*åker*) and meadow (*äng*), and discussed the transformation of land from meadow into arable field during the 19th century.

[44] Early Swedish tax assessments talk about "outskirts" (*utmark*) in which forests (*skog*) and pens (*hagmark*) are included (Sidenbladh, 1878). The 20th century assessments differ between forest land (*skogsmarksvärde*) and timber/growing wood (*skogsvärde*). See SOU 1936:52, pp. 32ff for further details on the historical treatment. In SNA 2008, standing timber is included in "inventories in work-in-progress" (SNA 13.41).

[45] Households including estates. See Statistics Sweden (1959, tab E.4, p. 35) for various years between 1937 and 1951 and Statistical Yearbook of Statistics Sweden for years until 1975. For 1992, see Swedish Forest Agency, Swedish Statistical Yearbooks of Forestry of 1995, tab. 2.2, p. 43. For 1998–2014, see Statistics Sweden, Statistikdatabasen (table "Allmän fastighetstaxering för lantbruk efter ägarkategori, tabellinnehåll och år").

of forest and timber valuation.[46] Relating Flodström's preferred estimate of the total value of private timber tracts, 1,248 million SEK (Flodström, 1912, Table D, pp. 160f), with their estimated tax-assessed value, 602 million, suggests a sales price ratio of 2.07. This is 74 percent higher than the sales price ratio for all agricultural property. This sales price ratio is assumed to be true for the entire 19th century up to 1908. There are data for 1938–1944 in Statistics Sweden (1945), showing annual sales price ratios for agricultural property with more than 90 percent of its value being growing forest or forest land. These sales price ratios are on average 1.82, which is 54 percent higher than the ratios for all agricultural property. I use these "markups" of sales price ratios of timber tracts on the period between 1908 and 1938 on the agricultural sales price ratios reported above for total agricultural property. Englund (1956, pp. 504f) presents a fairly extensive discussion of the total value of Swedish timber tracts in 1952, landing at a value of 10,700 million SEK, which compared with the estimated tax value of 9,339 million SEK suggests a sales price ratio of 2.47.

For the postwar period after 1952, the sales price ratio for timber tracts is based on information about sales price ratios for the period 1980–1994 and 1995–2010. In the period, one can use data from Statistics Sweden's national wealth project which calculated the total market value of timber tracts using information about actual transactions, estimated sales price ratios and various adjustments for family transfers etc (Tengblad, 1993; Statistics Sweden, 1995). The ratio of those values to the observed tax-assessed totals yields a sales price ratio ranging between 0.88 and 3.07, with an average of 1.77.[47] For the second period, in Statistics Sweden's *Statistical Yearbook of Forestry* there are sales price ratios for agricultural property with different share of standing forest and forest land value of total assessed value. The property consisting of 100 percent share forest land value has a sales price ratio with an average of 2.14, which is on average ten percent higher than the sales price ratio for all agricultural property.

Altogether, I use the following sales price ratio for timber tracts. For the period 1810–1974, I assume a ratio of 2.00. As shown above, there is almost no reliable information from the early eras, but available estimates are strikingly consistent around the assume ratio. For the period 1975–1994, I use the sales price ratio for agricultural property presented above multiplied by 1.11 to reflect the fact that pure forest property are valued higher in relation to its tax value. Table B3 presents the sales price ratios for timber tracts.

[Table B3 about here]

B2.3 Other land

No adjustment of the tax values was needed (unlike for the agricultural real estate) and purchasing price coefficients, used to adjust tax values to market values, were the following. As already described in the previous section, there were contemporary attempts to investigate the deviations between the tax values and "true" market values in relation to the tax reassessments of 1858 and 1862 (see, e.g., Statistics Sweden, 1865, p. 69). In the case of non-agricultural real estate, these deviations were found to be quite small and therefore the purchasing

[46] Flodström (1912, pp. 158–166), and the two appendices H1. "Försök till värdering av Sveriges skogar under förutsättning, att nuvarande skogsavverkning fortfar till skogstillgången, där avverkningen är mindre än tillväxten, uppnår normal storlek, eller, där avverkningen är större än tillväxten, tar slut" and H2 "Värdet av Sveriges skogar".

[47] Having sales price ratios below one (in the early 1990s) is quite unrealistic, both as the tax assessments were deliberately aimed at being lower than the market values to avoid over-taxation and because timber tracts tax values are normally lower than those of other agricultural land. We therefore disregard them in the analysis.

price coefficient for 1862 is set to be 1. For the years 1903 and 1908, Flodström (1912) present careful large-sample estimates of tax and market values finding coefficients of 1.11 in 1903 and 1.00 in 1908. From this and previously cited references stating of a close resemblance between tax and market values for city dwellings in 1862, Similar evidence of market values is available for the years 1935 and 1945 in Spånt (1979), with ratios 1.11 and 1.43, respectively.[48] For the years in between these reference dates, coefficients were linearly interpolated.

In the 1950s, Statistics Sweden started publishing official purchasing price coefficients. They are reported annually in Statistical Yearbook since 1957. As in the case of agricultural property, the coefficients were based on sales prices compiled for small regional areas and adjusted for house-specific information about size, building year and assumed quality depreciation.

B3. Memorandum category: Consumer durables

In this study, the total stock of consumer durables alongside of other non-financial assets is estimated for the first time for the full nineteenth and twentieth centuries (see below for previous estimates made for Sweden).

Consumer durables, i.e., goods such as cars, furniture, electronic equipment, are typically not included in household balance sheets. The main reason for this is that they in the national accounting system, are assumed to evaporate within one year and are therefore are classified as running expenses rather than capital investments. But many consumer goods last considerably longer than only one year such as cars, boats, electronic equipment and furniture.[49] Moreover, these durables are often purchased with borrowed money, and since the debts are more visible one needs to also account for the assets in order to avoid underestimating household net worth. Consumer goods also reflect long-run changes in household welfare, as household tend to consume more as they get richer.

Semi-durable goods, primarily clothing, will not be included in the calculations. This is potentially problematic from a historical point of view when clothing were most likely relatively more important in portfolios of poorer households. But notwithstanding this conceptual issue, the aggregate values of clothing should be minor at any point in the currently studied period.

In general, measuring the stock of consumer durables is difficult. The standard procedure used by statistical agencies is the *perpetual inventory method*, which defines the stock of consumer durables CD_t as the accumulated annual consumption flows I_t (in real terms) accounting for annual depreciation δ:

$$CD_t = I_t + (1 - \delta)CD_{t-1} \ . \qquad (1)$$

The basis for computing equation (1) is to get acceptable estimates for annual household consumption of consumer durables. There exists no official series at Statistics Sweden over

[48] Flodström, 1912, Bil. A. ”Taxeringsvärden och köpeskillingar å fastigheter, som gått i köp under tiden mellan 1903 och 1908 års taxeringar”, pp. 299–303; Spånt (1979), Appendix B.

[49] Naturally, even if the goods are utilized in homes their market values typically decrease rapidly and it is actually this market value reduction that is reflected in the depreciation term δ (which statistical agencies assume to be 100 percent9.

the stock of consumer durables, but there are some previous estimates made, mainly concerning the annual flows of consumer purchases across categories of goods, but also some calculations of the stock. The only real series of a consumer durable stock is computed by Berg (1983, 2000) for the period since 1950. In Bollfras (1878), Fahlbeck (1890) and Flodström (1912), residual values from fire insurance values are used to address the amount of other household assets. Other than that, most attention has been put on constructing annual *flows* (e.g., Lindahl, Dahlgren and Kock, 1937; Bentzel et al., 1957; Dahlman and Klevmarken, 1971) or to study these items within small subsets of the population (Kuuse, 1969; Lilja, 2004).

From 1950 onwards, the official series from the Swedish national accounts is used (Berg, 1983). During 1931 and 1950 I use the series of inventories, motor vehicles and bicycles from Bentzel et al. (1957, tables A:IV and A:VI, pp. 407–409) and between 1861 and 1930, data from Lindahl, Dahlgren and Kock (1937) is used. For the earliest period, 1810–1860, there exist no detailed series for private durable consumption. There is, however, evidence available on private total final consumption reported in Edvinsson (2005, Table F), which dates back to year 1800. When relating the observed durable consumption during the 1860s to Edvinsson's total final consumption that same decade, one finds that the share of durable consumption over total private consumption lied quite stable around three percent of private final consumption during the 1860s (after which it started to increase). For this reason, I assume that this was also the share that was true all the way back to 1810.[50]

The most important durable consumer good in the second half of the 20th century is undisputedly cars. From 1930 onwards, I am able to compute stocks separately for motor vehicles (cars and motorcycles) and other durable goods as there are data on consumption flows for these two broad items from this year. In order to land on sensible relative sizes of stocks and also a balanced depreciation rate (see below) one must determine some yardstick stock values for motor vehicles at different points in time. I have done this for 1930, 1951 and the 2010 using information on the number of cars and motorcycles in Sweden from the official registries (deducting 20 percent to account for vehicles owned by firms and the public sector) and assessed average market values for cars[51] and motorcycle[52] prices. The car stock in 1951 comes from the very careful investigation of travel habits by Endrédi (1969, table 5, p. 113). Figure B5 shows the development of the aggregate value of the stocks of consumer durables and cars relative to national income during the full study period.

[Figure B5 about here]

[50] All stock calculations are made for volumes, i.e., using deflated data. The only CPI series that reaches back to 1810 is the new one of Edvinsson and Söderberg (2010), which I therefore use.

[51] The average value of a car was 3,000 SEK in 1930 and 75,000 SEK in 2010. According to car historical expert Jan Ströman (former lecturer at the Royal Institute of Technology) there was a great variation in car prices after the First World War. The most commonly owned car in the 1920s, the T-Ford (representing about half of all registered cars in Sweden), was sold at prices around 2,000 SEK in current prices. Around 1930, European car manufacturers such as Opel and Renault had started to gain market shares with their more robust, and inexpensive, smaller cars costing about 3,000 SEK whereas the more expensive American-made Chevrolet, costing about 5,000 SEK, had also gained in popularity. For 2010, average market prices come from one of the largest Swedish internet market for new and used cars, www.webcar2000.com (2011-06-02).

[52] The average value of a motorcycle was 1,500 SEK in 1930, 1,085 SEK in 1951 and 52,000 SEK in 2010. Historical values are collected from a survey of historical motorcycle models and their prices made by the Swedish Technological Museum (REF). It states that standard models of both the Swedish *Husqvarna* manufacturer and *Harley & Davidson* was worth 1,500 SEK in 1928. In 1950, the popular Swedish motorcycles by *Husqvarna* and *Nymans* cost about 1,100 SEK. In 2010, finally, the average motorcycle market value was 52,000 SEK according to www.webcar2000.com (2011-06-02).

An important parameter in the perpetual inventory method is the depreciation rate δ. Determining the depreciation is difficult as it is not directly observed, and the choice always introduces some arbitrariness. Moreover, the depreciation rate should probably vary over time, but in what way and due to what factors is not clear and therefore a constant rate will be used. Importantly, I use the yardstick estimates of the separately estimated motor vehicle stock to tune in a sensible depreciation rate, and have landed at 0.15. This means that 15 percent of the value of purchased goods "rusts away" each year and that half of the market value of the goods is gone after four years. Finally, all calculations are made in volumes, using deflated values, and the only CPI series that reaches back to 1810 is the recent series of Edvinsson and Söderberg (2010), which is therefore used.

How do the new series match previous estimates of the stock of consumer durables made in the late 19th and early 20th centuries? Bollfras (1878) found that they amounted to roughly 450 million SEK in 1880, Fahlbeck (1890, p. 55) suggested 650 million SEK in 1885 and Flodström (1912, p. 215) 940 million SEK in 1908. These amounts are larger than the ones I present, and the difference is notable (from a third to four times as large). The exact reasons for these deviations are unclear, but the fact that the previous estimates also include clothing can be one important explanation.

The role of consumer durables for the total private wealth-income ratio $\frac{W_P}{Y} = \beta_P$ in Sweden is shown in Figure B6. It is evident that the inclusion or exclusion of the stock of consumer durables is not crucial for the overall level or trend of β_P.

[Figure B6 about here]

B4. Memorandum category: Fire insurance values

There is a long tradition in national accounts to use fire insurance values to estimate the value of national non-financial assets. In Sweden, fire insurance values have not been important in the construction of national wealth estimates but have been discussed in some of the investigations concerning to what extent these values report similar levels and trends as other estimates of non-financial assets.

There are some conceptual problems with using fire insurance values in the present study of Swedish wealth. The most important one is that officially reported values of fire-insured assets will contain both gross assets of households, primarily housing and consumer durables, and gross assets of corporations. This makes it difficult for the calculation of private and national wealth using this study's methodology which departs from the full account of households. In addition, fire insurance values have been disputed to accurately reflect the true value of the stock of insured assets due to problems of valuation, an interest of insurance companies to over-insure their clients, underinsurance by cash-constrained small companies or poor families and by large corporations that prefer to bear the risks themselves.

There are some series showing the total value of fire-insured assets in Sweden as insured by Swedish insurance companies and foreign insurance companies licensed in Sweden. These values were reported by Statistics Sweden in various publications between the 1850s and the

1960s.[53] Figure B7 shows the ratio between fire-insured valued non-financial assets to national income and the standard ratio of non-financial assets in tax-assessed values to national income. The main message is that the fire-insurance values trended more and also seem to be varying more than asset values based on tax assessments. Englund (1956) discusses this trend and, in particular, why fire insurance values of the 1950s exceed those of tax-assessed, and market-price based, values of the insured property. He offers no clear answer but suggests that there may be a combination of depressed market values of rental buildings due to postwar rent controls and a discrepancy between the going concern value of a building and the total cost of rebuilding it in case of a fire.

Given the large uncertainty about which assets that are actually included in the insurance data, the conclusion is that these values are of little help when computing the national or private wealth in Sweden.

[Figure B7 about here]

[53] The first observation is for 1858 in Finanskommittén (1858, p. 30–32). Then the five-year reports of the Swedish counties (BiSOS, femårsberättelse, sammandrag) report these values every five years between 1860 and 1885. Flodström (1912, pp. 124–125) report a series for 1891–1908. Finally, Statistics Sweden's Statistical Yearbook reports annual stocks of fire-insured values during the period 1910–1968.

Appendix C Household sector: Financial assets

Financial assets represent the second major asset component in the portfolio of households and the nonprofit institutions serving households. Following the system of national accounts structure, the items within this asset class are: *Deposits and currency*, *Shares and mutual funds*, *Bonds*, *Other claims* and *Individual pension and insurance savings*.

The main source material for the financial asset statistics is historical financial sector publications, as reported either by the banks themselves or by the Riksbank or Statistics Sweden. Historically, there have been many different kinds of banks that have all catered different parts of the Swedish economy. When it comes to household assets, the most important part concerns household deposits in the savings and commercial banks.

Because of the relatively ambitious regulations that have always surrounded banks, there exist annual statistical records on balance sheet statements for nearly all banking types since their appearance. As some economic historians have noted, one should be vary about the slight variations in quality of these statistics over certain time periods due to deficient reporting requirements as well as a general lack of supervision. Still, these variations should be well within the acceptable error margins for our purposes (Ögren, 2011).

Distinguishing between households and firms is difficult in the published banking statistics. While these are today regarded as separate sectors in the national accounts, in the past banks typically bunched them together into one category, called "the public". The following describes how the relative shares of these two groups are estimated over time and across asset classes.

Figure C1 shows the structure of financial assets. There are no apparent trends in the shares across financial asset types. Bank deposits and business equity each comprised about one third of household financial assets throughout the two centuries and the only major change is the recent rise of insurance savings that currently represents over 40 percent of financial assets.

[Fig C1 about here]

C1. Deposits and currency

One of the most important components of household financial assets in past times is currency and bank deposits. The main source for these data is the official banking statistics, published annually over the entire period.

Data on bank notes and coins in circulation are taken from the official Riksbank monetary statistics. The data come from the balance sheets of the Riksbank and, between 1834 and 1903, also from the private note-issuing commercial banks.[54] It is widely recognized that practically all of this is in the hands of households.[55] Figure C2 reports the relative shares of currency and various kinds of bank deposits in household portfolios.

[Figure C2 about here]

[54] Up until 1870, the source is Sveriges Riksbank (1931). From 1870 onwards the series of Edvinsson and Ögren (2014) is used.
[55] This has been argued by, e.g., Thunholm (1969).

Household deposits at banks are estimated as follows. During the first half of the 19th century, there were very few banks and other financial institutes active in Sweden. In the 1810s there were only a handful of so-called discount banks ("Diskonterna") acting as commercial banks in the major Swedish regions, but they all ceased to exist in 1818. In Brisman (1924, p. 244) there is evidence on total deposits at the three largest discounts, Göta Kanal, Göteborg and Malmö. Bertil Andersson studied the share of personal deposits among all deposits at the Malmö Diskont, finding shares ranging from 0.43 to 0.6 (Andersson, 1985, table 16). The total deposits counted are thus the sum of deposits times the household share of deposits.[56]

The Parliament-owned Riksbank acted as a commercial bank in this period and its deposits (listed in Riksbanken (1931, Tab. A) as "Växelbankens kreditorer" up to 1828 and "Löpande räkning i depositionsavdelningen" up to 1901 when the household deposits had disappeared) are therefore also included in our series. The privately owned commercial banks did not appear until 1834. Although commercial banks were traditionally regarded as banks mainly focused on servicing the corporate sector, they had household customers from the beginning. Today households hold most of their deposits with commercial banks. In order to separate out the share of deposits held by households, I sum deposits in savings accounts ("sparkasseräkning"), most of the long-term deposit accounts ("depositions- och kapitalräkning") and a small share of checking accounts. Household shares of the account types were retrieved from several studies of Swedish banks. That savings accounts were largely held by households is reported by Kock (1932, p. 74) and Thunholm (1969, pp. 67f). Kock (1958, p. 23) reports that households held about four fifths of the long-term deposits, and I therefore take 80 percent of the deposits reported in Statistics Sweden's Statistical Yearbook on the "Depositions- och kapitalräkning" (before 1956) and the sum of "Depositions- och kapitalräkning" and "Kapitalsamlingsräkning" (from 1956s onwards). Finally, as for checking accounts, Thunholm (1969, pp. 63ff) states that the this was historically the running expense-account for private business but as wages and salaries started being paid through banks in the late 1950s the number of households with such an account increased rapidly. I assume that households held ten percent of the value of checking account deposits up until the mid-1950s after which its share increased up to 100 percent by 1970. By this time, firms had started to use other account types (primarily the giro capital account).

Savings banks emerged in Sweden in the 1810s, and their main purpose was to offer savings accounts to individuals or households. I include all of the savings bank deposits in the household portfolios, and I also include all deposits held at the state-owned Post Savings Office (Postbanken). See also the discussion in Thunholm (1969, pp. 109–111). Data are mostly collected from Statistics Sweden (1960, pp. 99, 103) and they are annual from 1860 onwards. Before this date, total deposits are reported only for single years and not farther back than 1834 (despite the fact that the first Swedish savings bank appeared in 1813). I linearly interpolate the years in between the points of observations. For the period before 1834, I estimate the deposits as follows. I have annually number of banks to get a full series from Statistics Sweden (1960). I then assume that the average amount of deposits per bank was the same back to 1813 (the founding year of the first savings bank) as it was in 1834, a year for which such data exist. It is reasonable that a savings bank attracted roughly the same amount of savings as these were made on a quite standard deposit scheme. Having said this, the total

[56] There are some other studies of the Swedish discount banks supporting the numbers used. Annual balance sheets of the third biggest Discount bank, *Malmö Diskont*, are reported for some years in Kärrlander (2008). See also Kärrlander (2011). Nygren (1985, p. 29–32) reports that this bank was equally large to the one in Gothenburg, but that the largest was Göta Kanal Diskont, with about seven times larger amount of deposits.

amounts deposited at savings bank in 1834 was still quite small in relative terms—only about five percent of all notes and coins in circulation—why this has little impact on the total household portfolio.

From 1970 onwards, I use the Financial Accounts for total household deposits, supplemented by the Riksbank series over notes and coins in circulation.

C2. Shares and mutual funds

An important and partially difficult component in households' financial portfolios is shares in business equity and mutual funds, and also in unincorporated businesses. A basic distinction concerns whether the shares are listed (and traded) on organized secondary securities markets (stock exchanges) or if they are not. This difference has bearing on both valuation approaches and, in particular, the general availability of information on the size of these stocks.

In the case of market-listed shares, the quality of information about the number of listed shares and their market value has recently become improved thanks to research efforts (e.g., Gernandt, Palm and Waldenström, 2012; Waldenström, 2014). Market capitalization, i.e., the current market value of all listed shares, of the Stockholm Stock Exchange is known for the 20th century and there are also estimates available for the 19th century. For non-listed shares, however, the opposite is unfortunately true. Little is known about the number of total value of these shares, this is true today and even more so for historical periods.

To settle on a proper valuation is crucial. For non-listed shares this is often difficult since they are not associated with any easily observable market prices. To the extent that these shares are reported or estimated, they typically appear in their book or tax-assessed value. Shares in closely held firms are mostly family firms, and these have for most of the studied time period not even been recorded in the official economic statistical sources of Sweden. Unincorporated firms are not listed in any systematic manner and their value instead has to be estimated from information about turnover and assumptions about the relationship between the firms' capital stock and their recorded output ratios.

Adding to this difficulty is the fact that there are almost no previous attempts to estimate the size or aggregate value of the non-listed, closely held business equity or the unincorporated businesses. This lack is unfortunate since there is reason to believe that the stock of closely held firms is of an order of magnitude. In the present analysis I make a rough estimation of the total value of shares, listed and non-listed, and unincorporated firms owned by Swedish households for the entire period. Figure C3 reports the value relative to national income of the listed and non-listed shares (including unincorporated businesses).

[Figure C3 about here]

C2.1 Listed shares

The history of joint-stock companies in Sweden is not long. Even though Sweden may even have had the first joint-stock company in the world,[57] there existed only a dozen or so companies in Sweden when the first join-stock law was enacted in 1848. Indebetou (1925) lists

[57] Stora Kopperberg's Mining Company, issued its first shares in 1347 (Broberg 2006, p. 61).

the number of newly started corporations in each year during 1848–1925, and in the first decade after the new law less than a hundred of new companies had been launched. The expansion of incorporation came instead during the first decades of the 20th century, when several hundreds of new companies came into business annually. The stock of companies is not readily available in these early years, but assuming reasonable firm destruction rates the total number of joint-stock companies around 1900 was about 2,000 (Broberg, 2006). Secondary stock trading took place both on the country's prime market, the Stockholm Stock Exchange, an over the counter in banks or private brokerage firms.

The value of household-owned stocks and mutual funds are computed using a wide array of secondary sources. From 1970 onwards, the official, and highly reliable, series of the Financial Accounts is used.[58] Before that year, I construct the series using data on the market capitalization of the Stockholm Stock Exchange, Sweden's prime market place ever since its start in 1863.[59] As for the household share of the listed stocks, I use information on this for a few points in time during the study period. Before 1911, the households are assumed to hold 80 percent of the value of all listed shares.[60] In 1911, a new law authorized banks the right to hold shares in their balance sheets, and it is therefore reasonable that the household share of stock ownership declined gradually after that (Fritz, 1990). According McLure and Norrman (1997) households held about 75 percent of all listed shares in 1950. In 1970, finally, the value of households' listed shares according to the Financial Accounts (14 billion SEK) represents about 57 percent of the stock exchange capitalization. As the exact progression of the household shares is unknown, I assume it to decline linearly in between these years. The final household stock of share ownership is fairly well in line with some previous estimates. It is lower than the handful of years presented by Spånt (1979), but then Spånt does not account for the fact that others than households held listed share (his amounts are basically equal to the total stock market capitalization).

C2.2 Non-listed shares

The counting and valuation shares in closely held corporations and non-incorporated businesses, e.g., partnerships or small family firms, constitute one of the most difficult parts of this research. Not even today there exist comprehensive estimates of their total number or current market value. For this reason, this asset class is often excluded (not explicitly, but effectively) from the compilation of most countries' balance sheet statistics.

In this study, I present a tentative calculation based on four components: value of non-incorporated businesses owned by Swedish households (i), value of the non-listed shares (ii, iii) and value of foreign holdings (iv). During the 19th century, two main categories make up the non-listed company shares. This series relies on a combination of sources. There are a few point estimates made for single years, some series of the value of handicraft and home industry, and annual variations in firm creation, bankruptcy frequencies, and estimations of average market values of other small businesses. The final series seems plausible when compared

[58] Specifically, I use the data for 1970–1979 reported by a special report by Statistics Sweden, Bergman et al. (2010), and from 1980 onwards the series reported in Financial Accounts series Sparbarometern.
[59] Market capitalization of the Stockholm Stock Exchange is reported in Waldenström (2014).
[60] There is not data supporting the calculation of an exact share. From various historical sources, it appears that private individuals were the prime investors on the early Swedish stock market. From the firm-level microdata of all listed firms in 1901–1919 used by Waldenström, Gernandt and Palm (2012), it is however clear that also non-financial firms held other firms' shares in their balance sheets, representing about 10 percent of own equity. Since the majority of firms were not listed the true share of non-household stock holding must have been larger, and a fifth appears to be a reasonable estimate.

to the rest of household assets and national income, but it is hardly fully correct. Hopefully there will be better data available in the future to improve upon this initial attempt to construct a homogenous series.

C2.2.1 i) Capitalized value of home industries, 1810–1969

As for the first category, home industries, the capital stock K is estimated using data on gross output Y and assumptions about the relationship between capital and output, K/Y. Schön (1988, table 15, p. 112ff) estimates the value of gross total output among handicraft and home industries during 1810–1930, using data on the number of employed people in these industries and wage series in these industries. These handicrafts and home industries were reported separate from the rest of the industry statistics, covering the larger industrial firms for "either organization and legal or quantitative grounds" (Schön, 1988, p. 90). Assuming a capital-output ratio of 2, the capital stock is then calculated by multiplying the output by this ratio. Since there are overlaps with the other category, non-listed corporations, the capital stock of home industries is halved. For the period 1931–1969, the value of home industries is estimated to be of the same size relative the market value of incorporated non-listed firms (see below) as it was in the 1920s, roughly one fifth.

C2.2.2 ii) Market value of incorporated non-listed firms, 1810–1969

For the period between 1810 and 1850, it is clear that the number of incorporated companies in Sweden was small. Broberg (2006, p. 63) states that only 13 companies received official charter for issuing shares with limited liability between 1793 and 1842. However, in addition to those there were "several tens of companies" with some sort of limited liability, although not officially granted. I assume that there were ten joint-stock companies in 1810 and that the number increased to 48 in 1848. The average size of the equity capital of these companies is based on the presumption that their total market value in 1810 was equal to twice the value of the country-dominant canal shipping company "Göta canal company".[61] For the period 1834–1848, the average size of equity capital is assumed to be equal to the average size of the equity of commercial banks, which emerged at this time and whose balance sheets are available annually in Riksbanken (1931). The average capital during 1810 and 1834 is linearly interpolated.

From 1849 up to 1910, Indebetou (1925) reports both the annual number of charterings of new joint-stock firms and the total value of their book equity. I add an accumulated stock of new firms, net of a subtracted assumed bankruptcy rate of 10 percent of existing firms.[62] The total number of joint-stock companies is then multiplied by a five-year moving average of the annual average capital size of newly founded companies, also reported by Indebetou. This gives the total book value of Swedish joint-stock firms. From 1943 onwards, the stock of joint-stock companies is reported in the Statistical Yearbook of Statistics Sweden. This constructed series is then adjusted with respect to some reference years for which more comprehensive estimates of the total equity stock are reported. For 1880, Van Der Hagen and Cedershiöld (1881) reports that Sweden had 1264 incorporated firms with a total value of equity of 455 million SEK. This value represents 86 percent of the value of the above estimated

[61] Indebetou (1925, p. 9) reports that the Göta canal company's charter in 1810 was on a share value of 4.7 million Rdr Banco, or 7.1 million SEK.

[62] The exact bankruptcy rate is unknown, but there is some historical evidence on reported bankruptcies between 1866 and 1950 reported in Statistics Sweden (1960, Table 169, p. 170). The annual number lies on a fairly constant level up to the 1920s, and Gratzer (2002, Figure 1) reports a series since 1830 finding a relatively stable incidence of bankruptcies up until the 1970s.

series, and thus the estimated series is scaled down in this year. For the year 1908, (Flodström, 1912, p. 744–745) reports a total number of joint-stock companies of 5,014 having a total value of 1,911 million SEK, which is 42 percent higher than the estimated value.[63] A third reference period is 1970, or the 1970s, when information from the Financial Accounts and the National Wealth Statistics are used (see further below). At this point, the value of non-listed firms is about 3.7 times larger than the cumulated stock series, but in order to avoid inflating values in the interwar period, adjustments are made gradually in the 1940s and 1950s. Thus, the final estimated cumulative stock series is scaled, gradually descending from 100% of its original in 1849, to 86% in 1880, up to 138% between 1908 and 1943, up to 3.7 from 1957 onwards.

C2.2.3 iii) Market value of incorporated non-listed firms, 1970–2010

For the period 1970–2010, finally, I combine information from two sources. First, data from the Financial Accounts are used. Specifically, the total book value of "non-listed corporate shares" held by all Swedish sectors, i.e., not only households, is reported from 1980 onwards. For 1970–1980, there are only data on yearly transactions, but after adjustment for inflation and economic growth, these transactions can be used to "decumulate" the 1980 stock back to a stock in 1970. Two additional adjustments are in place. First, all non-household holdings need to be subtracted. This is done using sector-wise ownership information of non-listed shares in the National Wealth project of Statistics Sweden (Statistics Sweden, 1994), resulting in a household share of on average 52 percent between 1970 and 1990. This share decreased thereafter, to about 30 percent in the 1990s and 20 percent in the 2000s, reflecting an increase in cross-ownership among firms as reflected in the Financial Accounts. Second, the shares need to be converted into market values. This is done using information from a special investigation of the size and value of non-listed household equity capital in 1985 by Rylander and Bergman (1988), finding an approximate market-to-book ratio of 1.6.

C2.2.4 iv) Super-large, non-listed firm assets

Although the estimated stock of non-listed corporate shares should in principle cover all such firms in Sweden, there is reason to believe that they may be imprecise when it comes to the extremely large family firms held by a small number of super-rich Swedes. In the absence of objective information on these fortunes, journalists have at times created alternative estimates of the wealth of these super rich families, based on subjective valuations. Examples of such listings are the *Forbes 400* in the U.S. and the *Sunday Times Rich List* for the U.K. Because of their subjectivity in the valuation of the fortunes one must treat these numbers with great caution. For example, their methods comprise of a subjective and typically undisclosed selection of valuation techniques and comparisons with similar companies for which financial information is more openly disclosed. Journalists collect most of their information from publicly available sources such as newspapers, company reports and financial market prices, but at times also interviews with the rich themselves are used. See further the discussions in Davies and Shorrocks (2000) and Atkinson (2008).

In Sweden, business magazines *Affärsvärlden, Månadens Affärer* and *Veckans Affärer* for single years since 1983. Using these listings, it is possible to calculate the value of non-listed companies (family firms) held by the super-rich Swedes living in Sweden. The named residents owning non-listed wealth are between 100 and 300 in the 1980s and 1990s with fortunes averaging about half a billion SEK. In the 2000s, the lists only include between 40 and

[63] The capital value in 1908 is the sum of all shares (including the reserve fund) and retained earnings, net of shares held by industrial firms and foreign owners.

60 of this group, having an average wealth of 2-3 billion SEK.

The interesting question in this study is to see whether these numbers are large in relation to the rest of non-listed corporate wealth. Relating data on these fortunes in domestic family firms listed in Roine and Waldenström (2009) to the main series of this study, it is found that the fortunes of the super-rich are about a fifth of the total value of non-listed firms. This share is almost constant throughout the period from the 1980s to today. In other words, disregarding this pool of fortunes from the analysis is not unproblematic. However, given the highly imprecise nature of the estimations of this extreme wealth, which typically grossly underestimates indebtedness of the super-rich, it would probably be even more problematic to include them.

C2.3 Non-residents' ownership of Swedish shares

Foreign direct investments in Sweden were relatively limited over most of the period. During most of the 19th and 20th centuries, foreign ownership has been harshly regulated and documented. Still detailed information about foreign ownership is scarce.[64] Up until the 1870s there seem have been quite limited foreign purchases of Swedish assets. As regards property ownership, an investigation made in 1874 showed that there were 304 foreign property owners, of which 274 resided in Sweden. Their real estate properties amounted to 23 million SEK, or about one percent of all real assets (Gårdlund 1942, p. 188).

In the national wealth investigation of 1908, the total foreign ownership of Swedish industry was estimated to be about 80 million SEK (Flodström, 1912, p. 222), representing about 6.3 percent of the stock exchange listed market capitalization. Foreign ownership was restricted in the 1910s due to the political tensions in Europe and the need for a stricter Swedish neutrality policy (Samuelsson, 1977, pp. 21f). Cross-border portfolio and direct investments were thereafter scarce. In an investigation of the foreign ownership in Sweden during the postwar period, Samuelsson (1977) finds that about three percent of Swedish industrial companies were foreign subsidiaries, and the share of foreign-owned capital of the total Swedish incorporated business equity should therefore have been much smaller.

In the present study, one specific adjustment is made for foreign ownership of Swedish business firms for the period up to 1970. Using the 1908 evidence, it is assumed that foreigners held 6.3 percent of the exchange-listed shares from the opening of the Stockholm Stock Exchange in the early 1860s. From the mid-20th century, direct estimates of household ownership are used and therefore no extra adjustment for foreign ownership is necessary.

C3. Tobin's Q and the valuation of corporate wealth

A proper valuation of corporate wealth is important for the estimation of private wealth. The SNWD reports privately owned corporate net wealth in the form of the value of corporate equity owned by households. Specifically, this is the sum of listed shares on the Stockholm Stock Exchange and non-listed corporate shares in closely held companies (see also Piketty and Zucman, 2014, 2015).

[64] In some cases the distinction between financial and real asset ownership is difficult to make. The foreign purchase of the Klotenverken company in 1872 included "a complex of forests, mines, blast furnaces and iron ores" (Gårdlund 1942, p. 188).

One issue in corporate valuation in the context of national accounting concerns the relationship between the market value of corporate wealth and the replacement value of the assets in corporate balance sheets, i.e., the size of *Tobin's Q*. The SNWD does not contain aggregate data on corporate balance sheets and does thus not offer a full scrutiny of this questions. However, it is possible to use the national accounts in which national wealth W_N can be expressed as the sum of domestic national capital K_N and net foreign assets NFA. From this relation we can express domestic capital as

$$K_N = W_N - NFA\,. \tag{2}$$

Domestic capital can, in turn, be decomposed into private and public capital stocks and the sums of household, corporate and government capital as follows: $K_N = K_P + K_G = K_H + K_C + K_G$. Using this in equation (2) we can express corporate capital as follows:

$$K_C = W_N - NFA - K_H - K_G \tag{3}$$

Empirically, the SNWD contains information about the market value of non-financial assets of households (Appendix B), K_H, and of the public sector (Appendix E), K_G, in addition to values of national wealth and net foreign assets. We can therefore solve residually for the market value of corporate capital, K_C, using equation (3). The replacement value of corporate capital is more difficult to defined, but one estimate is the corporate capital stock computed in Statistics Sweden (1995) and later versions of the national accounts using perpetual inventory method (PIM)-calculations of accumulated investments.[65] $Tobin's\ Q$, or a version of it, is then the ratio of the residual-based market value of corporate capital, K_C, to the replacement (or book) value of corporate non-financial assets, A_C^N, i.e., $Tobin's\ Q = K_C/A_C^N$. In Table C1, I use these numbers to compute Tobin's Q during 1980–2010 which is the period for which we have information about A_C^N. The ratio is relatively low during the 1980s and 1990s, between 1/3 and 2/3, with no clear trend. In the 2000s, the ratio increases and reaches 100 percent at several occasions, especially in years when net foreign assets become positive.

An alternative expression of the relationship between market-valued and book-valued corporate equity is $Tobin's\ Equity\ Q$, defined as the ratio of the market value of corporate equity E_C to total assets less non-equity liabilities, $L_C - E_C$. This ratio is shown in Table C1 and it is similar to the other version of Tobin's Q, but it remains at the relatively low level also during the 2000s.[66]

Comparing the results for Tobin's Q in Sweden with the levels found by Piketty and Zucman (2014) suggests that Sweden is similar to Germany in having a relatively low Q. As discussed by Piketty and Zucman, the exact reasons for the low level in Germany is not clear, but one possible explanation is the corporate ownership structures, being largely dominated by holding companies for which corporate values are often discounted. Sweden has a similar bank-

[65] Statistics Sweden (1995, table 3:7) lists the stock of produce and non-produced non-financial assets of both non-financial and financial corporations for the end of years during the period 1980–1994 (or actually January 1 in 1981–1995). Since 1995, Statistics Sweden reports the produced stocks in the quarterly and annual national accounts. I estimate the stock of non-produced non-financial assets (i.e., land and timber tracts) assuming the average relation as in 1980–1994.

[66] Note that the number for E_C includes the total value of market capitalization of the Stockholm Stock Exchange and not only the share of listed stocks held by households, the reason being that it is not possible to single out household-owned corporate assets from the national accounts.

based governance system (in contrast to the Anglo-Saxon market-based corporate governance) with a traditionally large representation of holding companies as dominant company owners (maintaining influence through differentiated voting rights). That this governance structure has generated substantial discounts of market values of these holding companies is well-known (Henrekson and Jakobsson, 2012).

[Table C1 about here]

C4. Bonds

The estimation of the value of fixed-interest securities in the household balance sheet is based on different sources. A basic assertion is that fixed-interest securities, i.e., bonds issued by local mortgage institutions, corporations (mainly during the 19th century) or the government, are held in the same proportion as long-term bank deposits. In Spånt (1979), data on household amounts of bonds are presented in a handful of years. The bonds' share of bank deposits and bank notes was about five percent in 1935, a share that I assume was true back to 1880. Back to 1835 I assume that bonds were held at a share of three percent of bank deposits. Before 1835, the share is zero since there bonds were not issued to Swedish households at this early era; mortgage institutions and corporations hardly existed, and the Swedish government only issued loans to foreign markets (Nygren 1985, pp. 44f).

In 1945, the ratio of bonds to bank deposits was according to Spånt (1979) as high as ten percent, but this was an outlier due to the large expansion of war-related government loans, especially so-called premium lottery bonds ("premieobligationer") and tax-exempt savings bonds ("sparobligationer").[67] Using the Spånt shares of bank holdings, in 1951 the share of bonds was again down to about five percent, but this yields a markedly lower amount of bond holding than is implied by the actual outstanding lottery and savings bonds that year (whose share of bank holdings was eight percent). Moreover, even these eight percent is too low as we know households held other types of bonds (in 1970, lottery and savings loans only represented two thirds of households' bonds). Therefore, I assume that the household bond-bank deposits ratio in 1970 also held true during the period 1950–1969. In practice, this means that the large floatings of government bonds during the Second World War also remained in household portfolios. For this reason, the bond amounts in this study are markedly higher than those in Spånt (1979) but still at about the same level as in Berg (1983, 2000), whose approach is similar to mine. From 1970 onwards, data on fixed-interest securities are compiled by and collected from the Financial Accounts.

C5. Other claims

Informal credit markets dominated Swedish household finance during most of the 19th century. When needing money, households mainly lent money from each other, and therefore household financial assets contained a large share of informal claims in addition to bank holdings and financial securities. These claims were bills of exchange ("växlar"), promissory notes ("reverser") and other kinds of financial claims on others. Prior to Sweden's credit market deregulation of the mid-1980s, the formal channels for bank lending were highly rigid. Thus alternative channels for credit were relatively popular in being more flexible. For

[67] Premium lottery bonds is a kind of government bond where coupon payments are collected and distributed to bondholders through a lottery.

example, whenever there were time gaps between delivery and payment, e.g., when purchasing a house, people wrote promissory notes. Among small business, contained within the household, trade credit is another form of such claim.

Several economic historians have tried to estimate the size of the informal credit market in 19th century Sweden in comparison to the formal market. Lindgren (2002) investigates probate records in the town of Kalmar, finding that the share of interpersonal unpaid loans among the deceased was 80 percent around 1845, 75 percent around 1875 and 45 percent around 1905. Lilja (2004, pp. 82f) studies another small town, finding equally high shares of interpersonal debt up the 1870s, but thereafter a more rapid decline to about ten percent in 1900.[68] Translating these estimates to the national level poses some challenges, as it is likely that the shares of the informal credits were higher in agricultural regions and lower in large cities. On balance, I have landed at assuming the informal financial assets to be four times the size of bank deposits and currency in 1820 and 1840, 2.3 times in 1860, 1.5 times in 1880 and 0.22 times in 1900.

For the 20th century, Spånt (1979) has estimated the informal debt claims in household assets for the period 1935–1970 to. In 1935 he finds them to be as large as 25 percent of bank holdings, and I assume that this was the case also for earlier years. Possibly this underestimates the share for the 19th century since the formal financial system was heavily underdeveloped at this time (Lindgren, 2002). Spånt's data suggest 14 percent in 1966.

For the period from 1970 onwards, there is information about household loans in the Financial Accounts of Statistics Sweden. During this period, the ratio of miscellaneous claims to bank deposits shrinks from around ten percent in the beginning to less than one percent in the end.

C6. Pension entitlements

Pension entitlements represent a large and heterogeneous class of assets. They include individual and collective pension and insurance savings, some that are funded and some that are unfunded and instead being claims on future income streams. According to the definition of private sector wealth established in the 1980s, funded pension entitlements count as private wealth, including individual pension savings (sometimes called technical insurance reserves) and funded occupational pensions. In the Swedish Financial Accounts these items are officially counted since 1995. In the most recent version of the System of National Accounts from 2008, however, unfunded pension claims are treated as a memorandum category in a discussion about including all kinds of pension entitlements in private wealth (United Nations, 2008, chapter 17). In other words, there is an opening to treat not only should individual private pensions savings (previously part of the category technical insurance reserves) but also less tangible entitlements in the public and employment-related pension schemes as private assets.

The ambiguity remains, however, concerning how to treat pension wealth in relation to marketable wealth. On one hand, it makes sense to include pension assets from the viewpoint that it is well-known that pension savings tend to crowd out private financial savings and thus the structure of tangible household assets (Feldstein, 1974; Berg, 1983; Gale, 1998). On

[68] Perlinge (2005) estimates informal and formal claims in a small agricultural society between 1840 and 1900, finding somewhat higher shares of informal claims than Lindgren (2002) and Lilja (2004).

the other hand, these claims do not meet the standard requirements on an asset for being defined as "personal wealth". The property rights of pension assets are restricted, and individuals are not allowed to readily use them at will.

Another, more practical, reason for why unfunded (and maybe some of the funded) pension assets should be treated separately from other marketable private wealth is that they are not easily defined and also not easily valued. There are two different types of pension systems. In "defined benefit" schemes the individual's future pensions derive from a mixture of fees paid in by the working population and capital returns from securities funds. In "defined contribution" schemes, the individual's future pension is drawn from a fund in which money come from past contributions from the individual or her employer. Calculating the net present value of pensions in defined contribution schemes is relatively simple: it is simply the current value of the individual's pension fund. In the case of pensions in defined benefit schemes, however, the net present pension wealth is calculated using more or less complex formulas based on assumptions about individuals' expected remaining lifetime, size of future payments, discount rates and assumed capital returns from pension funds.

In Sweden there are many variants of pension schemes, both defined benefit and defined contribution, some publicly run and others organized privately as either collective (occupational) schemes or individual savings. Within each of these schemes there are also different components that need to be taken into account. For example, public pensions were early on intertwined with poverty alleviation, but have gradually turned into a combination of an income guarantee for all old-aged or invalidated citizens and a function of the size of earned incomes during the working life, and in the last decade also with a defined contribution component.

When estimating the historical evolution of pension wealth there are several challenges, especially regarding the 19th century and first half of the 20th century. First and foremost, there exist no statistical sources in Sweden carrying comprehensive information about coverage in the population, pension amounts or the full array of different pension schemes available. Having said this, there are bits and pieces of information that still allow for quantitative assessments, though with larger error bands. Second, in this early era the boundary between old-age pensions and social assistance to the poor and elderly were not clear cut. Before the substantial increases in public pension amounts in 1948, old-age pensioners could not live out of their public pension. Edebalk (1996) describes how old people were instead forced to make a living based on help from their children, prepare for a life at a local "poor house" (financed by local charities) or simply continue working. Local poverty alleviation money topped up the low public pensions, suggesting a relationship between public pensions and social assistance (Elmér, 1960). However, in the calculations of the value of pension assets I exclude all non-pension social transfers. Third, some employment-related pension schemes included in-kind parts that are difficult to assess quantitatively together with the cash pensions (Harrysson, 2000, p. 56). I disregard such in kind pensions throughout.

In the following subsections, I present new long-run estimations of the value of funded and unfunded pension entitlements in three main categories: *Funded individual pension and insurance savings*, *Funded collective (occupational) pension savings*, *Unfunded occupational pension assets (memorandum)* and *Unfunded public pension assets (memorandum)*.

C6.1 Funded individual pension savings and life insurance savings

In this category a number of individual pension and life insurance entitlements as well as prepayments of premiums and reserves against outstanding claims are included. Claims on the public pension system or collective employment-related schemes are not included.

Data on this kind of personal savings actually exist back to 1860. Prior to 1860, they are assumed to be zero (which they also actually were by 1860). For the period 1860–1950, data were reported by private insurance companies and trade unions and published in Statistics Sweden (1960).[69] For the period since 1950, data come from official statistical sources of Statistics Sweden. Specifically, for the 1950s and 1960s SOS Försäkringarna reports individual savings schemes and from 1970 onwards the official series in the Financial Accounts.[70]

There is a break in the series in 1996, when an additional insurance category – object insurances – was included in the ESA95 official definition of individual insurance savings (or "technical insurance reserves"). These object insurances represent roughly a quarter of all individual insurance savings, with life insurances and other private pension savings representing the other three fourths.

Another concern with the official series is that it may be on the low side. Ståhlberg (1995, p. 44) estimates the total value of private insurance savings in the 1980s and early 1990s, finding 50–90 percent larger amounts than the Financial Accounts. It is not clear, however, how this discrepancy can be explained, and for consistency reasons I use the official series of the Financial Accounts.

C6.2 Funded collective pension savings (Occupational pensions)

Occupational pension arrangements have existed during the entire study period, but their structure and scope have changed profoundly. There is a general lack of information about the employment-related pension systems in Sweden. Olofsson (1993) offers a broad characterization of the evolution of the pension system and Harrysson (2000, ch. 4) sketches the broad picture of the late 19th century up to the pension reform of 1948. During this period, most employees did not enjoy any occupational pension benefits whatsoever, but over time the share that did increased gradually. The most common arrangement was employee- or employer-run pension thrifts ("pensionskassor"), i.e., funded collective pension savings. The operations among these thrifts differed, with some offering members a fixed pay after retirement while others were less transparent concerning the benefits associated with membership. The postwar period saw an increased ambition in setting up these employment-related pension schemes, and blue- and white-collar workers have had general schemes on top of the public pensions.

Sources on funded occupational pension schemes are not as problematic as they are for public pensions (see below), but they still pose a number of challenges. The major reason for why occupational pension wealth is easier to estimate is that they were mostly set up as defined contribution schemes (although there were also examples of defined benefit schemes, such as in the case of state employees as mentioned above). This means that in order to calculate their net present value, it suffices to acquire information about the total value of the different

[69] See Statistics Sweden (1960), tab. 87. "Svenska bolags livförsäkringsverksamhet 1860–1950", p. 106.
[70] The Financial Accounts do not report stocks prior to 1980, but they do report annual transactions from 1970 and I use these to calculate the stocks. The same method was used by Berg (2000). For the period 1970–1994, item FA6110 (in ENS 1995) is used and from 1995 onwards (in ENS 2010) item FA6200 is used.

pension funds at year end. However, there are no comprehensive sources where all of these funds are listed and there are thus gaps in the series.

Data on 19th century employer- or employee-run occupational pension funds are not rich. Sundbärg (1901, pp. 996f) describes the history of the Swedish pension thrifts and presents a table with their number for ten categories and their total fund value in 1895. Furthermore, Harrysson (2000, p. 43) lists the number of thrifts once or twice each decade since the 1840s. Based on Harrysson's and Sundbärg's descriptions of the evolution of the number of thrifts during the 19th century and their average fund value in 1895, a rough calculation of the value back to 1810 is conducted.[71] In the first half of the 20th century, the total fund value of state-run occupational pension thrifts is published in Statistical Yearbook by Statistics Sweden. To this I add an estimated value of non-state thrifts using their observed share of the total value in 1948.

For the postwar period, the point of departure is the official post-1980 series of the Financial Accounts. These are available at a disaggregated level for collective private pensions, i.e., occupation pensions, from 1980 onward. Note that the official series at the Financial Accounts includes the premium pension savings in the public system (PPM) from 1996, but here they are removed since they actually belong to (and are here also already included in) the public pension series as described in the previous section. During 1950–1979, there is thus no official series on the stock of occupational pensions in the Financial Accounts. Instead I use the annual transactions on collective pension savings collected by Berg (2000).

It would be valuable to check the robustness of the stocks estimated. There is no public authority responsible for compiling and reporting stocks of the collective private pension system as is done for public pensions by the Swedish Pensions Agency. For single years, however, there are estimates, which include both funded and unfunded (in net present value) pension assets. Sjögren Lindquist and Wadensjö (2007) estimate the stock to be about 887 billion SEK in 2004, which is about 30 percent higher than the estimate of 688 billion SEK in the Financial Accounts. For 1999, Andersson, Berg and Klevmarken (2002) calculated the net present value of occupational and public pensions for middle aged and retired Swedes, finding that occupational pensions represented a smaller share of total pensions. For 1991, Olofsson (1993) finds a number of 355 billion SEK which is almost 40 percent larger than the official estimate of 259 billion SEK. Even more problematic, in 1980 Olofsson (1993) finds a number of 158 billion and Ståhlberg (1981) estimates it to be 110 billion SEK in 1978, both of these estimates are about three times as large as the Financial Accounts-based series. For 1985 Johansson and Johansson (1987) present estimates of the total pension wealth in the funded and unfunded ITP and STP occupational pension schemes, landing at a value of 277 billion SEK, which is more than twice as large. Although it is not explicitly stated what explains the discrepancies, some of it surely reflects the unfunded pension wealth that is not reported in the official series of the Financial Accounts. For simplicity,

[71] Specifically, Sundbärg states on p. 996 that there were twenty thrifts existing in the 18th century, that an additional 38 were founded in the period 1801–1850 and that yet another 115 emerged during 1850–1895. Harrysson (2000, p. 43), citing a previous study by Günther Sollinger, lists the number of thrifts each decade between the 1840s and 1895. Assuming the number of thrifts being 20 in 1810, I then interpolate linearly between the other years for which data exist to get an annual series. To get values, I first use the average fund value in 1895 (0.52 million SEK) and deflate it back to 1810 using CPI (landing at an average value in 1810 of 0.32 million SEK). Finally I then multiply the number of thrifts by their estimated average value.

A final remark on the occupation pensions concerns the extent to which they are to be considered inheritable assets (i.e., transferrable to relatives at death) or not. There exists little evidence on this issue for long historical periods. The default for most funded pension systems seems to be that unpaid pension assets that remains when someone dies are reinvested in the fund and not transferred to the family members. In some cases the insured have been offered the possibility to purchase an arrangement ("återbetalningsskydd") where remaining assets are inherited by the family. In the occupational pension scheme for white-collar workers (ITP), about one fifth of all newly signed pension schemes during 2007–2010 had this additional arrangement and were thus inheritable (Collectum, 2010). Unfortunately there exists no comprehensive statistics on the total stock of occupational pensions, but the share of inheritable schemes should be considerably higher than the one fifth observed in newly signed ITP pension schemes since these were signed by predominantly young workers who perhaps lack a family and who have not started to think actively about their own death.

C6.3 Unfunded private pensions (memorandum)

Employees in Sweden have at times also received pensions in the form of unfunded, defined benefit (*förmånsbestämda*) pensions paid out by employers from running expenses. There is little information in general about these schemes as they were typically decentralized, often firm-specific, and with the final claims on behalf of the employees generally highly uncertain. For a few employees in public administration during the 19th and early 20th centuries, the employer (the state) guaranteed a continued salary payment after a certain age (e.g., 70) for those who had been employed for at least a certain time (e.g., 30 years).[72] After the First World War, employers started offering their employees some sort of pension after retirement, partly as a way to reward longevity in firms but also due to bargaining agreements with labor unions. In general, these employment-based pensions were small, ranging between a tenth and almost a full average worker salary (Harrysson, 2000, pp. 47f).

The extent of these unfunded employment-based private pensions in net present value terms is quite uncertain and has to my knowledge not been documented before for almost any time period in Sweden. Harrysson (2000, p. 58) and SOU 1950:33 present some evidence on the extent of the occupational pension schemes, of which some were unfunded. As already noted above, private employers started in the 1920s signing collective insurance contracts with Sveriges Privatanställdas Pensionskassa, SPP, which were partly related to funded pensions but also a way to accumulated insurance funds to back up future pension benefit payments. Harrysson (2000) presents different kinds of evidence on the extent of these unfunded occupational pensions. To begin with, the installment of SPP in the 1920s marks a beginning of occupational pensions in Sweden, with the number of active members firms rising from a few dozens in the early 1920s to almost 5,000 in the late 1940s (naturally representing multitudes of employees). Some survey material from the 1940s concerning the structure of Swedish pensions, and their conclusion are that these unfunded defined benefit pensions were not significant relative the funded amounts in the thrifts and pension associations run by firms or trade unions. However, Berg (1983) estimates stocks of the sum occupational pensions, including both the value of pension thrifts and the net present value of future pension payments in the unfunded system. Specifically, these were the white-collar occupation pension scheme (ITP) that came in 1960 and the blue-collar occupational pension (STP) that came in 1973. His series suggests for the 1950s that the unfunded pension assets were almost two times the funded assets. As reported above, later estimates by Ståhlberg (1981) for 1978 and Johansson

[72] See, e.g., the encyclopedic entry "Pension" in Nordisk Familjebok from 1888, pp. 1001f, available at http://runeberg.org/nfal/0507.html.

and Johansson (1987) for 1985 suggest similar levels.

Based on these sources, the SNWD v1.0 contains an estimate of these unfunded private pensions. In the absence of direct estimates of occupational pension schemes, the basic approach is to use the above-mentioned estimates of total occupational pension wealth and subtract the recorded value of funded pensions in order to land at an estimate of the unfunded occupational pensions. Naturally, this indirect estimation approach is uncertain and it will be an underestimation in some periods and an overestimation in others, but until more tangible information is encountered these are the amounts used in the database.

C6.4 Unfunded public pension entitlements (memorandum)

The national Swedish old-age pension scheme has historically consisted of three parts: income pension ("inkomstpension", previously "allmän tillägspension, ATP"), guarantee pension ("garantipension", previously "folkpension") and premium pension ("premiepension, PPM"). The Swedish public pension system has to the large part been a defined benefit system, giving people a specified pension financed by a combination of pension fees paid by the working population, capital returns from pension funds and taxes.

Over the past century, the public pension system has undergone several reforms changing both its structure and composition.[73] The first important reform was the introduction of the guarantee pension system in 1913. This was actually the world's first universal public pension insurance system, which included all old-age pensioners and cripples, but at very low amounts that were far below the subsistence level.[74] A major reform of this system came in 1948 when pension amounts were substantially raised and for the first time allowed people to live only off their pension. There were also extra allowances for widows and compensation for people living in expensive areas ("dyrortstillägg"). The next major reform came in 1960, when the income pension was introduced and an additional amount, related to earnings during the working life, was added. Income pensions started being paid out for the first time in 1963. In 1995, a new major pension reform was decided in Parliament. This reform changed the funding principles of the system, making it more robust with respect to economic downturns. However, a new pension type was introduced: the premium pension, a funded pension of the defined contribution type.

Data on the net present value of Swedish public pension entitlements are scarce. From the year 2001 onward, the Swedish Pensions Agency publishes annual estimations of the current value of future pension claims of Swedish households for both income and premium pensions. For 1978 Ståhlberg (1981) made a careful estimation of the public pension wealth, and this estimate was adjusted to 1985 by Jansson and Johansson (1988). Berg (1983) made estimations for the period 1950–1978, including both public pension wealth and also employment-related pension entitlements (see next section). Berg's series lands at a somewhat lower than Ståhlberg's, and I therefore adjust Berg's series upwards. I use all of these values as reported, but subtract a latent tax debt (since pension income is taxed) of 25 percent. Years in between point estimates are linearly interpolated.

For the period 1914–1950, estimations are very crude. The main source of information is Elmér (1960) which reports pension amounts and eligibility rules. The guarantee pension was

[73] See Olofsson (1996) for a useful survey of the Swedish pension system between 1913 and 1993.
[74] Elmér (1960, pp. 261f) reports that the guarantee pensions were between a third and half of the official minimum living standard defined by social authorities in the first half of the 20th century.

at this time divided into one basic component and one means-tested component. Elmér (1960, pp. 532ff) reports the pension amounts and number of individuals in each class. I compute pension amounts in each class assuming that people live eleven years after retirement age (67 years), based on demographic statistics about remaining life expectancy rates (Statistics Sweden, 2010, p. 281).

C7. Net foreign assets

There are different methods to estimate the net foreign asset position over historical periods. The so-called *indirect method* uses accumulated flow of capital accounts. Schön (1989) estimates a series of Swedish net capital imports from the 1820s, using a method based on comparing the net export and changes in the foreign exchange reserves at the Swedish Riksbank. Schön's (1989) estimates build upon earlier efforts by Lindahl, Dahlgren and Kock (1937). Specifically, the method calculates net capital imports as the difference between the net export and changes in the foreign exchange reserves of the central bank. Schön adds the costs of the imported capital, using the interest on government bonds as a proxy for the cost of capital. The foreign debt stock is the equal to the accumulated capital imports. I present below an estimated series using precisely this indirect method, but still it differs somewhat from Schön's (1989) series despite using the exact same methodology. The difference lies mainly in the new standard in national accounting to handle transportation costs and insurance when valuing imports and exports.[75]

An alternative measure is to compile the value of all outstanding bond (and bank) loans of Swedish public and private actors floated abroad and then subtract the holdings of Swedish investors of foreign loans floated in Sweden. This other approach is called the *direct method*. Fahlbeck (1890) and Flodström (1912) apply this approach and find a series which is not all that different from the series of Schön. Altogether, there is a relatively robust basis for estimating the Swedish capital imports during industrialization. There is also a series based on Flodström (1912) on the total value of outstanding Swedish bond.

Figure C4 shows the evolution of net foreign assets as share of national income using the preferred indirect method and the complementary direct method. Strikingly, the methods show relatively similar levels and trends over the period up until 1930 when data on foreign outstanding loans become less clear. The build-up of a foreign debt during the industrial take-off is evident in both series, and so is the well-documented repurchases during the 1910s.

[Figure C4 about here]

C8. Memorandum category: Illegal offshore holdings

Offshore assets held in other jurisdictions, possibly for tax purposes, represent a potentially important but still difficult component in Swedish wealth portfolios. The importance of tax havens for personal wealth management in traditionally high-tax countries such as Sweden is a debated topic, and the nature of these flows make it difficult to properly assess the scope of off-shore assets. Historically, Swedish households have not owned notable assets or liabilities issued by or to foreign counterparties. Sweden as a country was a net debtor up until

[75] Statistics Sweden currently measure both imports and exports fob (*Free on board*), which means that the goods include transport and insurance costs when they arrive at the exporting country's and enter the importing country's frontier. Previously, imports were calculated cif (*Costs of insurance and freight*), i.e., before such costs.

World War I, issuing mainly government and mortgage bonds to continental investors from the 1830s onwards. During the 1910s, the country repurchased basically all of its foreign debt, and instead turned into a net creditor vis-à-vis the rest of the world. At the household level, however, holdings were always small. Flodström (1912, pp. 219ff) reports that for the year 1908, little is known about foreign shares owned by Swedish individuals, but indicates that their size is of little significance. The Censuses of the 20th century do not contain specific information about foreign shares or bonds held by Swedish households.

During the 1970s and 1980s, indications of tax-driven capital flight become more common in the Swedish economic debate. In 1989, Sweden removed its capital controls barring capital flows in and out of the country but kept its internationally high taxes on wealth and inheritance intact. This could easily lead to a situation where the rich move their capital overseas for tax avoidance reasons, and if so domestic wealth inequality could be severely underestimated. Roine and Waldenström (2009) present standard estimates of foreign household wealth based on residuals between observed balance sheet entries in the Balance of Payments and the Financial Accounts. In the case of the Balance of payments, real sector savings (in the current and capital accounts) should equal net financial flows (in the financial account) each year. This was also the case up until the late 1980s. At that point, the residual, called *net errors and omissions*, started growing negative year after year, signaling continuing unaccounted net capital outflows. About a third of these outflows are not actual outflows but rather accounting and valuation errors when compiling the current, capital or financial accounts. For this reason we use only 65 percent of the observed net errors and omissions as our estimate of foreign household wealth.[76] In the case of the Financial Accounts, the residual is called *unexplained financial savings* and is derived from comparing financial savings in the National Accounts (the difference between disposable income and the sum of private consumption and investment) and financial savings in the Financial Accounts (the aggregate value of bank deposits, securities portfolios, cash etc).[77]

In their analysis of trends in Swedish wealth inequality, Roine and Waldenström (2009) made some calculations of foreign wealth of Swedish (wealthy) households based on annual flow residuals in the Balance of Payments and Financial Accounts statistics. They found that for the years around the mid-2000s, Swedish households may have possessed fortunes outside of Sweden at a value of between 200 and 700 billion SEK depending on assumptions about rates of return. Taken at face value, this would imply that between three and seven percent of Swedish gross household wealth is placed abroad and thus not accounted for this study. But again, these estimates emanate from highly uncertain calculations and we will probably never arrive at a precise number. In fact, Waldenström (2011) showed that new statistical definitions and reassessment of historical data made by Statistics Sweden changed the previous estimates of substantial foreign holdings to basically no foreign holdings at all, but recent updates of this series up to 2014 indicated positive numbers for offshore capital between 500 and 1,300 billion SEK.[78] Figure C5 shows the impact of these two estimates for the Swedish

[76] This particular figure has been reached through discussions with those who compile these data. Blomberg et al. (2003) are able to attribute about 14 percent of the net errors and omissions to known valuation errors in the export statistics. Above from that, the authors believe that there are other errors of at least those amounts. We decide to remove 35 percent of the observed sums for our estimated household share.

[77] Bergman and Rylander (1984), SOU 2002 (p. 298) and Swedish National Tax Board (2008) all use the unexplained savings in the F.A. for analyzing the size of foreign household wealth. We use the newly revised figures for the financial savings in the National Accounts.

[78] In a recent study Zucman (2013) estimate undisclosed foreign wealth using gaps in countries' portfolio investment positions and found to substantial. The Swedish position does not, however, seem to deviate much from what is officially reported.

private wealth-income ratio between 1980 and 2010. Evidently, adding the possibly evaded offshore capital to the wealth stocks make no important difference to the overall level or trend.

[Figure C5 about here]

Considering the large uncertainties of the estimates of Swedish offshore holdings, they will not be included in the main analysis or in the core sections of the SWND.

Appendix D Household sector: Liabilities

In this section, I describe the reconstruction of the liabilities of Swedish households over the past two centuries. Estimating these liabilities has been associated with a number of challenges and difficulties. Most importantly, much of the historical statistical sources on bank lending are not based on the same sectoral decomposition of liabilities as is used today. In particular, households are not treated as a separate sector. Before the 1960s banks reported the amount of credits extended to "the public", which included both households and (most) private business.

Another problem concerning sectoral definitions in the historical credit market statistics is the so-called "housing sector", which was a separate sector reported in both bank and official public statistical records. A closer look at this sector shows, however, that this sector includes not only construction firms and home-owning households, but also public entities such as municipalities and counties. During the postwar period up until the 1980s, the Swedish credit market was heavily regulated and building and construction of housing represented a large and growing debtor during this period (Jonung, 1993). Some of these housing credits went to public and private construction companies, often called "construction credits" ("byggnadskreditiv"). Other credits went to the construction or purchase of commercial real estate. I exclude all such debts as detailed below. The majority of housing credits, however, ended up with households and must therefore be included.

The main approach has been to calculate household liabilities from the lender side, i.e., using banking statistics on lending. The advantage is that this information is available annually over the whole period. The alternative source, to use tax-returns based reports on household borrowing is not readily available for most of the period.

In addition to the formal borrowing, this study also presents estimates of informal liabilities of households. Just in the case of informal assets (discussed above), these liabilities are bills or promissory notes marking typically short-term loans granted from other households or companies. Today, these loans make up little more than a percent or so of total borrowing. Two hundred years ago, however, there existed almost no formal creditors in society why basically all borrowing had to be in the form of informal contracts. Therefore, for a long run historical perspective one cannot escape paying explicit account to the informal sector when assessing the size of aggregate liabilites.

Concerning the formal sector, households have borrowed from both the financial (corporate) and public sectors, and within these sectors there are different organizational types that have borrowed funds. The section is structured around these different borrower types.

Previously, Hagström (1968) has studied carefully the Swedish credit market and its sectoral composition for both borrowers and lenders during 1919–1964. Werin (1993) reports annual estimates from the period 1945–1990, mainly based on the Financial Accounts and an early reassessment of for years before 1970 by Olsson (1993). While being roughly plausible, the early numbers are estimates and extrapolations and therefore not directly linked to credit market statistics. Spånt (1979) reports debts for a handful of years before 1970, drawing largely on tax assessment surveys and, thus, including debts as they were reported on personal tax returns. The estimated amounts are, however, quite uncertain especially for early

years when they are considerably larger than all other estimates encountered.[79] Berg (1983) reports annual debt data from 1950 onwards, but draws entirely on Spånt (1979) for years before 1970. For the period 1970 onwards, I use the household lending series reported in the Financial Accounts and discussed by Bergman, Djerf and Lindström (2010).[80]

D1. Financial sector debt

The financial sector actors lending funds to households in Sweden have traditionally been *savings banks*, *commercial banks* and some other, less significant, institutional lenders including credit associations and insurance companies. Figure D1 shows the composition of total financial lending to households across lender types as well as the size of these loans as share of national income.

[Figure D1 about here]

The composition of household borrowing across type of financial institution is shown in Figure D2. Note that I distinguish between Riksbank lending and other commercial bank lending in the 19th century even though both categories were essentially commercial banks.

[Figure D2 about here]

D1.1 Commercial bank debt

The first Swedish commercial banks were the handful of Discount Banks. They were active in the beginning of the 19th century but all disappeared due to a political crisis in 1818. They lent money to the households, but on a quite limited scale (Kärrlander, 2011). The first modern commercial bank appeared in 1834. Until the 1860s, all commercial banks were note-issuing, unlimited partnerships and not focused on deposit banking or extending credits to ordinary households. From 1860s, a new banking legislation allowed commercial banks to be joint-stock companies, and the number of banks and especially branch offices increased steadily. Still, it was not until the 20th century postwar period that Swedish commercial banks started to be oriented towards household customers.

I construct a series of commercial bank lending to households using yearly publications of national totals of commercial bank statistics.[81] The majority of lending was in the form of loans against fixed collateral, while the rest was mainly discounted bills of exchange and some lending in checking accounts. For 1908, additional information is available about the household share of commercial bank lending. Flodström (1912) reports that the commercial banks expanded credit to the public (firms and households) of an amount of 2,198 million SEK while the firms (limited and unlimited companies) owed 2,010 million SEK to these

[79] For example, Spånt reports an aggregate debt of households in 1935 of 7,600 million SEK, about 88 percent of GDP. In that same years, I find the ratio to be 56 percent. For 1945, Spånt reports a total debt of 13,100 million SEK (78 percent). For that year, Werin (1993, Fig. 4.1, p. 55) finds a level of about 35 percent while our estimate lands on 43 percent.

[80] Olsson (1993) reports a household-specific debt during 1962–1969 is reported.

[81] See Sveriges Riksbank (1931), pp. 172ff (balance sheets of the commercial banks) and, e.g., Statistical Yearbook (1917), Table 158 "Bankernas [Riksbanken inräknad] viktigaste inländska ut- och inlåningsräkningar vid slutet av åren 1875–1916", p. 190. Note that also the Riksbank, i.e., the central bank, lending is included in the lending series up until 1930. Since the Riksbank was initially a hybrid between a commercial and central bank, owned by Parliament but at the same time competing with the commercial banks, it is correct to include the private lending by this bank in our series.

banks. The difference, 187 million SEK (2,198 minus 2,010) must be credits granted to private individuals, which represents about 8.7 percent of total credits.[82] I use this share for all years up to 1929.

From 1929 to 1955, Hagström (1968) reports detailed estimates of household lending in commercial banks. Based on contemporary reports and assessments by bankers, he concludes that the household share of total credit was ten percent during the 1920s and 1930s, i.e., about the same as I find for 1908.[83] For the more recent years, he uses different pieces of evidence to compile his series but the share varies around ten percent throughout.[84]

D1.2 Savings bank debt

Savings banks started appearing in Sweden in the 1810s, and their number grew quickly. The main objective of savings banks was initially to offer deposit accounts to households and thereby stimulate saving and a prudential lifestyle. Direct credits to households were limited, and instead savings banks mainly lent money through purchases of bonds issued by domestic mortgage associations, which in practice meant agrarian finance. Since the loan amounts were fairly small, and the fact that family farms are included in the household sector, I regard savings bank lending as having gone to households ultimately.[85]

Data on savings bank credits come from various sources. They include different loan types and both the large community of geographically dispersed savings banks and the larger, state-owned Postal Bank ("Postbanken"). Direct data on lending do not exist before 1835. For the period between 1813 (when the first savings bank, Bromö glasarbetares sparbank, was founded) and 1834, I instead use the product between the total number of active savings banks (BiSOS, 1893, p. IV) and the average lending amount in 1835. For 1835–1875, I use data on savings bank lending in Nygren (1985, p. 140), corroborated with more detailed information for 1860 reported in Finanskommittén (1863, p. CIV-CV). For the period 1880–1935, savings bank credits are reported in Statistical Yearbook, Statistics Sweden for loans across different collateral types: tangible ("fast egendom" and "annat hypotek") and personal guarantees ("borgen").[86] For the period 1935–1970, data also come from the Riksbank's Statistical Yearbook. Over the entire period 1919–1955, I compare the series with numbers presented by Hagström (1968) and the differences are small.

D1.3 Other credit institute debt

In addition to loans at commercial and savings banks, households borrowed from other credit

[82] See Flodström (1912), pp. 726–727 for data on the debt of commercial banks ("Kredit- och fondhandelsbolag samt solidariska bankbolag") to the public and pp. 740–741, 744–745 for data on debts of joint-stock companies ("Samtliga aktiebolag och soldariska bankbolag") and limited partnerships ("Vissa enkla bolag (handelsbolag) och föreningar"), respectively.
[83] See Hagström (1968, pp. 345–348).
[84] Note that Hagström only provide numbers every five years during the period 1929–1949 and every two-three years thereafter, why I linearly interpolate in order to get annual estimates.
[85] The question is still open concerning how much of savings bank lending that went to households. Flodström (1912) reports that in 1908 savings banks lent 641 million SEK (pp. 690–691) to "the public", i.e., private firms and households, and 164 million SEK to insurance companies (pp. 726–727). At the same time, the firm sector, i.e., joint-stock companies (pp. 740–741) and limited partnerships (pp. 744–745), had borrowed 685 million SEK and 5 million SEK, respectively, from the joint group of savings banks and insurance companies. The difference, 115 million SEK, or 18.8 percent in 1908, is accordingly borrowed by households. I assume this to be the share of households of total savings bank lending.
[86] See, e.g., for 1880–1915 Statistical Yearbook 1917, p. 193.

market institutes throughout the study period. These institutes were: Mortgage associations, credit associations, and insurance companies.

Mortgage associations started appearing in Sweden in the 1830s, created to cater the financial needs of factories and large farms. The business centered around issuing bond loans to predominately foreign investors and channeling the funds to the members of the associations (Nygren 1985, pp. 44f). I have not regarded any of these credits as going to households. By contrast, in the 1870s urban mortgage companies ("stadshypoteksföreningar") emerged and they were more focused on lending to borrowing households. I include all lending to city mortgage associations that were given out by the State Mortgage Association ("Konungariket Sveriges stadshypotekskassa"), which is reported in Statistics Sweden (1960) during 1875–1950 and in the Statistical Yearbook of the Riksbank between 1950 and 1970.[87] From 1970 onward, the lending is included in the Financial Accounts.

Insurance companies were another major lender to households. Early in the 20th century they offered their customers special loans against their life insurances ("lån och förskott mot livförsäkringsbrev"). I collect data on these in 1908 from Flodström (1912), various years during 1919–1962 from Hagström (1968, p. 361), and Statistical Yearbook of Statistics Sweden up until 1970.[88]

D2. Loans from the public sector

D2.1 State housing credit

The housing sector attracted enormous attention among Swedish politicians from the 1930s onward. The ambitious postwar credit market regulations were largely motivated by the need to channel funds to the construction of housing. In this way, a complex and extensive system for private and public housing credits was built up.[89]

Another credit form was the state-run Owner-occupied housing credit fund ("Statens egnahemslånefond"), created in 1904 with the ambition to extend housing credit to low-income working class households, initially on the country-side but soon also in urban areas. The loans were intermediated by certain local housing associations ("hushållningssällskap") and all credits were applied for at the Ministry of Agriculture.[90] I include the accumulated debt to the fund between its start in 1904 to its end in 1948.

In the 1930s, additional funds were installed by the state authorities aimed at specific areas in the housing sector. In 1932 came the State Fund for Housing ("Statens Bolånefond"), in 1936 the State Fund for Low-Income Families with Many Children ("Statens lånefond för mindre bemedlade, barnrika familjer") and in 1938 the State Fund for Invetory Purchases ("Statens bosättningslånefond"). Annual data on outstanding loans at these funds during the

[87] See Statistics Sweden (1960, Tab. 82 Hypoteksinrättningar 1870-1950, s 101).
[88] See Statistics Sweden, Statistical Yearbook, "Svenska försäkringsbolag, Livförsäkringslån" (1970 p. 204; 1978 p. 222).
[89] For further details on the Swedish postwar housing credit market, see, e.g., SOU 1978:11, ch. 6, Andersson (1979), Nygren (1985) or Bladh (2002).
[90] See *Lantmannens uppslagsbok* (1923), "Egnahem" (at http://runeberg.org/lantuppsl/ 2010-12-30).

1930s and 1940s are reported in the Statistical Yearbooks of Statistics Sweden and the Riksbank.[91]

From the 1950s, data on these and similar loans to household housing come directly from the archival sources of the forerunners to the present public agency, Swedish National Board of Housing, Building and Planning.[92] Specifically, data on loans to housing for households come from Bostadsstyrelsen's archive. There annual reports ("petitor") to the central government declare both stocks and flows of these different loans. As supplementary source I have used the annual reports ("huvudböcker") published since 1951. In these documents, there are primarily two types of loans that are included. First, direct loans to multi-family houses ("Tertiär- och bostadslån till flerfamiljshus (inkl. räntebärande tvätterilån)"), of which I assume that half went to households and half to construction firms. Second, direct loans to one- and two-family houses ("Egnahemslån, bostadslån och förbättringslån till en- och tvåfamiljshus, räntebärande"), of which I assume that the full amount went to households.

From 1970 onwards, the series on state loans to households in the Financial Accounts has been used. There is a break in the series in 2001, when the Financial Accounts starts including additional debts to the state, mainly unpaid taxes. This component is roughly of equal size as the other state loans, but since it is not available for earlier years I exclude it from the series for consistency reasons.

D2.2 Student loans

The system of state-funded higher education in Sweden has been largely organized by way of subsidized student loans. These loans were introduced in the 1960s and are still used on a large scale, but in a slightly altered form.[93]

To date there has not existed a homogenous series on the aggregate value of the stock of outstanding student loans from the 1960s until present day, but thanks to efforts at the agency for student aid, CSN, such evidence is now available for this database.[94] The Financial Accounts include all public loans to households after 1970, but before this year one needs to supplement the housing loans (see previous section) with the student loans.

D3. Interpersonal (informal) debt

Informal borrowing has played an important role in household portfolios. During most of the 19th century, this form of indebtedness represented roughly three fourths of all liabilities and even in 1930 it amounted to as much as a fifth of all debt. These loans were typically written promissory notes or bills of exchange issued by either other households or corporate lenders in relation to a transaction of, e.g., a house or a car. In these cases, a financial claim would also arise on the asset side of household (see our discussion about this kind of financial asset above).

Although we know little about its precise extent, estimates by economic historians suggest that the informal credit market was decisively larger than the formal, bank-based market up

[91] Statistics Sweden tables "Statens egnahemslånerörelse, 1906-", and Riksbank tables "Utestående egnahems- m fl lån vid årets slut".
[92] I am grateful to archivist Maria Nilsson for helping me to acquire these sources.
[93] Over the years, the degree of subsidization has decreased, making the loans more market-oriented.
[94] I am grateful to Lars Hillerström at CSN for assembling data on the stock of outstanding student loans.

until the end of the 19th century. Lindgren (2002) used probate records showing peoples' debts at death in the city of Kalmar over the period 1830–1900. He found that informal credits in 1830 were about five to six times the debts in the organized credit market (primarily bank loans) while they were about equally large in 1900. Other studies finding similar levels for different Swedish regions are Hellgren (2002), Lilja (2004) and Perlinge (2005).

Appendix E Public sector wealth

This study presents a preliminary balance sheet of the Swedish public sector annually during the period 1870–2010. Previous estimates of the public sector wealth are available for the years 1980–1994 in Statistics Sweden (1995) (see also Tengblad, 1992) and the Financial Accounts report financial assets and liabilities of the public sector since 1950.

The Swedish public sector is traditionally divided between *central government* and *local government*. The central government is effectively the state and, since the 1950s, also the social insurance system ("socialförsäkringssystemet"). The local government was restructured in the early 1860s, divided into two administrative levels: counties ("landsting") and municipalities ("kommuner").[95] The number of counties was historically around 25 but is today down to 20 counties after a series of county mergers. The prime policy responsibilities of counties have been health care and public transport. The number of municipalities has decreased drastically over time. A century ago they were about 2,500, but after merger waves in the 1950s and 1970s they are today down to 290. The main responsibilities of municipalities are the provision of childcare, schooling, sanitation and other local public goods.

The estimation of public assets and liabilities follows the same approach as was used to estimate the value of private sector wealth reported above. Public wealth consists of reported stocks of non-financial and financial assets and liabilities, retrieved from yearly tax assessments and from official accounting statements. For details see the following subsections.

The reliability of the values of these public sector balance sheets is quite difficult to assess in the absence of a market place for most of the public assets. Except for the most recent years in the late 20th century there are few sources of accounting standards used. Several items are valued on a running cost-basis, which is arguably the most motivated approach in many cases but it still suffers from a number of well-known problems. The most important problem is the implication that expensive activities are deemed more valuable despite the fact that they may merely be run inefficiently and therefore should not worth as much.

E1. Central government wealth

Between 1870 and 1949 central government assets are valued based on tax-assessed value of state-owned land and forestry and the official state balance sheet statements published annually in the Statistical Yearbook of Statistics Sweden and its forerunner in the 19th century.[96] The tax-assessed land values are transformed into market values through the multiplication of a sales price ratio.[97] The other state assets consist mainly of the equivalent equity capital

[95] Historically, the municipalities were up until 1970 divided into two categories: rural municipalities (*landskommuner* and *muncipalsamhällen*) and urban municipalities (*städer* and *köpingar*). These are combined into one single category in the present study.

[96] The State balance sheet is reported for many years in the Statistical Yearbook of Statistics Sweden, e.g., in 1880: "Öfversikt af Statens finansiella ställning", ""Behållningar i fonder; Statens jernvägar med materiel", or in 1950, tab. 280, "Statens tillgångar och skulder". Tax-assessed land values of the state are reported in the same sources "Taxeringarna till bevillning eller kommunal inkomst- och förmögenhetsskatt samt kommunal progressivskatt" under "Bevillningsfri fastighet".

[97] We set this ratio to 1.6 for the whole period, based on the average level of the sales price ratios for land and timber tracts of the private sector (the average for the period 1810–1950 was 1.56). The reason for not using the actual yearly ratios is that there are annual fluctuations reflecting tax reassessments of private property when publicly owned land was not reassessed.

in the state-owned companies and public utilities such as the railway company (and the railway infrastructure), water power plants, telegraph and telephone lines and buildings.[98] That is, for each of these utilities, the equity is estimated as the capitalized value of yearly net income or by subtracting non-equity liabilities from gross assets.[99] An adjustment was made in the land value series before 1875 to overcome a time series break between 1875 and 1878 when the value more than doubled due to changed reporting standards.

From 1950 onwards, financial assets are reported annually in the Financial Accounts at market values for the whole of central government, including the social insurance sector. Non-financial assets are retrieved from Statistics Sweden (1995) for the period 1980–1994 and from the official central government balance sheet published by the Swedish National Financial Management Authority (Ekonomistyrningsverket). For the period 1950–1979, however, no organized reporting of state balance sheets have been found. The state budget was during this period divided into a current budget ("driftsbudget") and a capital budget ("kapitalbudget") and where the latter included the flow of incomes and costs adhering to the state assets and liabilities, and therefore no separate balance sheet was reported in the yearly budget. For this reason, I assume that the value of state non-financial assets equaled the value of local government non-financial assets, which is motivated by the fact that these two were roughly in line with both before 1950 and after 1979.[100]

Central government liabilities, or the central government debt, are taken from Fregert and Gustavsson (2014) for the period 1810–1949 and from the Financial Accounts for the period 1950 onwards.

Figure E1 shows assets, liabilities and net wealth as share of national income for the central government between 1870 and 2010. The figure depicts several historical episodes of importance, e.g., the state borrowing expansion during the Second World War (war loans) and the 1990s economic crisis. On the asset side, the drastic increase during the postwar era related to the expansion of a public pension system and the installment of public buffer funds (so-called Public Pension funds, or AP funds) implied a tripling of state assets between 1950 and 1970.

[Figure E1 about here]

E2. Local government wealth

During the entire historical period, local government balance sheets are published in the official publications of Statistics Sweden separately for municipalities and counties. Before

[98] The main state companies are reported as the value of the "funds" in each of these. The most important were the railway company (*Statens Järnvägar*, SJ), Post Office (*Postverket*), Telegraph Office (*Televerket*), Water power plant (*Statens vattenfallsverk*) and Timber tract authority (*Domänverket*).

[99] The total value of the state railways was calculated by contemporaries using the capitalization method, i.e., dividing the net income by a percentage rate of return, which was mostly between three and four percent. In 1870–1875, no capitalized value is reported directly but can be computed using the net income statements and reported "rates of return in relation to the construction value of the railways" that are available annually in the Statistical Yearbooks ("Sveriges officiella statistik i sammandrag", published in the periodical *Statistisk Tidskrift*).

[100] In 1950, the total value of central government assets is basically identical to its value in 1949. In 1980, the value of reported central government non-financial assets is 30 percent higher than the local government non-financial assets. This suggests that the value of the former is somewhat underestimated in the 1970s and perhaps also the 1960s, but the difference is not large (about one twentieth of national income).

1950, assets and liabilities for counties and municipalities jointly are available in Statistics Sweden (1960, table 250).[101] These tables report typically both the value of total assets and the value of real estate and inventories and the value of all liabilities.[102] Note that municipalities have changed profoundly in structure, both in terms of their number (they were over 1,000 in 1900 down to 290 in 1980) and economic structure between urban ("stadskommuner" or "städer") and rural ("landskommuner", also including "köpingar" and "municipalsamhällen").

From 1950 onwards, the Financial Accounts report the total value of financial assets and liabilities in all municipalities and counties each year. Non-financial assets are reported in the balance sheet statements in the official statistics.

Figure E1 shows assets, liabilities and net wealth as share of national income for the local governments between 1870 and 2010. The size of the budget and the swings across years are clearly smaller than for the state balance sheet. This is partly explained by the longstanding balanced-budget requirement in the local government budget legislation.

[Figure E2 about here]

[101] For years 1870–1873 only total assets are reported, and I assume that the relationship with liabilities these years are the same as in 1874.

[102] Separate accounts are also available. For counties 1880–1917 in SCB (1960, tab. 243, p. 231) and 1918–1950 in SCB (1960, tab. 245, p. 232). For municipalities 1880–1917 in SCB (1960, tab. 243, p. 231) and 1918–1950 in SCB (1960, tab. 249, p. 238). After 1950, balance sheet data are available in Statistical Yearbook of Statistics Sweden, Municipal finances (Kommunernas finanser). The municipal series are not fully comparable before and after 1918 due to differing reporting standards.

Appendix F Income and savings

F1. National income

Let Y_d denote gross national product, GDP, which is the total value of the produced goods and services of a country during one calendar year. GDP can be decomposed into domestic consumption C, gross investments I^G, government investment and consumption G, and net exports $NX = X - IM$. This yields the classical GDP identity: $Y_d = C + I^G + G + X - IM$.

We use national income, or net national income, Y as income denominator in our analysis. This concept captures total incomes net of capital depreciation as well as the net of foreign income flows. In other words, not only do we consider incomes to Swedes that appear within the domestic economy but also those occurring from abroad. Likewise, we subtract domestic incomes that accrue to foreigners. Denote the consumption of fixed capital δK, where δ is the rate of depreciation of the capital stock, and net foreign income NFI, then national income is defined as

$$Y = Y_d - \delta K + NFI \quad . \tag{4}$$

Equation (4) states that national income equals the gross domestic product (GDP) minus capital depreciation and plus net foreign incomes (which can be either positive or negative).

There exist several versions of a Swedish historical GDP. This variety is due to two main factors. First, there has been a development in the international standards for national accounts. The 1993 national accounts of the SNA was replaced by the 2008 SNA and in 2010 came the 2010 ESA that was recently adopted by the EU countries. Statistics Sweden has followed this development but also made several changes of its own (since 2000 the Swedish official GDP has been revised over 50 times). Second, there has been a gradual development in the research on Swedish historical national accounts, with important contributions made by Krantz and Schön (2007), Schön and Krantz (2012, 2015) and Edvinsson (2005, 2014).

Our main national income series is based on the historical GDP *by expenditure*, i.e., as the sum of all expenditures on private and public consumption, investment and net exports. This is the official series used by Statistics Sweden and also the definition used by Piketty and Zucman (2014). Edvinsson (2005, 2012, 2014) present several series over GDP by expenditure using different adjustments with respect to the various generations of System of National Accounts.[103] In the most recent version using ESA 2010, GDP includes new items such as investments in research and development (R&D) and some outlays on military equipment. I disregard these new series in my database since they are still not available over the historical period.

In addition, GDP is also commonly measured *by activity* as in Edvinsson (2012, 2014). As Edvinsson explains, this is his most reliable historical GDP series, derived from the production side, summing the gross value added in all sectors and subtracting the cost of intermediate inputs.

[103] Once again, Krantz and Schön (2007, 2012) have produced several generations of Swedish historical national accounts, largely similar to the ones used by Edvinsson but still different in some important respects. The differences between Edvinsson and Krantz and Schön lie mainly in how they treat various subsectors, e.g., investments in real estate, calculation of trade values and so forth.

Figure F1 shows the effect on the wealth-income ratio of using different national income series. Note that the series are not equivalent but that the main series is preferred for the reasons mentioned. It is clear that the recent upgrading of the GDP, both for historical eras (e.g., adding new estimates of home production) and also modern times by Statistics Sweden, lowers the wealth-income ratio. However, disregarding the SNA 1993 GDP by activity series, the overall impact on the wealth-income ratio is not overly large.

[Figure 1 about here]

Capital depreciation is reported annually since 1800 in Edvinsson (2005). I use that series when using the Edvinsson (2005) GDP by activity, or its share of GDP when using the other series.

Net foreign income, NFI, or net current transfers from abroad, is reported annually in Statistics Sweden's Statistical Yearbook back to 1964. For years before that, I compute it by multiplying a fixed interest rate (assumed at five percent) paid on the stock of net foreign assets, i.e., $NFI = r \cdot NFA$. Naturally, we would have preferred using the gross stocks of foreign-owned capital in Sweden K_F times the interest rate paid on that, r, and of Swedish-owned capital abroad, K^* time some interest rate r^*, i.e., $NFI = r \cdot K_F - r^* \cdot K^*$. But there are presently not enough data on the gross stocks and different interest rates in order to make such computations.

F1.1 Growth rates in population and per capita income

It is relevant to characterize how much of the national income growth that is accounted for by per capita income growth and population growth. Table F1 shows this for a number of time periods between 1810 and 2010.

[Table F1 about here]

F2. Household disposable income

While relating the household portfolio to national income is relevant, a number of economic questions address the importance of household assets and liabilities to the actual income flow that household dispose of at any point in time. Household disposable income Y_H^d is defined in a standard manner. First, gross factor income Y_H^g is computed by adding the sum of wages and salaries and gross private surplus. Then from this we subtract direct taxes T and add transfers Z such that we get the following equation for household disposable income:

$$Y_H^d = Y_H^g - T + Z \ . \tag{5}$$

From 1950 onwards, the Swedish national accounts reported by Statistics Sweden include a disposable household income.[104] Between 1850 and 1949, gross factor income comes from

[104] We use a series supplied in Berg (2010) from 1950 up to 1979 and from 1980 we use the series "II.4.1.B6n Disponibel inkomst, netto" for households and NPISH (sectors S14+S15) in Statistics Sweden's Statistikdatabasen, table "Inkomster och utgifter samt kapitaltransaktioner (ENS2010), löpande priser, mnkr efter sektor, transaktionspost och år" (2015-09).

Edvinsson (2005), series U ("Wages and salaries (including social benefits)") and W ("Gross surplus"). Taxes are direct income taxes used for chapter 1 in Henrekson and Stenkula (2015) available since 1862. While other direct taxes, primarily property taxes, should in principle also be excluded the availability of these is somewhat more problematic for the early periods. Furthermore, the level in the 1950s of the computed disposable income is quite close (about two percent difference) to the level reported in the official national accounts series. Benefits are reported annually since 1930 in a public investigation of the Swedish pension system (Pettersson, Pettersson and Westerberg, 2006). There are thus gaps in the latter half of the 1850s as regards coverage of taxes and benefits, but since taxes and benefits represented a tiny fraction of gross incomes (less than three percent) this matters little for the overall income series. Before 1850, household disposable income is assumed to be at the same level relative to national income as it was during the period 1850–1859 (which was 65 percent).

Figure F2 shows the ratio between household disposable income and national income over the full study period. As explained above, in the initial four decades the ratio is constant, but thereafter it is related to historically observed series. There is an interesting hump shape in the evolution, with the share of household income to national income increasing up to the early 20th century and then falling rapidly in the 1960s down to historically low levels in the 1980s. While this pattern reflects many things, it mirrors the relative importance of private income to public income in Sweden. As personal incomes and profits increased during industrialization, the ratio rose. Later, as the public sector started expanding, the relative size of private incomes fell. There are also interesting episodes such as the 1990s spike, reflecting the fall in GDP (the denominator) while personal incomes were largely maintained due to the transfer system.

[Figure F2 about here]

The private wealth-household disposable income is shown in Figure F3 alongside the private wealth-national income ratio. Naturally the two series are bound to differ over the latter part of the period since this is when an increasing share of welfare services shifted over from private to public provision, financed largely via the tax bill.

[Figure F3 about here]

A final note on the relationship to household disposable income is the relative importance of household indebtedness. In recent years the role of household liabilities and its long-run effects on fiscal and economic stability in the rest of the economy have attracted enormous attention among researchers and in the policy debate. Figure F4 shows the ratio of liabilities to disposable income of households and of their liabilities to national income over the whole period. There is a clear rise in ratio in both series, and the current levels seen in the 2000s are obviously of historic proportions. There is a similar drift in the gap between the two series, a drift that suggests that the focus on disposable incomes for deeming the graveness of indebtedness may be only part of the full story.

[Figure F4 about here]

F3. Saving

The SNWD presents a new continuous series for private and public savings in Sweden be-

tween 1810 and 2010. The official national accounts started in 1950 and from this year onwards there is relatively good information about annual gross and net savings in the private and public sectors. For the period before 1850 savings rates are estimated from historical data on investments, capital depreciation and net exports. Sector-specific saving rates are also reported for the full period, using detailed information since 1950 and rough estimates before that.

F3.1 Saving 1950–2010

Data on national, private and public savings in Sweden since 1950 are available in the national accounts. It should be noted that these series have been revised by Statistics Sweden a number of times over the years, why it is important to be clear about which generation of evidence that is being used. For the period 1980–2010, the most recent version of the national accounts tables ("Kvartalstabeller") of Statistics Sweden published on February 28, 2014 (Statistics Sweden, 2014) are used.[105] For the period 1950–1979, data compiled and published by Berg (1988, 2000) are used.

Household net saving is calculated in the standard way, which means subtracting household consumption expenditure from household disposable income. For corporations, including both non-financial and financial corporations, net saving is computed as the sum of operating surplus, property income and current transfers net of household collective insurance savings (change in net equity of households in pension funds reserves). For the public sector, finally, is computed in the same way as the household sector, subtracting final consumption expenditure (and the change in net equity of households in pension funds reserves) from disposable income which is the sum of primary incomes (taxes less subsidies and net property income) and net current transfers.

F3.2 Saving 1810–1949

Before 1950 Sweden has no official series on private or public saving. Therefore I estimate a new series from existing evidence on historical national accounts compiled by other authors.[106] Specifically, it is noted that in an open economy private savings can be defined as the sum of private investments, net exports and net foreign income. Letting S^g be the flow gross savings measured in current prices gives that

$$S^g = I^g + CA\,. \tag{6}$$

where I^g is gross investments and $CA = X - IM + NFI$ is the current account, i.e., the difference between exports X and imports IM plus net foreign income NFI. Net savings S^n is computed by subtracting the consumption of private fixed capital δK, where δ is the rate of depreciation, from gross investments as follows:

[105] This is the quarterly national accounts tables ("Kvartalstabeller") published on Statistics Sweden's webpage www.scb.se. I use annual data on the sheet "GDP by income components and distribution by sector of income, transfers and saving".

[106] The Swedish Institute of Economic Research (Konjunkturinstitutet) made preliminary national accounts including some savings estimations in the 1940s. In Östen Johansson's influential historical statistics (Johansson, 1965) there are savings rates based on similar estimations as ours, and Lundberg (1969) also provide a series of investment and saving, including estimates of the shares of the public, corporate and household sectors. Similarly, Schön (2000) refer to unpublished saving rates from the nineteenth and twentieth centuries.

$$S^n = (I^g - \delta K) + CA\,. \tag{7}$$

Saving rates are computed by dividing the saving flows by national income Y:

$$s^n = S^n/Y\,. \tag{8}$$

Data on private sector gross investment I^g are available in Edvinsson (2005, appendix series I) back to 1800. These are the nominal value of gross investment (in purchasers' prices, million SEK) of various types of activities and total gross investment. Data on the consumption of fixed assets δK are also available back to 1800 in Edvinsson (2005, appendix series J). The private sectors for which investments were made are "Agriculture and ancillaries", "Manufacturing and handicrafts", "Building and construction", "Transport and communication"," Other private services" and "Services of dwellings". We use the data in Edvinsson (2005) for the period 1810–1980 after which we switch to the newest series of Statistics Sweden (Statistics Sweden, 2014), which are at a notably higher level than Edvinsson's series because of recent major revisions of Statistics Sweden.

Data on the current account balance CA are based on the net export of goods and services collected from the most recent historical estimates available in Edvinsson (2014) and on the net foreign income reported above. Figure F5 shows national net and gross saving rates over the full period 1810–2010.

[Figure F5 about here]

F3.3 Sectoral saving rates

For the entire period sectoral decomposition of saving is reported. Before 1950 this is based on applying approximate – and unfortunately highly uncertain – shares of national saving reported in Lindberger (1956) and Lundberg (1970). Shares of national saving adhering to households, corporations and the government are reported by Lundberg (1970, pp. 92f) reports for the period 1923–1962 and Lindberger (1956, ch. 4) for 1945–1951. The shares before 1923 are assumed to be at the same level as in the 1920s.

Some corporations in Sweden are owned by non-Swedish citizens (currently about forty percent of all stock exchange-listed equity) and the public sector, and in neither of these cases the savings emanating from these corporations should be included in S^n. In the case of foreign-owned corporations, the National Accounts automatically account for this since both gross surplus and property income of corporations are computed in net terms with respect to cross-country flows.[107] Central and local government corporations are not treated separately in the National Accounts which means that some of the reported corporate net savings are in fact not private but public. The current structure of the national accounts does not allow for computation of savings across ownership categories, and a crude assumption is made that the share of public sector-owned corporate savings is equal to the share of publicly owned cor-

[107] This means that the surplus and property incomes of foreign-owned corporations active in Sweden will be registered as outflows to the owners' respective countries. Analogously, profits and incomes of Swedish citizens coming from their corporations situated abroad will be registered as inflows. In the National Accounts, the net profit and income flows are registered and thus the foreign ownership of firms in Sweden is accounted for.

porate shares, listed and closely held, of all corporate shares according to the Financial Accounts.[108]

Private gross and net saving rates are the sum of personal and corporate saving rates: $s_{Pt}^{g} = (S_{Ht}^{g} + S_{Ct}^{g})/Y_t = S_{Pt}^{g}/Y_t$ and $s_{Pt}^{n} = S_{Pt}^{n}/Y_t$, respectively. National net savings rate s_N^n is computed by adding the public net savings rates s_G^n to the private net savings rate such that $s_N^n = s_P^n + s_G^n$.

Figure F6 shows the private gross and net savings rates for the period 1810–2010, where the early series based on investments and net exports up to 1950 are combined with the national accounts-based series for the period since 1950.

[Figure F6 about here]

In Figure F7, the private and government net saving rates are shown over the full period. Note that the level in the period up to the 1920s is determined by an assumed fixed share of national saving attributed to the two sectors. But interestingly the difference in saving intensity between the public and private sectors is relatively similar over the entire two-century period, which offers some support for the attributed shares in the old era.

[Figure F7 about here]

Figure F8, finally, breaks up the private net saving rate into the personal (household) saving rate and corporate saving rate during the postwar era. The figure shows how household saving was consistently higher up until about 1980 and that thereafter corporate saving has been higher.

[Figure F8 about here]

[108] Specifically, for each year we sum the total value of listed shares (series FA5110 in the Financial Accounts) and non-listed shares (series FA5120) held by the public sector (S13) and the Swedish Riksbank (S121) and divide this by the total value of all listed and non-listed shares owned by domestic sectors (S1).

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Tables

Table B1: Asset shares and sales price ratios in the calculation of Swedish produced assets.

	Agricultural property						Non-agricultural property (urban dwellings)			
	Farms				Timber tracts					
	Share of agricult. prop.,%	Share of land in farms, %	Share of build. in farms, %	Sales price ratio	Share of agricult. prop.,%	Sales price ratio	HH share of dwellings, %	Share of land in dwell., %	Share of build. in dwell., %	Sales price ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1810	75.5	33.1	66.9	1.50	24.5	2.00	0.9	24.5	75.5	1.12
1820	75.5	33.1	66.9	1.50	24.5	2.00	0.9	24.5	75.5	1.12
1830	75.5	33.1	66.9	1.50	24.5	2.00	0.9	24.5	75.5	1.12
1840	75.5	33.1	66.9	1.50	24.5	2.00	0.9	24.5	75.5	1.12
1850	75.5	33.1	66.9	1.45	24.5	2.00	0.9	24.5	75.5	1.12
1860	75.5	33.1	66.9	1.25	24.5	2.00	0.9	24.5	75.5	1.12
1870	76.9	33.1	66.9	1.25	23.1	2.00	0.9	24.5	75.5	1.14
1880	80.1	32.5	67.4	1.24	19.9	2.00	0.9	24.5	75.5	1.05
1890	80.1	27.5	71.7	1.22	19.9	2.00	0.8	24.5	75.5	1.02
1900	80.1	22.6	77.0	1.20	19.9	2.00	0.7	24.5	75.5	1.09
1910	80.1	22.7	77.3	1.19	19.9	2.00	0.7	24.1	75.9	1.04
1920	79.7	25.4	74.6	1.24	20.3	2.00	0.7	23.5	76.5	1.14
1930	76.7	28.1	71.9	1.13	23.3	2.00	0.7	22.8	77.2	1.10
1940	73.8	30.8	69.2	1.44	26.2	2.00	0.7	21.1	78.9	1.23
1950	65.9	34.8	65.2	1.48	34.1	2.00	0.7	18.8	81.2	1.33
1960	60.9	41.8	58.2	1.62	39.1	2.00	0.7	16.3	83.8	1.65
1970	59.1	48.2	51.8	2.13	40.9	2.00	0.7	19.7	80.3	1.96
1980	51.9	45.3	54.7	1.97	48.1	2.00	0.7	25.8	74.3	1.80
1990	40.7	36.6	63.4	1.92	59.3	2.00	0.7	26.8	73.2	1.76
2000	39.8	38.8	61.2	2.09	60.3	2.00	0.7	32.6	67.4	1.85
2010	41.2	41.2	58.8	1.94	58.8	2.00	0.7	39.1	60.9	1.58

Note: (1): Percentage share of farms in total agricultural property; (2): Percentage share of land in (1); (3): Percentage share of buildings and constructions in (1); (4) Sales price ratio of farms, defined as sales price divided by tax-assessed value; (5): Percentage share of timber tracts in total agricultural property; (6) Sales price ratio of timber tracts; (7) Household Percentage share of non-agricultural property; (8) Percentage share of buildings in non-agricultural property; (9) Percentage share of land in non-agricultural property; (10) Sales price ratio of owner-occupied housing. See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Table B2: Agricultural sales price ratios (*köpeskillingskoefficienter*), 1810–2010.

Period	Sales price ratio (average)	Source/Comment
1810–1842	1.29	Martinius (1970) studies market and tax values of land in five hundreds (*härader*) in the county of West Gothnia in 1842 finding a sales price ratio of 1.40, which after correcting for county-level sales price ratio is 1.45. The annual variation 1810-1841 is based on agricultural deflator index from Pettersson (1987, Tab. 6).
1843–1861		Linear interpolation.
1862–1876	1.25	Seth (1863) refers to investigations finding a sales price ratio of 3 for 1857, but after our adjustment for underreporting (resulting doubled tax values) the suggested ratio is 1.50. BiSOS (1863, p. 69) suggests (without references) a ratio of 2, which after out adjustment would suggest a ratio of 1. Sidenbladh (1878) suggests a ratio of 1.5, but Fahlbeck (1890) finds it too high, suggesting 1.25. Altogether, we suggest a sales price ratio of 1.25 for the period.
1877–1907	1.22	Linear interpolation.
1908	1.19	Flodström (1912) makes a national survey of individual sales and tax values, finding sales price ratio of 1.19.
1909–1920	1.37	Linear interpolation.
1921–1928	1.26	In a special investigation by the Swedish Parliament, large samples of property transactions were collected from six counties from all Swedish regions (Swedish Parliament, 1930).
1929–1937	1.14	Linear interpolation.
1938–1944	1.36	Statistics Sweden (1945) presents annual country-level data on sales and tax values of agricultural estates.
1945–1950	1.55	Linear interpolation.
1951–2010	1.88	Official sales prices ratios for agricultural estates reported in the Statistical Yearbook of Statistics Sweden.

Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Table B3: Timber tracts sales price ratios (*köpeskillingskoefficienter*), 1810–2010.

Period	Sales price ratio (average)	Source/Comment
1810–1908	2.07	Flodström (1912) estimates the value for 1908, which is the ratio of private timber tracts (1,248 million SEK) to their tax-assessed value (602 million SEK = 20 percent of total agricultural property).
1909–1937	1.80	This period uses data on 1908, 1921–1928 (see agricultural property above) and 1938. Annual values are interpolated linearly and multiplied by the average difference between sales price ratios for timber tracts and all agricultural property in the start and end years.
1938–1944	1.77	Statistics Sweden (1945) presents annual country-level data on sales and tax values of agricultural estates. For timber tracts, the property with at least 90 percent of its share being standing forest and forest land is used.
1945–1951	2.27	Linear interpolation.
1952	2.47	Englund's (1912) estimate. The ratio is between private timber tracts (10,700 million SEK) to their tax-assessed value (9,339 million SEK = 32 percent of total agricultural property).
1953–1994	2.06	Agricultural sales price ratio reported above multiplied by 1.11 to reflect the higher sales price ratio for timber tracts (average differential of the ratios during 1980–2010).
1995–2010	2.15	Official sales price ratio on agricultural real estate with 100 percent timber tracts, from Statistics Sweden's *Statistical Yearbook of Forestry*.

Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Table C1: Tobin's Q calculations.

	K	K_G	K_H	K_C	A_C^N	A_C^F	$L_C - E_C$	Tobin's Q	Market value of corporate shares	Tobin's equity Q
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1980	1,740	365	1,006	369	786	1,253	1,334	47%	160	23%
1981	1,618	407	854	357	867	1,485	1,529	41%	205	25%
1982	1,649	437	902	310	934	1,731	1,729	33%	254	27%
1983	1,726	470	921	335	1,027	2,045	1,957	33%	375	34%
1984	1,816	507	960	349	1,130	2,335	2,215	31%	377	30%
1985	2,005	536	1,021	447	1,263	2,596	2,441	35%	448	32%
1986	2,291	552	1,079	660	1,405	3,154	2,889	47%	692	41%
1987	2,552	584	1,239	729	1,626	3,553	3,316	45%	681	37%
1988	3,215	676	1,607	932	1,889	4,364	3,984	49%	954	42%
1989	3,853	737	1,952	1,164	2,262	5,205	4,801	51%	1,164	44%
1990	4,420	827	2,076	1,517	2,379	5,780	5,627	64%	893	35%
1991	4,510	804	2,183	1,522	2,337	5,945	5,719	65%	862	34%
1992	4,278	810	2,096	1,371	2,217	6,157	5,953	62%	874	36%
1993	4,080	817	1,904	1,360	2,269	6,342	5,927	60%	1,256	47%
1994	4,467	868	2,420	1,179	2,291	6,507	5,895	51%	1,298	45%
1995	4,138	685	2,516	937	2,578	7,166	6,314	36%	1,445	42%
1996	4,111	769	2,252	1,089	2,628	7,987	6,797	41%	1,888	49%
1997	4,600	801	2,442	1,358	2,744	8,933	7,705	49%	2,088	53%
1998	5,157	903	2,577	1,678	2,928	10,503	8,399	57%	2,713	54%
1999	7,175	926	2,840	3,410	3,080	11,711	9,559	111%	4,059	78%
2000	7,627	924	3,375	3,327	3,340	13,154	10,908	100%	4,005	72%
2001	8,191	954	3,936	3,301	3,636	13,858	11,722	91%	3,345	58%
2002	6,979	997	4,380	1,602	3,856	13,289	11,437	42%	2,351	41%
2003	7,537	1,030	4,399	2,108	3,937	14,611	11,607	54%	2,931	42%
2004	8,265	1,056	4,922	2,287	4,039	16,339	12,547	57%	3,383	43%
2005	9,699	1,081	5,124	3,494	4,184	19,983	14,281	83%	4,293	43%
2006	11,088	1,118	5,371	4,600	4,440	22,527	15,599	104%	5,089	45%
2007	12,543	1,161	6,697	4,684	4,756	23,313	17,675	98%	4,717	45%
2008	11,015	1,217	6,981	2,816	5,184	23,571	20,779	54%	3,107	39%
2009	12,214	1,288	6,542	4,384	5,499	25,867	20,823	80%	4,308	41%
2010	14,346	1,345	7,340	5,662	5,622	27,042	21,162	101%	5,210	45%

Note: (1): $K = W_N - NFA$; (2) and (3) show market values of produced and non-produced non-financial assets of government and household sectors, (4): $K_C = K - K_G - K_H$ is the value of corporate non-financial assets, computed on a residual basis; (5) shows estimated non-financial assets of the corporate sector (non-financial and financial firms) based on accumulated investments (perpetual inventory method) reported by Statistics Sweden; (6) and (7) show financial assets and liabilities of the corporate sector according to the Financial Accounts, Statistics Sweden; (8) = (4)/(5) shows the deducted Tobin's Q for market-valued corporate capital in the SNWD to corporate capital in the investment-based series of Statistics Sweden; (9): total market capitalization of the Stockholm Stock Exchange plus total estimated value of non-listed shares (from SNWD); (10): (9)/[(5)+(6)-(7)]. See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

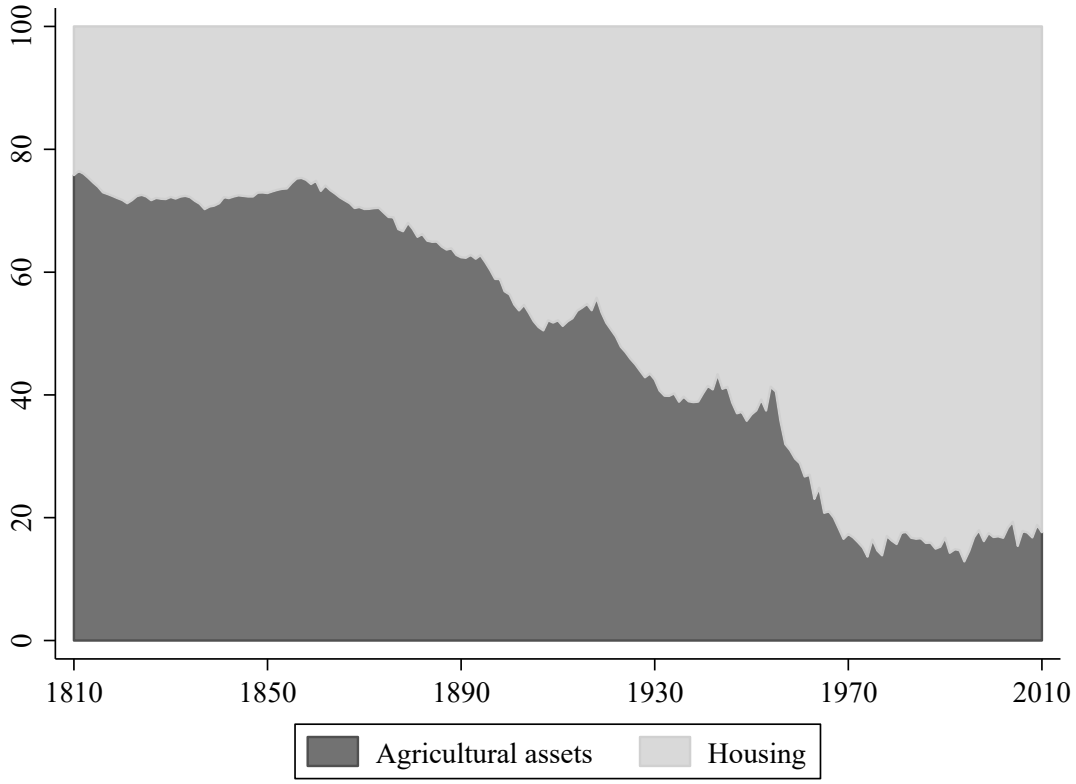
Table F1: Decomposing income growth in population and per capita income growth.

	Real growth rate, national income	Real growth rate, per capita national income	Population growth rate	Adult population growth rate
1810–2010	2.4	1.7	0.7	0.9
1810–1870	1.5	0.5	0.9	1.0
1870–1910	2.4	1.6	0.7	0.8
1910–2010	3.0	2.5	0.5	0.8
1910–1950	3.1	2.5	0.6	1.0
1950–2010	3.0	2.5	0.5	0.6
1950–1980	3.6	3.1	0.6	0.7
1980–2010	2.3	1.8	0.4	0.6
1950–1970	5.5	4.7	0.8	1.0
1970–2010	2.2	1.9	0.4	0.5
1970–1990	2.1	1.8	0.3	0.5
1990–2010	2.4	1.9	0.5	0.6

Note: The table shows GDP-deflated income growth decomposed into population growth and per capita income grow using SNWD table SE1.1.

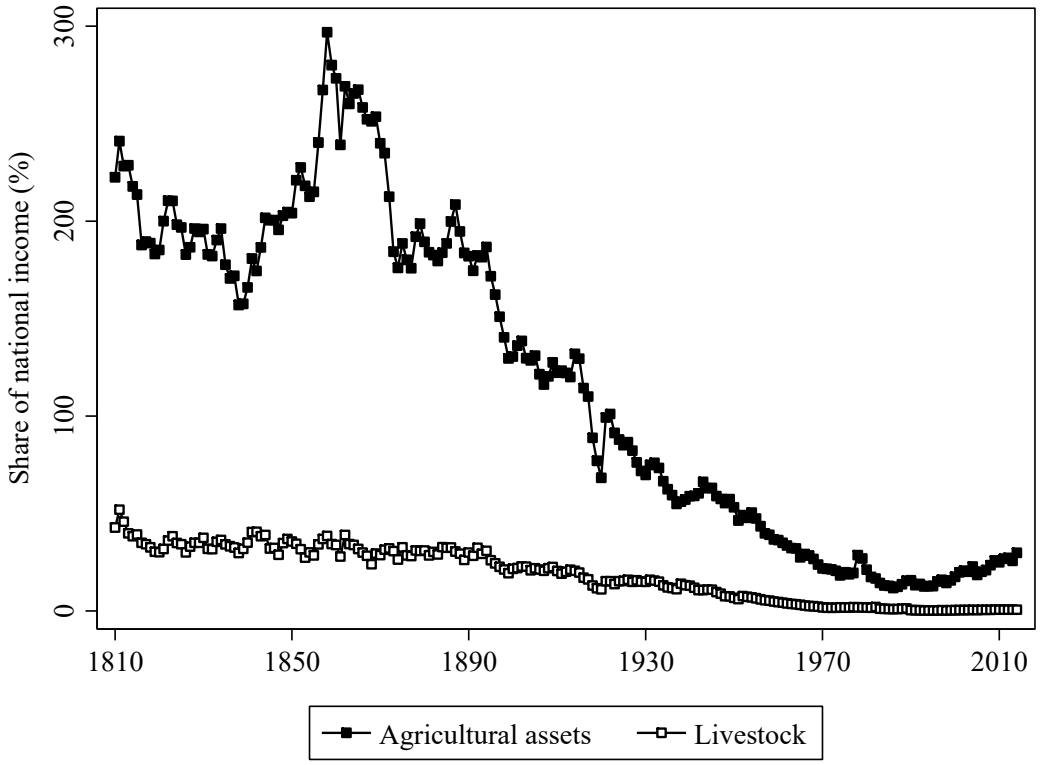
Figures

Figure B1: The composition of non-financial assets of the household sector, 1810–2010.



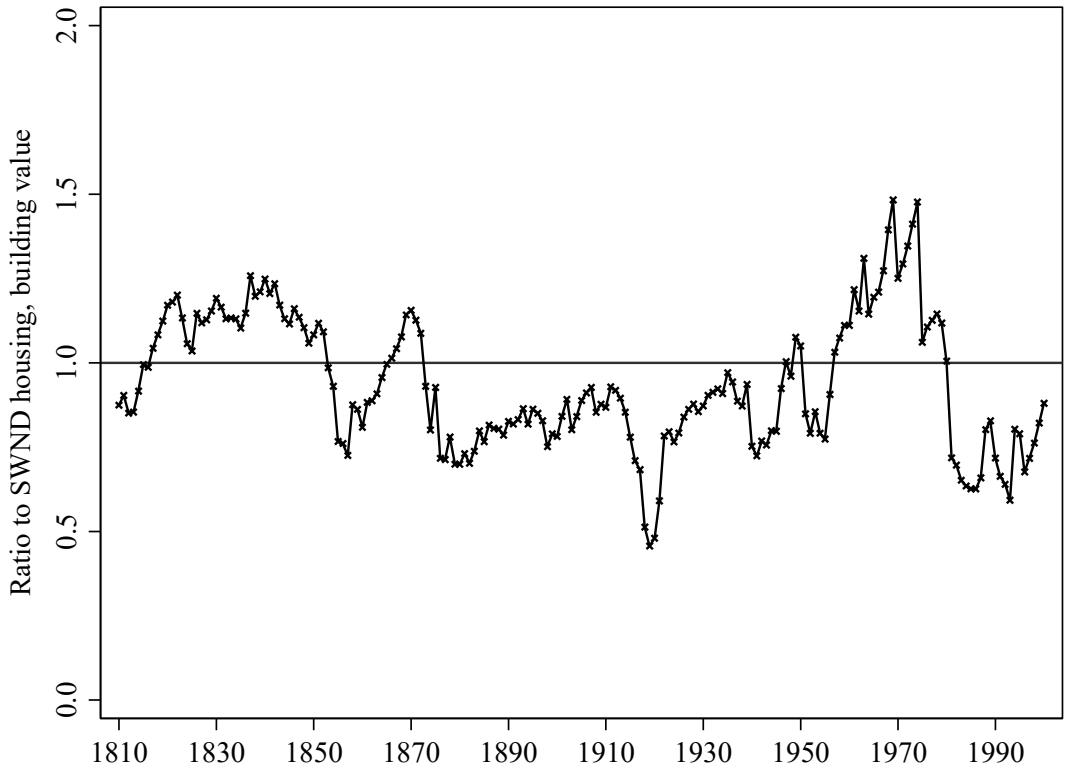
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure B2: Agricultural assets and livestock relative to national income, 1810–2014.



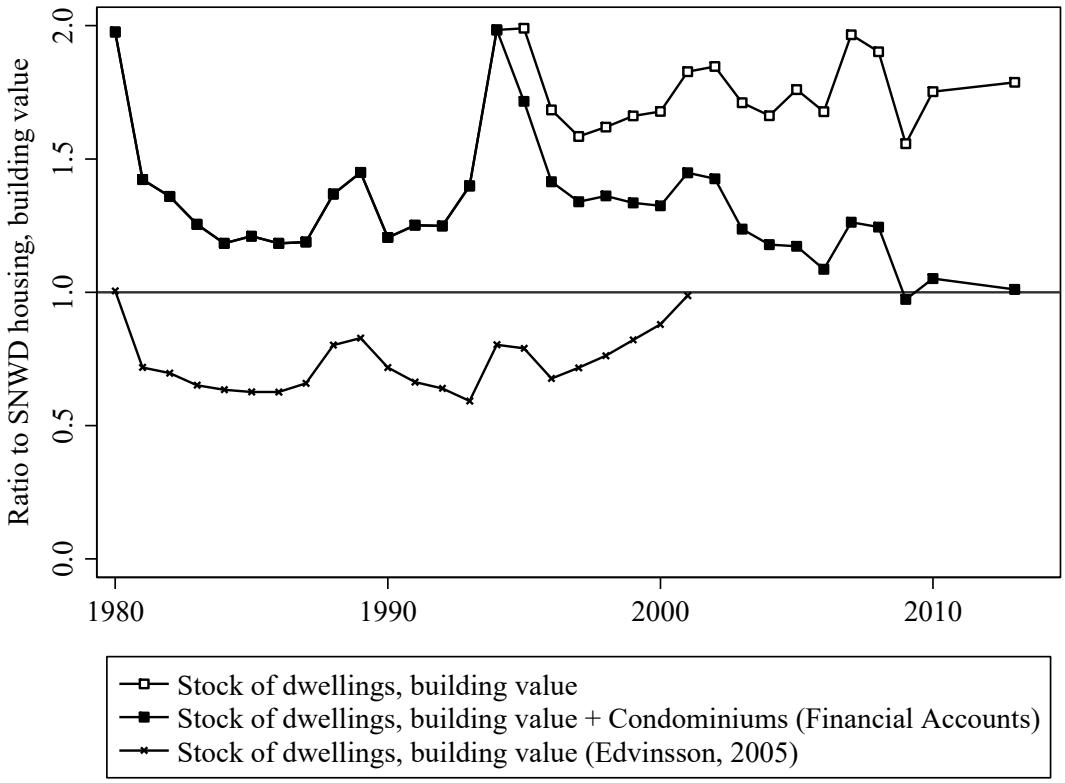
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure B3: Residential buildings in SWND vs. Edvinsson (2005).



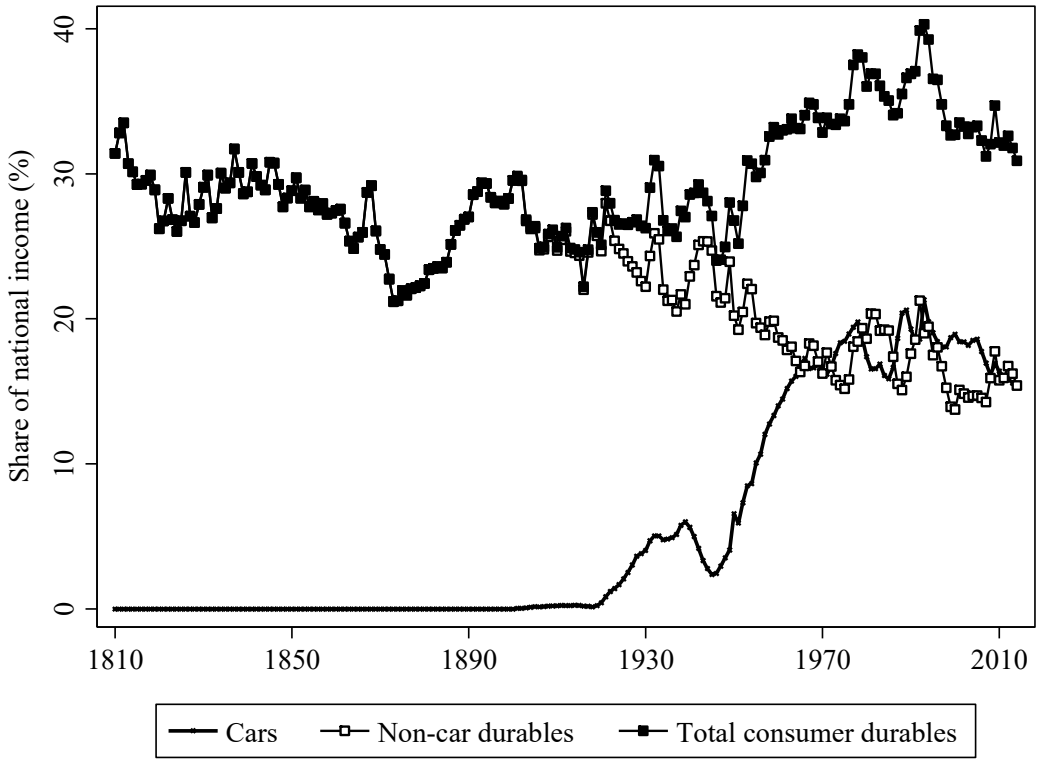
Note: The figure shows the ratio of the building value in non-agricultural real estate in the SNWD to the current value of the stock of residential building (K. Net (capacity) stock of various types of produced assets (in current, purchasers' prices, million SEK), aggregate economy, and the total net stock of produced assets of the aggregate economy, of the private sector and of manufacturing and handicrafts (1st of January each year)). See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure B4: Residential buildings in SWND vs. estimates by Statistics Sweden.



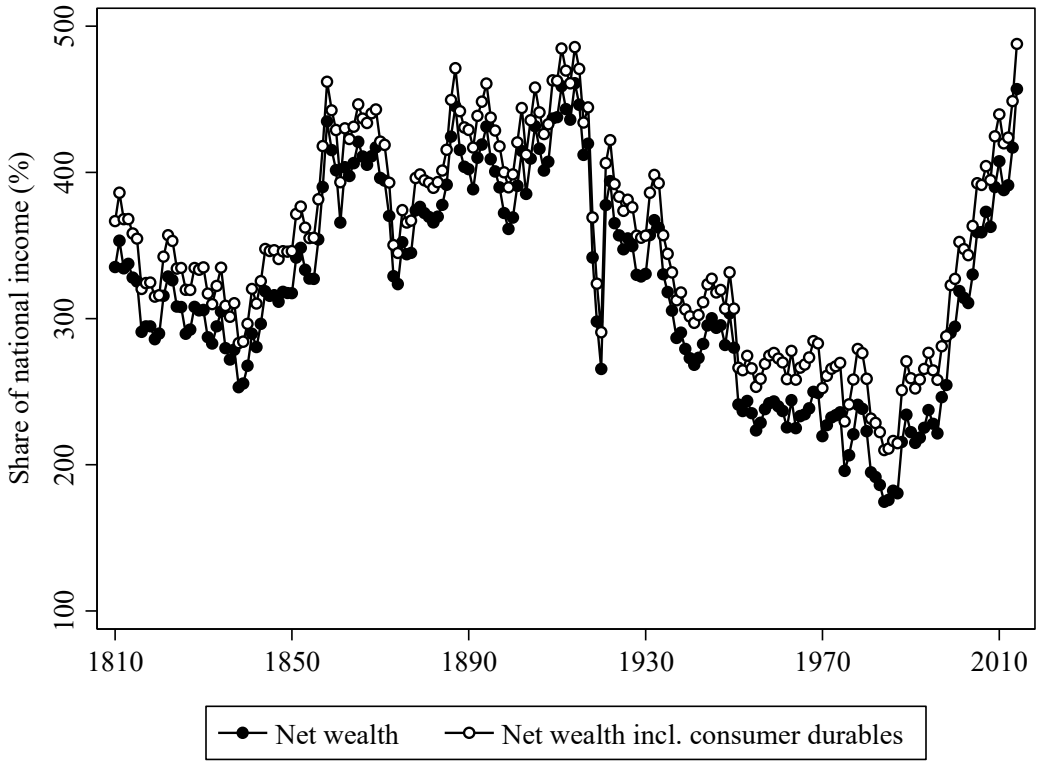
Note: The figure shows the ratio of the building value in non-agricultural real estate in the SNWD to the current value of the stock of residential building and the value of condominium associations in the Financial Accounts. See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure B5: Cars and non-car consumer durables relative to national income.



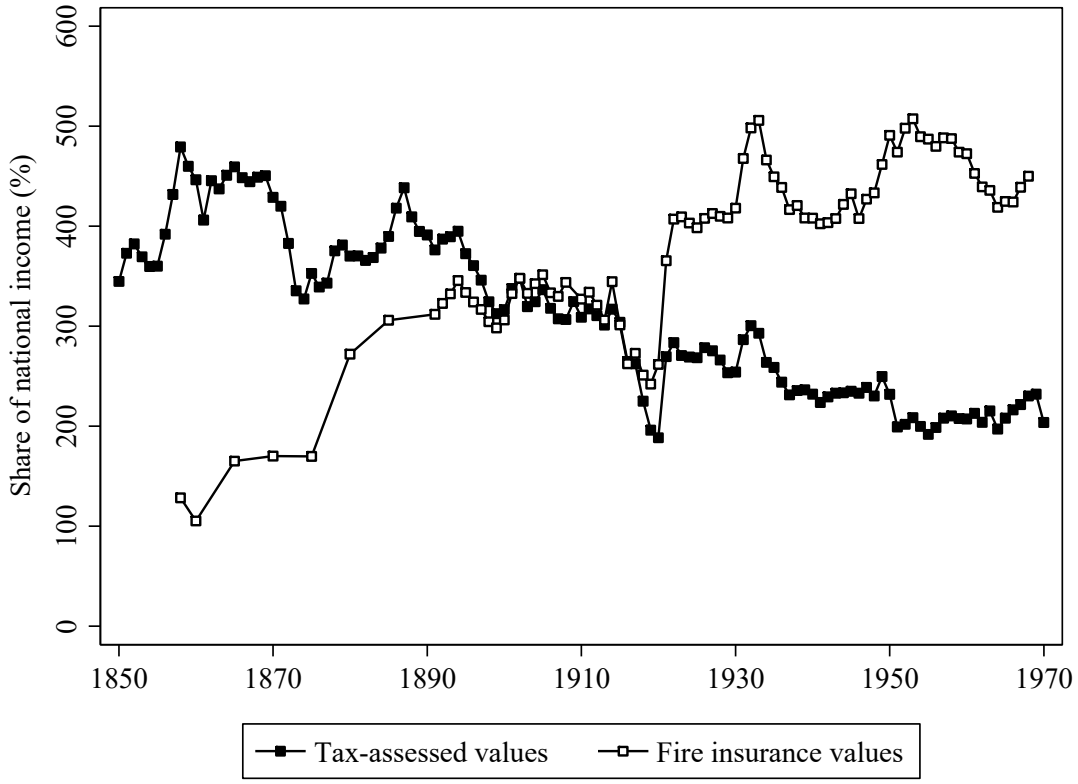
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure B6: Wealth-income ratios with and without the stock of consumer durables



Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure B7: Comparing tax-assessed and fire insurance-based values of non-financial assets including consumer durables divided by national income.

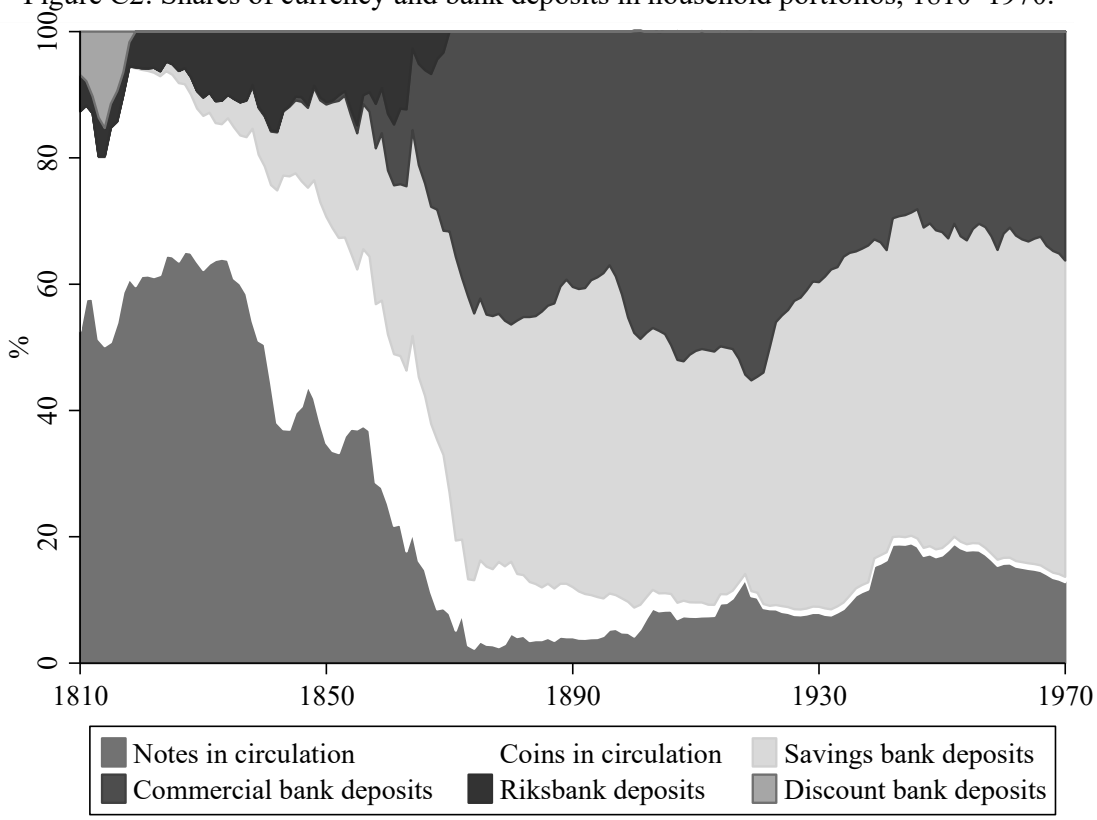


Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure C1: Composition of financial assets, 1810–2014.

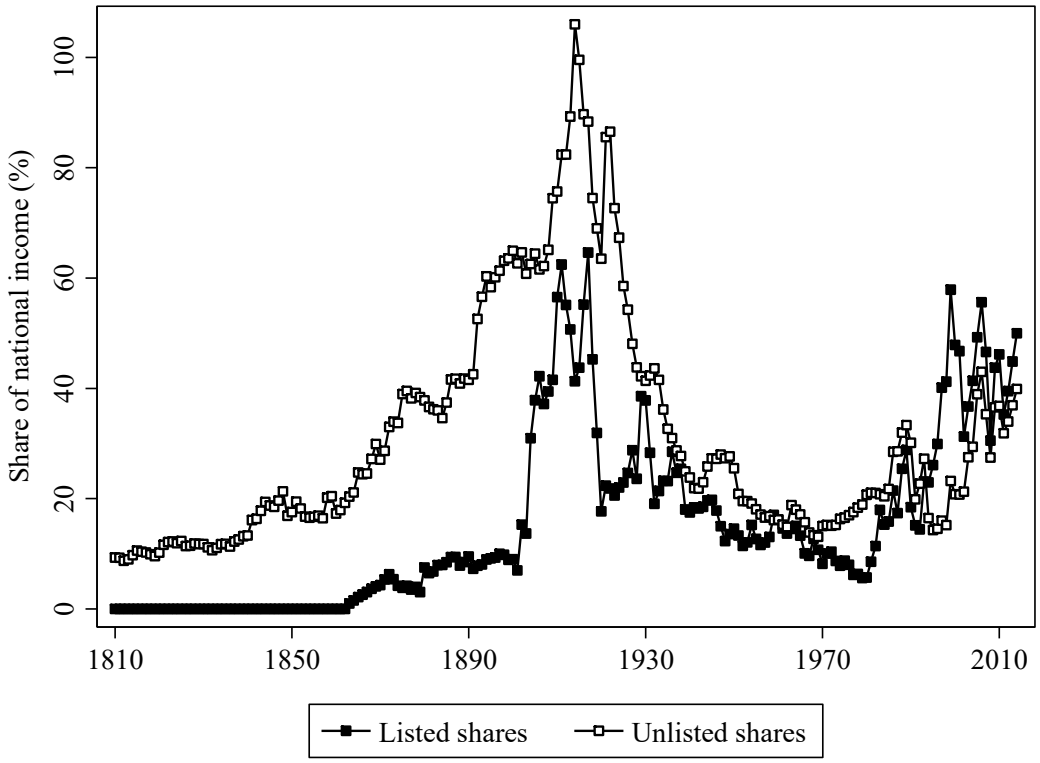
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure C2: Shares of currency and bank deposits in household portfolios, 1810–1970.



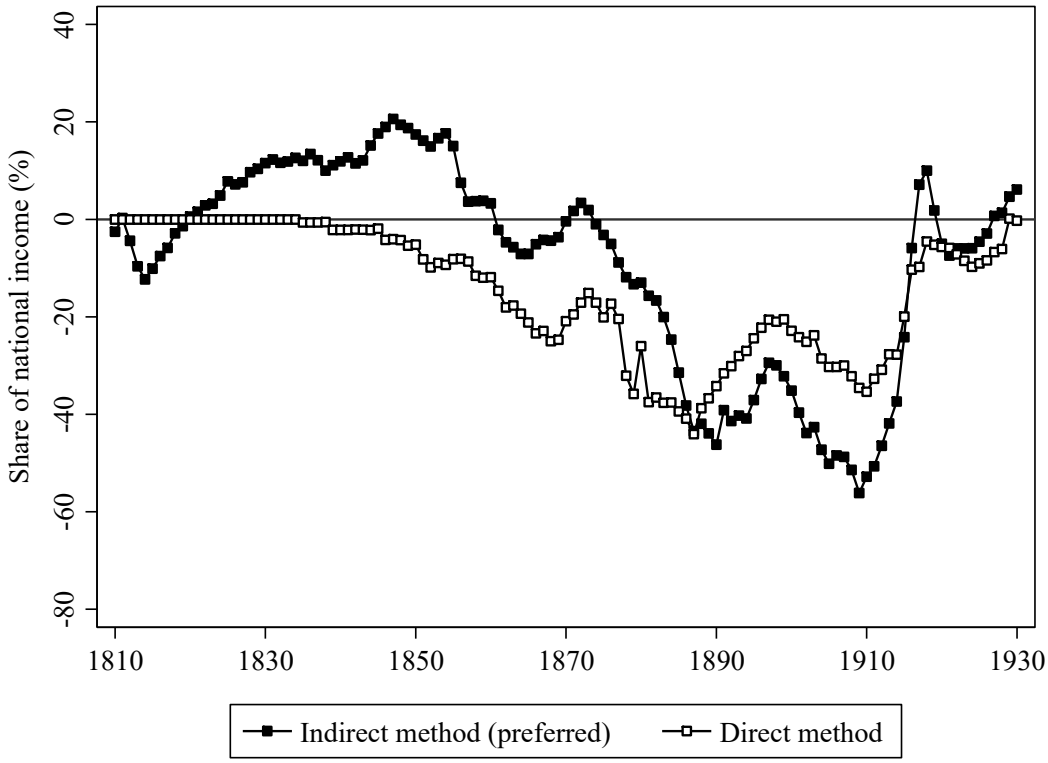
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure C3: The value of listed and unlisted corporate shares to national income.



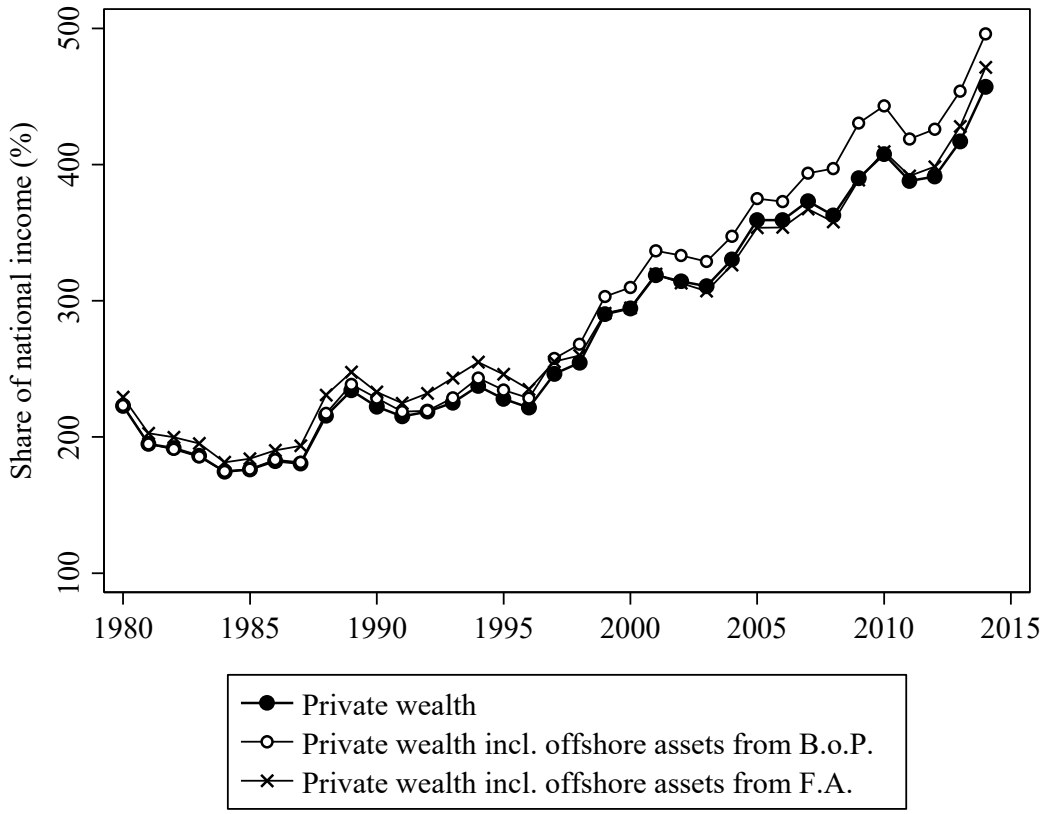
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure C4: Net foreign wealth, indirect and direct methods, 1810–1930.



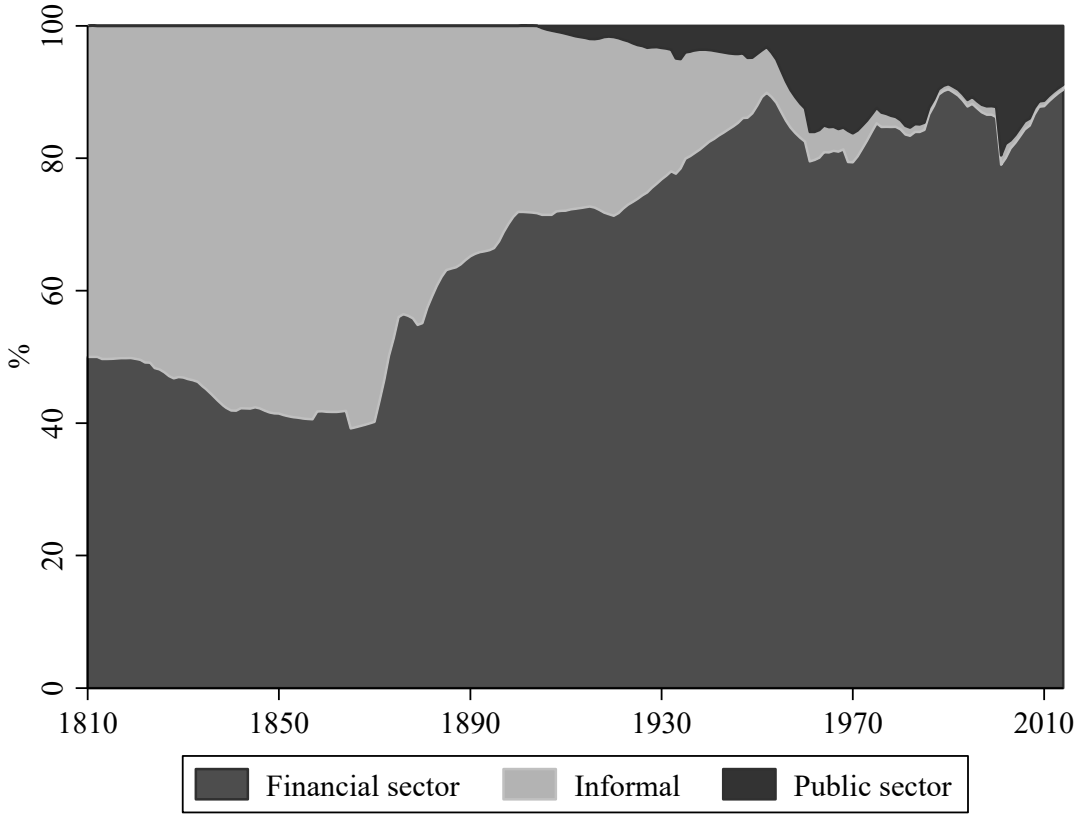
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure C5: Offshore wealth in private wealth-income ratios, 1980–2010.



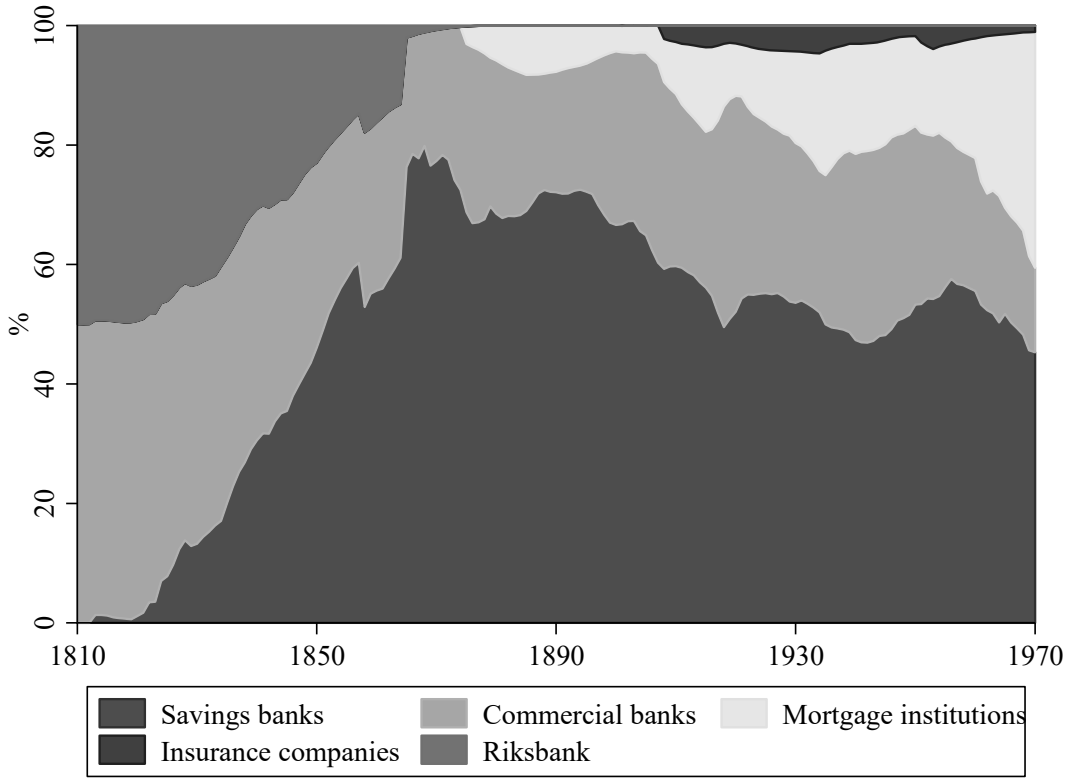
Note: "B.o.P." denotes offshore wealth estimated based on accumulated net errors and omissions in the Balance of Payment. "F.A." denotes unexplained savings in the national accounts based on comparing with the financial accounts. See text for further details and www.uueconomics.se/danielw/SNWD.htm for data.

Figure D1: Composition of total financial lending to households across lender types as well as the size of these loans as share of national income.



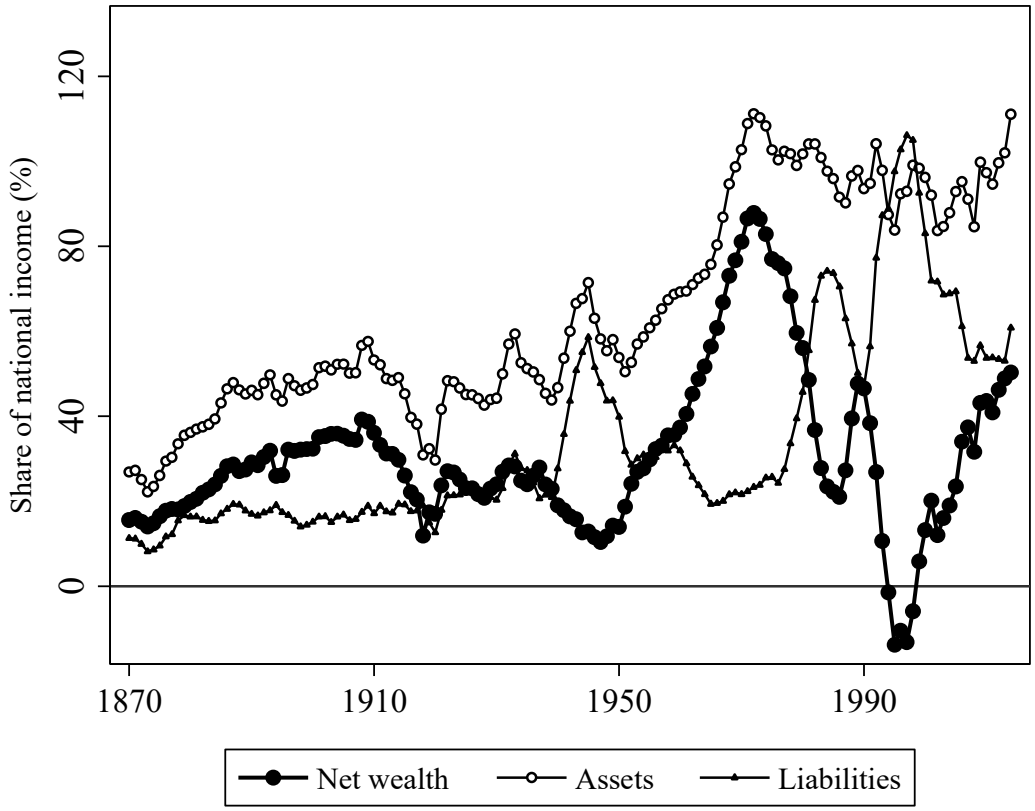
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure D2: Institutional origins of household bank borrowing



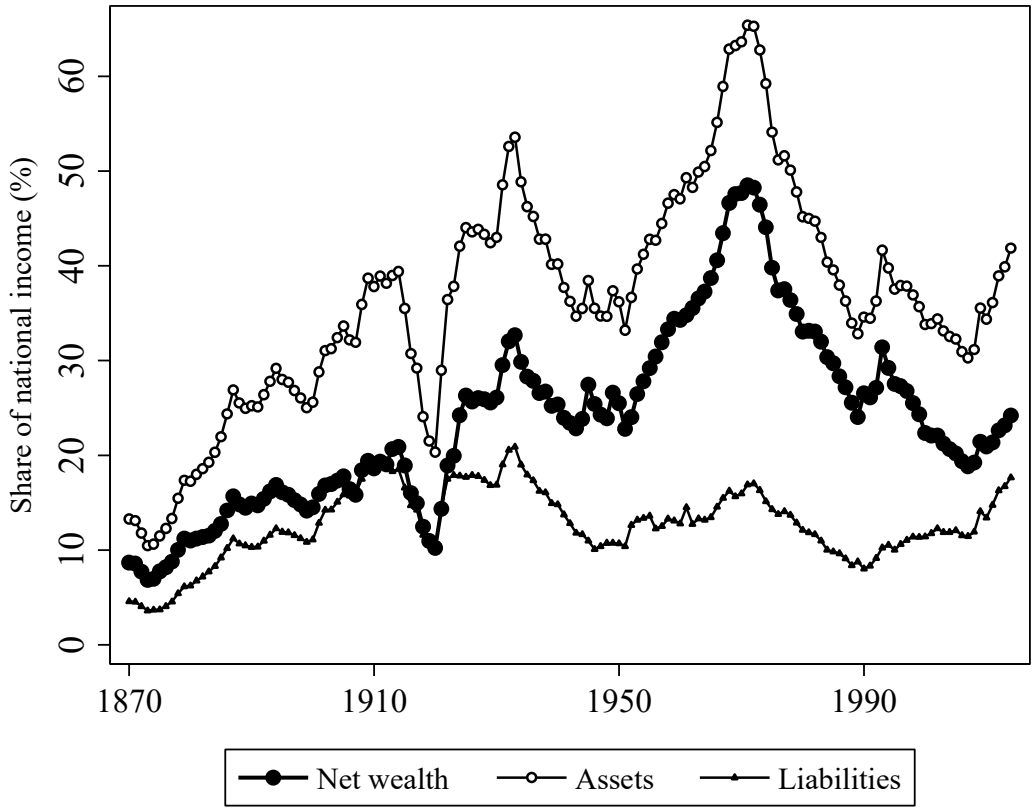
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure E1: Central government net wealth, 1870–2014.



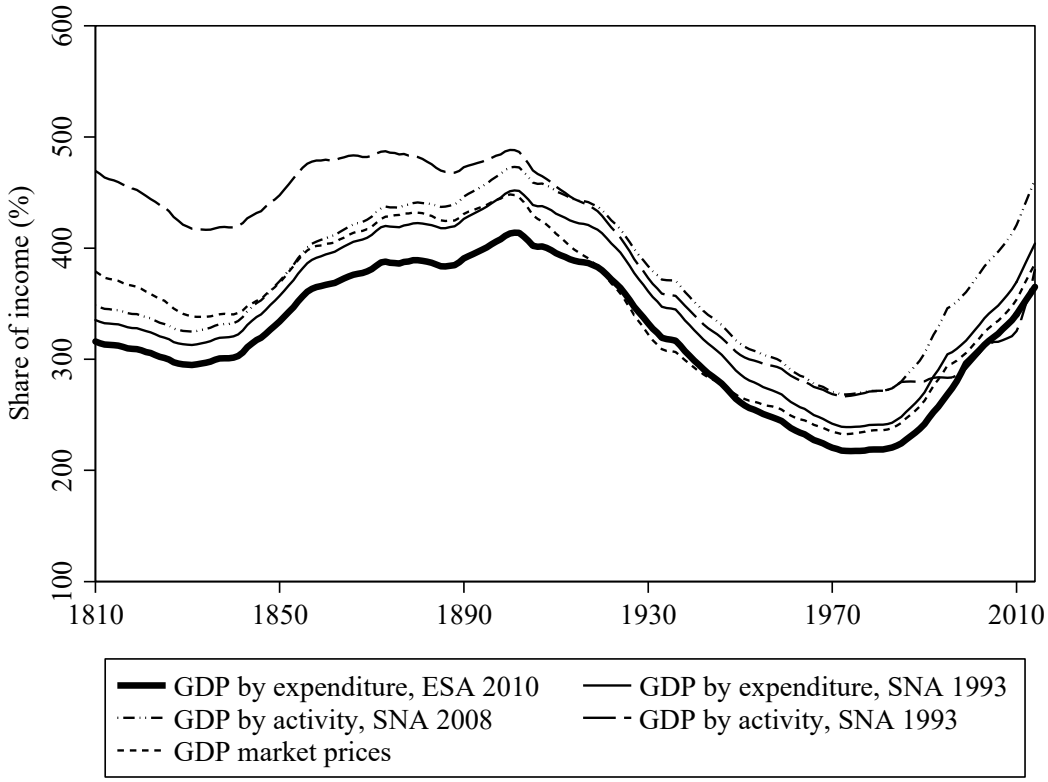
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure E2: Local government net wealth, 1870–2014.



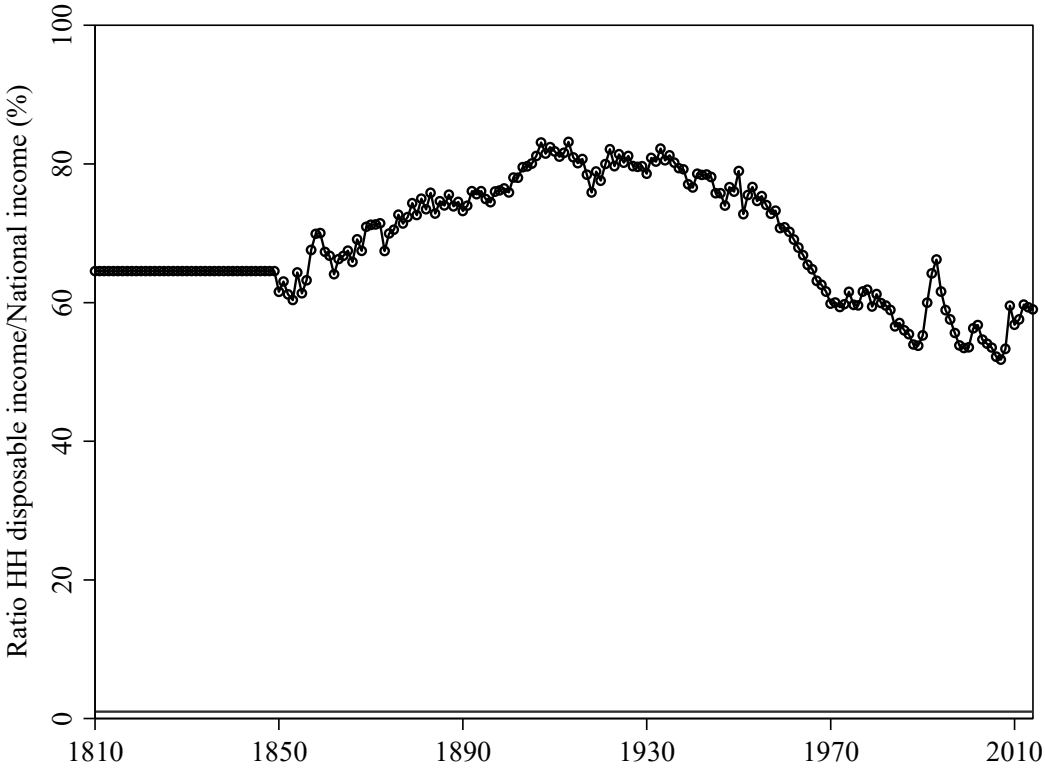
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F1: Wealth-income ratios using different national income estimates, 1810–2014.



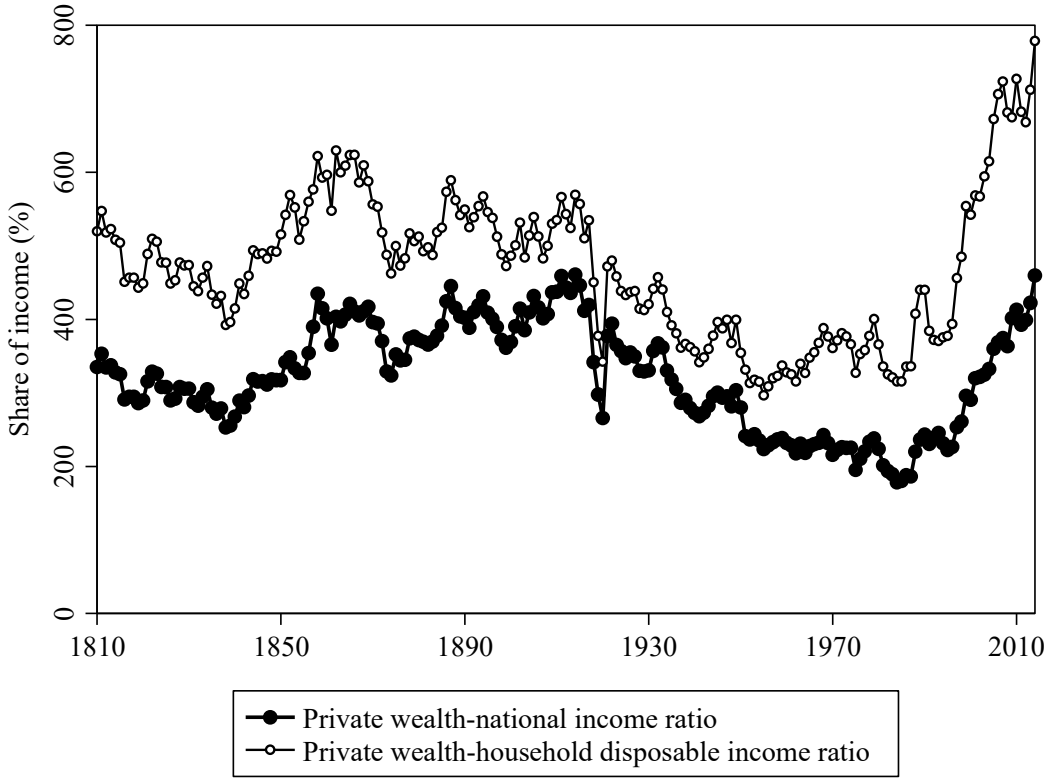
Note: Our main series is "GDP by expenditure, ESA 2010" while the others are variants presented in the text. For data see www.uueconomics.se/danielw/SNWD.htm.

Figure F2: Ratio of household disposable income to national income, 1810–2014.



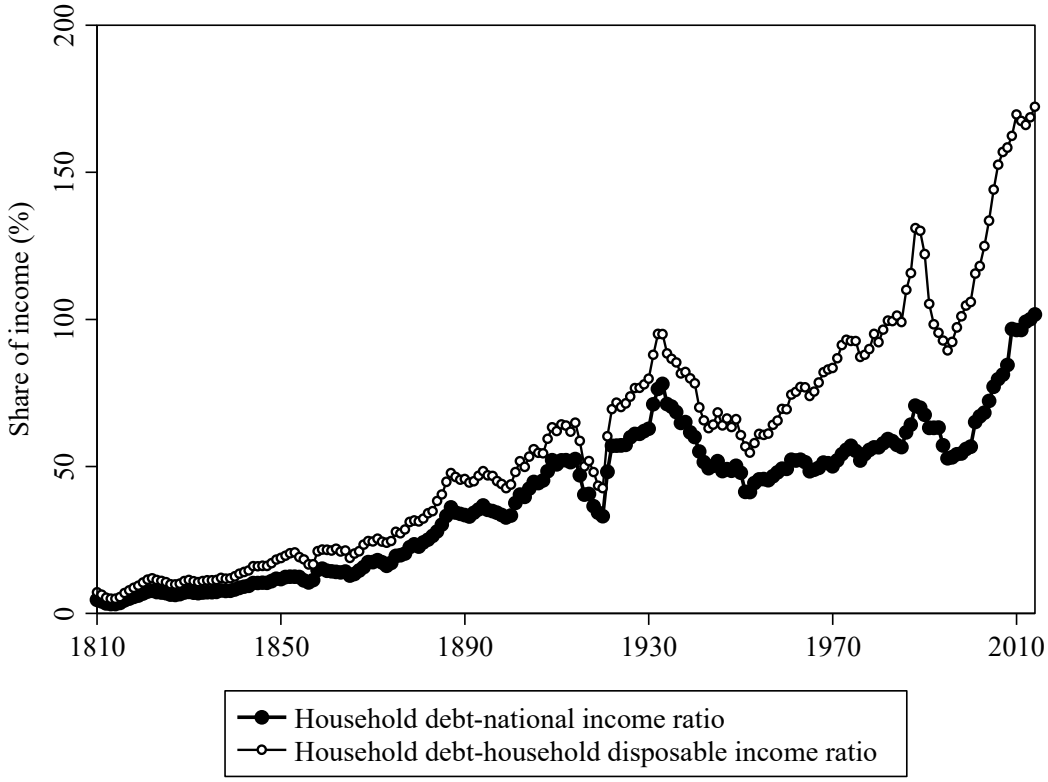
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F3: Ratio pf private wealth to different income denominators, 1810–2014.



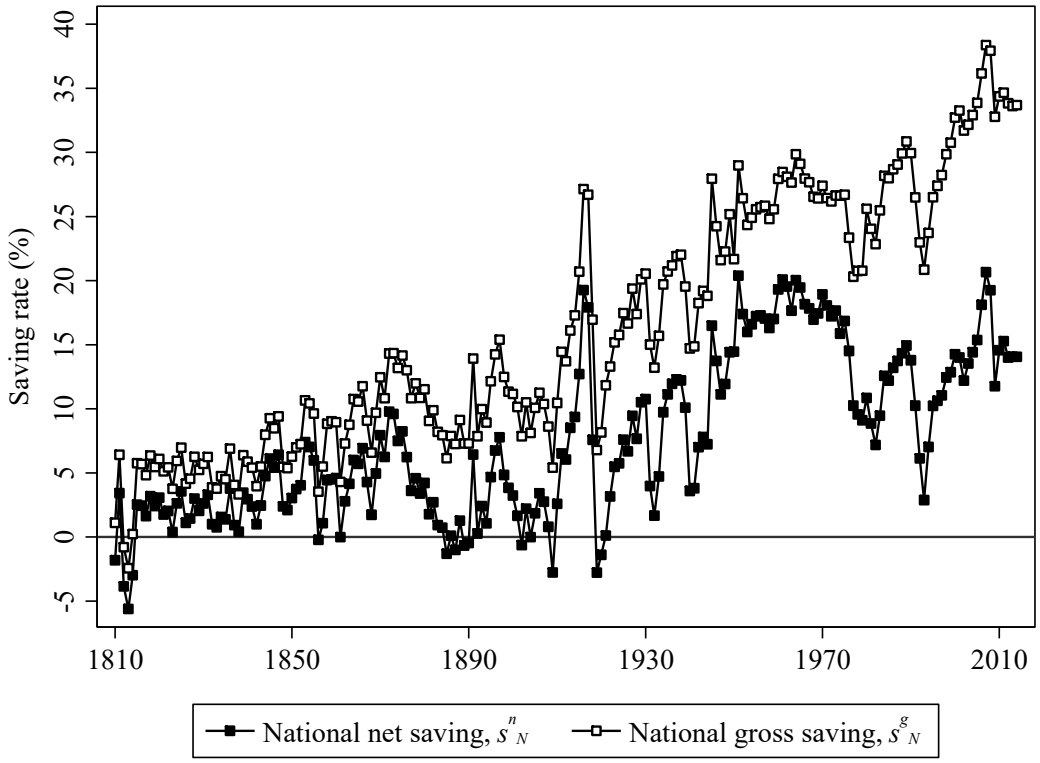
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F4: Ratio of household liabilities to different income denominators, 1810–2014.



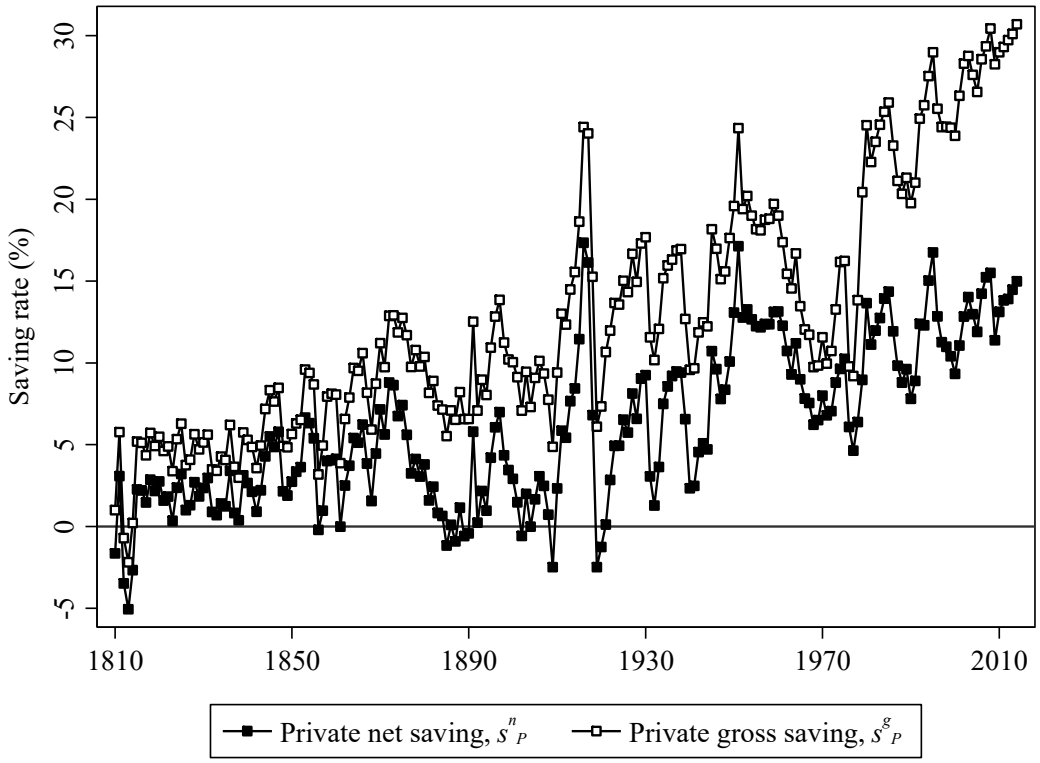
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F5: National net and gross saving rates, 1810–2014.



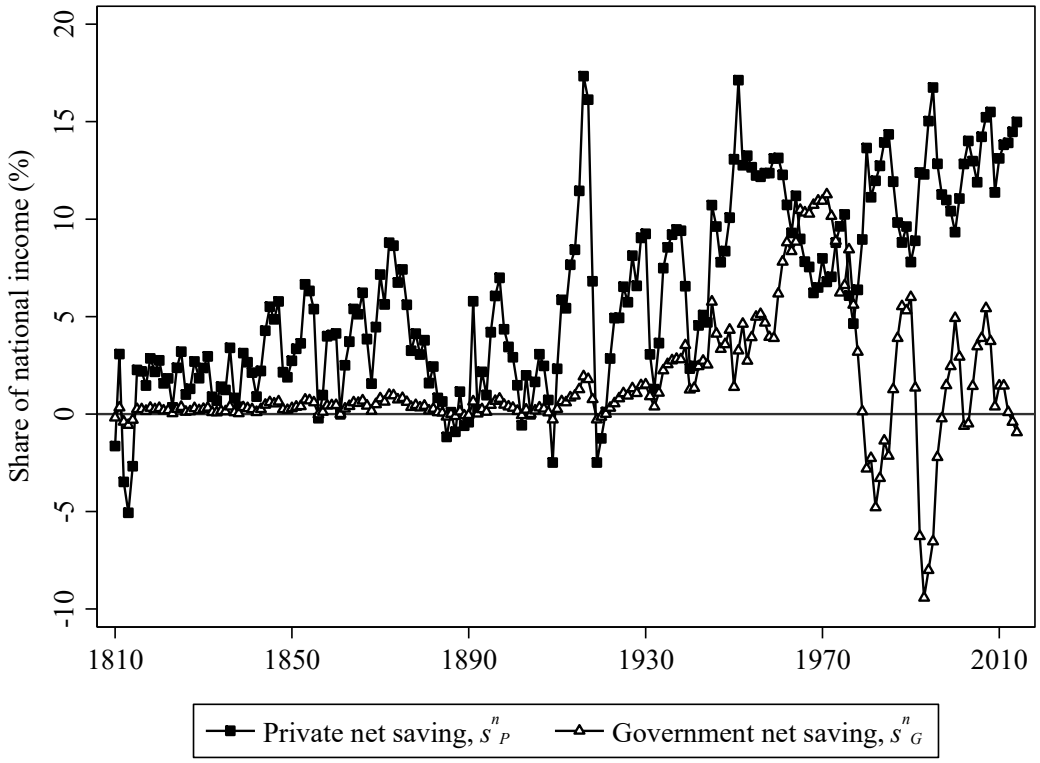
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F6: Private net and gross saving rates, 1810–2014.



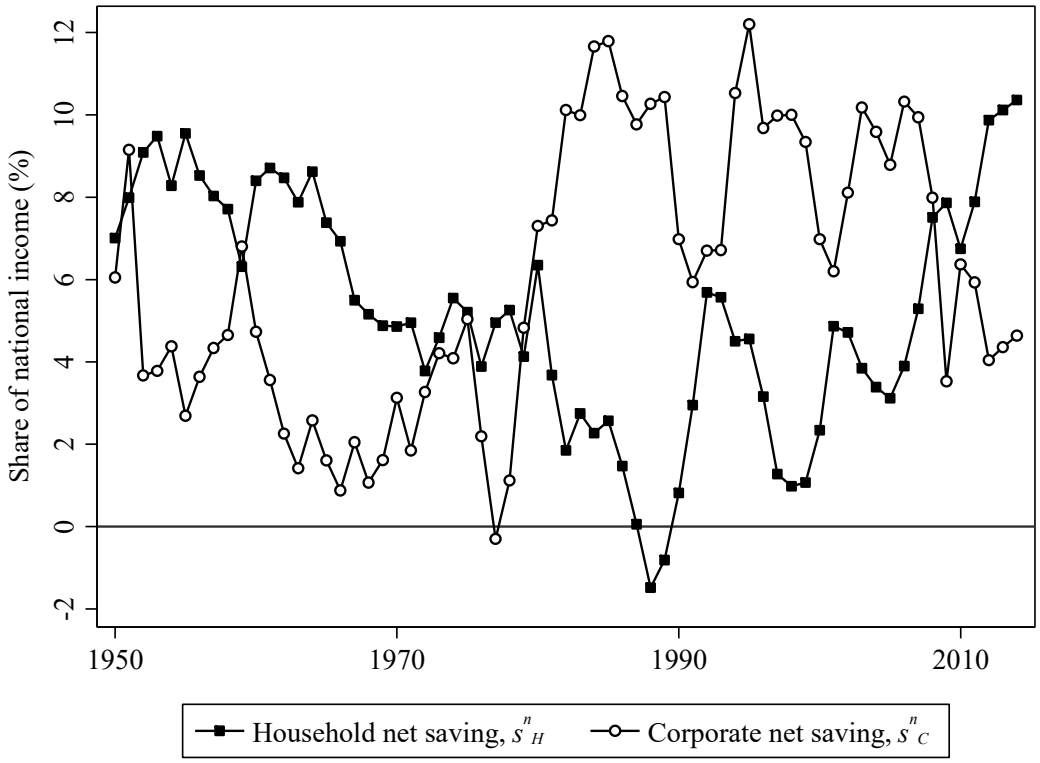
Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F7: Private and government net saving rates, 1810–2014.



Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.

Figure F8: Personal (household) and corporate net saving rates, 1950–2014.



Note: See text for sources and www.uueconomics.se/danielw/SNWD.htm for data.