Wealth-income ratios in a small, late-industrializing, welfare-state economy:
Sweden, 1810–2010*

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Abstract
This paper uses new data on Swedish wealth-income ratios over two hundred years in order to answer the question: Do the findings of Piketty and Zucman (2014) for very rich and large Western economies extend to small countries that were historically backward and that developed a different set of political and economic institutions during the twentieth century? The findings show on both similarities and differences. In the pre-industrial era up to the First World War, Sweden looks completely different than the rest of Europe, having wealth-income ratios that were about half of those in France and Britain. Over the twentieth century, aggregate trends and levels are much more similar, but the structure of national wealth differs. In Sweden, government wealth grew much faster and became more important than elsewhere and this also holds true for the public pension system, which suggests an explicit role of historical economic and political institutions for the long-run evolution of wealth-income ratios.

JEL: D30, J10, N30.
Keywords: Wealth-income ratios, household portfolios, pension wealth, welfare state

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1. Introduction

The evolution of wealth-income ratios over the path of development has attracted a lot of attention in the recent economics literature and also policy discussions. Understanding how wealth accumulation can be related to macroeconomic factors such as saving or technological change or institutional influences such as the formation of a modern welfare state requires analyzing time series over very long time horizons. The recent study by Piketty and Zucman (2014) analyzes such long-run historical series of national and private wealth-income ratios in a few very large and rich Western European and North American societies: France, Germany, Great Britain and the United States.¹ Their main finding is that the relative importance of aggregate wealth has fluctuated grossly over time, being historically high in the nineteenth century up to World War I and then falling over the twentieth century until the 1970s after which they have once again started to rise again, reaching levels not witnessed for over a century. 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.

These findings raise several important issues. First, do these patterns observed in large, populous and early industrialized economies carry over to smaller, less populated and later industrialized economies? This is not obviously the case since standard trade models would predict that technology shocks – e.g., industrialization – that increases demand for capital shifts relative factor prices in a large economy whereas in small economies that are price-takers the same demand shock must be met by factor imports (unless sufficient amounts of domestic capital have been accumulated through past savings). The question is therefore: Do we observe increased cross-border capital flows in Sweden following the industrial take-off? Second, economic and political institutions is likely to shape – and also be shaped – by the evolution of wealth-income ratios over and above the more mechanical changes in saving or relative prices. For example, overwhelming institutional developments of the twentieth century, such as the extension of universal suffrage and the rise of modern welfare states, substantially increased the scale of government undertakings in society, which may have required a faster

¹ See also Piketty and Zucman (2015) and Piketty (2014). Their studies continue a research literature on the structure and development of aggregate household wealth where a particularly pioneering contribution to the cross-country analysis was made by Goldsmith (1985, 1991) (see also Goldsmith 1962; Goldsmith, Lipsey and Mendelsen, 1963; Wolff, 1989; Davies, Lluberas and Shorrocks, 2011).
accumulation of public sector wealth and reduced incentives of households to save for welfare, and thus affected both the size and structure of national wealth.²

This study aims to shed new light on these issues by examining the evolution of wealth-income ratios in Sweden over the past two centuries.³ Unlike the large economies studied by Piketty and Zucman (2014), Sweden is the archetypal “small, open economy”, being price-taker on global goods and capital markets, and a country that industrialized much later than the bigger economies, starting in the late nineteenth century but with industrial output not surpassing agricultural output until the 1920s (Edvinsson, 2005). Do these characteristics imply qualitatively different outcomes in the evolution wealth-income ratios, e.g., that the lagged industrialization implies that the trends in wealth-income ratios also lag behind those of the early industrializers? Finally, Sweden developed in the twentieth century a “social-democratic” welfare state (Esping-Andersen, 1990) which became one of the world’s most extensive, encompassing universal social insurance and high levels of taxation and redistribution. Did this differing political institutional development influence the accumulation and structure of private and public wealth as compared to other, less welfarist-oriented countries?⁴

A new historical database on Swedish aggregate national and private wealth and saving is presented.⁵ The 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,

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² Wars are another channel through which policy can affect public expenditures (see, e.g., Peacock and Wise- man, 1961) and national and sectoral balance sheets. Piketty and Zucman (2014) show that the extent of war destructions during the World Wars varied but was overall fairly limited even in countries such as Germany and France where many battles took place. Sweden did not participate in the two World Wars and has in fact not fought war since the Napoleonic era in the beginning of the nineteenth century why the war-related impact on the country’s wealth was even more limited.

³ This study adheres to the recent analysis of the long-term evolution of inherited wealth in Sweden by Ohlsson, Roine and Waldenström (2014).

⁴ In addition to these major differences, Sweden of course contrasts in several other dimensions: Sweden was not a belligerent country in any of the World Wars of the twentieth century; Sweden is the most Northern country for which long-run wealth-income ratios have been studied so far; Swedes talk a different language and share a specific, national cultural heritage. But while these differences surely also matter they are hardly as important to the level, trends and composition of wealth-income ratios as the factors described in the main text.

⁵ For details about the database including descriptions of variables, definitions and sources and the full dataset, see the data appendix in Waldenström (2015) and the author’s website for downloads. My analysis also builds on some valuable previous efforts to estimate Swedish national wealth. Bollifras (1878), Fahlbeck (1890), Flodström (1912) and Englund (1956) made calculations for single years. Statistics Sweden produced comprehensive accounts for the period 1980–1994 (Statistics Sweden, 1995; Tengblad, 1992), and additional estimations have also been made by Berg (1983, 1988, 2000), Spånt (1979), Bergman, Djerf and Lindström (2010), Lindmark and Andersson (2014) and Bergman (2015).
includes subseries for non-financial and financial assets and liabilities are subcomponents within each of these categories are also provided annually over the whole period. The database also consists of estimated pension assets in the public and private funded and unfunded private and public pension systems, informal financial claims and debts within the (unconsolidated) private sector that were dominating household portfolios in most of the nineteenth century, as well as the stock of consumer durables. 

The series estimated here show that, similar to the British, French, German and American experiences, wealth-income ratios in Sweden fell during World War I and continued falling until the postwar era. Over the last 20 years wealth-income ratios in Sweden have increased dramatically and have today reached levels not witnessed since the 1930s. This recent surge in the importance of wealth is similar to the experiences found in other Western economies.

But Sweden also differs from the large continental and Anglo-Saxon economies in some central respects. First, during the nineteenth century the Swedish wealth-income ratios reached only about half the levels found in Britain, France and Germany but were close to those of the U.S. The analysis shows that changes in the aggregate savings rate and fluctuations in the economic growth rate can explain much of this Swedish pattern. Before 1900 low savings dominated low growth and kept the wealth-income ratio low; much of the initial investments during the early industrialization instead came from capital imports. The low U.S. wealth-income ratio, by contrast, was due to a combination of high savings and high growth.

During the twentieth century, Sweden differs in terms of the composition of wealth accumulation. In particular, government wealth grew much faster in Sweden than elsewhere throughout the postwar era, and today its share of national income is many times larger than the equivalent ratios in the other large Western countries. The analysis links this government wealth growth to the expansion of welfare state institutions, especially the build-up of a public pension system that required the state to hold large buffer funds to ensure long-term financial stability. In other words, Sweden was “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.

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6 For details about the database including descriptions of variables, definitions and sources and the full dataset, see the data appendix in Waldenström (2015) and the author’s website for downloads.
The study also offers some empirical input to the recent discussion of Krusell and Smith (2014) about which variant of the Harrod-Domar-Solow model to use when characterizing the long-run steady state levels of wealth-income ratios as function of saving and income growth. Using the new Swedish historical evidence on gross and net saving rates, income growth and rate of capital stock depreciation, the study finds that all steady-state expressions in Piketty and Zucman (2014) and Krusell and Smith (2014) deviate from the observed wealth-income ratios during different sub-periods, but that when looking at the entire 200-year period the $s/g$ model of Piketty and Zucman (2014) produces the closest match with the actual outcome.

Finally, the paper’s analysis and the new Swedish wealth and saving database also opens up a wide agenda for further research on questions with 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?7

The paper is organized as follows. Section 2 presents central measurement and theory concepts, including a more detailed description of the new Swedish wealth database. Section 3 reports the main empirical results, namely the evolution of Swedish private and national wealth-income ratios and the role of capital imports and growth of government. Section 4

7 In addition, household indebtedness and the role of bubbles in housing or financial markets for household assets are factors with a strong influence on the stability of countries’ financial systems (e.g., Acharya and Richardson, 2009). Consumer spending and savings behavior can only be fully understood by studying the structure of household assets and liabilities (Poterba 2000; Guiso, Haliassos and Jappelli, 2002; Campbell and Cocco, 2007). The question about whether household wealth spring primarily out of life cycle savings or inheritance flows has been debated for a long time, and it requires good information about wealth stocks in order to be properly addressed (Kessler and Masson, 1989; Gale and Scholz, 1994; Piketty, 2011; Ohlsson, Roine and Waldenström, 2014).
examines the accumulation of private wealth in terms of the relative contribution from private savings and asset price gains to long-run accumulation. Section 5 concludes and points to future research.

2. Concepts and measurement

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

I present a new database of annual national and private wealth and savings for Sweden over the period 1810–2010. Definitions of all variables in the database follow the U.N.’s System of National Accounts, SNA 2008 (United Nations, 2009) and to a large extent Eurostat’s European System of Accounts ESA 2010 (Eurostat, 2013).8 The overall analytical and definitional framework is adopted from the recent study of 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. While several of these series are newly collected for this study, many emanate from previous efforts by scholars and statistical agencies.9 The non-financial assets are mainly in the form of tax-assessed stock values, similar to those used by Piketty and Zucman, and not generated by accumulating past investments through the perpetual inventory method. A complete description of the full Swedish wealth dataset and details of its construction, including extensive treatments of source materials, previous studies, alternative defini-

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

9 Fahlbeck (1890) and Flodström (1912) made important contributions to Swedish national accounting, including the construction of national wealth estimates for single years. In the 1970s, Roland Spånt published an ambitious study of the evolution of the Swedish household wealth stocks and wealth distribution since 1920 (Spånt 1979), and another important contribution is Lennart Berg’s estimations of annual household balance sheets for the period from 1950 onwards (Berg 1983, 1988, 2000). In the 1990s, Statistics Sweden constructed national balance sheets for Sweden between 1980 and 1993 (see Nordin, Olsson and Wickman-Parak, 1992; Tengblad 1992; Statistics Sweden 1995). Furthermore, my database also relies on the work by Swedish economic historians in generating long-run national accounts series (Edvinsson, 2005, 2014; Krantz and Schön, 2007).
tions and the numerous problematic aspects of the data, are presented in the companion paper Waldenström (2015) and on the author’s webpage.

Net wealth in year $t$, $W_t$, is defined as the sum of the end-of-year market value of non-financial assets $A^N_t$ plus financial assets $A^F_t$ less liabilities $L_t$. Non-financial assets consist of produced assets, mainly dwellings and other constructions, and non-produced assets such as urban and agricultural land and timber tracts.\footnote{The stock of consumer durables are 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.} Financial assets consist of deposits and currency, shares, bonds, informal claims as well as life insurance savings and funded pension assets.\footnote{Unfunded public pension claims are also 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.} Liabilities include standard financial sector loans, state loans to housing or higher studies and central government debt.

Sector level wealth is report 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). 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 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 $W_{pt} = W_{ht}$.\footnote{While this assumption is not always true in reality, but as shown empirically below for the only period for which we can actually compute this variant of $Q$ for Sweden (1980–2010) it appears to be roughly in accordance with the actual evidence.}

Public sector wealth, $W_{gt}$, consists of the sum of net assets of the central government (the state), $W_{CGt}$, and the local governments (counties and municipalities), $W_{LGt}$. Like in the case of private wealth, public wealth is computed from official statements of balance sheets, tax-assessed values of public land holdings, the value of outstanding public debt etc. 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 a yearly 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 1870–2010.
Note that national wealth in an open economy does not only encompass domestic capital $K_t$ but 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 $NFI$. There are different $\beta$s for the different sectors in society, with $\beta_{Pt}$, $\beta_{Ge}$ and $\beta_{Nt}$ denoting the wealth-income ratios using private, government and national wealth.

In addition to the new wealth data for Sweden, the study presents a set of new estimates of annual national and sectoral gross and net saving rates for Sweden since 1810. Gross saving is denoted $S_t^g = s_t^g Y_t$ 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: $s_{Pt}^g = (s_{Ht}^g + s_{Ct}^g)/Y_t = S_{Pt}^g/Y_t$ and $s_{Pt}^n = S_{Pt}^g/Y_t$, respectively. 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 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). After 1950 I use the numbers for household, corporate, government and national saving reported in the official national accounts. In 2014 Statistics Sweden started implementing R&D outlays as investments, thereby incorporating the latest recommendations of ESA 2010. Waldenström (2015) computes a supplementary analysis that includes private R&D expenditures since 1963 in the analysis.

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13 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 $NFI$.
14 Shares of national saving adhering to households, corporations and the government are reported by Lundberg (1970, pp. 92f) reports for the period 1923-1962 and Lindberger (1956, ch. 4) for 1945-1951. The shares before 1923 are assumed to be at the same level as in the 1920s. See Waldenström (2015) for a full description of sources and computations of the saving data.
15 See Berg (2000) and Statistics Sweden,
2.2 Long-run wealth-income ratios: Conceptual framework

Which are the forces determining the level and trends of wealth-income ratios over time? What is the role of new savings and capital gains stemming from relative price increases? Does it matter if one uses gross or net saving rates? And is there a role for economic and political institutions in all of this?

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 approach departs from a basic formula defining wealth accumulation as a function of previous wealth, saving net of depreciation and capital gains: $W_{t+1} = W_t + s^n Y_t + KG_t$. 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 of 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: $\beta = s_t^n / g$.\(^\text{16}\)

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).\(^\text{17}\) In Section 5 below, this decomposition is done for Sweden over different time periods since 1810 and different types of saving rates, contrasting the results to those found in other countries.

Some scholars, Krusell and Smith (2014) and Acemoglu and Robinson (2015), have questioned Piketty and Zucman’s use of net of depreciation saving and output when characterizing the Harrod-Domar-Solow model. Instead, the critics argue, the textbook version of the Solow model uses gross output $Y^d$ and gross saving rate $s^\theta$. The Piketty and Zucman approach assumes that $s^\theta$ is a constant fraction of income, regardless of the pace of income growth. Krusell and Smith (2014) show that this assumption implies that basically all of national income must be saved as growth goes to zero, a situation they find both implausible and against what

\(^{16}\) This steady-state result is derived by Piketty and Zucman (2014) from the dynamic equation $\beta_{t+1} = \beta_t\left(\frac{1 + g_{W,t}}{1 + g_t}\right)$ where $1 + g_{W,t} = 1 + s^n_t / \beta_t$ is the savings-induced rate of wealth growth and $1 + g_t = Y_{t+1}/Y_t$ is the rate of income growth.

\(^{17}\) 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 $\beta_{t+1} = \beta_t\left(\frac{1 + g_{W,t}}{1 + q_t}\right)$ where $1 + q_t$ is the capital gain or capital loss.
we otherwise know about people’s saving behavior. Furthermore, the assumption leads to the fairly remarkable result that when $g$ goes to zero in the $\beta = s_r / g$ formula then $\beta$ goes to infinity.

There are thus two versions of the classical Harrod-Domar-Solow growth model, one of Piketty and Zucman (2014) using net of depreciation saving and output, and one offered in macroeconomic textbooks according to Krusell and Smith (2014) using gross saving and output growth rates. Krusell and Smith (2014) solve for the steady-state level of $\beta$ when using all combinations of gross and net saving and growth rates, and this yields the following two-by-two matrix (Figure 1) of the expression for the wealth-income ratio in long-run steady-state, $\beta$.

![Figure 1 about here]

In Section 5 below I assess empirically these four expressions using the observed historical rates of gross and net saving, income growth and depreciation against the observed levels of wealth-income ratios for Sweden since 1810.

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, Britain, France, Germany and the U.S. A compositional analysis also addresses the specific importance of foreign capital to the small, late-industrializing Swedish economy and how the extension of a social-democratic welfare state influenced both the relative size of government wealth and the composition of private wealth.

3.1 Private and national wealth-income ratios in Sweden, 1810–2010

Figure 2 shows the ratio of Swedish private wealth to national income, $\beta_p$, between 1810 and 2010 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 from around 300 percent, or three years of national income to earn the stock of private wealth, in the early agrarian era up to 500 percent at the time of the industrial take-off in the late nine-
teenth century. During the twentieth century the wealth-income ratio falls sharply, beginning in the years just after the First World War up to the 1980s when a historical low level at only 185 percent was reached 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 that the household wealth in the early nineteenth century was made up of mostly non-financial assets (buildings and agricultural land) and that financial assets became important only after the 1870s. Private debt was quantitatively insignificant in the nineteenth century, but when ordinary people from the interwar era onwards started earning enough to take mortgage loans and borrow for car purchases, i.e., the rise of “popular wealth” (Atkinson and Harrison, 1978), the debt-income ratio increased: from about 30 percent in 1920 up to almost 100 percent in 2010. Of course, the evolution of national income matters greatly to the evolution of $\beta$ and subsequent sections will further decompose these changes into the rate of income growth, saving intensity and asset price development.

[Figure 2 about here]

National wealth and its relation to national income since 1870 is shown in Figure 3. The figure also shows the relative importance of private and public sector wealth along with the institutional changes in Sweden coming with the transition from a pre-modern agrarian economy into a developed welfare state. The most important finding of the figure is that historically practically all of the country’s net wealth is made up of private wealth. Up until the middle of the twentieth century, $\beta_p$ represented more than nine tenths of $\beta_N$ and $\beta_G$ virtually never reached above 50 percent. An exceptional era in this respect was the period between 1950 and 1973 when government wealth expanded rapidly and $\beta_G$ more than quadrupled. This development was due to the expansion of the Swedish social security system and specifically the establishment of a new pension system which required that the state accumulated buffer funds to back up the government’s pension entitlements to the pensioners. These buffers were in principle made up of forced household savings and in the next section’s analysis of the role of

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18 Within these two broad asset, however, the composition has shifted. Agricultural assets (farmland, forests and buildings) comprised three fourths of all non-financial assets in the agrarian era, but from the 1870s this share decreased and from the 1930s onwards the majority of non-financial assets was housing. Financial assets have been comprised of about one third bank deposits and currency and one third business equity. The only major change in the composition of financial assets is a recent rise of insurance savings which in 2010 represented over 40 percent.
3.2 International comparison: Sweden vs. four large economies

How does the evolution of Swedish wealth-income ratios match similar evidence for other countries? Comparing Sweden with the four large economies previously analyzed by Piketty and Zucman introduces interesting cross-country variation in both institutional and economic dimensions. The comparative analysis is therefore crucial for fully comprehending the Swedish historical experience, but at the same time it can arguably also offer important insights to the analysis of the four large countries as well as our understanding of the role of institutions for wealth accumulation.

Figure 4 displays wealth-income ratios in Britain, France, Germany, Sweden and the U.S over the most recent era, 1970–2010. As Piketty and Zucman also noted there are naturally a number of country-specific aspects to consider when making a full account of these patterns, 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 around 200 percent (or two years of national income) in Sweden and around 300-400 percent in the large countries. During the 2000s, Sweden has a ratio around 300 percent and the other countries around 400-600 percent. When considering national wealth (right panel), Sweden is more similar but always in the low end. A second result is that Sweden follows a similar trend of and increasing $\beta$, but a close inspection reveals that the rise is not very smooth, but accompanied by a fairly large temporal variation. Moreover, if anything the rise in Sweden does not start until the late 1990s, which puts the role of both economic and policy events of the 1970s and 1980s into some question (more on this later).

Turning now to the long-run historical perspective there are two figures that show this. First, Figure 5 displays $\beta_P$ in Europe and the U.S. between 1810 and 2010. Sweden’s wealth-
income ratio in the nineteenth century is much lower than that of France, Germany and the U.K., roughly between one third and half of their levels. In contrast, Sweden lies almost exactly at the level as that of the U.S., beginning low at around 300 percent of national income and then slowly increasing to between 400 and 500 percent a century later. During the twentieth century, the five countries are more similar to each other, all dropping during World War I and the continuing to decrease up until the postwar era when the decrease is at some point (different across countries) turned into an increase.

Figure 6 shows the development of $\beta_N$ since 1870. Although the time span is shorter the picture looks almost the same as for private wealth: Before World War I Sweden is very similar to the U.S., with a wealth-income ratio that is about half of those in the other European nations. 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 relatively low Swedish wealth-income ratio in this group of countries did not appear until the 1970s.

4. **Explanations to the evolution of Swedish wealth-income ratios**

4.1 *Is Sweden “the U.S. of Europe”?*

A main result from the previous section is that Sweden does not seem to have followed a “European” pattern, but instead that it was much closer to the U.S. experience, especially before World War I. Since Sweden and the U.S. has historically shared some important features, in particular being sparsely populated, i.e., having a small population on a large, partly uncultivated land mass, and being predominantly agrarian throughout the nineteenth century.\(^\text{19}\)

Do these similarities in demography, industrial structure and low capital intensity imply that Sweden can in fact be labelled “the U.S. of Europe”? Answering this question properly requires a closer inspection of the data. Figure 7 decomposes the private wealth-income ratios

\(^{19}\) 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 these countries into three asset classes that were also defined by Piketty and Zucman (2014): agricultural land, housing and other domestic assets. The figure shows that Sweden and the U.S. do not deviate from the large European countries in terms of housing or other domestic assets, but that they do when it comes to the aggregate value of agricultural land. Throughout the nineteenth century such land in the U.S. and Sweden had values at 1–2 years of national income, compared to 3–4 years of national income in France and Britain.

But is this relatively low agricultural land values in Sweden and the U.S. due to low land prices (a relative price effect) or small amounts of land used in agriculture (a volume effect)? Piketty and Zucman (2014) point out for the U.S. that given its relatively high saving rates and yet vast geographical land abundance, the low recorded land values can only be rationalized with land prices per acre being very low. However, they do not provide any hard evidence on such relative price effect, which leaves the question unsettled. Here the case of Sweden can add new light on the issue. Table 1 reports time series of inflation-adjusted land price per acre in Sweden and the U.S. between 1800 and 1920. In 1800 an acre was worth on average 103 USD in Sweden and only one tenth of that, 10 USD, in the U.S. In 1850 the U.S. land value had increased to one fourth of the Swedish value, by 1880 it was almost one half and in the 1910s the U.S. land value per acre had surpassed the Swedish. While there are much to say about the underlying forces determining these relative price changes, the main message is that U.S. land prices per acre does in fact seem to have been very low in the the nineteenth century, thus supporting Piketty and Zucman’s assertion.

But if Sweden’s land prices were so high, why was its aggregate value of agricultural land not higher in terms of national income? According to the framework offered by the Harrod-

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20 Note that Piketty and Zucman urge for caution when making cross-country comparisons based on their data.
21 This in fact squares only with having and 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 (2014a) argue that this was indeed the case in the nineteenth century U.S.
22 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.
Domar-Solow model the answer indicates the existence of a volume effect, i.e., that net savings were too low in Sweden at this early stage of development in order to generate a stock of assets. Table 2 shows the net saving rates and national income growth rates for the five countries analyzed here for different periods since 1810. The Swedish savings rate was at a very low level in the beginning of the nineteenth century, only at 2–3 percent of national income, whereas the savings rate in the U.S. was four times as high and in line with that of France and Britain. Over time the Swedish savings rates increased and by the latter part of the twentieth century all four countries seem to have converged.

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. While 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. But 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.

[Table 2 about here]

4.2 The role of foreign capital

A finding of the section above was that Sweden seems to have been a relatively capital-scarce economy during the nineteenth century: $\beta_P$ hovered around 300–450 percent, about half of that in France and Britain. Most of the Swedish private wealth was in the form of fairly illiquid assets such as agricultural land and buildings. But how could this small amount of domestic liquid capital have sufficed to finance the Swedish industrialization in the late nineteenth century? One possible answer is capital imports, i.e., that borrowed foreign wealth was used to finance the domestic real investments needed to build productive capacity. Indeed, according to the standard small, open economy model, an increased relative demand for a factor of production should not set off relative price changes since prices are set in international markets where the small economy is a price-taker, but instead a cross-country flow of factors 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 and it is not until today that the question can be fully addressed with the new data on domestic and foreign wealth. Some argue that studies of industrial firm balance sheets shows 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 had not been available.

Figure 8 shows the ratio of net foreign assets (defined as all claims on foreigners net of foreign claims on citizens at current market prices) to national income since 1810 in Sweden and the four large countries. The picture’s main message here is that Sweden was indeed a net importer of capital in the late nineteenth century and early twentieth century; foreign wealth worth about one half year’s national income made up the Swedish capital stock. Most of these foreign funds came from German and French creditors (Franzén, 1998, p. 110). In comparison with the other countries, Sweden was the largest net debtor, the U.S. also borrowed internationally but at a smaller level whereas French, British and German investors were instead net creditors on international capital markets. How much of these foreign funds that reflect true capital exports and how much that was non-market colonial appropriations is unclear, however. Gauging the quantitative importance of the foreign capital is difficult, but it represented about 80 percent of total commercial bank credit and 180 percent of central government debt around the turn of the century 1900.23 When decomposing the rise in national wealth into a domestic and foreign wealth component in the 1870–1910 period using the model of Section 2, all countries exhibit a significantly positive effect coming from foreign capital exports except for Sweden where the capital import contribute negatively to the rise in national wealth.24

The figure also shows that foreign capital mattered much less for the Western economies over most of the twentieth century. But perhaps the cross-border capital flows took other forms? A

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23 See Appendix.
24 See Table 6a in Piketty and Zucman (2014) and additional results for Sweden, available upon request.
particularly debated issue in Sweden concerns the tax-driven capital flight that people some claimed was substantial in the 1980s, 1990s and 2000s when Sweden both taxed capital at internationally rates while liberalizing the capital account (in 1989). Recently there have been attempts made to estimate this potential illicit offshore wealth, and those offered by Roine and Waldenström (2009) suggests that private Swedish wealth worth between a twentieth and a fifth of one year’s national income could be held in tax havens. This means 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 adhere mainly to the past.

4.3 The role of social-democratic welfare-state institutions

4.3.1 Size of government wealth in the welfare state

As already suggested in the discussion above, political and economic institutions are potentially important determinants of public and private wealth accumulation. Over the twentieth century Sweden developed what is perhaps the world’s most extensive welfare state, combining publicly provided universal social insurance, free schooling and an ambitious redistribution via the tax bill. This institutional setup clearly affects the structure of aggregate wealth as individuals in Sweden for a long time have had weak or no incentives at all to save privately for education, health care or retirement over and above the tax payments already made. In stark contrast to Sweden stand the welfare-state arrangements in France, Germany, Britain and the U.S. Welfare services in these countries rely 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 Gösta 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, p. 85–86).

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25 Wars are another channel through which policy can affect public expenditures (see, e.g., Peacock and Wiseman, 1961) and national and sectoral balance sheets. Piketty and Zucman (2014) show that the extent of war destructions during the World Wars varied but was overall fairly limited even in countries such as Germany and France where many battles took place. Sweden did not participate in the two World Wars and has in fact not fought war since the Napoleonic era in the beginning of the nineteenth century why the war-related impact on the country’s wealth was even more limited.

26 See, e.g., Feldstein (1974), Berg (1983) and Gale (1998) for both theoretical and empirical evidence on such crowding out effects.
Does the form of institutional welfare-state arrangement shape the structure of national wealth? And does it have implications for the size of government, as measured by the net wealth of government as share of national income? Although it may be possible to formulate a model showing how a universalistic welfare-state that hampers incentives for private wealth accumulation should have a relatively low level of private wealth, it is also tractable to just take the prediction to the data. Figure 9 depicts the evolution of government wealth over national income $\beta_G$ in the five countries over the past 140 years. A first clear 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. 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. According to a decomposition of the government wealth growth into saving and capital gains using the analysis presented in Section 2, it stands clear that almost all of the high Swedish $\beta_G$ is due to saving: while other governments elsewhere effectively dissaved in most periods the Swedish government has consistently saved.

[Figure 9 about here]

The positive and relatively high Swedish $\beta_G$ back to the nineteenth century is fascinating since it shows that Sweden had a relatively large government sector long before the expansion of its social-democratic welfare around the middle of the twentieth century (Lindbeck, 1997). Whether this fact is just a coincidence or signals the existence of long-standing institutional roots of welfare state formation is a question worth further inquiry. It interesting to note, however, that the German government wealth was relatively big in the 1870–1910 period, i.e., the era when the Bismarckian social insurance system, the first of its kind, was established. Sweden was early on inspired by the German developments, and this may be a partial explanation to the fact that both these countries had relatively large government sectors in this era.

A second result standing out from the evolution of $\beta_G$ across countries is the fairly weak association to Esping-Andersen’s welfare-state capitalism categories. Even though the social-democratic (Swedish) regime is, as expected, associated with the largest government sector,

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27 That Sweden has the largest government sector in terms of $\beta_G$ is true also after adding Australia, Canada, Italy, Japan and Spain for which data exist from 1970 onwards in Piketty and Zucman (2014).
there is divergence both among the “conservative” welfare states France (low $\beta_G$) and Germany (high $\beta_G$) and the liberal welfare states USA (medium $\beta_G$) and Great Britain (low $\beta_G$). This variation does, of course, not reject the tractability of Esping-Andersen’s framework, in particular since the country rankings vary over time (although with Sweden consistently in the top). However, the new evidence does create an opportunity for refinements in the theory of welfare states, their emergence and transition over the path of development.

4.3.2 The role of pension wealth in the welfare state

A specific question related to the welfare state concerns how pensions are financed. Pensions are a central part of everyone’s lifetime welfare and thus an integral part of any modern welfare-state arrangement. Despite this fact, a large part of individual’s pension wealth is often excluded from analyses of private wealth, namely the value of unfunded pension entitlements which are often important parts of so-called defined benefit pension plans. In the analysis by Piketty and Zucman (2014), unfunded pension assets are excluded mainly since they are not backed up by tangible assets held by the policyholder (the state or an employer) but only to promises about future payments.\(^{28}\) Furthermore, the unfunded pension wealth is also not redeemable on demand or possible to liquidize on secondary markets unlike most other real or financial assets included in the marketable wealth definition. Having said this, expectations about a future pension income stream may influence the accumulation, and thus the structure, of personal wealth of policy holders as argued already in the previous section. In this case private wealth is lower than it would have been in the absence of a public pension wealth, and if the crowding-out elasticity is one there is an exact replacement of private wealth for public pension assets. Evidence on such crowding-out effect has been documented in some countries’ pension systems, e.g., by Feldstein (1974) studying the U.S. and Berg (1983) in a study of Sweden.

Figure 10 presents a primary attempt to investigate the importance of public and private pension wealth among Swedish households and how this may have changed over the past century. The series build on newly estimated data on Swedish pension assets attributed to households.\(^{29}\) There are four series in the figure: $\beta_p = W_p / Y$, which is the Swedish private wealth-

\(^{28}\) Another reason to exclude unfunded pension wealth is the difficulty to distinguish it from the present value of claims on other parts of the social security system, e.g., healthcare or the right to social assistance.

\(^{29}\) 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
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; $\beta_{p}^{DC+DB} = (W_p + A_p^{DB})/Y$, which sums private wealth (which includes the DC pension wealth) and the net present value of unfunded, defined-benefit pension wealth (DB); $\beta_{p}^{DC+DB+AP} = (W_p + A_p^{DB} + A_G^{AP})/Y$, 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. The figure’s main message is that there was a dramatic build-up of pension wealth in the postwar era, beginning with the 1947 reform to raise the basic guarantee pension (folkpension) and followed by another major pension reform in the 1960s where public pensions for white-collar workers were raised. Looking at the sheer amounts, by 2010 the sum of private wealth and total pension wealth in the public and private systems amounts to almost six years of national income, i.e., almost twice as much as the private wealth alone. Before the Second World War, however, pension entitlements were according to my estimates unimportant relative to other private net assets. While this may come as a surprise given the fact that Sweden introduced a universal public pension system already in 1914 as the first country in the world to do so, pensions were in fact very small for decades.

[Figure 10 about here]

How does the structure and quantitative importance of pension wealth in Sweden relate to the experience of other rich countries? Was there a similar secular increase in the role of public pensions during the postwar period? Does the composition of funded vs. unfunded, private vs. public, differ systematically across welfare-state types? Unfortunately this question cannot be fully answered since the available data on aggregate public pension wealth and private wealth are lacking for most countries, in particular when it comes to assessing trends over longer time periods (recall that Piketty and Zucman exclude unfunded defined-benefit pensions from pensions. Lastly, funded individual pension savings are always included. The value of funded pensions is relatively easy to observe and estimate from historical sources (e.g., Statistics Sweden, 1960), but unfunded are more difficult. Unfunded public pensions are based on tables on 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).
their analysis). However, there is some historical evidence on public pension assets \((A_P^{DC} \text{ and } A_P^{DB})\) in Great Britain and the U.S. for a large part of the twentieth century. The comparability across countries is problematic and the following comparison should therefore be interpreted with caution. Wolff (1989, 2009) and Wolff and Marley (1989) estimate variants private and pension wealth for various years since 1922 using data from national accounts, estate tax records and wealth surveys.\(^{30}\) For Britain, Blake and Orzag (1999) present similar estimations of the size of funded and unfunded pension assets on a yearly basis between 1948 and 1994.

Figure 11 shows the evolution of unfunded, defined-benefit pension wealth and its role for wealth-income ratios in Britain, Sweden and the U.S. over the twentieth century. The postwar increase in the role of defined benefit pension wealth is visible in Britain and the U.S. as well, although the data do not tell whether this comes mostly from public pension plans (as in Sweden) or from private, employer-related plans. A difference across these countries, however, is the order of magnitude of the relative importance of unfunded pensions. In Sweden, their share of the sum of all wealth including unfunded pensions increased from a third to about one between 1950 and 2000. Over the same period in Britain, it increased from a quarter to about a half and in the U.S. from about a twentieth to about one fifth. In other words, whereas the postwar increasing trends in the importance of unfunded pensions are relatively similar across these countries during the postwar period, their levels are not. Pensions, especially unfunded pensions tied to public schemes, are much more important relative to the rest of private financial and non-financial wealth in Sweden than they are in Britain and the U.S., and most likely a share of this is related to the specific high-tax welfare-state arrangements that Sweden has had since the early postwar era.

[Figure 11 about here]

\(^{30}\) Wolff and Marley (1989, table 15.3) estimate different concepts of aggregate wealth between 1922 and 1983. I use for \(W_p\) their series \(W_1\), and for pension wealth \(W_P^{DC+DB}\) their series \(W_3\), which is defined as \(W_1 + \text{the full reserves of trust funds less their actuarial value in } W_1\) and \(\text{the total value of pension reserves less the CSV of pensions (which is included in } W_1 \text{ and } W_2)\). They also present a series of \(W_4\), which is \(W_3 + \text{the expected value of future social security benefits}\), i.e., a concept of social-security wealth rather than just pension wealth. However, they also discuss a concept called \(W_5\), defined as \(W_4 + \text{the expected value of future pension benefits}\), 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 \(W_3\) to \(W_1\) in 1983 (1.15), suggesting that the additional wealth in \(W_5\) from 1983 and earlier does not make a crucial difference.
5. **Further decomposing wealth accumulation: Savings vs. capital gains**

Until now the decomposition of wealth-income ratios was based on sub-asset categories and comparisons across countries. This section continues to analyze the similarities and differences between the Sweden and the larger economies, but instead uses the analytical framework described in Section 2 which showed how the accumulation of wealth can be decomposed between contributions of past savings and capital price changes. In their analysis of these two sources of wealth growth, Piketty and Zucman (2014) found that almost all of the long-run wealth accumulation is due to past savings whereas capital gains primarily have mattered for shorter time periods. It should be noted that the role of capital gains is indirect since it does not rely on actually observed relative price changes but are instead backed out from the observed growth of wealth and private savings. In order to alleviate some of the indirectness I compare the capital gains contribution with observed asset price changes in the housing and stock markets in Sweden.

Table 3 makes similar decompositions for Sweden since 1810 and compares them with France and the U.S. (using the data of Piketty and Zucman, 2014). The table shows results for two different kinds of saving rates: *private net savings* ($s^P$), which contains savings of both corporations and households, and *personal net savings* ($s^H$), which contains only household savings. This distinction relates to the specific nature of the private sector wealth data where gross assets come from the household sector balance sheet (housing, bank deposits, shares, insurance savings etc.) and are therefore most directly connected with the savings of households. The savings of corporations are in principle also reflected private sector wealth through the value of corporate equity held by households, but due to potential deviations between the book and market values of corporate equity there can be fairly big mismatches between how much of investments that has been resulted in an accumulated capital stock in the corporate sector and how much of this stock’s value that is reflected as market value in household security portfolios.  

[Table 3 about here]

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31 For Sweden, data on aggregate corporate book asset values can be reconstructed since 1980 (see Statistics Sweden, 1995; Bergman, 2014). Tobin’s Q is here computed 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 0.5 until the late 1990s when it increases drastically to around 2–2.5 in the mid-2000s only to fall back to around one in 2010 (data available upon request). Piketty and Zucman (2014a) found that in Germany a relatively low Q at around 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 1970’s, 1980s and most of the 1990s contributed to a low $\beta_P$. 

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The decomposition results in Table 3 suggest that Sweden differs quite notably from the larger and historically richer economies France and USA. The main result of Piketty and Zucman for these counties, which was that savings account for almost all of private wealth accumulation, does not seem to hold as clearly for Sweden. Throughout the nineteenth century, capital gains account for most of the wealth growth in Sweden regardless of if one uses private savings (which includes corporate savings) or only personal savings, in which case capital gains stand for almost 90 percent of the wealth growth. 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 almost 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.

How does this predominant role of capital gains in Swedish wealth formation match with the historical evidence of actual capital gains recorded in Swedish asset markets? Can we even infer from the evolution of asset price gains which of the two saving rates used above, the private or personal, that comes closest to real world outcomes? Recent efforts documenting the historical evolution of Swedish housing prices and stock returns since the 1870s make it possible to address these questions.32 Table 4 shows, for different episodes since 1870, the inflation-adjusted average annual 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 (from Table 3).

During 1870–1910, capital gains were positive in all series around two percent annually. In the interwar era, however, house price gains and capital gains implied using personal saving remained at around two percent annual growth whereas capital gains in private wealth when using private savings plummet to zero and stock prices fell by three percent per year. In the postwar era up to 1980, all series report historically low capital gains. This was an era of wartime financial regulation, with banks, industries and most asset markets kept under strict controlled by the government and its agencies. After 1980, markets were drastically deregulated and liberalized, and this institutional regime switch had dramatic effects on asset prices: real

housing prices increased by two percent per year while real stock prices (excluding dividends) rose by nearly ten percent annually. In the same period, capital gains contribution to wealth growth was 2.7 percent when using personal savings but minus 0.1 percent when private savings is used. The reason for the last deviating result is the sizeable corporate savings in the last decades of the nineteenth century leaving no room for capital gains (recall the discussion in the previous section). Overall, the results show a rather strong association in both changes and levels between house price gains and capital gains in $\beta_p$ implied from using personal savings. Stock returns also co-move with these capital gains, but they are much more volatile than house prices. By contrast, capital gains backed out of the wealth growth equation when private savings, which includes corporate savings, are used appear much less consistent with observed asset price gains.

5.1 Does Piketty’s “second law” hold in the case of Sweden?

The discussion in Section 2 concluded that modeling the long-run steady-state level of $\beta$ as function of saving and income growth could depend on which saving and which output that one uses. Piketty and Zucman (2014a) expressed $\beta$ as a function of net saving and net output – “the second law of capitalism” of Piketty (2014) whereas Krusell and Smith (2014) instead argued that the “textbook” version of the Harrod-Domar-Solow expresses $\beta$ as function of gross saving, gross output and the depreciation rate.

This section makes use of the new Swedish long-run evidence of wealth and saving to empirically examine how well these different theoretical models fit the actual historical outcomes for Sweden. Table 5 shows the results over different historical episodes. First, when looking over the entire two hundred-year period, an admittedly extremely long “long-run”, the Piketty-Zucman model with net saving and net output – Piketty’s “second law” – outperforms the others: It predicts a level of beta at 352 percent of national income, to be compared with an average observed level of 342 percent – a deviation of less than three percent. The other models deviate more, from 11 percent, in the Piketty and Zucman model using net saving but gross output, to 20–30 percent in the “textbook” model when instead gross saving is used.

33 The dramatic impact of the institutional changes of the 1980s on asset prices, financial expansion, corporate profits and income inequality is discussed by Roine and Waldenström (2012).

34 Focus is put on private wealth since it is available all the way back to 1810. The results are essentially the same when using national wealth and national saving rates.
Looking at different subperiods, the variation is much larger and the fit with the observed levels generally lower. From 1810 up to 1950, all models in fact substantially undercut the observed levels by between one and two thirds. The Piketty-Zucman $s/g$-model performs slightly better during 1810–1870, but after that all models perform the same. Explanations to these relatively low theoretical $\beta$’s may be related to the previous findings of this study, which showed that saving along cannot account for the private wealth accumulation in Sweden historically. In particular, Sweden imported substantial amounts of private capital to finance the country’s industrialization in the late nineteenth century and domestic capital gains were found to be substantial, both of which substitutes a saving-induced wealth accumulation for either an imported or a capital gains-induced wealth growth.

The period after World War II shows a better fit between the theoretical and empirical wealth-income ratios. In the 1950–1980 period, when savings vastly dominated relative price effects in Sweden, the Piketty-Zucman model performs well (seven percent deviation). After 1980, finally, the “textbook” models using gross saving and output perform better (three percent deviation).

Altogether, the new historical evidence of Sweden seems to deliver mixed support for the simplistic wealth accumulation models in which the steady-state wealth-income ratio is determined by the relative size of the saving rate and the income growth. In the very long run, the models (especially Piketty-Zucman’s $s/g$-model) tend to deliver a very close match between the model-implied and the empirically observed $\beta$’s. Over shorter periods, with “shorter” meaning periods of up to sixty years or possibly even longer, the goodness of fit of the models is worse suggesting the need for richer models of wealth accumulation.

6. Conclusions

This paper has presented a new database on Swedish historical national wealth and savings with homogenous series of annual wealth-income income ratios over the past two centuries. A number of important findings have emerged. First, the series show that, similar to the British, French, German and American experiences, wealth-income ratios in Sweden fell during
World War I and continued falling until the postwar era. Over the last 20 years wealth-income ratios in Sweden have increased dramatically and are today at levels not witnessed since the 1930s. This recent surge in the importance of wealth is similar to the experiences found in other Western economies. During the pre-World War I era, however, Sweden differs from the rest of Europe, with wealth-income ratios being roughly only half as big. The Swedish pattern was in this period very similar to that of the U.S., but an examination of the underlying factors shows that the countries differ in that Sweden had a much lower saving rate that was dominated by even the low pre-industrial growth rates. Sweden’s industrialization was instead to a relatively large extent financed by foreign capital, which goes well with a small, open economy model where demand shocks sets off cross-border factor flows rather than price changes.

Capital gains seem to have mattered relatively more in Sweden than in the large economies. The difference is not so large when the accumulation of private wealth is related to the saving of both households and corporations. When only using for household saving, however, which could be motivated by the fact that the historical private wealth totals are essentially built on a complete household wealth account, then capital gains account for most of the wealth increases almost regardless of time period. Redoing this analysis for the other countries, the same change does not happen, which underscores the different experience in Sweden. When comparing the capital gains, which were computed as residuals in the two-sector wealth accumulation model, with observed historical asset price gains in the Swedish housing and financial markets, I find strong resemblance with the average annual increases when using only household 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.

During the twentieth century, Sweden differs in terms of the composition of wealth accumulation. In particular, government wealth grew much faster in Sweden than elsewhere throughout the postwar era, and today its share of national income is many times larger than the equivalent ratios in the other large Western countries. The analysis links this government wealth growth to the expansion of welfare state institutions, especially the build-up of a public pension system that required the state to hold large buffer funds to ensure long-term financial stability. In other words, Sweden was “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


Bollfras, K. D. (1878), Försök till uppskattning af svenska nationalförmögenheten af B-s, Stockholm.


Figure 1: Steady-state wealth-income ratio $\beta$ across growth models.

Version of Harrod-Domar-Solow model:

<table>
<thead>
<tr>
<th>Output/income concept:</th>
<th>Gross output</th>
<th>Net output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piketty and Zucman (2014)</td>
<td>$\frac{s^n}{g + s^n\delta}$</td>
<td>$\frac{s^n}{g}$</td>
</tr>
<tr>
<td>“Textbook” (Krusell and Smith, 2014)</td>
<td>$\frac{s^g}{g + \delta}$</td>
<td>$\frac{s^g}{g + \delta(1 - s^g)}$</td>
</tr>
</tbody>
</table>

*Note: $s^n$ and $s^g$ denote net and gross saving rates, respectively, $g$ income growth rate and $\delta$ the depreciation rate (consumption of fixed capital).*
Figure 2: Private wealth-income ratio and its components in Sweden, 1810–2010.

Source: Appendix table SE2.1 (SNWD, v 1.0).
Figure 3: National, private and government wealth-income ratios in Sweden, 1870–2010.

Source: Appendix table SE1.1 (SNWD, v 1.0).
Figure 4: Private and national wealth-income ratios in five Western economies, 1970–2010.

Figure 5: Evolution of private wealth-income ratios, five countries, 1810–2010.

Figure 6: Evolution of national wealth-income ratios, four countries, 1870–2010.

Figure 7: Composition of private wealth, five countries, 1810–2010.

Note: Piketty and Zucman (2014) emphasize the potential problems with comparisons across countries 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: appendix tables SE2.2, SE2.3 (SNWD, v1.0). All other countries: Piketty and Zucman (2014), appendix tables A17 (housing), A20 (agricultural land) and A23 (other domestic assets).
Figure 8: The role of foreign wealth, five countries 1810–2010.

Figure 9: The role of government wealth, 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: Appendix table SE 3.1 (SNWD, v1.0). All other countries: Piketty and Zucman (2014), appendix tables A9 and A10.
Figure 10: 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) $\beta_{P^{DC+DB+AP}} = (W_p + A_p^{DB} + A_p^{AP})/Y$, 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:** Appendix table SE2.4 (SNWD, v1.0).
Figure 11: Unfunded pensions and private wealth: Sweden vs. 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 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, including also “the expected value of future pension benefits”, but it also includes “the expected present value of future social security benefits” (concept W4) and is therefore not suitable as measure of pension wealth. Furthermore, W5 is not reported in the same way for the whole period as W3. Sources: Sweden: Appendix table SE2.4 (SNWD, v1.0). 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 1922–1983 from Wolff and Marley (1989, table 15.3) and for 1989–2007 from Wolff (2011, tables 4.6, 5.3), and private wealth and national income for whole period from Piketty and Zucman (2014, Table US.1).
<table>
<thead>
<tr>
<th>Year</th>
<th>Sweden</th>
<th>USA</th>
<th>Ratio Sweden/USA (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>103</td>
<td>10</td>
<td>1077</td>
</tr>
<tr>
<td>1850</td>
<td>110</td>
<td>27</td>
<td>403</td>
</tr>
<tr>
<td>1865</td>
<td>98</td>
<td>39</td>
<td>253</td>
</tr>
<tr>
<td>1870</td>
<td>108</td>
<td>31</td>
<td>350</td>
</tr>
<tr>
<td>1875</td>
<td>115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1880</td>
<td>101</td>
<td>42</td>
<td>239</td>
</tr>
<tr>
<td>1885</td>
<td>95</td>
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<td></td>
</tr>
<tr>
<td>1890</td>
<td>71</td>
<td>52</td>
<td>136</td>
</tr>
<tr>
<td>1895</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900</td>
<td>68</td>
<td>54</td>
<td>125</td>
</tr>
<tr>
<td>1905</td>
<td>84</td>
<td>70</td>
<td>120</td>
</tr>
<tr>
<td>1910</td>
<td>57</td>
<td>103</td>
<td>55</td>
</tr>
<tr>
<td>1915</td>
<td>77</td>
<td>104</td>
<td>74</td>
</tr>
<tr>
<td>1920</td>
<td>76</td>
<td>85</td>
<td>90</td>
</tr>
</tbody>
</table>

*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 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 2: Saving and growth in four countries, 1810–2010

<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>Sweden</th>
<th>U.K.</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$s^n_p$</td>
<td>$g$</td>
<td>$s^n_p/g$</td>
<td>$s^n_p$</td>
</tr>
<tr>
<td>1810–1870</td>
<td>10.3</td>
<td>1.2</td>
<td>8.6</td>
<td>3.0</td>
</tr>
<tr>
<td>1870–1910</td>
<td>10.9</td>
<td>1.1</td>
<td>9.9</td>
<td>3.6</td>
</tr>
<tr>
<td>1910–1950</td>
<td>8.2</td>
<td>1.4</td>
<td>5.9</td>
<td>7.1</td>
</tr>
<tr>
<td>1950–1980</td>
<td>14.0</td>
<td>4.5</td>
<td>3.1</td>
<td>8.4</td>
</tr>
<tr>
<td>1980–2010</td>
<td>10.5</td>
<td>1.8</td>
<td>5.8</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Source: Data on private net saving rates and growth from Piketty and Zucman appendix (downloaded at piketty.pse.ens.fr/capitalisback/, Feb. 2015) for France (Table FR.4b), U.K (Table UK.5a) and USA (US.5a). Data for Sweden calculations from SNWD, v1.0, tables SE1.1, SE5.1.
Table 3: Decomposing wealth accumulation in saving and capital gains.

<table>
<thead>
<tr>
<th>Period / saving rate</th>
<th>Sweden</th>
<th>France</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wealth growth, $g_W$ (%)</td>
<td>Contribution from Savings, $g_{WS}$ (%)</td>
<td>Capital gains, q (%)</td>
</tr>
<tr>
<td>1810–1870</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (s₁²)</td>
<td>0.7</td>
<td>1.1</td>
<td>(38%) (62%)</td>
</tr>
<tr>
<td>Personal (s₂²)</td>
<td>1.8</td>
<td>0.2</td>
<td>(13%) (87%)</td>
</tr>
<tr>
<td>1870–1910</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (s₁²)</td>
<td>0.9</td>
<td>1.5</td>
<td>(37%) (63%)</td>
</tr>
<tr>
<td>Personal (s₂²)</td>
<td>2.4</td>
<td>0.3</td>
<td>(12%) (88%)</td>
</tr>
<tr>
<td>1910–1950</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (s₁²)</td>
<td>1.8</td>
<td>0.1</td>
<td>(95%) (5%)</td>
</tr>
<tr>
<td>Personal (s₂²)</td>
<td>1.9</td>
<td>0.6</td>
<td>(32%) (68%)</td>
</tr>
<tr>
<td>1950–1980</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (s₁²)</td>
<td>3.7</td>
<td>–0.7</td>
<td>(124%) (–24%)</td>
</tr>
<tr>
<td>Personal (s₂²)</td>
<td>3.0</td>
<td>2.5</td>
<td>(84%) (16%)</td>
</tr>
<tr>
<td>1980–2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (s₁²)</td>
<td>3.8</td>
<td>–0.1</td>
<td>(102%) (–2%)</td>
</tr>
<tr>
<td>Personal (s₂²)</td>
<td>3.7</td>
<td>1.0</td>
<td>(27%) (73%)</td>
</tr>
<tr>
<td>1870–2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (s₁²)</td>
<td>2.4</td>
<td>0.3</td>
<td>(89%) (11%)</td>
</tr>
<tr>
<td>Personal (s₂²)</td>
<td>2.7</td>
<td>1.0</td>
<td>(38%) (62%)</td>
</tr>
</tbody>
</table>

Table 4: Comparing actual and model-imputed capital gains in Sweden, 1870–2010.

<table>
<thead>
<tr>
<th></th>
<th>Observed in historical asset prices:</th>
<th>Imputed from model decomposition:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Real housing price gains</td>
<td>Real stock returns</td>
</tr>
<tr>
<td>1870–1910</td>
<td>+1.3</td>
<td>+3.0</td>
</tr>
<tr>
<td>1910–1950</td>
<td>+1.8</td>
<td>−3.0</td>
</tr>
<tr>
<td>1950–1980</td>
<td>+0.7</td>
<td>+0.1</td>
</tr>
<tr>
<td>1980–2010</td>
<td>+2.0</td>
<td>+9.9</td>
</tr>
<tr>
<td>1870–2010</td>
<td>+1.4</td>
<td>+2.1</td>
</tr>
</tbody>
</table>

Notes and sources: (a): Housing price gains are derived from 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 come from the Piketty-Zucman decomposition approach described in section 2 where the saving rate is for either private sector as a whole ($s_P^n$) or households only ($s_H^n$).
Table 5: Steady-state wealth-income ratios: Actual vs. Theoretical

<table>
<thead>
<tr>
<th>Period</th>
<th>Empirical Private wealth-income ratio $\beta_p$</th>
<th>Empirical macroeconomic parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Empirical Piketty-Zucman “Textbook model”</td>
<td>$s_p^g$ $s_p^n$ $g$ $\delta$</td>
</tr>
<tr>
<td></td>
<td>$Y$ $Y_d$ $Y$ $Y_d$ $s_p^g$ $s_p^n$ $s_p^g$ $g$ $g + \delta (1 - s_p^g)$</td>
<td></td>
</tr>
<tr>
<td>1810–1870</td>
<td>364 192 207 117 122 3.0 6.1 1.4 3.8</td>
<td></td>
</tr>
<tr>
<td>1870–1910</td>
<td>431 140 149 138 147 3.6 9.2 2.4 4.2</td>
<td></td>
</tr>
<tr>
<td>1910–1950</td>
<td>362 212 235 197 216 7.1 14.7 3.0 4.5</td>
<td></td>
</tr>
<tr>
<td>1950–1980</td>
<td>242 202 226 174 191 8.4 15.5 3.7 5.2</td>
<td></td>
</tr>
<tr>
<td>1980–2010</td>
<td>259 333 418 240 282 9.3 20.1 2.2 6.1</td>
<td></td>
</tr>
<tr>
<td>1810–2010</td>
<td>342 303 352 252 284 8.5 17.6 2.4 4.6</td>
<td></td>
</tr>
</tbody>
</table>

Notes and sources: Empirical and theoretical steady-state expressions from Figure 1 (and Piketty and Zucman, 2014; Krusell and Smith, 2014). “$Y$” and “$Y_d$” denote gross and net output, $s_p^g$ and $s_p^n$ denote gross and net private saving rates (weighted by national income), $g$ is the national income growth rate and $\delta$ is the depreciation rate. Data on wealth-income ratios, saving rates, income growth and depreciation rates from SNWD, v1.0, tables SE1.1, SE5.1.