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## Wealth-Income Ratios in a Small, Late-Industrializing, Welfare-State Economy: Sweden, 1810–2014

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## ABSTRACT

### **Wealth-Income Ratios in a Small, Late-Industrializing, Welfare-State Economy: Sweden, 1810–2014\***

This paper uses new data on Swedish national wealth over a period of two hundred years to study whether the patterns in wealth-income ratios previously found by Piketty and Zucman (2014) for some very rich and large Western economies extend to smaller countries that were historically backward and developed a different set of political and economic institutions during the twentieth century. The findings point to both similarities and differences. In the pre-industrial era, Sweden had much lower wealth levels than the rest of Europe, and the main explanation is that the Swedes were too poor to save their income. Over the twentieth century, Swedish aggregate trends and levels are much more similar to those of the rest of Europe, but the structure of national wealth differs. In Sweden, government wealth grew much faster and became more important, not least through its relatively large public pension system. This suggests an explicit role of historical economic and political institutions for the long-run evolution of wealth-income ratios.

JEL Classification: D30, E01, E02, N30

Keywords: wealth-income ratios, national wealth, household portfolios, pension wealth, welfare state, institutions, economic history

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## 1. Introduction

The historical evolution of aggregate national wealth addresses central aspects of long-run economic development and how the welfare of countries reflects changes in the level of technological development or institutional structures. A recent study by Piketty and Zucman (2014) presents data on long-run historical series of national and private wealth-income ratios in some very large and rich Western European and North American societies: France, Germany, the United Kingdom and the United States.<sup>1</sup> Their key finding is that the relative importance of aggregate wealth has fluctuated grossly over time, documenting historical wealth-income ratios in the nineteenth century up to the First World War, when they fell sharply and then continued to decrease until the 1970s, after which they once again started to rise. Piketty and Zucman attribute these patterns to a combination of accumulated savings (which appears to be the main driver, especially over the long run) and relative price gains.

Although these findings provide a number of important insights, some important issues remain unresolved. First, do the patterns in wealth-income ratios observed in large, populous and early industrialized economies carry over to smaller, less-populated and later-industrialized economies? A priori, this does not need to be the case. For example, standard trade models predict that a technological shock, such as industrialization, which increases the demand for capital, should shift relative factor prices in a large economy, and thus potentially the relative value of wealth, but leave factor prices unchanged in a small, price-taking economy and instead spur cross-border factor flows. A second issue concerns the role of economic and political institutions. These are likely to shape—and be shaped by—the evolution of wealth beyond more mechanical changes in savings or relative prices or geopolitical shocks that have attracted most attention so far.

This study aims to shed light on these and related issues by examining the evolution of wealth-income ratios in Sweden over the past two centuries.<sup>2</sup> Unlike the large countries studied by Piketty and Zucman, Sweden is the archetypical “small, open economy”, being a price-taker on global goods and capital markets and also a country that industrialized much later

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<sup>1</sup> See also Piketty and Zucman (2015) and Piketty (2014). Their studies continue the line of research on the structure and development of aggregate household wealth, where a particularly pioneering contribution to the cross-country analysis was made by Goldsmith (1985). Other important contributions to this line of research include Goldsmith 1962; Goldsmith, Lipsey and Mendelsen, 1963; Wolff, 1989; Davies, Lluberas and Shorrocks, 2011).

<sup>2</sup> The study also adheres to the recent analysis of long-term trends in inherited wealth in Sweden by Ohlsson, Roine and Waldenström (2014).

than the larger economies on the European continent. Furthermore, Sweden developed a social-democratic welfare state in the twentieth century (Esping-Andersen, 1990), which became one of the world's most extensive universal social insurance systems, with high levels of taxation and redistribution. When contrasted against the less welfare-oriented continental European and Anglo-Saxon countries, this raises the question of whether differing political institutional developments influence the accumulation and composition of private and public wealth.<sup>3</sup>

The foundation of the analysis is a new historical database on Swedish aggregate national and private wealth and savings. This database covers the private sector, households and corporations over the period 1810–2010 and the public sector, with both central and local government balance sheets, during 1870–2010, and thus the entire Swedish national wealth over the period 1870–2010. The private sector wealth database, which essentially consists of household balance sheets, includes subseries for non-financial and financial assets, and liabilities are sub-components within each of these categories and are also provided annually over the whole period. The database also consists of estimated pension assets in both funded and unfunded private and public pension systems, informal financial claims and debts within the (unconsolidated) private sector that were dominating household portfolios during most of the nineteenth century, as well as the stock of consumer durables.

A number of findings come from the analysis. The series estimated here show that, similar to the British, French, German and American experiences, wealth-income ratios fell in Sweden in the 1910s and then continued decreasing until the late postwar era. In recent years, wealth-income ratios have increased dramatically and today are at levels not witnessed since the onset of the First World War. A statistical analysis shows that in addition to the two World Wars, the recent surge in the importance of wealth is truly a common structural break found in all the studied Western economies.

However, the investigation also detects several important differences between Sweden and the large continental and Anglo-Saxon economies. Most importantly, Swedish wealth-income

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<sup>3</sup> In addition to these major differences, Sweden contrasts in several other dimensions: Sweden was not a belligerent country in any of the World Wars of the twentieth century (or, as a matter of fact, in any wars after the Napoleonic campaigns); Sweden is geographically the most northern country for which long-run wealth-income ratios have been studied so far; Swedes speak a different language and share a specific national and cultural heritage. Although these differences surely matter, they are hardly as important to the level, trends and composition of wealth-income ratios as the factors described in the main text.

ratios in the nineteenth century were only half the levels found in Britain, France and Germany, but were approximately the same as those in the U.S. The main explanation is the relatively low Swedish saving rates, which even dominated the low pre-industrial economic growth. The low U.S. wealth-income ratio, by contrast, was due to high savings being dominated by even higher levels of income growth. As a channel of finance for industrialization, Swedes instead seem to have turned abroad, and the study documents positive flows of capital imports from the middle of the nineteenth century. Second, the Swedish social-democratic egalitarian institutions developed in the twentieth century created a completely different set of incentives. The study finds that government wealth grew much faster in Sweden than elsewhere in the postwar era and, as a specific part of this system, the build-up of the public pension system boosted the stock of unfunded (defined benefit) public pension wealth to internationally unmatched proportions. In other words, Sweden differed from the large European economies in the nineteenth century, unable to save because of low incomes and therefore unable to accumulate domestic wealth, and in the twentieth century, mainly because of the expansion of political institutions linked to the universalistic welfare-state system.

Finally, the study and its new long-run database with Swedish wealth and savings also opens a wide agenda for further research on questions of relevance for Sweden and other small, European late-industrializers: What was the role of imported capital relative to domestic savings in financing the industrial breakthrough? Does evidence on public sector wealth over time square with the traditional views of causes and consequences of the remarkable twentieth century growth of government in the Western world? How significant is pension wealth and, more generally, social security wealth to the private and public balance sheets? Do the conventional industrialization chronologies of countries based predominantly on flow variables such as GDP, investments, prices and wages hold up against the historiography offered by stock variables such as domestic capital, foreign assets or the value of agricultural land? Finally, can the new evidence on gross and net financial assets within and across sectors shed new light on the historical importance of finance for long-run economic growth, or perhaps add perspective to the discussion about financial stability related to the extent of private indebtedness?

The remainder of this paper is organized as follows. Section 2 presents the central measurement and theoretical concepts, including a more detailed description of the new Swedish wealth database. Section 3 reports the main empirical results concerning the evolution of

Swedish private and national wealth-income ratios and how it compares with similar evidence of other countries. Section 4 decomposes the accumulation of wealth between contributions from new savings and asset price gains, whereas Section 5 further investigates the determinants of the observed patterns, focusing specifically on historical land prices, the role of capital imports and the emergence of the welfare state. Section 6 concludes and identifies areas for future research.

## **2. Concepts and measurement**

### **2.1 Wealth, income and savings in Sweden: A new historical database**

I present a new database, the Swedish National Wealth Database (SNWD), containing annual national and private wealth and savings for Sweden over the period 1810–2014. Definitions of all variables in SNWD follow the international standards of the System of National Accounts, SNA 2008 (United Nations, 2009), and the European System of Accounts, ESA 2010 (Eurostat, 2013).<sup>4</sup> The analytical and definitional framework is adopted from the recent study by Piketty and Zucman (2014), and the Swedish database is structured in a similar fashion as their cross-country dataset.

Data on Swedish historical wealth come from a variety of sources: tax assessments of land and housing, bank statistics of outstanding loans to the public and the value of currency and deposits, market capitalization at the stock exchange plus assessed market value of non-listed business equity, informal claims and debts, pension assets associated with different private and public systems. Although several of these series are newly collected for this study, many emanate from previous efforts by scholars and statistical agencies.<sup>5</sup> The non-financial assets are mainly in the form of tax-assessed stock values, similar to those used by Piketty and Zucman and are not generated by accumulating past investments through the perpetual inventory method. A complete description of the SWND and details of its construction, including exten-

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<sup>4</sup> There are some discrepancies between the SNA 2008 and ESA 2010 as well as differences in how countries implement these systems in their own practices. An important new feature of the 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 the ENS 1995 (the Swedish version of ESA 1995).

<sup>5</sup> Fahlbeck (1890) and Flodström (1912) made important contributions to Swedish national accounting, including the construction of national wealth estimates for single years. Berg (1983, 2000) compiled household balance sheets since 1950. In the 1990s, Statistics Sweden constructed national balance sheets for the period 1980–1994 (Tengblad 1992; Statistics Sweden 1995). In addition, the database relies on the work by Swedish economic historians in generating long-run national accounts series (Edvinsson, 2005, 2014; Krantz and Schön, 2007).



sive treatments of source materials, previous studies, alternative definitions and the numerous problematic aspects of the data are presented in the companion paper Waldenström (2015a) and its appendix Waldenström (2015b).

Net wealth in year  $t$ ,  $W_t$ , is defined as the sum of the end-of-year market value of non-financial assets,  $A_t^N$ , plus financial assets,  $A_t^F$ , less liabilities,  $L_t$ . Non-financial assets consist of produced assets, mainly dwellings and other construction, and non-produced assets, such as urban and agricultural land and timber tracts.<sup>6</sup> Financial assets consist of deposits and currency, shares, bonds, informal claims as well as life insurance savings and funded pension assets.<sup>7</sup> Liabilities include standard financial sector loans, state loans to housing or higher studies and central government debt.

Sector-level wealth is reported for the private and government sectors. Private sector wealth,  $W_{Pt}$ , is estimated yearly since 1810 and follows the structure of Piketty and Zucman (2014). Specifically, it is defined as the sum of the net wealth of households (including non-profit institutions serving households),  $W_{Ht}$ , which includes corporate wealth measured as the total value of the household-owned equity of non-financial and financial corporations, and a “residual” corporate wealth component,  $W_{Ct}$ , which is defined as the difference between firms’ market value and the replacement value of the firm net assets. In other words, if Tobin’s  $Q$  is equal to one, then this difference is zero and  $W_{Pt} = W_{Ht}$ .

Public sector wealth,  $W_{Gt}$ , consists of the sum of the net assets of the central government (the state),  $W_{CGt}$ , and the local governments (counties and municipalities),  $W_{LGT}$ . As 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. The main source for the postwar era is the Financial Accounts. Before that, a full set of assets and liabilities for both central and local governments are available from different sources on an annual level back to 1870. Consequently, the Swedish series of national wealth,  $W_{Nt}$ , is defined as the sum of private and government wealth and is available annually for the period 1870–2014. Note that national wealth in an open economy encompasses not only domestic capital,  $K_t$ , but

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<sup>6</sup> The stock of consumer durables is reported separately from the main variables as the SNA classifies them as being consumed away within one year and thus not part of a stock of assets.

<sup>7</sup> Unfunded public pension claims are not part of the main specification of household assets, but in a sensitivity analysis below I report a new series for public pension wealth since the introduction of the universal public pension system in 1914.

also the net of assets and liabilities vis-à-vis foreigners, i.e., net foreign assets,  $NFA_t$ , which means that we can also write national wealth as  $W_{Nt} = K_t + NFA_t$ .

The main variable of interest in this study is the aggregate *wealth-income ratio*,  $\beta_t = W_t/Y_t$ , which shows the number of annual national incomes  $Y_t$  needed to earn the current stock of wealth. National income is defined in as the gross domestic product,  $Y_t^d = f(K_t, L_t)$ , less capital depreciation,  $\delta K$ , plus net foreign income,  $NFI$ .<sup>8</sup> There are different  $\beta$ s for the different sectors in society, with  $\beta_{Pt}$ ,  $\beta_{Gt}$  and  $\beta_{Nt}$  denoting the wealth-income ratios using private, government and national wealth, respectively.

In addition to the new wealth data, the study also presents new estimates of annual national and sectoral gross and net saving rates for Sweden since 1810. Gross saving is denoted as  $S_t^g = s_t^g Y_t$  and net saving is  $S_t^n = S_t^g - \delta_t K_t$ . Private gross and net saving rates are the sum of personal and corporate saving rates such that  $s_{Pt}^g = (S_{Ht}^g + S_{Ct}^g)/Y_t = S_{Pt}^g/Y_t$  and  $s_{Pt}^n = S_{Pt}^n/Y_t$ . The national saving rate is defined as the sum of private and public saving,  $s_{Nt}^n = s_{Ht}^n + s_{Ct}^n + s_{Gt}^n$ . Data on savings are scarce or even nonexistent before 1950, when Sweden introduced its official national accounts. Between 1810 and 1950, therefore, savings are computed from the historical national accounts of Edvinsson (2005, 2014) as the sum of investments, gross or net of depreciation, and the sum of the current account (defined as the difference between exports and import of goods and services) and capital accounts (defined as the net foreign income). The sectoral decomposition of saving before 1950 is based on applying approximate—and, unfortunately, highly uncertain—shares of national saving reported in Lindberger (1956) and Lundberg (1970).<sup>9</sup> After 1950, I use the numbers for household, corporate, government and national saving reported in the official national accounts.

## 2.2 Framework for understanding wealth-income ratios over the long run

What are the forces determining the level and trends of wealth-income ratios over time? In particular, what is the role of new savings and capital gains in the accumulation of wealth? Does it matter whether one uses gross or net saving rates? And, is there a role for economic and political institutions in all this?

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<sup>8</sup> National income is defined in a standard manner as the gross domestic product,  $Y_t^d = f(K_t, L_t)$ , less capital depreciation,  $\delta K$ , plus net foreign income,  $NFI$ .

<sup>9</sup> Shares of national saving adhering to households, corporations and the government are reported by Lundberg (1970, pp. 92f) 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. See further Waldenström (2015b, section F3).

In the path-breaking analysis of Piketty and Zucman, a structural macroeconomic framework based on the Harrod-Domar-Solow growth model is presented for understanding the evolution of  $\beta$ . The analysis departs from a standard formula for wealth accumulation as a function of previous wealth, net of depreciation saving, and capital gains:  $W_{t+1} = W_t + s_t^n Y_t + KG_t$ . If one abstracts from capital gains and assumes that there is only one (capital) good in the economy, then savings-induced wealth growth drives all wealth accumulation. Over a sufficiently long time period with stable growth and saving rates, Piketty and Zucman show that the steady-state level of  $\beta$  relies on the relationship between private net savings  $s^n$  and income growth rate  $g$  as follows:  $\beta = s_t^n / g$ .<sup>10</sup>

Extending this framework by considering two goods where relative price effects can give rise to capital gains, wealth growth can now be decomposed into a saving-induced component (a volume effect) and a capital gains-induced component (a relative price effect).<sup>11</sup> In Section 5 below, this decomposition is shown for Sweden over different time periods since 1810 and for different types of saving rates, contrasting the results with those found for other countries.

### 3. Wealth-income ratios over the path of development

This section presents and analyzes the evolution of wealth-income ratios in Sweden from the beginning of the nineteenth century until today. The analysis is essentially comparative, contrasting the developments in Sweden with those found previously for France, Germany, the U.K. and the U.S. but also investigating whether there are robust common cross-country patterns using new econometric time series estimations of common structural break points.

#### 3.1 Private and national wealth-income ratios in Sweden

Figure 1 shows the ratio of Swedish private wealth to national income,  $\beta_p$ , between 1810 and 2014 and how it is composed between non-financial and financial assets and liabilities. The trend over the full two-hundred-year period resembles an italicized “N”, an  $N$ :  $\beta_p$  increases

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<sup>10</sup> This steady-state result is derived by Piketty and Zucman (2014) from the dynamic equation  $\beta_{t+1} = \beta_t \frac{(1+g_{Wst})}{(1+g_t)}$ , where  $1 + g_{Wst} = 1 + s_t^n / \beta_t$  is the savings-induced rate of wealth growth and  $1 + g_t = Y_{t+1} / Y_t$  is the rate of income growth.

<sup>11</sup> Denoting the volume of capital,  $V$ , and the market value of capital,  $K = qV$ , Piketty and Zucman (2014) show that the wealth-income ratio evolves according to the process  $\beta_{t+1} = \beta_t \frac{(1+g_{Wst})(1+q_t)}{(1+g_t)}$ , where  $1 + q_t$  is the capital gain or capital loss.

from approximately 300 percent, or three years of national income to earn the stock of private wealth, in the early agrarian era to almost 500 percent at the time of the industrial take-off in the late nineteenth century. During the twentieth century, the wealth-income ratio declines, starting in the years just after the First World War basically all the way until the 1980s, when it reached a historical low of only 179 percent in 1984. This long secular decline in the relative value of private wealth is seen in both non-financial and financial asset-income ratios.

The figure also shows how pre-industrial household wealth was predominantly non-financial (buildings and agricultural land), whereas financial assets remained unimportant until the end of the nineteenth century, reflecting the development of a private banking system and the overall monetization of the Swedish economy.<sup>12</sup> Private debt was insignificant in the nineteenth century and started increasing during the interwar period onwards as ordinary people started earning enough to acquire mortgage loans and borrow for car purchases. This rise of “popular wealth” (Atkinson and Harrison, 1978) caused the household debt-national income ratio increase from approximately 30 percent in 1920 to 100 percent in the 2010s. Trends in national income also naturally contribute to the evolution of  $\beta$ , and subsequent sections precisely show by how much through decompositions of  $\beta$  into income growth, saving intensity and relative asset price developments.

[Figure 1 about here]

National wealth and its relation to national income since 1870 is shown in Figure 2. Practically all of Sweden’s net wealth is made up of private wealth; until the mid-twentieth century,  $\beta_P$  represented over nine-tenths of  $\beta_N$ . An exceptional era was the 1950s, 1960s and 1970s, when Swedish government wealth expanded rapidly and  $\beta_G$  more than quadrupled. This expansion reflects the build-up of a social security system and, in particular, the establishment of a pension system, which required the state to accumulate buffer funds to back up its pension obligations to the retirees. Many regard these buffer funds as “forced household savings”, and below, I examine whether these funds—had they indeed been saved privately—are quantitatively significant alongside other forms of household pension wealth.

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<sup>12</sup> Of course, within these two broad assets, the composition has shifted over time. In particular, agricultural assets (farmland, forests and buildings) went from constituting three-fourths of non-financial assets in the agrarian era to less than half in the 1930s and less than one-tenth after the 1970s. Financial assets were approximately one-third bank deposits and currency and one-third business equity until the 1970s when insurance savings become important, amounting to half of all financial assets in the 2010s.

[Figure 2 about here]

### 3.2 International comparison: Sweden vs. four large economies

How does the evolution of Swedish wealth-income ratios match the experiences of other countries? Are the differences in terms of country size or level of economic development across historical periods immediately visible in the trends and levels of  $\beta$ ? Looking at the long-run time trends, is it possible to detect common patterns in trends and important regime switches, or are these experiences predominantly country-specific? This section aims to answer these questions by comparing Sweden with different countries, all of which are larger than Sweden in terms of either economy or population or both.

To begin, Figure 3 displays wealth-income ratios during the period 1970–2010 of Sweden and nine other industrialized countries reported by Piketty and Zucman (2014). Naturally, there are a number of country-specific aspects to consider when making a full comparative account, but if one restricts attention to how Sweden compares with the rest, then two immediate results stand out. First, Sweden's wealth-income ratios are relatively low. When considering private sector wealth (left panel), in the 1980s and 1990s,  $\beta_P$  hovers at approximately 200 percent (or two years of national income) in Sweden and 200–400 percent in the other countries. During the 2000s, Sweden has a ratio of approximately 300 percent and the other countries are at 400–600 percent. When considering national wealth (right panel), Sweden is more similar but always on the low end. The two countries that appear to most resemble Sweden in both cases are Canada and Germany. A second result is that Sweden appears to follow a similar trend of an increasing  $\beta$ , even if a close inspection reveals that the rise is not very smooth. In fact, the rise in Sweden begins only in the late 1990s, which naturally has bearing on the acclaimed role of macroeconomic and policy events in the 1970s and 1980s (more on this later).

[Figure 3 about here]

Turning to the long-run historical perspective, Figure 4 displays  $\beta_P$  between 1810 and 2010 in the countries for which such long-run data exist: Sweden, France, Germany, the U.K. and the U.S. The wealth-income ratio in the nineteenth century is much lower in Sweden than in the

other European nations, at roughly one-third to one-half of their levels. However, Sweden is almost exactly on par with the level of the U.S., beginning low at approximately 300 percent of national income and then slowly increasing to between 400 and 500 percent a century later. In the twentieth century, all five countries appear to converge, dropping during the First World War and then decreasing further until the 1980s, when the decrease turns into an increase.

[Figure 4 about here]

Figure 5 shows the long-run development of  $\beta_N$ . Although the time span is somewhat shorter, the picture looks almost exactly the same as for private wealth: Before the First World War, Sweden resembles the U.S., having a wealth-income ratio that is approximately half of those found in the rest of Europe. In the twentieth century, the countries are all in the same region and Sweden does not deviate notably. It is interesting to note, however, that the modern relatively low Swedish national wealth-income ratio is not present until the 1970s.

[Figure 5 about here]

Next, the cross-country comparison moves from essentially resting on casual observations to a more systematic examination of the trends and trend breaks across historical regimes. In the following, I apply recent econometric techniques to find *statistical* answers to questions such as: Are there statistically robust structural breaks, i.e., shifts in means, in the wealth-income ratios? If so, when do these breaks occur, and to what extent are they common across countries or country-specific? Two methods are used, one for estimating breaks in individual countries one at the time (Bai and Perron, 1998, 2003) and the other for estimating common breaks for groups of countries (Qu and Perron, 2007). Both methods are based on estimating breaks in a multistep procedure, first testing whether there are any breaks in the series and then, if breaks are detected, recursively evaluating their exact timing and magnitude.<sup>13</sup> For a shift to

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<sup>13</sup> In both cases, log-linear models are estimated, regressing  $\beta$  on constants in each time period separated by structural breaks (if any). In Bai and Perron's model, this entails estimating for one country at the time  $\beta_t = c_j + u_t$  for  $t = (T_{j-1} + \dots + T_j - 1)$  over regimes  $j = 1, 2, \dots, m - 1$ , where  $m$  is the maximum number of breaks allowed (throughout, we set  $m = 3$  because this is the upper boundary for the Qu-Perron model to be able to provide an estimation given the dataset at hand). The method of Qu and Perron is based on estimating  $\beta_t = (I \otimes c')S\gamma + \varepsilon_t$ , where  $\beta_t = (\beta_{1t}, \dots, \beta_{nt})'$  is now an  $n$ -country vector of logged wealth-income ratios,  $I$  an identity matrix,  $c_t = (c_{1t}, \dots, c_{nt})'$  a vector with  $q$  constants for each country  $i$ ,  $S$  a selection matrix,  $\gamma_j$  a vector of estimated coefficients and  $\varepsilon_t$  a random error. For a more extensive description of these methods, the different

be defined as “structural”, regimes are required in both models to be at least 21 years long (corresponding to setting the model’s trimming parameter to 15 percent), but naturally setting this length is a matter of perspective given the questions at hand.<sup>14</sup>

Table 1 and Figures 6 and 7 present results on the 140-year period from 1870 to 2010, which is the longest period for which annual observations are available. The first panel examines private wealth-income ratios, whereas the second panel examines national wealth-income ratios. As for the common breaks in all five countries, the Qu and Perron method detects three significant break points: 1) the First World War, 2) the Second World War—both of which are associated with drops of approximately one-third of the wealth-income ratio—and 3) the 1980s, when wealth-income ratios increase by approximately one-third. The wartime episodes are not surprising given the well-known attributes of these geopolitical shocks having a tremendous impact on the taxation and regulation of capital and, to some extent, outright destruction of capital.<sup>15</sup> The 1980s break is less obvious but comes right after the important policy shifts towards liberalization and tax reductions in many Western countries. Looking at the single-country breaks, they are broadly consistent with the timing of the common breaks, especially around the two World Wars, and all countries report at least one break in the post-1980 era. However, the precise timing of this latter break point appears to be partly due to artifacts of the statistical models: the breaks vary between 1981 and 1990, but in some countries (Sweden, Germany, the U.S.), breaks in models with shorter minimum regime lengths are recorded much later in the 1990s.<sup>16</sup> If anything, this gives perspective to conclusions about the role of the policy changes of the 1980s.

The estimated break points for Sweden clearly deviate from those of the larger countries. There are no breaks found around the Second World War and only a small change in 1915, whereas breaks are recorded between the wars in the mid-1930s (national wealth) or shortly

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tests they entail, problems and an application to a long-run series of top income shares, see Roine and Waldenström (2011). All data and GAUSS codes are available from my personal webpage (attributing to the authors of the respective methods for generously sharing their computer programs).

<sup>14</sup> In fact, the minimum length is determined by the bounds of the Qu and Perron model, which cannot be estimated for shorter regimes given the number of countries and time-series length. The Bai and Perron model works with shorter regimes, but the longer regime length was chosen for comparability reasons.

<sup>15</sup> Piketty and Zucman (2014) show that the extent of war destruction during the World Wars varied but overall was fairly limited, even in countries such as Germany and France, where many battles took place.

<sup>16</sup> Recall that the minimum regime length was set by the bounds of the Qu and Perron model. When instead fitting the Bai and Perron model with regimes as short as seven years (corresponding to a five-percent trimming value), new dates are found for the latest breaks: Sweden in 1999, Germany in 1998 and the U.S. in 1997 (all three corresponding to large positive mean-shifts in  $\beta$ ). For France and the U.K., the timing does not change.

after, in the early 1950s (private wealth). Sweden experienced other kinds of shocks that could account for these breaks, for example, in the 1930s with the demise of the dominant Krueger empire in 1932 (the “Krueger crash”), which severely hurt middle-class wealth as well as certain business groups, and in the early 1950s, through a shift towards stricter market regulations and hikes in most capital taxes.<sup>17</sup> If anything, the Swedish break points highlight that political institutional changes associated with the World Wars were probably as important as the actual wars in shaping aggregate wealth-income ratios, especially over the long run.

[Table 1 about here]

[Figure 6 about here]

[Figure 7 about here]

#### **4. Decomposing wealth accumulation: Savings vs. capital gains**

In their analysis of the long-run wealth growth, Piketty and Zucman (2014) found that almost all the long-run wealth accumulation in the large Western economies they studied emanates from past savings, whereas capital gains mattered primarily over shorter time periods. Sweden may potentially have followed a different trajectory by being a small and (relatively) open economy. This section begins the analysis of the drivers of Swedish wealth-income ratios by decomposing them into net of depreciation savings and capital gains, an analysis that builds on the conceptual framework presented in section 2. As the capital gains in this framework are derived residually from observed wealth accumulation and new savings, I continue by contrasting the results against recently compiled evidence of actual long-run asset price movements in Sweden. Finally, I empirically assess how models using savings and output net or gross of depreciation match the Swedish historical data.

Table 2 decomposes private wealth accumulation in Sweden since 1810 and compares it with previous results for France and the U.S. (Piketty and Zucman, 2014). The table presents results for two different kinds of saving rates: *private net savings* ( $s_P^n$ ), which sums the savings of corporations and households, and *personal net savings* ( $s_H^n$ ), which consists of only household savings. Making this distinction relates to the specific nature of private sector wealth

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<sup>17</sup> The literature on the volatile eras of the 1930s and 1950s in Sweden is vast, but discussion of the origins and effects of the Swedish postwar market regulations (leading to a “financial ice age”) can be found in Jonung (1993) and discussion of the importance of the Krueger crash for private wealth and its distribution can be found in Roine and Waldenström (2009).



data, where gross assets come from the household sector balance sheet (housing, bank deposits, shares, insurance savings, etc.) and therefore are most directly mapped against personal savings. The savings of corporations, in principle, are also reflected in private sector wealth through the value of corporate equity held by households, but if there are considerable deviations between book and market values of corporate equity (and Tobin's  $Q$  differs from one), then large corporate savings that are not reflected in market values of firms could interfere with the balance between personal savings and capital gains or losses in other asset markets, predominantly the housing market.<sup>18</sup>

[Table 2 about here]

A main result in Table 2 is that Sweden differs quite notably from the larger and historically richer economies of France and the U.S. Throughout the nineteenth century, capital gains account for most of Sweden's real growth in private wealth regardless of whether one uses private savings (which includes corporate savings) or only personal savings, in which case capital gains account for almost 90 percent of the wealth growth.<sup>19</sup> During the twentieth century, Sweden looks more similar to the other countries, but only when private saving is used. Disregarding corporate savings, capital gains once again represent most of private wealth growth in Sweden, whereas in France and the U.S., saving is still the dominant source. The exception in Sweden is the period 1950–1980, when personal savings were historically high.

Now, is it possible to match the large model-based estimated capital gains with historical evidence of capital gains observed on Swedish asset markets? Would it even be possible to infer from the evolution of asset price gains which of the two saving rates used above, private or personal, come closest to accounting for the real private wealth growth? Thanks to recent efforts to document historical returns on Swedish housing and stock markets, it is now possible

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<sup>18</sup> For Sweden, data on aggregate corporate book asset values can be reconstructed since 1980 (see Statistics Sweden, 1995). Tobin's  $Q$  is computed here as the ratio of the market value of all household business equity (listed and non-listed) to net corporate book assets. The Swedish  $Q$  ratio hovers around 0.3–0.5 until the late 1990s, when it increases drastically, almost reaching unity around 2000, only to fall to lower levels thereafter (see further Waldenström, 2015a). Piketty and Zucman (2014) found that in Germany, a relatively low  $Q$  at approximately 0.5 can account for much of the country's low  $\beta_p$ . In other words, Sweden resembles Germany in that its low corporate valuation during the 1970s, 1980s and most of the 1990s contributed to a low  $\beta_p$ .

<sup>19</sup> I discuss this result further below, but for the time being, it should be noted that such large capital gains are incompatible with an open-economy model, where insufficient domestic savings should spur capital imports because relative factor prices are set on world markets and not locally.

to answer these questions.<sup>20</sup> Table 3 shows, for different episodes since 1870, the inflation-adjusted average annual real returns on housing and on stock market investments, and the two different implied average annual capital gains in Swedish private wealth when using private and personal saving rates (retrieved directly from 2). Much can be said about these historical developments, but if we restrict attention to the main message, a very clear pattern emerges. Over the whole period, real house price gains and capital gains in  $\beta_P$  implied from using personal savings are strongly associated in both levels and changes. Stock returns also move simultaneously with these capital gains but with less precision. By contrast, the model-based capital gains using private savings appear to be much less consistent with observed asset price gains. In other words, the simple structural model of section 2 decomposing wealth growth into net savings and capital gains performs remarkably well when evaluated against real-world price gains in housing markets and using personal saving rates. The opposite holds true when using private saving rates, a result that most likely reflects discrepancies between the measurement of corporate values in either book or market terms.

[Table 3 about here]

## 5. Further explanations for the evolution of Swedish wealth-income ratios

### 5.1 Is Sweden “the U.S. of Europe”?

A main result from the previous sections is that Sweden has not followed a “European” pattern but instead a path much closer to the U.S., especially before the First World War. Although this resemblance may seem unexpected at first sight, a closer look reveals that Sweden and the U.S. in fact have some historical features in common that could have bearing on wealth-income ratios: they were both sparsely populated, i.e., a small population on a large, partly uncultivated land mass, and they were predominantly agrarian throughout the nineteenth century.<sup>21</sup>

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<sup>20</sup> Bohlin (2014) and Söderberg, Blöndal and Edvinsson (2014) computed homogenous time series of housing prices in Gothenburg and Stockholm since 1875, with all-Swedish series available since 1857. Similarly, Waldenström (2014) presents new Swedish evidence of stock returns since 1871 and bond yields since 1856.

<sup>21</sup> Population density during the nineteenth century (using Maddison data on inhabitants per square km of current country surface) was relatively high in France (from 50 to 60 between 1820 and 1910), Germany (from 70 to 170) and the U.K. (from 90 to 180), whereas it was relatively low in Sweden (from 6 to 12) and the U.S. (from 1 to 9).

Of course, the question is whether these similarities in demography and industrial structure suffice to account for the observed low capital intensity and, if so, whether Sweden can, in fact, be labeled “the U.S. of Europe”. Answering this question properly requires a closer inspection of the data. As a first step, Figure 8 decomposes the private wealth-income ratios of the five countries for which historical data on  $\beta$  are available into three assets classes: agricultural land, housing and other domestic assets.<sup>22</sup> Although Sweden and the U.S. do not depart from the large European countries in terms of either housing wealth or other domestic (mainly financial) assets, they indeed do so in regard to the value of agricultural land. In the nineteenth century, such land was worth approximately 1–2 years of national income in the U.S. and Sweden, compared to 3–4 years of national income in France, Germany and the U.K.

[Figure 8 about here]

Why then did both Sweden and U.S. have such lowly valued agricultural land? Was it due to low land prices (a relative price effect), or because little land was used in agriculture (a volume effect)? In their account of the issue for the U.S. only, Piketty and Zucman (2014) assert, without offering hard evidence, that with the observed high American saving rates and vast geographical land abundance, the low land prices can be rationalized only with a very low price per acre.<sup>23</sup> The next step, then, is to shed more light on the issue, and this is done in Table 4, which reports the inflation-adjusted land price per acre in Sweden and the U.S. during the period between 1800 and 1920.<sup>24</sup> In 1800, an acre was worth, on average, 103 USD in Sweden but only 10 USD in the U.S., i.e., approximately one-tenth. In 1850, land values in the U.S. had increased to one-fourth of that in Sweden, by 1880 it was almost one-half, and in the 1910s, the U.S. land value per acre had surpassed that in Sweden. In other words, U.S. land prices per acre were, in fact, very low in the nineteenth century, which supports Piketty and Zucman’s assertion about one important reason for the low U.S. wealth-income ratio.

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<sup>22</sup> Even though the asset categories are admittedly very broad, Piketty and Zucman still urge caution when making cross-country comparisons based on their historical series.

<sup>23</sup> This, in fact, squares only with having an elasticity of substitution between capital and labor  $\sigma$  being less than 1 in a standard CES production function. The relative price effect (land price per unit of labor) then will dominate the volume effect (having much land per citizen), and Piketty and Zucman (2014) argue that this was indeed the case in the U.S. during the nineteenth century.

<sup>24</sup> The Swedish land value per acre (4,047 square meters transformed from the Swedish unit hektar, 10,000 square meters) is computed by simply dividing the farmland value by the size of farmland. Lindert (1993, table 1) reports data from agricultural censuses and the official U.S. Department of Agriculture averages for the 48 states. Prices are in 1960 USD.

[Table 4 about here]

However, this leaves us with a puzzle for Sweden: if the country's land prices were so high, why was the aggregate value of agricultural land not higher in terms of national income? According to the standard wealth accumulation model, the answer could indicate a volume effect, i.e., that net savings were too low in Sweden at this early stage of development for generating a stock of assets. Table 5, finally, reports net saving rates and national income growth rates for the five countries analyzed here over different periods since 1810. The Swedish saving rate was at a very low level at the beginning of the nineteenth century, at only 2–3 percent of national income, whereas the saving rate in the U.S. was four times as high and in line with that of France and Britain. Over time, the Swedish saving rates increased, and by the latter part of the twentieth century, all four countries seem to have converged.

[Table 5 about here]

Summing up the discussion, the answer to the question “Is Sweden ‘the U.S. of Europe’?” must be “no”. The two countries are remarkably similar in their wealth-income ratios, especially during the nineteenth century, but for quite different reasons. Whereas the U.S. had a low ratio largely due to very low land prices, Sweden had a low ratio due to domestic savings: the Swedes were simply too poor to afford accumulating any of their income. However, even though Sweden was not the U.S. of Europe, it was even more dissimilar to the other European countries included in the comparison. This calls for further research into the role of differing historical and institutional experiences for wealth accumulation among the countries across the European continent.

## **5.2 The role of foreign capital**

The above analysis showed that Sweden was a relatively capital-scarce economy during the nineteenth century and that most of the Swedish private wealth was in the form of fairly illiquid assets, such as agricultural land and buildings. However, if this was true, how could the country manage to industrialize in the late nineteenth century with such a small amount of domestic liquid capital? One possible answer is *capital imports*, i.e., that the borrowed foreign wealth was used to finance the domestic real investments needed to develop the country's productive capacity. Indeed, the standard small, open economy model predicts that an in-

creased relative demand for a production factor (in this case capital) should not change relative prices because these are set in international markets, but instead set off cross-country factor flows to meet the demand shock.

The role of foreign capital in the Swedish industrialization has been debated by Swedish economic historians, but it is fair to say that consensus has never been reached. Some argue that studies of industrial firm balance sheets show that the bulk of liabilities were in the form of domestic bank loans (Gårdlund, 1942). Others emphasize the role of foreign capital imports (Schön, 1989), in particular arguing that even though Swedish banks indeed did lend money to Swedish industrial corporations, Swedish banks were, in turn, largely capitalized by foreign loans. Furthermore, the Swedish government borrowed abroad to finance the railway expansion, which benefited domestic industrialization, and that also left some funds for the private industry to borrow, which otherwise may not have been available.

Figure 9 sheds light on the issue in the form of the ratio of net foreign assets (defined as all claims on foreigners' net of foreign claims on citizens at current market prices) to the stock of private wealth since 1810. The picture shows a striking pattern: Sweden was indeed a net importer of capital during the entire industrial take-off, with foreign wealth representing approximately one-seventh of the total private capital stock. Most of these foreign funds came from German and French creditors who bought Swedish bonds floated on the Hamburg and Paris markets (Franzén, 1998, p. 110). Compared with the other countries in the figure, Sweden was the largest net debtor and only the U.S. had a negative foreign position, but at a smaller level, whereas France, Germany and the U.K. were instead net creditors on international capital markets.<sup>25</sup> Gauging the quantitative importance of these foreign funds for Swedish industrialization is difficult, but it represented approximately 80 percent of total commercial bank credit and 150 percent of central government debt around the turn of the century, 1900.<sup>26</sup> When decomposing the rise in national wealth into a domestic and foreign wealth component during the 1870–1910 period using the model of Section 2, all countries exhibit a significantly posi-

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<sup>25</sup> If non-market colonial appropriations were an important part of these foreign funds alongside true market-related capital exports, however, that could call for a reinterpretation of Britain, France and Germany being the bankers of the industrializing world.

<sup>26</sup> See the main SNWD file, sheets SE2.3 (memo: commercial banking statistics) and SE3.1 (government wealth).

tive effect coming from foreign capital exports except for Sweden, where the capital imports contribute negatively to the rise in national wealth.<sup>27</sup>

[Figure 9 about here]

In the late twentieth century, foreign capital mattered less for the Western economies. However, perhaps this is an artifact of cross-border capital flows taking other, less openly disclosed, forms. A particular debate in Sweden has concerned the tax-driven capital flight that according to some was substantial in the 1980s, 1990s and 2000s, when Sweden combined high internationally high capital tax rates and a liberalized capital account (in 1989). Recent attempts to estimate this potential illicit offshore wealth offered by Roine and Waldenström (2009) suggest that private Swedish funds worth between two and five percent of total private wealth could be held in tax havens.<sup>28</sup> This implies that tax-driven capital flight has little significance for the aggregate wealth-income ratios, even in a traditional high-capital tax country such as Sweden, and thus that the importance of foreign capital to the Western economies adheres mainly to the past.

### **5.3 The role of social democratic welfare-state institutions**

#### **5.3.1 Government wealth in the welfare state**

A vast body of research literature shows that political and economic institutions are key determinants of the balance between the size and scope of government.<sup>29</sup> Most of these studies, however, characterize governments in terms of flow variables, typically the amount of social spending or taxes raised (as a share of domestic production) during a budget year. In this study, government is instead measured in terms of assets and liabilities, a perspective that can hopefully provide a complementary dimension to the conventional perspective.

As is well known, during the postwar period, Sweden developed one of the world's most extensive welfare states, combining a broad scheme of publicly provided universal social insur-

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<sup>27</sup> See table 6a in Piketty and Zucman (2014); additional results for Sweden are available upon request.

<sup>28</sup> This is roughly at the same level that Zucman (2013) finds for all of Europe. Swedish estimates are reported in the main SNWD file, sheets SE2.3 (offshore financial assets) and SE2.1 (private wealth).

<sup>29</sup> The proposed channels are numerous, including the extension of franchise (e.g., Meltzer and Richards, 1981; Acemoglu and Robinson, 2000) and the structure of the electoral system (e.g., Persson and Tabellini, 1999). See also Acemoglu et al. (2015) for a comprehensive account of how the evolution of political institutions may influence national endowments.

ance, centralized wage-setting policies on the labor market and an ambitious redistribution via the tax bill (Lindbeck, 1997). This institutional setup is bound to have influenced the structure of aggregate wealth in a number of ways, one of the most direct being a lower private wealth accumulation as individuals long had little or no incentive to save privately for education, health care or retirement. At the same time, public wealth had to increase to meet the government's increased ambitions.<sup>30</sup> The welfare-state arrangements in France, Germany, the U.K. and the U.S. stand in stark contrast to Sweden. Welfare services in these countries have traditionally relied on means-testing or previous contributions rather than universal provision, on private or corporatist rather than public financing. Taken together, these countries actually represent all the three forms of welfare-state capitalism that Gøsta Esping-Andersen famously characterized (Esping-Andersen, 1990): the “liberal” welfare state (the U.S.), the “conservative” welfare state (France and Germany) and the “social-democratic” welfare state (Sweden). Whether to classify the British welfare state as “liberal” or “social-democratic” is widely discussed and remains an open question (Esping-Andersen, 1999).

A first question is thus: Does the form of institutional welfare-state arrangement shape the structure of national wealth? Although it would be possible to formulate a model showing how a universalistic welfare state slashes incentives for private wealth accumulation and has a relatively large government, I limit the ambition here to take this prediction to the data. Consequently, Figure 10 depicts the evolution of government wealth over national income,  $\beta_G$ , in the five countries over the past 140 years. A first result is that Sweden has had the largest government sector in terms of net assets of all the countries considered for most of the time periods.<sup>31</sup> Unlike the other countries, Swedish government wealth has never been negative according to these estimates. In part this is explained by the fact that the country has not conducted warfare since 1813 and has not needed to borrow massively nor build a large defense industry. When decomposing the government wealth accumulation into saving and capital gains components, it stands clear that practically all the high Swedish  $\beta_G$  emanates from saving: whereas other governments elsewhere effectively dissaved in most periods, the Swedish government has consistently saved.

[Figure 10 about here]

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<sup>30</sup> See, e.g., Feldstein (1974), Berg (1983) and Gale (1998) for both theoretical and empirical evidence on such crowding-out effects.

<sup>31</sup> That Sweden's government sector, measured as  $\beta_G$ , is in the top group internationally is true also after adding Australia, Canada, Italy, Japan and Spain for which data exist from 1970 onwards in Piketty and Zucman (2014).

A particularly fascinating finding is that Sweden had a relatively large Swedish  $\beta_G$  all the way back to the nineteenth century, i.e., long before the expansion of a social-democratic welfare state. Whether this fact is just a coincidence or marks the existence of long-standing institutional roots of welfare-state formation is a question worth further inquiry. As a comparative note, it is interesting that the German government was relatively wealthy during the 1870–1910 period, which was the era when the Bismarckian social insurance system was introduced. Sweden was an early adopter of the thoughts underlying this new German welfare system, and this could perhaps partially explain why both of these countries had relatively large government sectors in this era.

A second result standing out in Figure 10 is the fairly weak association to Esping-Andersen’s welfare-state capitalism categories. The social-democratic (Swedish) regime is, as expected, associated with the largest government sector, in particular during the 1960s and 1970s, when there was an especially rapid expansion of the government in Sweden. However, the figure indicates divergences among the “conservative” welfare states of France (low  $\beta_G$ ) and Germany (high  $\beta_G$ ) and also among the liberal welfare states of the U.S. (medium  $\beta_G$ ) and Great Britain (low  $\beta_G$ ). This variation, of course, does not reject the tractability of Esping-Andersen’s framework, in particular because the country rankings vary over time (although with Sweden consistently in the top). Nevertheless, the new evidence represents an opportunity for refinements in the theory of welfare states, their emergence and transition over the path of development.

### **5.3.2 The role of pension wealth**

A specific wealth issue directly related to the welfare state concerns pensions. Pensions are a central part of everyone’s lifetime welfare and thus are an integral part of any modern welfare-state arrangement. Nevertheless, standard wealth analyses often exclude a large part of people’s pension entitlements, namely, unfunded pension assets in public and private defined benefit pension schemes. The main reason for disregarding them is that they are not backed by tangible assets held by the policyholder (the state or an employer).<sup>32</sup> On the other hand, unfunded pension wealth arguably influences the accumulation of private wealth by policyholders, making private wealth lower than it would have been in the absence of an unfunded pension claim. Evidence on such a crowding-out effect has been documented in some coun-

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<sup>32</sup> Another reason to exclude unfunded pension wealth is the difficulty of distinguishing it from the present value of claims on other parts of the social security system, e.g., health care or the right to social assistance.



tries' pension systems, e.g., by Feldstein (1974) studying the U.S. and Berg (1983) in a study of Sweden.

Figure 11 presents a compilation of evidence on the funded and unfunded public and private pension wealth of Swedish households and its evolution over the past two centuries. The series build on newly estimated data on Swedish pension assets attributed to households.<sup>33</sup> There are four series in the figure:  $\beta_P = W_P/Y$ , the Swedish private wealth-income ratio, which includes pension assets that are part of funded, often work-related, defined-contribution (DC) plans;  $\beta_P^{-DC} = (W_P - A_P^{DC})/Y$ , which excludes all funded occupational pensions (that are part of households' financial assets);  $\beta_P^{DC+DB} = (W_P + A_P^{DB})/Y$ , which combines private wealth (including, of course, the DC assets) and the net present value of unfunded, defined-benefit pension wealth (DB);  $\beta_P^{DC+DB+AP} = (W_P + A_P^{DB} + A_G^{AP})/Y$ , which also adds to the last series the total value of government-controlled pension buffer funds, called *AP-funds*, which were built up in the 1960s and 1970s via the income taxes and thus are sometimes referred to as “forced personal savings”. By 2014, the sum of private wealth and total pension wealth in the public and private systems amounts to seven years of national income, i.e., approximately 1.5 times the private wealth alone. Looking back in time, however, pension entitlements were, according to my estimates, unimportant relative to other private net assets until the late 1940s. Although this may come as a surprise, given that Sweden had introduced a universal public pension system already in 1914, being the first country in the world to do so, these early basic guarantee pensions (*folkpensioner*) were, in fact, never intended to be much more than a complement to the municipal poor-relief (Elmér, 1960).

The most important new result of the figure, however, concerns the timing of the dramatic build-up of pension wealth in Sweden. The 1947 reform raised the basic guarantee pensions and raised their net present value from five percent to 25 percent of private wealth. Even more

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<sup>33</sup> The data on Swedish pension wealth include estimates of all public and private funded and unfunded pensions since 1810. Public pensions are unfunded basic guarantee pensions, unfunded income-based pensions and funded premium pensions (introduced in 1996). Occupational, public and private, pensions include unfunded and funded pensions. Finally, funded individual pension savings are always included. All pensions are in pre-tax terms, as stipulated by the ESA 2010, i.e., no adjustment is made for the fact that policyholders typically pay income tax on the pension income. The value of funded pensions is relatively easy to observe and estimate from historical sources (e.g., Statistics Sweden, 1960), but unfunded pensions are more difficult. Unfunded public pensions are based on tables showing pension payment schemes across age groups reported in Elmér (1960, tables I-V, pp. 532–541), calculations for the periods since 1950 made in Berg (1983, Table A3.3, for 1950-1979), Ståhlberg (1981) for 1978 and the Swedish Pension Agency's Orange Reports since 2001. Unfunded occupational pensions are very difficult to value and are estimated very crudely as a fixed share (five percent) of funded occupational pensions, based on surveys of their relative importance made in the 1940s (reported in Harrysson, 2000, table 4.5; see also Elmér, 1960, pp. 274ff). See Waldenström (2015b, section C6) for details.

significant was the second major pension reform in 1960, when public pensions for white-collar workers were elevated, lifting the value of pension wealth from one-third to one hundred percent of total private wealth. Thus, it was in the 1960s that the Swedish pension wealth, almost exclusively tied to public sector schemes, took on significant proportions. This development also coincides with the tremendous growth of Sweden's  $\beta_G$  seen above.

[Figure 11 about here]

Turning to the international picture, is the composition of funded vs. unfunded and private vs. public the same across rich countries or does it differ, perhaps systematically across Esping Andersen's welfare-state types? And is the observed secular increase in the role of Swedish public unfunded pension wealth during the postwar era part of an international pattern or is it unique to Sweden? Unfortunately, I cannot fully answer these questions because of a general lack of data on aggregate public and private pension wealth for most countries, particularly in regard to assessing trends over longer time periods (recall that Piketty and Zucman exclude unfunded defined-benefit pensions from their analysis). Having said this, there are some pieces of evidence for the U.K. and the U.S. over a fairly large part of the twentieth century. For the U.K., Blake and Orzag (1999) present estimations of the size of funded and unfunded pension assets on a yearly basis between 1948 and 1994.<sup>34</sup> For the U.S., Wolff (1989, 2011) and Wolff and Marley (1989) estimate variants of private and pension wealth in various years since 1922 using data from national accounts, estate tax records and wealth surveys, and the Investment Company Institute (2015) reports annual totals since 1974.<sup>35</sup> Note that the comparability across countries is problematic and the following comparison should therefore be interpreted with caution.

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<sup>34</sup> The series with unfunded pensions are "Basic state pension wealth", "SERPS pension wealth" and "Unfunded occupational pension wealth" (Blake and Orzag, 1999, table 12).

<sup>35</sup> Wolff and Marley (1989, table 15.3) report different concepts of aggregate wealth for single years between 1922 and 1983. For  $W_p$ , I use their series W1, and for pension wealth  $W_p^{DC+DB}$  their series W3, which is defined as W1 plus "the full reserves of trust funds less their actuarial value in W1" and "the total value of pension reserves less the CSV of pensions (which is included in W1 and W2)". They also present a series of W4, which is W3 plus "the expected value of future social security benefits", i.e., a concept of social-security wealth rather than only pension wealth. They also discuss a concept called W5, defined as W4 plus "the expected value of future pension benefits", but do not present aggregate numbers that can be used here. However, Wolff (2011, tables 4.6 and 5.3) present  $W_p^{DC+DB}$  based on the Survey of Consumer Finances from 1989 to 2007, and the ratio to  $W_p$  in 1989 (1.22) is in line with the ratio of W3 to W1 in 1983 (1.15), suggesting that the additional wealth in W5 from 1983 and earlier does not make a significant difference. The ICI series used are "Private-sector DB plans", "State and local government DB plans", "Federal DB plans" and "Annuities", where the latter includes fixed and variable annuity reserves at life insurance companies (ICI, 2015, table 1).

Figure 12 shows the evolution of unfunded pension wealth and its role for wealth-income ratios in the U.K., Sweden and the U.S. during the twentieth century. There is a striking contrast between Sweden and the other two countries. All three countries indeed exhibit increasing *trends* in the share of defined benefit pension wealth of total private wealth over the period (or at least until the late 1990s), but the *levels* of these shares differ between the countries by an order of magnitude. In the 1940s, unfunded public and private pension wealth was insignificant in all them, amounting to only five to ten percent of total private wealth. However, twenty years later, in the 1960s, unfunded pension wealth in Sweden had grown to become as valuable as all private wealth, whereas it still amounted to only one-third in the U.K. and one-tenth in the U.S., and these shares remained fairly consistent in the following decades. Almost all this new pension wealth in Sweden was tied to public pension schemes, whereas in the Anglo-Saxon countries, public schemes represented only 40 percent.

[Figure 12 about here]

Taken together, when assessing the growth of government in Sweden from a balance-sheet approach, it appears as the canonical social-democratic welfare state did not emerge until the 1960s, i.e., at least three decades after beginning of Social Democratic governmental hegemony and the introduction of central wage bargaining. Although this may at first sight seem too late, the balance sheets actually tell a story that fits rather well with previous accounts of the Swedish welfare state.<sup>36</sup>

## 6. Summary and conclusions

This paper presents a new database on Swedish historical national wealth and savings and analyzes homogenous series of annual wealth-income ratios over the past two centuries. A number of important findings have emerged. First, the series show that Swedish wealth-income ratios fell during the First World War from historically high levels and continued falling until the postwar era. Over the past 20 years, wealth-income ratios in Sweden have increased dramatically and today are at levels not witnessed since the 1930s. These trends are remarkably similar to what was previously documented for France, Germany, the U.K. and

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<sup>36</sup> For example, in an analysis of the Swedish model, Assar Lindbeck notes: “Thus, it was not until the mid-1960s and early 1970s that Sweden diverged from other western countries to the extent that it was appropriate to talk about a special Swedish model. Some of the ideological and institutional roots of the model may, however, be traced back to earlier decade.” (Lindbeck, 1997, p. 1275).

the U.S. by Piketty and Zucman (2014), and this common pattern is further established here in statistical structural break analyses.

Having said this, Sweden stands out in a number of ways from these countries. During the entire nineteenth century and until the 1910s, Sweden had wealth-income ratios that were only roughly half as large as those of the rest of Europe. The Swedish pattern in this period was more similar to that of the U.S., but an examination of the underlying factors shows that the countries differed: whereas Sweden's low wealth-income ratio was due to a very low saving rate, the low U.S. ratio was due to high income growth. In the absence of domestic capital, the study finds that Sweden's industrialization coincided with substantial inflows of foreign funds, a pattern that confirms the standard open-economy model of a small nation experiencing a demand shock such as industrialization.

Capital gains mattered more in Sweden than in the large economies. The difference is not so large when the accumulation of private wealth is related to total private sector savings, but when only the personal savings of households matter, capital gains do, in fact, account for most of the private wealth increases almost regardless of time period. Repeating this analysis for the other countries, the same change does not occur, which underscores truly different mechanisms at work in Sweden. To test the bearing of these two variants of estimated capital gains-contributions with actual historical asset price gains observed in the Swedish housing and financial markets, I find a strong congruence when capital gains are based on personal savings but not when they are based on total private savings. Altogether, this finding suggests that the importance of capital gains for private wealth growth has been larger in Sweden than in the other countries studied.

The role of political and economic institutions for wealth accumulation has been largely overlooked in past studies. In this respect, Sweden offers an opportunity to analyze this important issue on various dimensions, employing Sweden's different political context and welfare-state institutions vis-à-vis those found in Continental European and Anglo-Saxon countries. The study documents an extraordinarily large growth of government wealth in the postwar era, precisely at the time of the most intensive expansion of the social democratic welfare state. A particularly important part of this process was the establishment of a comprehensive public pension system, which essentially slashed private incentives to save privately for old age.

New estimates of the total stock of unfunded public pension wealth show that in the 1960s and 1970s, it reached a level of almost twice the entire stock of private wealth.

Sweden was thus “un-European” in the nineteenth century, unable to save because of low incomes and therefore unable to accumulate domestic wealth, and it was “un-European” in the late twentieth century, mainly because of the expansion of political institutions linked to the universalist welfare-state system.

## References

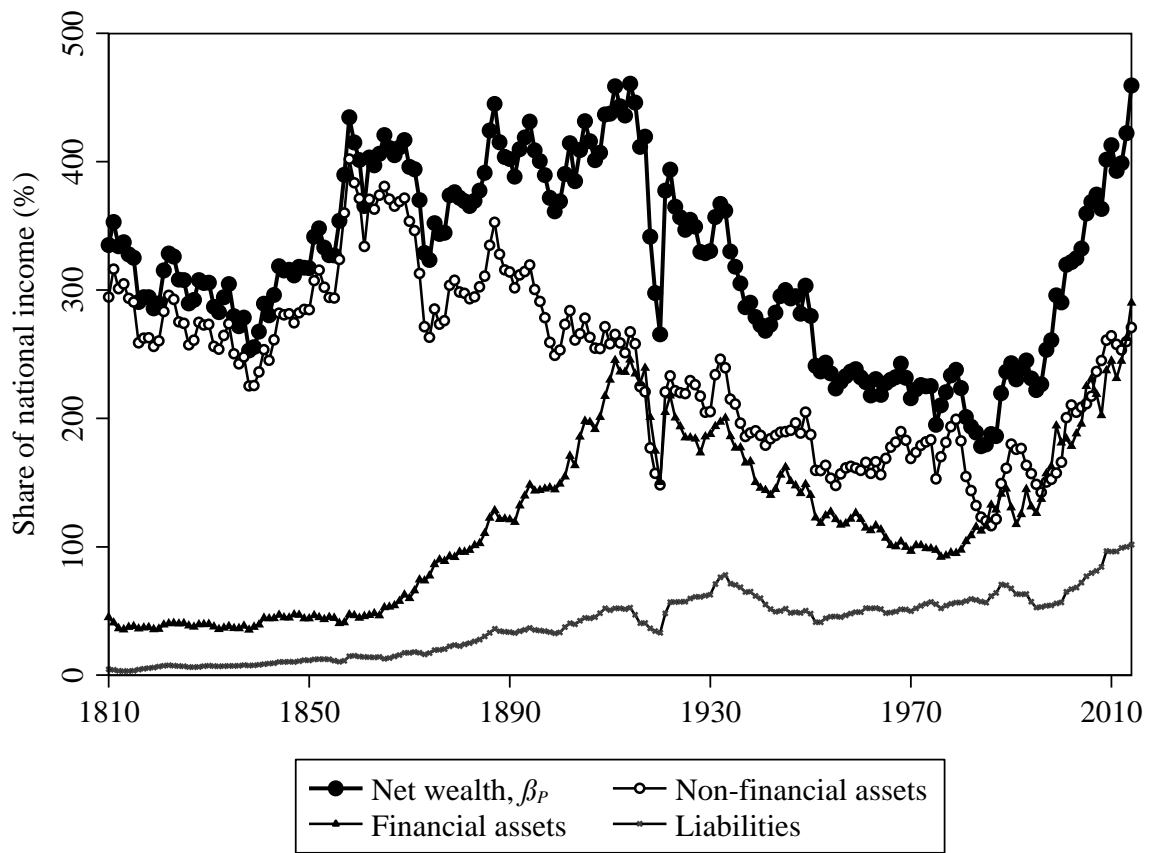
- Acemoglu, D., J. A. Robinson (2000). "Why Did the West Extend Franchise? Democracy, Inequality, Growth in Historical Perspective", *Quarterly Journal of Economics* 115(4): 1167–1199.
- Acemoglu, D., S. Naidu, P. Restrepo, J. A. Robinson (2015). "Democracy, Redistribution and Inequality". In: A. B. Atkinson and F. Bourguignon (Eds.). *Handbook of Income Distribution*, vol. 2, Amsterdam: Elsevier.
- Atkinson, A. B., A. Harrison (1978). *The Distribution of Personal Wealth in Britain*, Cambridge University Press, Cambridge.
- Bai, J., P. Perron (1998). "Estimating and Testing Linear Models with Multiple Structural Changes", *Econometrica* 66(1): 47–78.
- Bai, J., P. Perron (2003). "Computation and Analysis of Multiple Structural Change Models", *Journal of Applied Econometrics* 18(1): 1–22.
- Berg, L. (1983). *Konsumtion och sparande – en studie av hushållens beteende*. Ph. D. Dissertation, Department of Economics, Uppsala University.
- Berg, L. (2000). "Sparande, investeringar och förmögenhet – en analys med inriktning på sammansättning och förändring av hushållens sparande och förmögenhet", Bilaga 7, SOU 2000:11 *Finansmarknadsutredningen*, Stockholm: Fritzes.
- Blake, D., Orszag, J. M. (1999). "Annual estimates of personal wealth holdings in the United Kingdom since 1948", *Applied Financial Economics* 9(4): 397–421.
- Bohlin, J. (2014). "A price index for residential property in Göteborg, 1875–2010", in: R Edvinsson, T Jacobson and D Waldenström (eds.). *Historical Monetary and Financial Statistics for Sweden*, vol. 2, Stockholm: Sveriges Riksbank and Ekerlids förlag.
- Davies, J, R. Lluberias, A. Shorrocks (2011). *Credit Suisse Global Wealth Databook*, Zurich: Credit Suisse.
- Edvinsson, R. (2005). *Growth, Accumulation, Crisis: With New Macroeconomic Data for Sweden 1800–2000*, Ph.D. Dissertation, Stockholm: Almqvist & Wiksell International.
- Edvinsson, R. (2014). "The Gross Domestic Product of Sweden within Present Borders, 1620–2010", in: R Edvinsson, T Jacobson and D Waldenström (eds.). *Historical Monetary and Financial Statistics for Sweden*, vol. 2, Stockholm: Sveriges Riksbank and Ekerlids förlag.
- Elmér, Å. (1960). *Folkpensioneringen i Sverige*. Malmö: Gleerups.
- Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism*. Princeton, NJ: Princeton University Press.
- Esping-Andersen, G. (1999). *Social Foundations of Postindustrial Economies*. New York: Oxford University Press.
- Eurostat (2013). *European System of Accounts. ESA 2010*, Luxembourg: Publications Office of the European Union.
- Fahlbeck, P (1890). *Sveriges Nationalförmögenhet, dess storlek och tillväxt*, Stockholm, P. A, Norstedts & Söner.
- Feldstein, M. (1974). "Social Security, Induced Retirement, and Aggregate Capital Accumulation", *Journal of Political Economy* 82(5): 905–926.

- Flodström, I. (1912). *Sveriges nationalförmögenhet omkring år 1908 och dess utveckling sedan mitten av 1880-talet. Finansstatistiska utredningar V*. Stockholm: Finansdepartementet.
- Franzén, C. (1998). *Skuld och tanke: svensk statsskuldproblematik i ett internationellt perspektiv före 1930-talet*. Stockholm: Almqvist & Wicksell.
- Gale, W. G. (1998). "The Effects of Pensions on Household Wealth: A Reevaluation of Theory and Evidence". *Journal of Political Economy* 106(4): 706–723.
- Gårdlund, T. (1942). *Industrialismens samhälle*, Stockholm: Tiden.
- Goldsmith, R. W. (1962). *The National Wealth of the United States in the Postwar Period*, NBER, Princeton University Press, Princeton.
- Goldsmith, R. W. (1985). *Comparative National Balance Sheets; A Study of Twenty Countries, 1688–1978*. Chicago: University of Chicago Press.
- Goldsmith, R. W., R. E. Lipsey, M. Mendelsen (1963). *Studies in the National Balance Sheet of the United States, Volume 2*. Princeton: Princeton University Press
- Harrysson, L. (2000). *Arbetsgivare och pensioner. Industrierbetsgivarna och tjänstepensioneringen i Sverige 1900 – 1948*, Lund: Värplinge Ord & Text.
- Investment Company Institute (2015). "The U.S. Retirement Market, First Quarter 2015", June, Washington, D.C. [www.ici.org/info/ret\\_15\\_q1\\_data.xls](http://www.ici.org/info/ret_15_q1_data.xls) (2015-09).
- Jonung, L. (1993). "The rise and fall of credit controls: The case of Sweden 1939–89". In: M. D. Bordo and F. Capie (Eds.). *Monetary Regimes in Transition*, Cambridge University Press, Cambridge.
- Krantz, O., L. Schön (2007). *Swedish Historical National Accounts, 1800–2000*. Lund: Almqvist & Wiksell International.
- Lindbeck, A. (1997). "The Swedish Experiment". *Journal of Economic Literature* 35(3): 1273–1319.
- Lindberger, L. (1956). *Penningvärdeundersökningen. D. 3, Investeringsverksamhet och sparande : balansproblem på lång och kort sikt*. SOU 1956:10, Stockholm: Fritzes.
- Lindert, P. (1993). "Long-run trends in American farmland values", in: M. Rothstein, D. Field (eds.). *Quantitative Studies in Agrarian History*, Iowa State University Press.
- Lundberg, L. (1969). *Kapitalbildningen i Sverige 1861–1965*, Stockholm: IUI.
- Meltzer, A. H., S. F. Richard. (1981). "A Rational Theory of the Size of Government". *Journal of Political Economy* 89(5): 914—927.
- Ohlsson, H., J. Roine, D. Waldenström (2014). "Inherited wealth over the path of development: Sweden, 1810–2010", Working Paper, Uppsala University.
- Persson, T., G. Tabellini (1999). "The size and scope of government:: Comparative politics with rational politicians". *European Economic Review* 43(4–6): 699–735.
- Piketty, T. (2014). *Capital in the 21st century*, Belknap, Cambridge, MA.
- Piketty, T., G. Zucman (2014). "Capital is Back: Wealth-Income Ratios in Rich Countries, 1700–2010". *Quarterly Journal of Economics* 129(3): 1255–1310.
- Piketty, T., G. Zucman (2015). "Wealth and inheritance in the long run", in: A.B. Atkinson and F. Bourguignon (eds.). *Handbook of Income Distribution, vol.2B*, Amsterdam: North-Holland.

- Qu, Z., P. Perron (2007). “Estimating and Testing Multiple Structural Changes in Multivariate Regressions”, *Econometrica* 75: 459–502.
- Roine, J., D. Waldenström (2009). “Wealth Concentration over the Path of Development: Sweden, 1873–2006”. *Scandinavian Journal of Economics* 111(1): 151–187.
- Roine, J., D. Waldenström (2011). “Common Trends and Shocks to Top Incomes: A Structural Breaks Approach”. *Review of Economics and Statistics* 93(3): 832–846.
- Schön, L. (1989). “Kapitalimport, kreditmarknad och industrialisering 1850–1910”, in E. Dahmén (Ed.). *Upplåning och utveckling – Riksgäldskontoret 1789–1989*, Riksgäldskontoret: Stockholm.
- Söderberg, J., S. Blöndal, R. Edvinsson (2014). “A price index for residential property in Stockholm, 1875–2010”, in: R Edvinsson, T Jacobson and D Waldenström (eds.). *Historical Monetary and Financial Statistics for Sweden, vol. 2*, Stockholm: Sveriges Riksbank and Ekerlids förlag.
- Statistics Sweden (1995). *Realkapitalstock och förmögenhet 1980–1995*, Statistiskt Meddelande N10SM9501, Stockholm: Statistiska Centralbyrån.
- Ståhlberg, A.-C. (1981). “Pensionstillgångarna i Sverige och deras fördelning”, *Statistisk Tidskrift* 1, 438–447.
- Tengblad, Å. (1993). “National wealth and stocks of fixed assets in Sweden, 1981–90”, *Review of Income and Wealth*, 39: 159–17.
- United Nations (2009). *System of National Accounts 2008*, New York, United Nations.
- Waldenström, D. (2014). “Swedish stock and bond returns, 1856–2012”, in: R Edvinsson, T Jacobson and D Waldenström (eds.). *Historical Monetary and Financial Statistics for Sweden, vol. 2*, Stockholm: Sveriges Riksbank and Ekerlids förlag.
- Waldenström, D. (2015a). “The National Wealth of Sweden, 1810–2014”, Working Paper, Department of Economics, Uppsala University.
- Waldenström, D. (2015b). “Swedish National Wealth Database (SNWD): Appendix”, Mimeo, Department of Economics, Uppsala University.
- Wolff, E.N. (1989). “Trends in Aggregate Household Wealth in the U.S., 1900–83”, *Review of Income and Wealth* 3, 1–29.
- Wolff, E.N. (2011). *The Transformation of the American Pension System. Was It Beneficial for Workers?*, Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Wolff, E.N., M. Marley (1989). “Long-term trends in US wealth inequality: methodological issues and results”, in: *The measurement of saving, investment, and wealth*, Chicago, IL: University of Chicago Press.
- Zucman, G. (2013). “The Missing Wealth of Nations, Are Europe and the U.S. net Debtors or net Creditors?”, *Quarterly Journal of Economics* 128(3): 1321–1364.

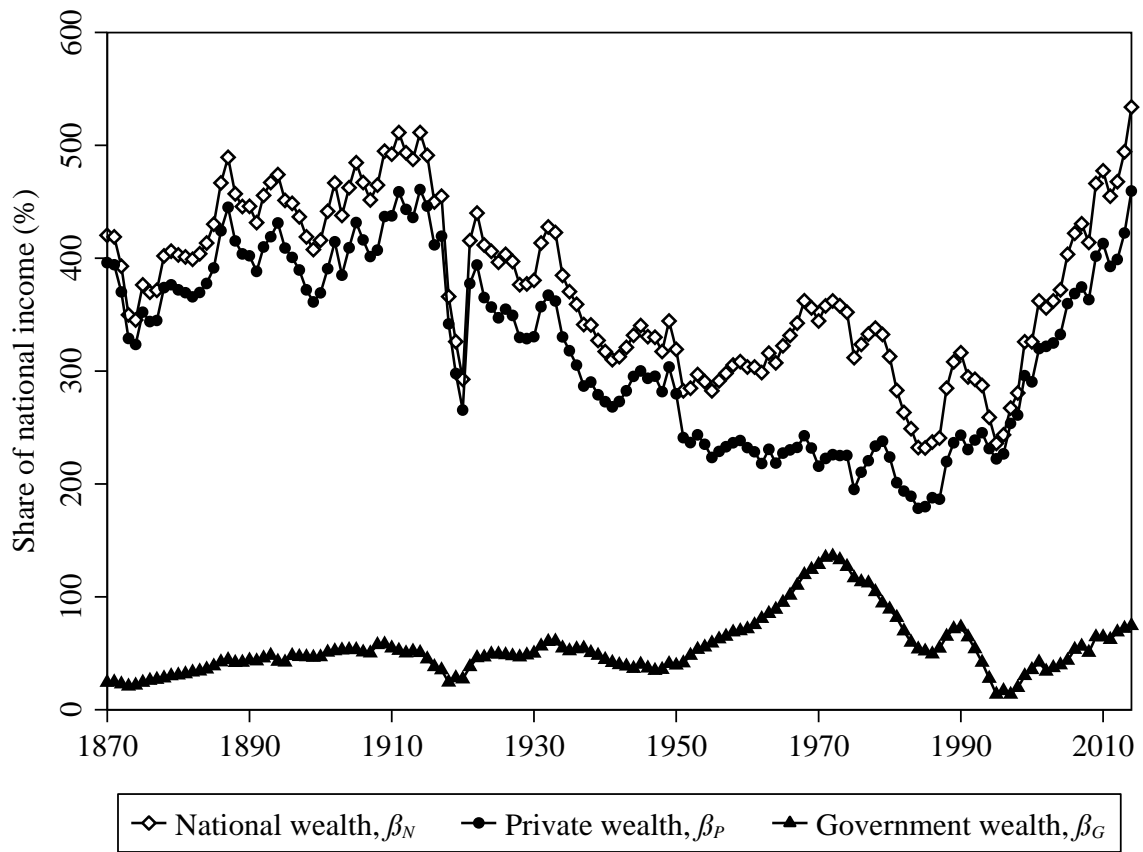


Figure 1: Private wealth-income ratio and its components in Sweden, 1810–2010.



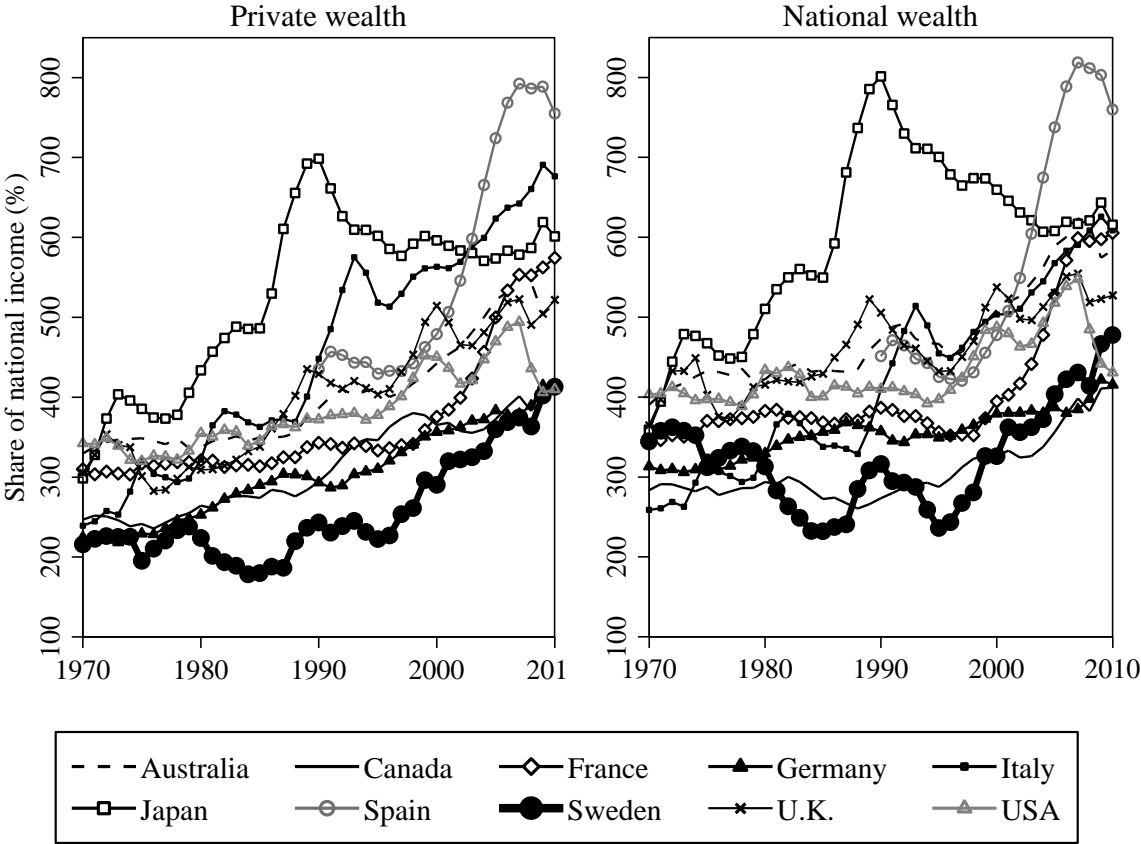
Source: Appendix table SE2.1 (SNWD, v1.2).

Figure 2: National, private and government wealth-income ratios in Sweden, 1870–2010.



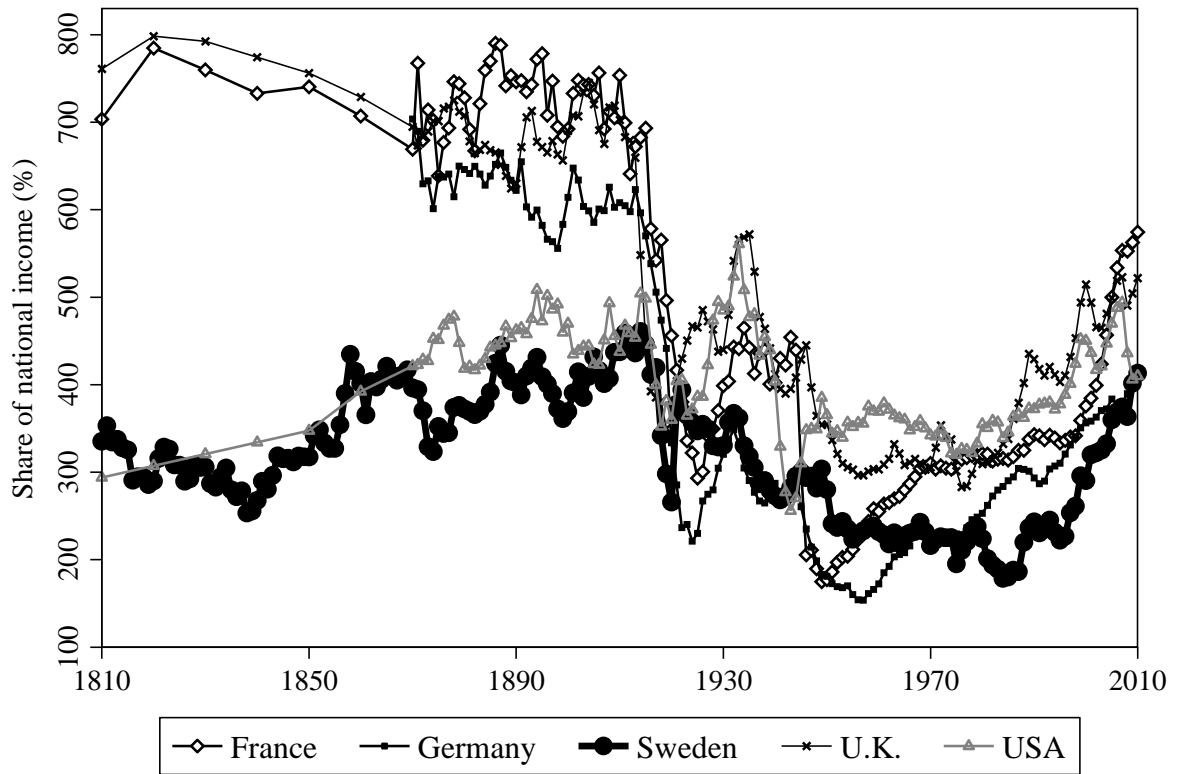
Source: SNWD, v1.2, table SE1.1.

Figure 3: Private and national wealth-income ratios in five Western economies, 1970–2010.



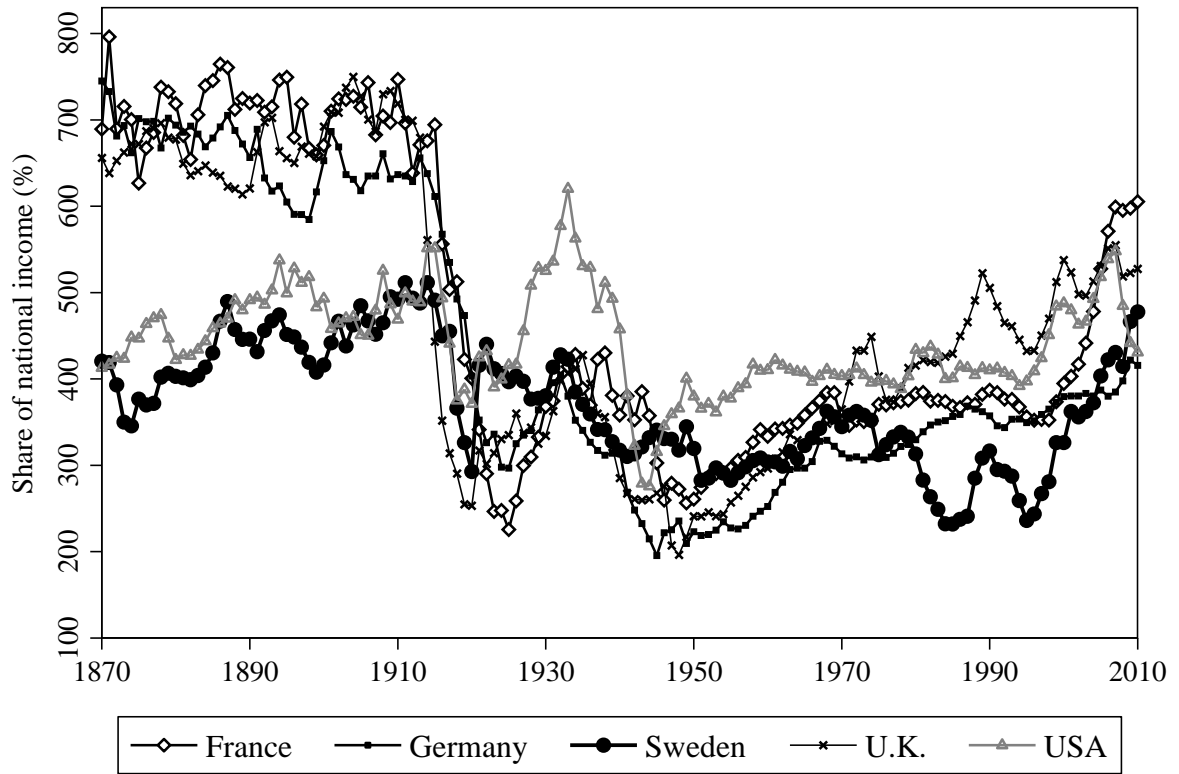
Sources: Sweden: SNWD, v1.2, table SE1.1. All other countries: Piketty and Zucman (2014), appendix tables A1 (national wealth-income ratios) and A5 (private wealth-income ratios).

Figure 4: Evolution of private wealth-income ratios, five countries, 1810–2010.



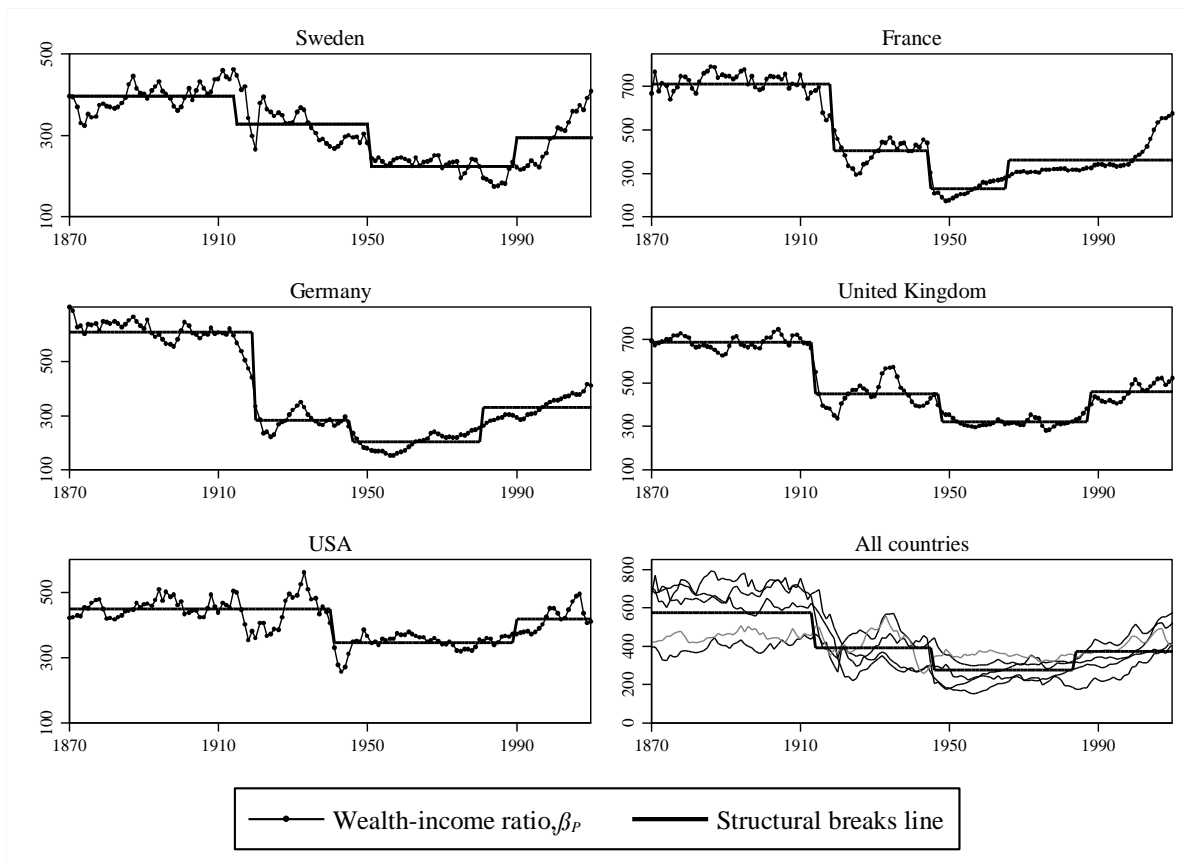
Sources: Sweden: SNWD, v1.2, table SE1.1. All other countries: Piketty and Zucman (2014), appendix tables A5, A6 (private wealth-income ratios).

Figure 5: Evolution of national wealth-income ratios, four countries, 1870–2010.



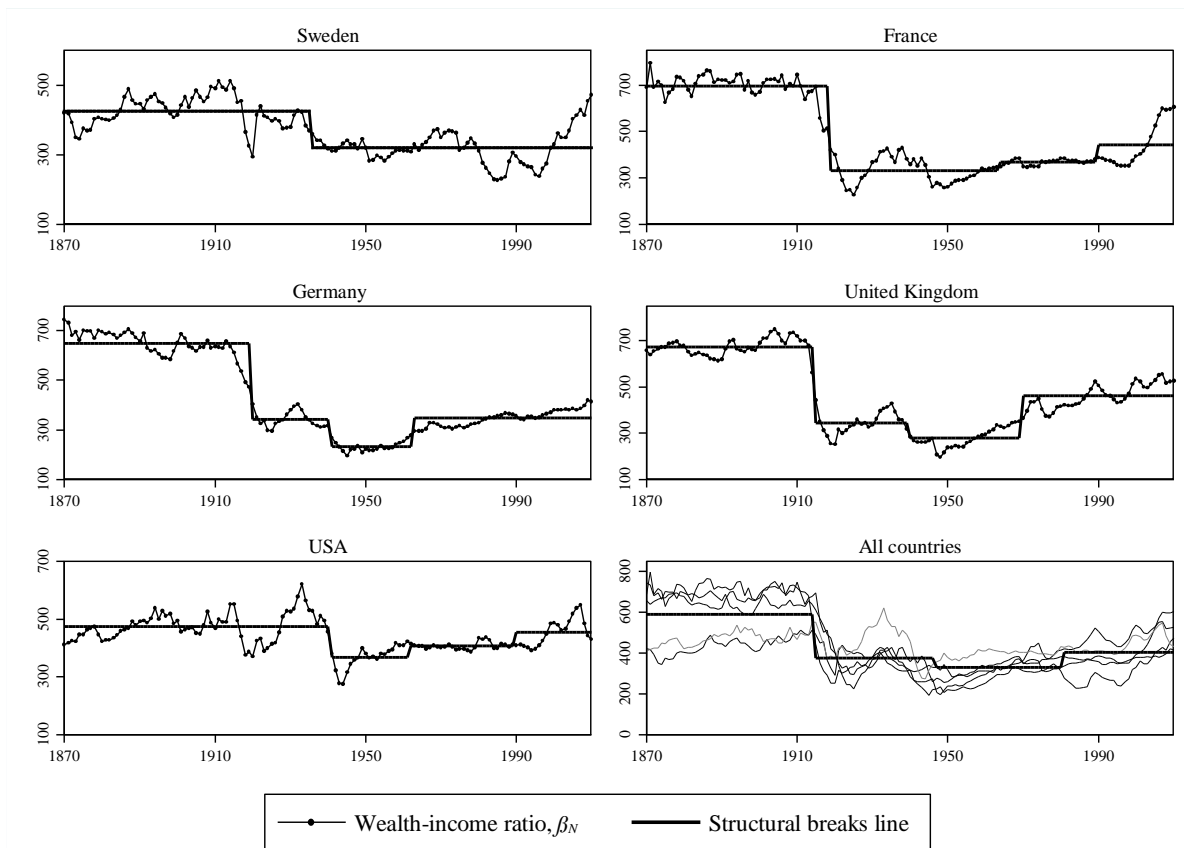
Sources: Sweden: SNWD, v1.2, table SE1.1. All other countries: Piketty and Zucman (2014), appendix table A1.

Figure 6: Structural breaks in private wealth-income ratios, 1870–2010



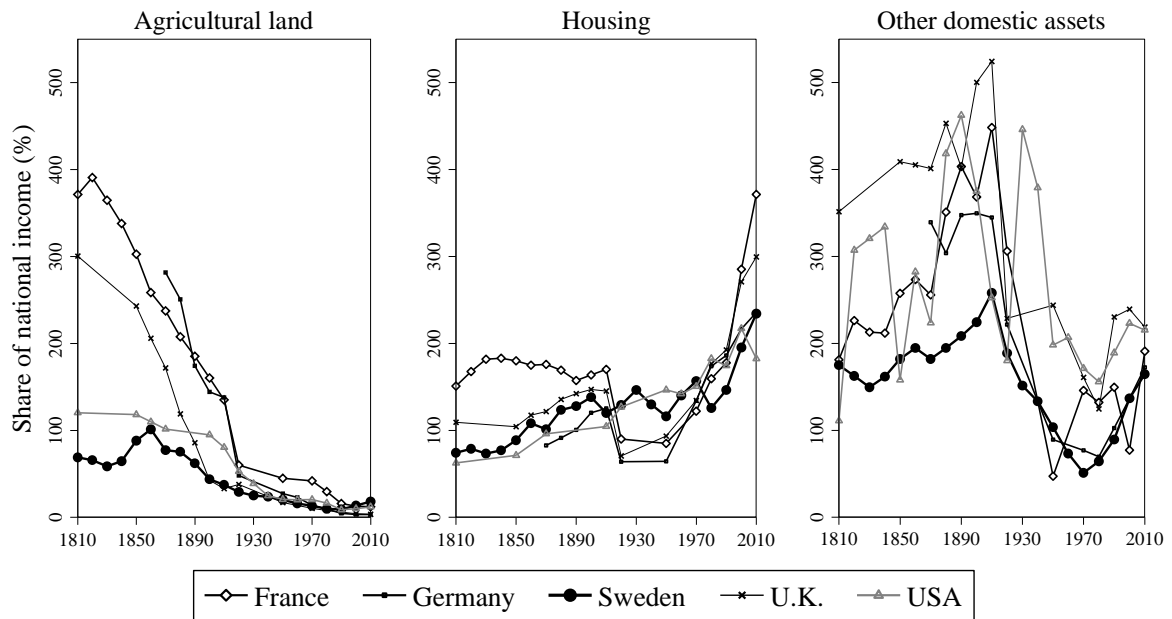
*Note:* Figures show national wealth-income ratios (same as in Figure 4) and a fitted structural breaks-regression line based on the estimation results in Table 1.

Figure 7: Structural breaks in national wealth-income ratios, 1870–2010.



*Note:* Figures show national wealth-income ratios (same as in Figure 5) and a fitted structural breaks-regression line based on the estimation results in Table 1.

Figure 8: Composition of private wealth, five countries, 1810–2010.

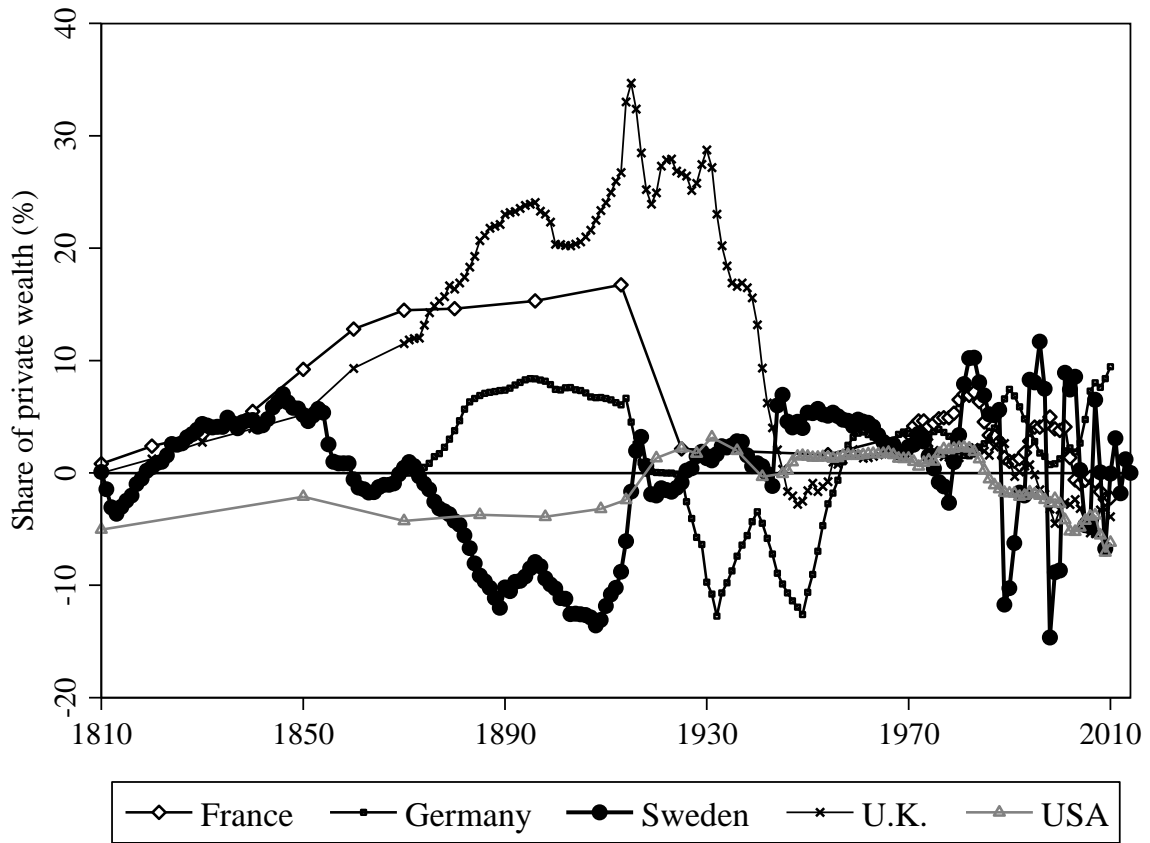


*Note:* Piketty and Zucman (2014) emphasize the potential problems with comparisons across countries and why these numbers must be interpreted cautiously. Housing in Sweden is the sum of buildings (houses, apartments) and land used for personal housing. Agricultural land in Sweden equals the sum of farmland values and 50 percent of the total value of forestry and timber tracts.

*Sources:* Sweden: SNWD, v1.2, tables SE2.2, SE2.3. All other countries: Piketty and Zucman (2014), appendix tables A17 (housing), A20 (agricultural land) and A23 (other domestic assets).

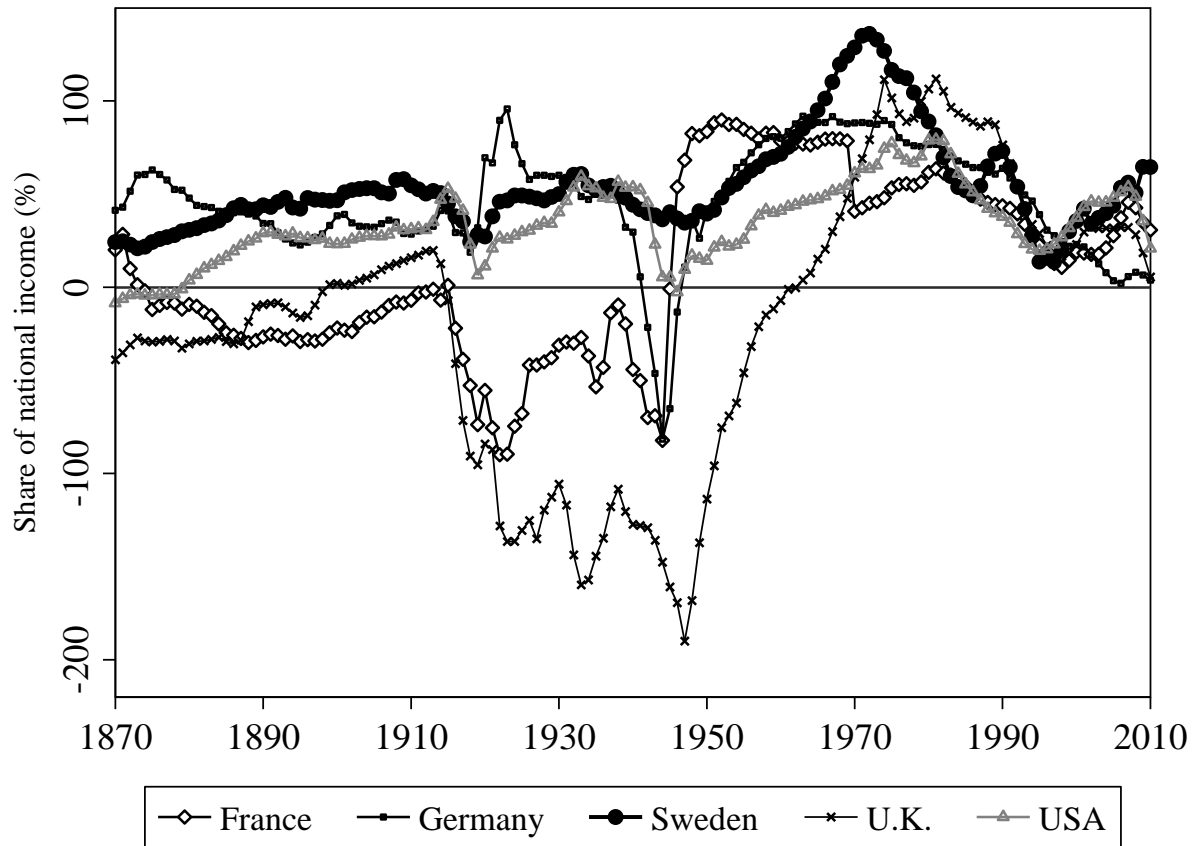


Figure 9: The role of foreign wealth in five countries, 1810–2010.



*Notes:* The series are net foreign assets as share of private wealth. Net foreign assets are defined as the difference between citizens' financial claims on foreigners and foreigners' financial claims on citizens.  
*Sources:* Sweden: SNWD, v1.2, table SE1.3. All other countries: Piketty and Zucman (2014), appendix tables A25 and A26.

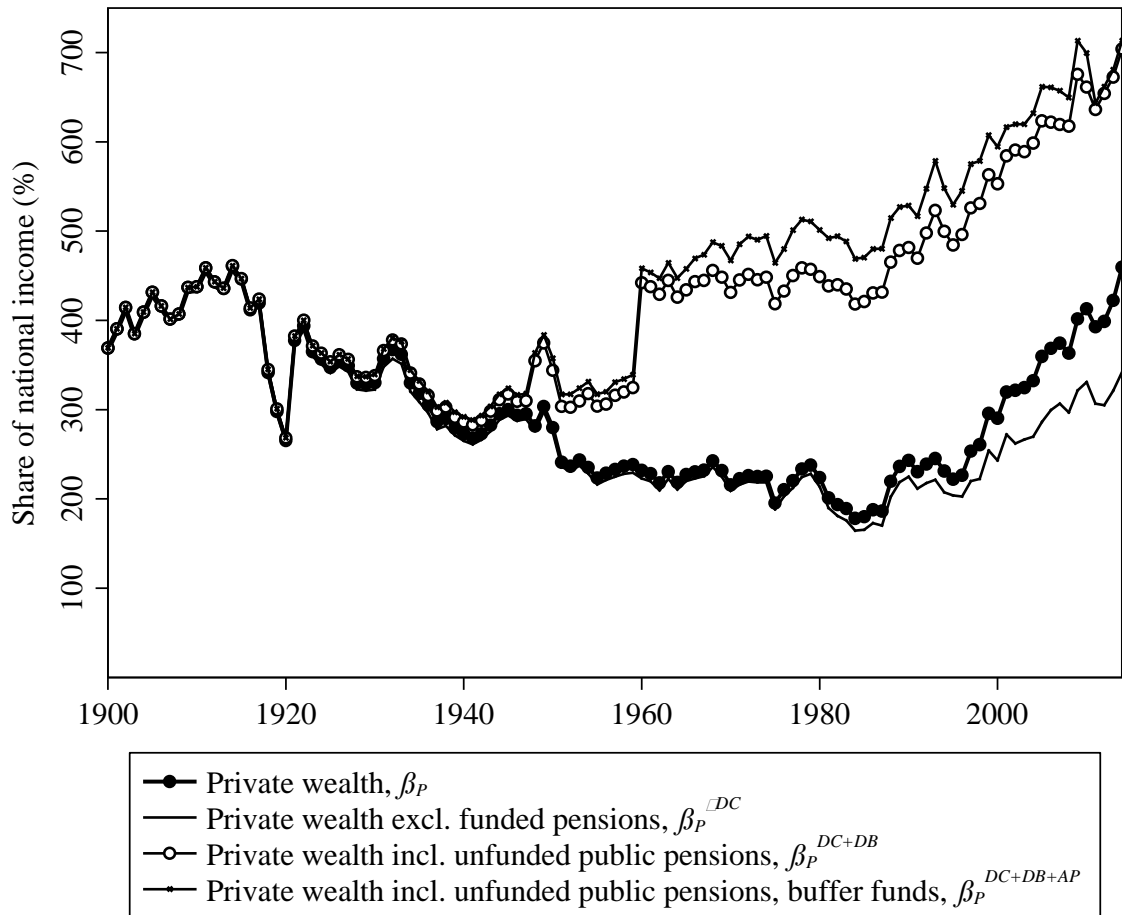
Figure 10: The role of government wealth in five countries, 1870–2010.



*Note:* Government wealth is defined in Sweden as the sum of net assets of the state and all counties and municipalities.

*Sources:* Sweden: SNWD, v1.2, table SE3.1. All other countries: Piketty and Zucman (2014), appendix tables A9 and A10.

Figure 1: The role of pension wealth in Sweden.



Note: There are four series in the figure: 1)  $\beta_P = W_P/Y$ , which is the Swedish private wealth-income ratio, which includes pension assets that are part of funded, often work-related defined-contribution (DC) plans; 2)  $\beta_P^{-DC} = (W_P - A_P^{DC})/Y$ , which excludes all funded occupational pensions; 3)  $\beta_P^{DC+DB} = (W_P + A_P^{DB})/Y$ , which sums private wealth (which includes the DC pension wealth) and the net present value of unfunded, defined-benefit pension wealth (DB); 4)  $\beta_P^{DC+DB+AP} = (W_P + A_P^{DB} + A_G^{AP})/Y$ , which onto the last series also adds the total value of government pension buffer funds, called AP-funds, which were built up in the 1960s and 1970s through private tax contributions and controlled by the government but paid in by the households and generally considered to belong to households.

Source: SNWD, v1.2, table SE2.4.

Figure 2: Defined-benefit pension wealth in Sweden, the U.K. and USA.



*Note:* Unfunded pension assets are defined as follows. For Sweden, they are the sum of estimated public income pensions since 1914 and private unfunded (defined benefit) pensions over the whole period. For the U.K., they are defined as the sum of “Basic state pension wealth”, “SERPS pension wealth” and “Unfunded occupational pension wealth”. For the U.S., unfunded pensions before 1974 are backed out by taking the ratio between the concept W3 in Wolff and Marley (1989, table 15.1), which is defined as marketable net worth (concept W1) plus “full reserves of trust funds less their cash surrender value” plus “the total value of pension reserves less the CSV pensions” (where CSV stands for cash surrender value). Wolff and Marley also defined a concept W5, which is highly relevant. It includes not only “the expected value of future pension benefits” but also “the expected present value of future social security benefits” (concept W4) and therefore is not suitable as a measure of pension wealth. Furthermore, W5 is not reported in the same way for the whole period as W3. For the period since 1974, private and public unfunded pension claims are the sum of items “Private-sector DB plans”, “State and local government DB plans”, “Federal DB plans” and “Annuities”.

*Sources:* Sweden: SNWD, v1.2, table SE2.4. U.K.: Pension wealth from Blake and Orzag (1999, table 12) and private wealth and national income from Piketty and Zucman (2014, table UK.1). USA: Pension wealth for 1922–1972 from Wolff and Marley (1989, table 15.3) and for 1974–2010 from Investment Company Institute (2015, table 1), and private wealth and national income for whole period from Piketty and Zucman (2014, table US.1).

Table 1: Structural breaks in wealth-income ratios.

	First World War		Second World War		Postwar –1979		Postwar 1980–present	
	Break date:	$\Delta\beta$	Break date:	$\Delta\beta$	Break date:	$\Delta\beta$	Break date:	$\Delta\beta$
<i>Private wealth-income ratios:</i>								
All countries	1914 [1913,1915]	-183 (-32%)	1946 [1945,1947]	-116 (-30%)			1984 [1983,1985]	94 (34%)
Sweden	1915 [1909,1917]	-69 (-18%)			1951 [1950,1953]	-102 (-31%)	1990 [1981,1992]	70 (31%)
France	1919 [1918,1920]	-308 (-43%)	1945 [1944,1946]	-174 (-43%)	1966 [1964,1968]	131 (57%)		
Germany	1920 [1919,1921]	-327 (-54%)	1946 [1943,1948]	-79 (-28%)			1981 [1980,1983]	126 (62%)
U.K.	1914 [1912,1915]	-238 (-35%)	1948 [1947,1950]	-130 (-29%)			1988 [1987,1989]	141 (44%)
USA			1941 [1939,1943]	-102 (-23%)			1990 [1987,1992]	73 (21%)
<i>National wealth-income ratios:</i>								
All countries	1915 [1914,1916]	-214 (-36%)	1947 [1943,1951]	-45 (-12%)			1981 [1980,1982]	74 (22%)
Sweden			1936 [1932,1938]	-105 (-25%)				
France	1919 [1918,1920]	-365 (-52%)			1964 [1963,1989]	37 (11%)	1990 [1972,1991]	75 (20%)
Germany	1920 [1919,1921]	-304 (-47%)	1941 [1940,1942]	-110 (-32%)	1963 [1962,1964]	113 (49%)		
U.K.	1915 [1914,1916]	-327 (-49%)	1940 [1934,1945]	-67 (-19%)	1970 [1969,1972]	183 (65%)		
USA			1941 [1938,1943]	-106 (-22%)	1962 [1961,1976]	41 (11%)	1990 [1978,1991]	46 (11%)

*Note:* The breaks in “All countries” are based on estimating the Qu and Perron (2007) methodology, and single-country breaks are based on estimating the Bai and Perron (1998, 2003) methodology. Years in brackets represent 95 percent confident intervals. Sizes of breaks ( $\Delta\beta$ ) are based on regressing models with the level of  $\beta$  onto break dates, and the percentage change from the pre-break level is in parenthesis. For the common break, the size of the break is based on an unweighted average. See the text for further details.

Table 2: Decomposing wealth accumulation into savings and capital gains.

Period / saving rate	Sweden			France			USA		
	Wealth growth, $g_W$ (%)	Contribution from		Wealth growth, $g_W$ (%)	Contribution from		Wealth growth, $g_W$ (%)	Contribution from	
		Savings, $g_{Ws}$ (%)	Capital gains, $q$ (%)		Savings, $g_{Ws}$ (%)	Capital gains, $q$ (%)		Savings, $g_{Ws}$ (%)	Capital gains, $q$ (%)
<u>1810–1870</u>									
Private ( $s_p^n$ )		0.7	1.1	1.1	1.3	−0.1	3.4	2.9	0.5
		(38%)	(62%)		(113%)	(−13%)		(86%)	(14%)
Personal ( $s_H^n$ )	1.8	0.2	1.6	1.3	1.4	−0.1			
		(13%)	(87%)		(111%)	(−11%)			
<u>1870–1910</u>									
Private ( $s_p^n$ )		0.9	1.5	1.4	1.5	−0.1	4.1	2.9	1.1
		(37%)	(63%)		(106%)	(−6%)		(72%)	(28%)
Personal ( $s_H^n$ )	2.4	0.3	2.1						
		(12%)	(88%)						
<u>1910–1950</u>									
Private ( $s_p^n$ )		1.8	0.1		1.9	−3.9	2.8	2.7	0.1
		(95%)	(5%)		(−91%)	(191%)		(97%)	(3%)
Personal ( $s_H^n$ )	1.9	0.6	1.3	−2.2	0.7	−2.9			
		(32%)	(68%)		(−38%)	(138%)			
<u>1950–1980</u>									
Private ( $s_p^n$ )		3.7	−0.7		5.5	1.1		3.8	−0.4
		(124%)	(−24%)		(83%)	(17%)		(111%)	(−11%)
Personal ( $s_H^n$ )	3.0	2.5	0.5	6.6	4.5	2.0	3.4	2.7	0.7
		(84%)	(16%)		(70%)	(30%)		(80%)	(20%)
<u>1980–2010</u>									
Private ( $s_p^n$ )		3.8	−0.1		3.0	0.8		2.3	0.9
		(102%)	(−2%)		(80%)	(20%)		(72%)	(28%)
Personal ( $s_H^n$ )	3.7	1.0	2.7	3.8	2.4	1.3	3.3	1.6	1.7
		(27%)	(73%)		(65%)	(35%)		(48%)	(52%)
<u>1870–2010</u>									
Private ( $s_p^n$ )		2.4	0.3	1.4	1.5	−0.1	3.4	2.9	0.5
		(89%)	(11%)		(106%)	(−6%)		(86%)	(14%)
Personal ( $s_H^n$ )	2.7	1.0	1.7						
		(38%)	(62%)						

*Notes and sources:* France: Piketty and Zucman (2014), appendix table FR.4b (NB: 1870-1810 is actually 1810-1910). USA: Piketty and Zucman (2014), appendix table US4b. No data reported before 1870; no decompositions with personal saving data reported before 1950.

Table 3: Comparing actual and model-imputed capital gains in Sweden, 1870–2010.

	Average annual percentage change			
	Observed in historical asset prices:		Imputed from model decomposition:	
	Real housing price gains	Real stock returns	Capital gains contribution to $g_W$ using <i>private</i> saving	Capital gains contribution to $g_W$ using <i>personal</i> saving
	(a)	(b)	(c)	(d)
1870–1910	+1.3	+3.0	+1.5	+2.1
1910–1950	+1.8	−3.0	+0.1	+1.3
1950–1980	+0.7	+0.1	−0.7	+0.5
1980–2010	+2.0	+9.9	−0.1	+2.7
1870–2010	+1.4	+2.1	+0.3	+1.7

*Notes and sources:* (a): Housing price gains are derived from the prices of houses and apartments reported by Blöndal, Söderberg and Edvinsson (2014) for Stockholm and Bohlin (2014) for Gothenburg, with all series combined into an unweighted average. (b): Stock returns are computed from the composite market index at the Stockholm Stock Exchange as reported by Waldenström (2014). (c) and (d): Capital gains-induced wealth growth comes from the Piketty-Zucman decomposition approach described in section 2, where the saving rate is for either the private sector as a whole ( $s_P^n$ ) or households only ( $s_H^n$ ).

Table 4: Land values in Sweden and the U.S., 1800–1920.

Year	Land value per acre		Ratio Sweden/USA (%)
	Sweden	USA	
1800	103	10	1077
1850	110	27	403
1865	98	39	253
1870	108	31	350
1875	115		
1880	101	42	239
1885	95		
1890	71	52	136
1895	65		
1900	68	54	125
1905	84	70	120
1910	57	103	55
1915	77	104	74
1920	76	85	90

*Notes and sources:* The Swedish land value per acre (4,047 square meters transformed from the Swedish unit hektar, 10,000 square meters) is computed by simply dividing the farmland value by the size of the farmland. Lindert (1993, table 1) reports data from agricultural censuses and the official U.S. Department of Agriculture averages for the 48 states. Prices are in 1960 USD.



Table 5: Saving and growth in four countries, 1810–2010.

	France			Sweden			U.K.			USA		
	$s_P^n$	$g$	$s_P^n/g$	$s_P^n$	$g$	$s_P^n/g$	$s_P^n$	$g$	$s_P^n/g$	$s_P^n$	$g$	$s_P^n/g$
1810–1870	10.3	1.2	8.6	3.0	1.5	2.1						
1870–1910	10.9	1.1	9.9	3.6	2.4	1.5	11.4	1.9	6.0	13.0	4.0	3.3
1910–1950	8.2	1.4	5.9	7.1	3.1	2.3	13.0	1.4	9.3	10.4	3.2	3.3
1950–1980	14.0	4.5	3.1	8.4	3.7	2.3	7.2	2.1	3.4	10.2	3.5	2.9
1980–2010	10.5	1.8	5.8	9.3	2.2	4.2	7.1	2.5	2.8	7.1	2.8	2.5

*Source:* Data on private net saving rates and growth are from Piketty and Zucman (2014), appendix tables for France (table FR.4b), the U.K. (table UK.5a) and USA (table US.5a). Data for Sweden’s calculations are from SNWD, v1.2, tables SE1.1, SE5.1.