ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Roine, Jesper; Waldenström, Daniel

Working Paper

Long run trends in the distribution of income and wealth

SITE Working Paper, No. 26

Provided in Cooperation with:
Stockholm Institute of Transition Economics (SITE), Stockholm School of Economics

Suggested Citation: Roine, Jesper; Waldenström, Daniel (2014) : Long run trends in the distribution of income and wealth, SITE Working Paper, No. 26, Stockholm School of Economics, Stockholm Institute of Transition Economics (SITE), Stockholm

This Version is available at:
https://hdl.handle.net/10419/204737

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

Stockholm Institute of Transition Economics

WORKING PAPER

May 2014

No. 26

Long-Run Trends in the Distribution of Income and Wealth

Jesper Roine and Daniel Waldenström

STOCKHOLM INSTITUTE OF TRANSITION ECONOMICS

Working papers from Stockholm Institute of Transition Economics (SITE) are preliminary by nature, and are circulated to promote discussion and critical comment. The views expressed here are the authors' own and not necessarily those of the Institute or any other organization or institution.

Stockholm Institute of Transition Economics (SITE) · Stockholm School of Economics · Box 6501 · SE-113 83 Stockholm · Sweden

Long run trends in the distribution of income and wealth*

Jesper Roine† and Daniel Waldenström‡

April 25, 2014

Chapter in Atkinson, A.B., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. 2, North-Holland, Amsterdam, forthcoming.

Abstract

This paper reviews the long run developments in the distribution of personal income and wealth. It also discusses suggested explanations for the observed patterns. We try to answer questions such as: What do we know, and how do we know, about the distribution of income and wealth over time? Are there common trends across countries or over the path of development? How do the facts relate to proposed theories about changes in inequality? We present the main inequality trends, in some cases starting as early as in the late eighteenth century, combining previous research with recent findings in the so-called top income literature and new evidence on wealth concentration. The picture that emerges shows that inequality was historically high almost everywhere at the beginning of the twentieth century. In some countries this situation was preceded by increasing concentration, but in most cases inequality seems to have been relatively constant at a high level in the nineteenth century. Over the twentieth century inequality decreased almost everywhere for the first 80 years, largely due to decreasing wealth concentration and decreasing capital incomes in the top of the distribution. Thereafter trends are more divergent across countries and also different across income and wealth distributions. Econometric evidence over the long run suggests that top shares increase in periods of above average growth while democracy and high marginal tax rates are associated with lower top shares.

Keywords: Income inequality, Income distribution, Wealth distribution, Economic history, Top incomes, Welfare state, Taxation

JEL Classification: D31, H2, J3, N3

* We have received valuable comments from Anthony Atkinson and seminar participants at the conference "Recent Advances in the Economics of Income Distribution" held at the Paris School of Economics, April, 2013. We thank Wiemer Salverda for sharing wealth distribution data on the Netherlands. Data underlying all graphs and tables in the chapter are available on the authors' websites or upon request.

† Stockholm Institute of Transition Economies, Stockholm School of Economics, P.O. Box 6501, SE-11383 Stockholm. E-mail: Jesper.Roine@hhs.se.

‡ Department of Economics, Uppsala University, P.O. Box 513, SE-751 20, Uppsala. E-mail: Daniel.Waldenstrom@nek.uu.se.

Table of contents

1. Introduction ... 3
   1.1 From the Kuznets series, to household surveys, and back again ... 3
   1.2 Outline of the chapter ... 6
      1.2.1 Top income shares and other measures of long run income inequality ... 6
      1.2.2 Long-run trends in the wealth distribution ... 7
      1.2.3 Searching for explanations ... 8
   1.3 What is this chapter not about? ... 9
2. Long run trends in income inequality ... 11
   2.1 Methods and data in the top income literature ... 13
      2.1.1 Tax statistics and the definition of income ... 13
      2.1.2 Reference total for the population ... 16
      2.1.3 Reference total for income ... 17
      2.1.4 Interpolation techniques and the interpretation of the Pareto coefficient ... 18
      2.1.5 Tax avoidance and tax evasion ... 20
      2.1.6 Other issues ... 22
      2.1.7 So can we trust the top income data? ... 22
   2.2 The evidence and what we learn ... 23
      2.2.1 Common trends or separate experiences? ... 23
      2.2.2 The importance of developments within the top decile ... 26
      2.2.3 The importance of capital incomes and capital gains ... 27
   2.3 The relation between top income data and other measures of inequality ... 31
      2.3.1 Comparing tax-based and survey-based estimates of top income shares ... 31
      2.3.2 Theoretical and empirical relationship between top shares and overall inequality measures ... 32
      2.3.3 Other series over long run inequality: wages, factor prices and life prospects ... 34
   2.4 Income inequality over the long run – Taking stock of what we know ... 38
3. Long run trends in wealth inequality ... 40
   3.1 Data and measurement ... 40
      3.1.1 The wealth holding unit ... 41
      3.1.2 The concept of wealth ... 42
      3.1.3 Measuring historical wealth inequality ... 46
      3.1.4 Tax avoidance and evasion ... 48
   3.2 Evidence on long run trends in wealth inequality ... 49
      3.2.1 Country specific evidence ... 49
      3.2.2 Cross-country trends in long-run wealth concentration ... 67
   3.3 The composition of wealth ... 69
   3.4 Concluding discussion: What do the long run wealth inequality trends tell us? ... 71
4. Determinants of long run trends in inequality ... 73
   4.1 A first look at inequality trends, structural changes and shocks ... 74
      4.1.1 What about the Kuznets curve? ... 78
   4.2 Combining wage earnings and wealth ... 80
      4.2.1 Explaining the drop over the first half of the twentieth century: Wealth shocks and the cumulative effects of taxes ... 82
   4.3 Explaining increasing top wages: Executive compensation, superstar effects and the possibility of changing norms ... 84
   4.4 Econometric evidence on determinants of top income shares ... 89
      4.4.1 Determinants of inequality: Correlations over the long run ... 89
      4.4.2 The effect of top tax rates on top incomes ... 91
      4.4.3 Political and institutional factors and the impact of crises ... 92
   4.5 What do we learn? ... 93
5. Summary and concluding remarks ... 95
   5.1 Going forward ... 97
References ... 98
Figures ... 109
Tables ... 134
Appendix ... 141

1. Introduction

This chapter gives an overview of the evidence on long run trends in the distribution of personal income and wealth. Our focus will be on empirical estimates of the respective distributions but we will also cover some ideas that aim to explain the observed patterns. The *long run* refers, at best, to the period from around 1750, i.e., the time around the British industrial take-off, and onwards, but in most cases the time span begins in the early twentieth century. As a result of data availability most of the evidence is based on today's developed economies and as a result generalizations will tend to be skweded toward this set of countries. However, this is not to say that the results are relevant for rich countries only. In many cases the data coverage starts at the very beginning of industrialization of todays developed economies and in addition data is also available for several developing nations.[1]

The kinds of questions we try to answer in this chapter are: What do we know (and how do we know) about the distribution of income and wealth over time? Are there common trends across countries or over the path of development? How do the facts relate to proposed theories about changes in inequality? We will mainly draw on the advances made in the field over the past decade, but before outlining the contents of the chapter and its limitations we want to recall some points in the development of evidence on long run inequality leading up to the recent research.[2]

1.1 From the Kuznets series, to household surveys, and back again

In the very beginning of his famous presidential address to the American Economic Association in 1954, Simon Kuznets outlined some ideals concerning the data required to study long-term changes in inequality (Kuznets, 1955). The "economist's pipe dream" that he described roughly corresponds to what we today would call a detailed, individual panel data set, preferably spanning several generations. He emphasized things such as being able to adjust incomes for household size, to capture "all units in a country rather than a segment either at the upper or lower tail", the importance of being able to control for transitory income fluctuations and

[1] For a comprehensive treatment of developing countries, see chapter 10 in this Handbook by Alvaredo and Gasparelli (2014).

[2] In the Handbook of Income Distribution, Volume 1, two chapters provided a historical perspective; one by Peter Lindert on inequality in Britain and America starting with estimates for England and Wales as far back as 1688 (Lindert, 2000), and one by Christian Morrison on developments in selected European countries with observations as far back as the 18th Century for France and Sweden (Morrison, 2000). We naturally build on their chapters and focus on new findings extending the picture given in their respective chapters.

being able to calculate individual life time incomes, etc. He also stressed the importance of the relation between income and wealth (savings) for understanding the distributional dynamics over time.

In many ways the development of inequality data for a long time after Kuznets' well-known speech focused on this "wish-list". Even though important advances were, of course, made with respect to historical data, it is fair to say that the focus was on the construction of contemporary national household surveys and individual micro panel data sets.[3] Eventually much effort also went into making such data comparable across countries in projects such as the Luxembourg Income Study (LIS), and its more recent companion the Luxembourg Wealth Study (LWS). Building on these and other similar projects, compilations of data such as the World Income Inequality Database (WIID) have also been put together.[4] This development has indeed changed empirical inequality research for the better and made it possible to address a number of new and important questions. But the relative focus on micro data shifted attention away from some issues, and in particular questions regarding long-run developments. Given the relatively recent nature of most household survey data and micro data in general, "the long run" based to these sources naturally becomes quite limited, typically not covering more than the last couple of decades.[5] Such a relatively short time span is unfortunate since several issues concerned with economic development and structural change require a much longer time horizon.

However, recent research has changed things dramatically. Starting with the path-breaking work of Thomas Piketty (2001a, 2003), which extends the methods first used in the seminal work by Kuznets (1953) to generate series of top income shares spanning the entire twentieth century in France using income tax data, similar efforts have followed for many countries. Using similar data and methodology, aiming at making estimates as homogenous as possible,

[3] Kuznets (1963) updated his series and added data for some more years and countries. Others, like Adelman and Taft Morris (1971), did compile an early data set on the distribution of income as far back as the late 19th century, but the reliability of this data was debated (e.g., Paukert, 1973). Contributions on the long run development of wealth inequality include the comprehensive work by Atkinson and Harrison (1978) and studies by, e.g., Lampman (1962), Atkinson, Gordon and Harrison (1986), Soltow (1965, 1975, 1984), Lindert 1986, 1987), Williamson and Lindert (1981), Wolff (1987) and Wolff and Marley (1987). Important contributions to the study of long run income inequality include Soltow (1968, 1969, 1971), Williamson and Lindert (1980, 1981), Willliamson (1980). See the introductory chapter in Brenner, Kaelble and Thomas (1991) for references and an overview. See also further references in Lindert (2000) and Morrison (2000).

[4] Despite such efforts there are many remaining issues when using these data. Atkinson and Brandolini (2001) outline the pitfalls in using compilations of inequality data from different sources.

[5] See the introduction by Thomas Piketty in Atkinson and Piketty (2007).

new data are to date available for 26 countries. Most of these were collected in two volumes edited by Anthony B. Atkinson and Thomas Piketty (2007, 2010) that also contain chapters on methodological issues and summaries. The full database is available on line at http://g-mond.parisschoolofeconomics.eu/topincomes/ and as more studies are conducted data is added here.

Most of the series span the whole of the twentieth century, sometimes even longer, making the resulting data set unique in its ability to address long run issues. There are also other features of the data such as the relatively high frequency (often yearly), the possibility to decompose income by source and the possibilities to study changes within the top of the distribution that have proven to be of importance and, as we shall discuss in more detail below, have led to new insights about inequality developments over the long-run. This renewed interest in the long run and the reevaluation of historical sources has also led to new studies on the historical trends in the wealth distribution (e.g., Kopczuk and Saez, 2004; Dell, Piketty and Saez, 2005; Piketty, Postel-Vinay and Rosenthal, 2006. See further Section 3 below).

The body of work extending and generalizing Kuznets pioneering research is often labeled according to its focus on the top of the distribution. The "top income literature" is of course a correct description in the sense that it is based on observing only high-income fractions of the population (typically roughly the top decile and sometimes an even smaller share), and then relating their incomes to estimates of total income. From this it follows that top income shares cannot say anything about changes *within* a large share of the total population. But it does not follow that this data is only about the rich. As we will outline in more detail below the top income literature is a contribution to both our understanding of long run changes in overall inequality, as well as a more detailed understanding of developments within the top. Both aspects are important.

Finally, one should remember that it is not always a matter of *choosing* the right inequality measure for the question at hand. In fact, when it comes to the study of long run inequality the availability of *any data at all* is often the binding constraint. In such a situation the relationship between different measures becomes important and we want to know things like: "What are the relationships between different inequality measures?" and "To what extent can this measure serve as a proxy for what we would ideally like to observe?". In the end, the approach to what we know and can know about inequality over the long run will have to be

pragmatic. Such an approach calls for cautious interpretation, but not for resignation. We believe, using the words of Kuznets (1955, p. 4), that even "if the trends in the income structure can be discerned but dimly", we should continue to improve on our informed guesses. This is far from saying that the best we can do is to patch together scattered observations over time, using different sources and methods. In fact, many recent insights points exactly to the opposite. In the end we need to combine an understanding about what we are, in fact, observing, how different measures relate to each other, and an understanding of how they relate to the model or theory we wish to test.

1.2 Outline of the chapter

Our chapter has three parts in addition to this introduction: one on the trends in long run income inequality, a second on trends in long run wealth inequality, and a third on potential explanations of these trends and how they relate to some of the theories about what determines inequality.

1.2.1 Top income shares and other measures of long run income inequality

In Section 2 we focus mainly on the new evidence on long run income inequality that has come out of the top incomes project, including some new data points.[6] This means that income inequality is generally in terms of total income, i.e., income from all sources, before taxes and most transfers. We briefly discuss the methodology and type of data used in this literature, and then give an overview of the most important findings. First, we review the broad trends and to what extent the developments can be described as common for different groups of countries.[7] Second, we stress the importance of studying different parts within the top decile as it turns out that this is a very heterogeneous group. Here we also present so called shares-within-shares measures capturing the relative development between various top groups. Third, we emphasize the importance of decomposing income with respect to source of income. This is an aspect that has not received much attention in the past literature on historical inequality, but which can now be studied in more detail thanks to the nature of the income

[6] Using newly found statistical sources we have calculated top income shares for Finland in the years 1865, 1871, 1877 and 1881.

[7] Most individual country studies are collected in the two volumes (Atkinson and Piketty, 2007, 2010) and all data are also available in the World Top Income Database (WTID). As new data becomes available for additional countries this is added to the database together with information about sources and adjustments etc. Taken together Atkinson and Piketty (2007, 2010) and the WTID provide details about particular aspects of data as well as the main suggested explanations for understanding individual country developments. Here we focus on developments that are joint for groups of countries or, possibly, for all countries.

tax-based sources, and which turns out of great importance for the interpretation of inequality developments. We also discuss the importance of how to treat realized capital gains.

Thereafter we move on to relating the results based on top income shares with results based on other sources and measures of inequality. We consider both top share measures using somewhat different sources and methods, as well as other estimates of historical inequality based on other measures (wage dispersion across occupations, factor price differentials and differences in life prospects). In particular, we discuss and update the evidence on the issue of how good a proxy top income shares are for other measures of inequality. Putting everything together we attempt to summarize the overall picture of income inequality developments for the period 1750–2010.

1.2.2 Long-run trends in the wealth distribution

In Section 3 we present the evidence on long run developments of wealth inequality. Similar to the discussion of income inequality trends, we begin by reviewing the different data sources and empirical methods used to estimate the distribution of wealth over time. Much of the methodology used to study the wealth distribution resembles the one used to examine trends in the income distribution. In particular, we often rely on top shares of a consistently defined reference total population and their respective shares of an estimate of total wealth as our main measure of inequality. As in the case of top incomes we also stress the importance of studying fractions within the top.

But there are also some important differences between studying income and wealth concentration. Personal wealth is more difficult both to define and to measure and the nature of wealth data is also different from income data. Even though information on the distribution of wealth has been collected throughout history (the Doomsday Book from 1086 in England being an early and well-known example) wealth holdings have not typically been taxed directly in a systematic way. Assets have instead mostly been taxed on their transfer and in particular at the time of death. Indeed most of the information we have on the distribution of distribution come from inheritance or estate tax data, sometimes complemented by wealth data collected in connection to population surveys. The section describes how researchers have handled these challenges in estimating the wealth distribution and to what extent meaningful cross-country comparisons can be made.

After having discussed methodology we move on to presenting the broad results emerging from this work covering ten of today-industrialized economies from their respective eras of industrialization until the present. For a few countries (Finland, the Netherlands, Norway and Sweden) the chapter also presents some new estimates of wealth concentration.[8]

1.2.3 Searching for explanations

In Section 4 we then discuss the possible explanations behind the observed facts. How should we relate the shifts in the income and wealth distributions over time to other developments in society? To what extent are there global forces and events that affect all countries in similar ways (possibly with some time lag between countries)? What theories can shed light on shifts in capital incomes, what theories could explain increasing top wages? How should we think about the development of total income stemming from both wages and capital? What evidence do we have from regression analysis?

We begin by discussing some broad topics often suggested as a cause (and somethimes consequence) of inequality and sketch how the developments of these relate to our evidence. In particular, we will look at how our series correspond to broad global developments such as globalization, technological revolutions, wars and economic shocks, and patterns of economic growth. We then focus on more some specific aspects. First, we look at theories emphasizing capital incomes and also the interactions between earned income and capital as well as the cumulative effects of taxation. These things were all of key importance for the decline of top shares in the first half of the twentieth century and for the lack of recovery after the wars. We then consider some mechanisms that have been suggested to explain increased top wages such as skill-biased technological change, the rise in executive pay and related so called super-star theories. These have all been suggested as important factors in the recent rise in top shares in many countries. Finally, we review some insights from econometric studies trying to use the new long run inequality data to shed light on the developments.

Clearly our coverage of possible theories will be both selective and incomplete. In the end it is based on our subjective reading of which aspects we think are key for understanding the long run developments of inequality, especially in light of the new evidence produced in the past decade. Furthermore, much of what we write about has been covered in previous over-

[8] We add observations of top wealth shares (to those already presented in previous studies) for Finland during 1987–2005, the Netherlands for 1993–2000 and 2006–2011, Norway in the 2000s and Sweden in 2007.

views and surveys of the top incomes literature (Piketty, 2005; Piketty and Saez, 2006; Atkinson and Piketty, 2007, 2010; Leigh, 2009; Atkinson, Piketty and Saez, 2010, 2011), overviews of the changing earnings distribution (Atkinson 2008a) and in overviews on wealth concentration trends (Wolff, 1996; Davies and Shorrocks, 2000, Atkinson, 2008b; Ohlsson, Roine and Waldenström, 2008). In general, our aim is to focus on the most recent work in the field building on previous surveys such as Lindert (2000) and Morrisson (2000).

1.3 What is this chapter not about?

There is a lot of work and several issues regarding inequality over the long run that our chapter does not cover. As we see it, there are four major themes that we do not address but that are still closely related to what we discuss. Two of these omitted themes concern the descriptive scope of our chapter while the other two relate more to the attempts to understand the developments.

First, we will not deal with issues of mobility but instead focus on repeated cross-sections of data. [9] A distribution where individuals constantly move in and out of the top (or bottom) of the distribution and where an individuals position one year says nothing of his position the next year is clearly very different to one where every individual keeps his place over time. Reality is obviously characterized by something in between the two extremes, but importantly the few studies that have been able to directly address this question (or aspects of it) conclude that trends in cross sectional data are not driven by changes in mobility and do capture actual inequality.[10] In short, even if repeated cross sections of inequality, in theory, could be misleading when discussing changes in inequality over time, this does not seem to be the case in practice.

Second, we will restrict our study in time to a period starting roughly at the beginning of the British industrial revolution (with data this far back being limited to a few data points for a small number of countries only), and with more comprehensive data starting in the beginning of the twentieth century. Recently there has been a lot of interesting work devising ingenious

[9] For an extensive treatment of income mobility, see chapter 11 by Markus Jäntti and Stephen Jenkins. For a more detailed study of mobility in the top of the income distribution, see Björklund, Roine and Waldenström (2012).

[10] A few studies have looked at income mobility over the 20th century, e.g., Kopczuk, Saez and Song (2010) on U.S. intragenerational mobility and Björklund, Jäntti och Lindquist (2010) and Lindahl et al. (2012) on Swedish intergenerational income mobility. See also Long and Ferrie (2007) on occupational mobility patterns in the U.S. and Great Britain since the 19th century.

methods of estimating distributional outcomes in pre-modern societies.[11] All of this work certainly adds to our understanding of inequality in historical episodes as well as its long-run evolution. However, since these earlier figures are mostly based on occupational groupings or social class we think one should be cautious when connecting our series to the estimates in earlier periods.

Third, we will not review theories about long-run inequality developments in any detail or with any attempt at fully coverage. We will instead outline some ideas and suggested mechanisms in a highly selective way to outline aspects that can help explain the key developments we find in the data.[12]

Fourth, we primarily discuss inequality as a left hand side variable in an econometric sense. This means that our discussion will mainly be one about how we can understand the developments of inequality and its determinants and not so much about the consequences of inequality on other developments such as, e.g., economic growth, political outcomes or health.[13] Of course, such a distinction is somewhat artificial in the sense that the distribution of resources at any point forms the basis for economic and political decisions, resulting in outcomes which then create the distribution for the next period.[14] Many questions are, thus, ultimately not about one causing the other, but rather about the dynamic interplay over time. Nevertheless it is often useful to separate questions in terms of how we think about the causality. In this separation we focus on understanding how and why inequality has changed, not on the consequences of inequality on other developments in society.

[11] See, e.g., Soltow and van Zanden (1998), Milanovic (2006), Borgerhoff Mulder et al. (2008), Scheidel and Friesen (2009) and Milanovic, Lindert and Williamson (2011).
[12] Chapter 6 in the Handbook of Income Distribution, Volume 1, (Piketty, 2000) provides an overview of theories of persistent inequality. See also Chapter 15 on inequality in macroeconomic theories and Chapter 16 on the relation between inheritance flows and inequality.
[13] See, for example, Atkinson (1997) and Aghion, Caroli, Garcia-Penialosa (1999) for overviews of inequality and growth. Leigh, Jencks, and Smeeding (2009) gives an overview of income and health.
[14] As is, for example, illustrated in the theoretical framework in Acemoglu, Johnson and Robinson (2005)

2. Long run trends in income inequality

In his 1953 book "*Shares of Upper Income Groups in Income and Savings*" Simon Kuznets produced the first comparable long run income distribution series.[15] His main innovation consisted in using U.S. income tax statistics over the period 1913–1948 and relating the incomes of those who paid taxes (the high income earners) to an estimate of all personal income.[16] In his words:

"The basic procedure is to compare the number and income of persons represented on federal income tax returns with the total population and its income receipts.[…] Since, except for a few recent years, tax returns cover only a small fraction of the total population – the fraction at the highest income levels – our estimates of income shares are only for a small upper sector. From the same source we can, with certain limitations, carry through the comparison for various types of income." (Kuznets, 1953, p. xxix)

The series for the U.S., together with observations from England and Germany,[17] showing a secular decline of top income shares at least since the 1920s, formed the empirical basis of the famous "Kuznets curve" theory.[18]

Kuznets' series were not systematically updated, even if tax data and aggregate income sources of course continued to be available and developed.[19] In recent years, however, there has been what one may call a rediscovery of Kuznets' methodology and with it a significant

[15] As Thomas Piketty (Piketty 2007, p 9) puts it: "These were the first long-run income distribution series ever produced (income distribution had been at the centre of speculative economic thought at least since the time of Ricardo and Marx, but few data were available)."

[16] Tax statistics had been used in several studies before but without relating them to top incomes. For example, see Bowley (1914), and Stamp (1914, 1916) for the U.K. and Crum (1935), Johnson (1935, 1937), and Tucker (1938) for the U.S. In passing, it can be noted that a few years before Simon Kuznets (1953) made his contributions South African economists Herbert Frankel and Hans Herzfeld used a similar approach in a study of European income distribution in South (Frankel and Herzfeld, 1943). Similarly, the Swedish economist Ragnar Bentzel independently published a study of the Swedish income distribution in the 1930s and 1940s, using almost the same approach as Kuznets did, i.e., relying on historical tax returns data relating them to reference totals computed from national accounts (Bentzel, 1953).

[17] He also compared to some observations from India, Ceylon, Puerto Rico, Kenya, and Rhodesia, but in these cases there was no time-series data.

[18] According to this, income inequality follows an inverse U-shape, rising with industrialization as only a limited number of individuals initially work in the more productive sector, but then eventually declining, as the productive technology gradually spreads to the whole economy. One should note that he developed this idea since he saw his findings of decreasing inequality as a puzzle in face of other aspects that would work in the opposite direction. In particular, he stressed the cumulative effect of the concentration of savings that should increase inequality over time. We will return to this part of Kuznets' article and to the interplay between income and wealth in Section 4.

[19] Kuznets (1963) did return to the subject and added data for some more years and countries.

increase in our knowledge about long run changes in the distribution of income. Beginning with the influential work on long run inequality in France by Thomas Piketty (Piketty, 2001) a number of researchers have created income inequality series using the same methodology for many countries (to date 26) and work is ongoing in many more.[20] For most countries the data spans the full length of the twentieth century, sometimes even longer. As Thomas Piketty phrases it in the introduction to the first of two volumes (Atkinson and Piketty, 2007 and 2010) that collects much of this work: "In a sense, all what we are doing in this project is to extend and generalize what Kuznets did in the early 1950s – except that we now have 50 more years of data and over 20 countries instead of one."

This – the long time span covered – is the most obvious advantage of the new data coming out of this project. For most countries the series start in the early 1900s and in some cases even further back. But there are other important aspects as well. First, data are typically high-frequency (yearly) which has proven to be important for the interpretation of some historical developments, in particular the dramatic short run shocks to top incomes in connection to the World Wars and the Great Depression. Second, the data offer a great deal of cross-country comparability as they are based on the same type of primary source across countries, income tax statistics, and there is typically no top coding of these data. Third, and perhaps most importantly, the data allow for a decomposition according to the source of income (i.e., earnings, capital income etc.), which has proven to be of crucial importance for understanding long-run developments of inequality and, in particular, the interplay between income and wealth.

Naturally, there are important limitations with using these data as well. First of all, data are limited to the development of top income shares and do not reflect what happens in the rest of the distribution. (However, as we shall see in section 2.3, it turns out that top income shares are highly correlated with more general distribution measures such as the Gini coefficient). Second, focus lies on pre-tax and transfer income. Third, the unit of analysis, as well as the income concept, is determined by the tax code, which differs both across countries and in some cases also over time within individual countries and means that we cannot make any adjustments for household size. It should be noted, however, that considerable effort has gone into adjusting for these changes to make country series at least consistent across time (but leaving some of the cross-country comparability problems unaddressed). Fourth, given the

[20] Table 3 contains a list of countries and time spans for which we presently have data.

concerns in most countries with tax avoidance and tax evasion, tax statistics are potentially problematic as a source of information on incomes.

2.1 Methods and data in the top income literature

To answer the basic question "What share of total income is received by some fraction of the population?" one needs to specify three things. First, we need to know what total income is, how it is defined and how large it is. Second, we need to decide what population we are talking about (all individuals, all adults, all households, etc.). Third, we need information about the incomes of the subset of the population whose income share we want to relate to the total. The innovation of Kuznets (1953) – which was developed in Piketty (2001a) and has been the methodology used in the top-income literature – was to relate the assessed incomes of the taxpaying population to all household sector incomes. Since historically only those with the highest incomes were taxed and thus obliged to hand in personal tax returns, their incomes must be related to reference totals not only for everyone in the taxed population but for the population as a whole. In other words, the reference total population and income need to also include individuals who did not file a tax return as well as their incomes. To construct these we must use aggregate sources such as population statistics (which is ample), census data (which do exist) and national accounts (which are scarce for historical eras). Top income shares can then be computed by dividing the number of tax units in the top, and their incomes, with the reference tax population and reference total income. Assuming that top incomes are approximately Pareto distributed, standard inter- and extrapolation techniques can be used to calculate the income shares for various top fractiles, such as the top 10 percent (P90–100) or the top 0.01 percent (P99.99–100).

In the following, we will briefly outline the main issues associated with going from basic data to calculating homogenous income shares. This includes thinking about the nature of tax data and the typical adjustments made, the construction of a population total, the construction of an income total, the interpolation techniques used and the relation to shares-within-shares estimates, and finally some other issues such as part-year incomes. For a more detailed discussion on the methodology, see Atkinson (2007).

2.1.1 Tax statistics and the definition of income

With the introduction of progressive income tax systems in many countries during the late

nineteenth and early twentieth centuries came tabulations published by tax authorities over all income tax returns. These tabulations, often published annually, typically group incomes in different income brackets and, for each bracket, report the number of individuals (or, more generally, tax units) and the total income assed. Table 1 exemplifies the type of information that is typically available in these tables with the case of Sweden in 1951.

[Table 1 about here]

As with most other income data sources the tabulated income statistics does not correspond to any theoretically comprehensive definition of income but a definition determined by tax legislation.[21] And even more importantly, what is included in this tax income concept has often changed over time and it varies across countries. In order to make estimates as comparable as possible, which has been a primary objective in each country study in the top income literature, one therefore needs to fix a definition for the income concept and then make adjustments to the tax data. The concept of income that has been used in almost all country studies of top incomes is some version of *total gross income*, defined as the sum of income from all sources, before taxes and transfers but net of allowable deductions (mainly interest payments). Total gross income thus consists of factor income (labor earnings and capital income) plus occupational pensions, which equals market income, and in addition taxable transfer income (public pensions and some social benefits). Social security contributions paid by employers and employees are generally excluded as they are not part of the tax base.[22]

Even if the total gross income concept may seem like a clear enough definition there are several broad categories of income that may cause problems of comparability both over time and across countries. One example is the tax treatment of transfers (often work-related such as sickness pay, unemployment insurance and pensions) that are sometimes included in the tax base, e.g., in the Nordic countries in recent decades. The reason to include them is that they are not viewed as "pure" transfers but rather part of a collective insurance scheme where you

[21] The well-known Haig-Simons definition of income, e.g., includes imputed rents, fringe employment benefits and capital gains. These items are often not included in taxable income.
[22] Conceptually, including social security contributions in gross incomes could be motivated since studies have found that they are to a large extent ultimately born by workers through lower wages, which influences not only the estimation of income inequality (which becomes lower) but also the analysis of the redistributive effect of the tax-transfer system (see Piketty and Saez, 2007, and Bengtsson, Holmlund and Waldenström, 2012).

need to work in the first place to get the transfer.[23] Taxable transfers have typically become more important over time but are also very different in size across countries. Roine and Waldenström (2008) calculate top shares both including and excluding such transfers for Sweden. Their conclusion is that for most of the twentieth century the difference is small, but in recent years the increase in top income shares is notably larger for market income than for total income (including taxable transfers). In the year when the effect is the largest the difference is almost one percentage point (about 15 percent of the income share), but it does not change the main trends though (and considering the importance of these systems in the Swedish context this is likely to be an upper bound of the effect).

Another area is the inclusion (or exclusion) of capital income and, in particular, realized capital gains. Many countries have moved in the direction of excluding parts of capital income in their tax bases, and to the extent that such incomes accrue to top income groups this would mean that top shares are underestimated over time. While the income from interest-bearing bank deposits and corporate dividends are easily observed and included in most countries' taxable income concept, other capital incomes, such as the imputed rent of homeownership and realized capital gains, are more difficult to observe. Imputing income from owner-occupied housing requires information about housing stocks at the household level, and has not been generally available over time. However, had it been possible to estimate homeownership rents, we believe that would have reinforced the equalization we observe over the twentieth century, possibly with a more ambiguous effect in the earlier period.[24] As for the impact of capital gains on long run trends, this issue is discussed further in section 2.2.3 below.

In many countries the historical income tax statistics also include information about the different sources of income, such as wage earnings, capital income and business income, across the income distribution. In these tables, income earners are typically ranked according to total gross income and then the amount of income from each source is listed within each gross income class. Table 2 displays an example of this kind of evidence for Sweden in 1951. Note that as in the case of total gross income, the reported incomes by source may not necessarily

[23] There may, of course, be other, e.g., political economy, reasons for why politicians have decided to make these transfers taxable alongside factor income.
[24] In most developed economies home ownership spread throughout the population during the 20th century as documented, e.g., by Atkinson and Harrison (1978) for the U.K. and Waldenström and Ohlsson (2013) for Sweden.

follow the theoretically most appropriate concepts but instead reflect definitions in the tax code. This is fairly clear in the Swedish 1951 example. The table consists of three, and perhaps even four, income sources reflecting capital income: interests and dividends (which are called "income from capital" in the tax data), (imputed) property income, realized capital gains and the part of farm income adhering to imputed income from agricultural property. Also, what we would theoretically think of as labor income is not only contained in what is called "labor income" but also in business (or entrepreneurial) income as well as the part of farm income reflecting labor.

[Table 2 about here]

2.1.2 Reference total for the population

As tax statistics are based on the "tax unit" concept, the natural reference population is the total tax unit population of the country, had everyone filed a tax return. In countries like Australia, Canada, Italy and Spain taxes are filed individually and the natural reference group is then the adult population defined as all residents above some age cut-off. In countries like France, Germany and the U.S. taxes are instead filed per family, which is typically defined as a married couple or a single adult (or an adult child living at home but with own income). In these cases the reference population becomes something like the adult population minus all married women (who file jointly with their husbands), with "adult" again defined as individuals above a certain age. In some countries, such as Finland, Sweden and the U.K., the definition of the tax unit has changed over time. In the Finnish case, for example, the family was the tax unit before 1935 when separate taxation of married couples was introduced. This was changed back again 1943 and the family was the tax unit again until the reintroduction of individual taxation in 1976. In Sweden the family was the tax unit before 1967 when a *choice* of filing individually was introduced. This was then the rule until individual taxation finally became compulsory in 1971. In the U.K. the family was the tax unit before 1991 when the system switched to being individual.[25] In all these cases the population total has to change accordingly. Sometimes there are overlapping periods or legislation that allows family or individual taxation. In these cases judgment has to be used to choose the appropriate reference total. Table 3 gives an overview of the key features of the top income data used in all the 26

[25] In addition to these legal changes there are cases where there is a discrepancy between how data are reported and the tax law. In Sweden, for example, data in the period 1951–1966 are reported individually even if couples were taxed jointly.

countries covered in our analysis, including the definition of tax units.

[Table 3 about here]

The main question based on these differences in tax unit concepts is of course: "How important is this administrative setup and variation over time and across countries for the analysis of long run inequality trends?". Does it, for example, matter if we consider the population above 15 as adults or if we set the threshold to 20? Atkinson (2007) answers these questions under reasonable assumptions. The maximum difference between using an age cut-off at 15 instead of 20 (typically the alternative spans are smaller) results in a 6 percent (not percentage point) difference. If the top one percentile share were 10 percent with an age cut-off at 20, it would thus be 10.6 percent with a cut-off at 15. With respect to the effect of the tax unit being the individual or the family (or household), the maximum bounds are a little wider. Contrasting the extreme cases where top couples consist of individuals where either both earn the same, or one spouse has zero income, a top 1 percent share of 10 percent can be reduced to 8.3 percent, or increased to 11.8 percent when moving from joint to individual taxation. In cases where it has been possible to calculate top shares for individuals and couples the difference is typically smaller. In general, Atkinson and Leigh (2005) show that unless husbands and wives have equal income, individual-based data tend to (but must not) give rise to a more unequal income distribution than does the household-based data. Overall, the impact of changing tax units and age cutoffs are not likely to be important for the long run trends we discuss below.

2.1.3 Reference total for income

When calculating the reference totals for income, there are basically two ways in which to proceed. Either one can start from the sum of all incomes reported on personal tax returns and then add items that are not included in the legal tax base as well as estimated incomes of individuals not filing taxes (not including children). Or one may start from the National Accounts item "Total Personal Sector Income" and from this broad concept deduct (estimates of) all items not included in the preferred definition of income. To the extent that data allow it, a calculation from both directions is of course desirable, as that would give an indication of the size of the potential difference between the respective procedures. In practice, these calculations may be difficult due to lack of data especially concerning early periods. In such cases the reference income total has typically been set to a share of GDP based on calibrations in

periods when data are available (see Table 3 for an overview).

The following relation between the different parts (taken from Atkinson, 2007, and Atkinson, Piketty and Saez, 2011) is a useful illustration of the two procedures (starting either from the top and deducting items or from the bottom adding items),

	Total ‘Personal sector total income’
	– Nonhousehold income (nonprofit institutions such as charities)
=	Household sector total income
	– Items not included in the tax base (such as employers’ social security contributions, nontaxable transfer payments etc.)
=	Household gross income reported to tax authorities
	– Taxable income not declared by filers
	– Taxable income of those who do not file tax returns
=	Declared taxable income of filers

Using different reference totals can potentially have an important impact on the income shares. In their analysis of a number of alternatives for computing reference totals, some based on different National Accounts aggregates, some being fixed shares of GDP and others departing from tax assessments adding estimated incomes of non-filers, Roine and Waldenström (2010, appendix C) show that there are indeed single years or episodes when differences are notable. Overall, however, the main trends in the results are robust to which alternative is chosen.

2.1.4 Interpolation techniques and the interpretation of the Pareto coefficient

The historical income tax statistics typically come in the form of grouped observations, where income earners in different income brackets are separated by even income thresholds (see Table 2 above). The estimated top income shares, by contrast, present the share of total income earned by specific top fractions in the income distribution, such as the top 10, 5, 1, 0.1 percentiles. These even fractions do almost never correspond to the even income thresholds observed in tax data. To get these top shares we therefore need to use interpolation, and in some cases even extrapolation when shares of the highest top groups are estimated within the highest, open-ended income interval (see Table 2).

The most common interpolation procedure in the top income literature has been to assume that incomes in the top are Pareto distributed. This goes back to Pareto (1897) who was the first to make systematic observations of the size distribution of income. Given the nature of data his observations were confined to the upper tail and even though he initially thought that the Pareto function was a correct description of the whole distribution (with a bound at a "physiological minimum" > 0) he eventually recognized that the distribution function over the whole population was probably hump-shaped and not Pareto distributed.[26]

The Pareto law says that incomes within the top of the distribution can be characterized by a power function of the form

(1) $$f(y) = ky^{-\alpha},$$

where y denotes income and k and α are constants. The parameter α in (1) is called "Pareto's alpha" or the "Pareto-Lorentz coefficient", and it reflects the degree of inequality, or the steepness of the income distribution; the higher α the lower the inequality. To see this, we can express the average income $\tilde{y}$ among people earning above a certain "base" income b as a function of the α as

(2) $$\tilde{y} = \left(\frac{\alpha}{\alpha-1}\right) b.$$

That is, at any income level b, the average income above is $\left(\frac{\alpha}{\alpha-1}\right)$ times as large. As $\alpha \to \infty$ the difference between the level b and those above goes to zero, while as $\alpha \to 1$ the distribution moves towards everything being concentrated in the top. This economically more intuitive interpretation of $\left(\frac{\alpha}{\alpha-1}\right)$ has lead to this ratio sometimes being called the "inverted Pareto-Lorentz β coefficient", $\beta = \frac{\alpha}{\alpha-1}$. This coefficient provides a tractable association between a theoretical inequality index and the empirically estimated top income shares.[27]

[26] See, e.g., Lydall (1968) for early references to the discussion of the shape of the top of the distribution and Atkinson (2007) with specific address to the top income literature. Some scholars have questioned the validity of the assertion that top incomes are Pareto distributed and instead applied other interpolation techniques, e.g., mean-split histograms, to construct exact top shares (Atkinson, 2007; Atkinson, Piketty and Saez, 2011).

[27] The characteristic of the β that it is constant within the income top, i.e., it does not depend on the level of base income b, has been shown not to be empirically true for most countries, however.

The assumption of a Pareto distributed upper income tail has been confirmed by several studies using individual micro data for years when such data are available.[28] But again, the results coming out of the top income literature do not hinge on this assumption. Several studies of top income shares have instead of Pareto interpolation estimated top shares using slightly different techniques, primarily mean-split histograms (see Table 4 in Atkinson, Piketty and Saez, 2011 for details).

2.1.5 Tax avoidance and tax evasion

Problems with tax avoidance and evasion are present in all studies of income inequality based on data from personal tax returns.[29] Importantly, though, overall underreporting does not necessarily change income *shares.* If incomes are missing in equal proportion across the distribution, and are also missing from the reference total, the shares are unaffected. If, however, income is missing in equal proportions in tax statistics but not from the reference total (as could be the case if we combine tax statistics and National Accounts statistics) then we will underestimate top shares (and overestimate the share of the rest of the population) since we simply allocate the income not observed for the top earners as being received by the rest of the population. If avoidance is more important in the top then we will of course also underestimate their share, while the impact of underreporting being more prevalent in the rest of the population typically creates a bias in the opposite direction but it also depends on the construction of the reference total.

The main potential problem for assessing the trends, however, is the extent to which avoidance and evasion is very different across countries or changes in a systematic way over time. It could, for example, be argued that the increased tax rates seen over the twentieth century have given taxpayers increased incentives to avoid taxation. But this would be ignoring that the same increase in tax rates have given tax authorities increased incentives to collect taxes. Broadly speaking high tax countries are also better at enforcement.[30]. In the recent top income literature virtually all studies include sections on the issue of tax avoidance and evasion. Un-

[28] See Feenberg and Poterba (1993, 2000) for the U.S., Piketty (2001) for France, and Atkinson, Piketty and Saez (2011) for further examples.

[29] See Slemrod and Yitzhaki (2002) for an overview of tax evasion and avoidance, and Slemrod (2000) for an overview of several issues concerning the economics of taxing the rich. We will not emphasize the distinction between legal tax avoidance and illegal tax evasion as we are interested in all missing income. Seldon (1979) proposed the term "Tax Avoision" to capture the blurring between the two.

[30] Overall, there is evidence that taxation is a key component of administrative capacity of government (Besley and Persson, 2009, 2013). See also Friedman, Johnson, Kaufman and Zoido-Lobaton (2000).

surprisingly, these all point to avoidance and evasion in various forms being present in all countries but the overall picture that emerges is that it is very unlikely that this would have a significant impact on the overall trend (see Atkinson, Piketty and Saez, 2011, for details). To illustrate, Italy stands out as a country where evasion is much larger than other OECD countries but Alvaredo and Pisano (2010) still conclude that this does not change the main development of inequality. Dell, Piketty and Saez (2007) look at the impact of assuming that *all* foreign income in Switzerland goes to French tax payers and conclude that this would have a marginal effect on French top income shares. Similarily, Roine and Waldenström (2008) estimate the impact of capital flight from Sweden and conclude that even if the absolut numbers are sizable, and the impact on top income shares is non-trivial, the effect does not alter the general conclusions. Under the extreme assumption of attributing all unexplained residual capital flows out of Sweden since the 1980s to the top 1 percent income group, this increases their share by about 25 percent. This is significant but it barely changes Swedens rank or trajectory in relation to other countries.

The areas where avoidance and evasion responses are most likely to have a significant impact are on short run fluctuations and when it comes to distinguishing the source of income. When ranking the importance of different behavioural responses to taxation Slemrod (1992, 1996) places timing of economic transactions at the top as most responsive to tax incentives. Examples of this are clearly visible in the form of spikes in certain years, in particular when including realized capital gains (e.g., in connection to the tax reform act in the U.S. in 1986, in connection to changes in capital gains taxes in Sweden in 1991 and 1994, the year before the increased tax on dividends in Norway in 2006, etc.). As the second most important response to taxation Slemrod identifies financial and accounting responses. This could take the form of income shifting between being corporate or personal, but also shifting the reported source of income. There are, for example, clear incentives for individuals to shift earnings to take the form of capital income in dual tax systems where capital taxes are lower than wage taxes. Such income shifting does not lead to aggregate effects but may be of importance when interpreting shifts across income sources.

The issue of avoidance and evasion is clearly potentially important and should not be dismissed. Still, it is striking that not even in evaluating cases that we have reason to belive are among the more extreme do we see effects that dramatically change the overall trends. Also,

as noted by Atkinson, Piketty and Saez (2011) the fact that some incomes (typically from capital) are tax exempt probably has a more important impact on inequality than underreporting.

2.1.6 Other issues

In addition to the above there are many other details in the historical income distribution data that calls for attention and possibly correction. For example, in any given year individuals move in and out of the relevant tax unit population, some become "adults" due to age reasons, some die, some move into the country, others move out, some get married, others divorce. This mobility affects the relevant population and it also creates "part-year incomes" that show up as low incomes in the data. Another potential difficulty is that tax years may not correspond to calendar years. Beside the problem of how to label observations this may create problems if reference data are collected for calendar years (as is often the case). Fortunately these problems turn out not to be very large in quantitative terms.[31]

2.1.7 So can we trust the top income data?

How should one deal with the challenges mentioned above that are associated with using historical income tax statistics? In past research scholars have suggested different approaches, including calculating theoretical bounds of the size of potential errors and employment of alternative sources that offer external checks of the order of magnitude by which an estimate could be wrong. In the end, however, one must make a number of judgment calls to select a final preferred series, and such calls can of course always be questioned. Having said that, considerable effort has gone into the construction of the series for each individual country with the explicit aim to make the series as homogenous as possible. We actually think that a hallmark of this research has been to take data quality issues very seriously and wherever possible produce estimates under different assumptions to be transparent about the effects of each individual choice made. In most cases where there are alternative ways to proceed all alternatives have been explored and to the extent that this affects the results this is reported. The end result, we believe, is a dataset with robust conclusions about the development of top income shares over time.

[31] For example, Atkinson (2007b) report that part year incomes reduced the top 10% income share by 0.3 percentage points in 1975–1976 (out of a total of about 25 percent in that year).

2.2 The evidence and what we learn

We identify three main themes in the empirical results. These themes form the basis for the three subsections below. The first addresses the overall evolution of income inequality as reflected in top income shares of the 26 countries covered here. The second theme is about the results showing a considerable heterogeneity among groups *within* the income top, especially differences in the top percentile and those in the lower part of the top decile. The third theme considers the role of decomposing total incomes by source, i.e., assessing whether the recorded trends are, for example driven by changes in the earnings distribution or whether they are based on shifts in the returns to personal wealth.

2.2.1 Common trends or separate experiences?

Figure 1 illustrates the top one percent income share over the period 1870–2010 for all observations we have to date. Clearly this kind of illustration is not meant to be readable in the sense that the development of individual countries is discernible; rather it illustrates the extent to which there are truly common trends globally.[32]

The overall picture that emerges is one where the top one percent income share hovers around a relatively high level up until the First World War (in the few countries for which data exist), and then declines steadily over the twentieth century up until around 1980. After 1980 there seems to be a more scattered pattern. In some countries, in particular the U.S. and the U.K., and in Anglo-Saxon countries more generally, top shares have increased significantly, while developments in other places, in particular in some Continental European countries, are close to flat after 1980.

[Figure 1 about here]

In the literature on top income shares, much emphasis has been put on the diverging pattern between Anglo-Saxon countries and continental Europe.[33] As a result of the recent additions of new evidence from other countries, however, it is motivated to go beyond this dichotomy

[32] This question can also be asked in a more systematic way by identifying common trends and structural breaks in the series using econometric techniques, see Roine and Waldenström (2011).

[33] This difference is one of the main findings in the recent research on top incomes. Indeed, the title of the first of two volumes (Atkinson and Piketty 2007, 2010) collecting much of this work is *Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries.*

and incorporate the experiences of countries in other parts of the world.[34] We extend the division and examine inequality trends across six different country groups:

- Anglo-Saxon countries (Australia, Canada, Ireland, New Zealand, United Kingdom, the United States)
- Continental European countries (France, Germany, Italy, the Netherlands, Portugal, Spain, Switzerland)
- Nordic countries (Denmark, Finland, Norway and Sweden)
- Asian countries (China, India, Indonesia, Japan and Singapore)
- African countries (Mauritius, South Africa)
- Latin American countries (Argentina, Colombia)

Figure 2 presents the long run evolution of top income percentile shares in these six country groups.[35] Looking at the overall long run development, there are clear similarities across the groups. They all exhibit a sharp decline in the top shares over the twentieth century, beginning around the time of the First World War and further reinforced by dramatic drops around the Second World War. Wartime shocks thus appear to have had a large impact on top income shares. Everyone was probably affected by the wartime trade disruptions and new regulations of most goods and labor markets, but when it comes to specific surtaxes on wealth and high incomes or even the bombings of factories and similar capital destroying events these were probably more important for the incomes of the rich. Having said this, the period 1914–1945 was also associated with periodic booms and asset price bubbles set off by a combination of highly expantionary fiscal policies and the economies being relatively closed. In both Denmark and Sweden, top income shares actually spiked in the midst of the First World War, and this is generally regarded as a consequence of the boom and asset price bubbles (Roine and Waldenström, 2008; Atkinson and Søgaard, 2013).

The twentieth century equalization trend in the top income shares continued up until the

[34] Alternatives to geography as basis for country grouping exist. One is to divide them based on their participation in the Second World War. Another grouping could be based on types of "welfare state regimes", using the terminology of Esping-Andersen (1990). Here Japan fits into the corporatist tradition corresponding roughly to the Continental European countries, although that is perhaps most true for a more recent sub period than for the whole of the 20th century.

[35] The creation of geographical country groups is problematic. Some of them are fairly homogenous, e.g., whereas the other groups are more diverse, in particular the Asian group. In fact, apart from being Asian countries, it is hard to find a priori reasons for why they should constitute a group. Moreover, the small number of Latin American and African countries also pose problems in terms of representativeness.

1980s when it either flattened out in some countries or was reversed into increasing top income shares. That these common trends over the past century are in fact statistically significantly joint across countries has been shown recently by Roine and Waldenström (2011) in an analysis of common and country-specific trends and structural breaks in top income shares.

Notwithstanding the similarities, the evidence also indicates variation across countries within the geographical groupings reported above. For example, the upward trend in top income shares begins in the late 1970s in the U.S., Canada and in the U.K., but starts about five to ten years later in Australia, New Zealand and Ireland (though Ireland has a short term peak around 1980). Within Continental Europe, most countries have not experienced stark increases in the top percentile share except for Portugal where it more than doubled between 1980 and 2000. The Asian data are not sufficiently complete to allow for conclusions about country differences: Japan and India appear to follow roughly similar patterns over time, with stable inequality levels before and after the dramatic shift in the 1940s when not only war but also profound institutional change hit these two countries. Since 1980 all the five Asian countries exhibit an increasing top share. In Latin America and Africa, variation is small but so is the sample and we cannot draw any conclusions from these results until we increase the number of observations.

[Figure 2 about here]

Altogether, this analysis shows that with respect to the development of inequality almost all countries display a secular decline in top income shares over the twentieth century up until around 1980. This decline is substantial: top percentile shares drop from around 20 percent of total personal income at the beginning of the 1900s to between 5 and 10 percent around 1980. In many countries much of this decline is concentrated around the World Wars and the Great Depression. Around 1980 the decline in top shares stops and in most countries they start to increase. This increase is substantial in Western English speaking countries (Australia, Canada, New Zeeland, the U.K. and the U.S.) as well as in China and India, it is more modest but still clear in both some Nordic countries (Sweden, Finland, and Norway, but less clear in Denmark) and some Southern European countries (Italy and Portugal, but less clear in Spain), while finally, the development in some Continental European countries (France, Germany, the Netherlands and Switzerland) and in Japan is close to flat.

2.2.2 The importance of developments within the top decile

In income inequality research, top income earners are often defined as everyone in the top decile (P90–100) of the income distribution. However, recent studies following Piketty (2001a) have shown that the top decile is very heterogeneous.[36] For example, the income share of the bottom nine percentiles of the top decile (P90–99) has been remarkably stable over the past century in contrast to the share of the top percentile (P99–100), which fluctuated considerably. Moreover, while relatively high wage earners dominate in the lower group of the top decile, capital incomes are relatively more important to the top percentile. Figure 3 shows the development of the P90-P99 income share over the period 1870–2010. Whereas the top percent income share fell by roughly a factor between two and four in the period until 1980 and has thereafter increased by a factor two in some countries, the long run share of the P90-P99 group has on average been relatively stable around 20-25 percent over the whole period..

[Figure 3 about here]

An alternative way of studying income concentration is to express it in terms of the income share of certain top groups within the income share of another, larger, top group. There are at least two merits with this approach. First, it measures the inequality within the top of the distribution, which is different from inequality overall especially when considering theories that predict a widening gap among the rich. Second, the top income shares may contain measurement error through the estimated reference total income held by the full population. By dividing the top income percentile by the top income decile, i.e., P99–100/P90–100, we get a "shares within shares" ratio that eliminates the reference total.[37]

Figure 4 shows the trend in the shares-within-shares ratio where we divide the top income percentile by the top income decile. It largely resembles the evolution seen in Figure 1 above, with a stable and relatively high level up to the 1910s and then a declining trend up until about 1980 after which an increase can be observed in some countries. This indicates both a degree of robustness of the overall trends in top income shares shown above and that concentration within the top has also changed over time.

[36] See Atkinson and Piketty (2007).

[37] Too see that this removes the influence of reference totals, note that $P99\text{–}100 = Y_{Top1}/Y_{All}$ (for income Y) and $P90\text{–}100 = Y_{Top10}/Y_{All}$. Hence, $P99\text{–}100/P90\text{–}100 = (Y_{Top1}/Y_{All})/(Y_{Top10}/Y_{All}) = Y_{Top1}/Y_{Top10}$.

[Figure 4 about here]

Taken together, the evidence suggests that there are substantial differences in the long run development between different groups in the top income decile. In fact, most of the observed overall changes in inequality are driven by decreasing or increasing shares of income earned by the top percentile group (P99–100) while the income share of the rest of the top decile in most countries is remarkably constant over the whole of the twentieth century.[38]

2.2.3 The importance of capital incomes and capital gains

A major finding of the recent top income literature is that capital incomes are crucial for the development of income inequality over the long run (Atkinson and Piketty 2007, 2010; Atkinson, Piketty and Saez, 2011). While wage earnings have always comprised the bulk of incomes among the masses, in the top of the distribution incomes have come from both labor and capital. As a consequence, the variation in top income shares can be expected to largely reflect changes in capital income flows. Some of these capital incomes are returns to corporate ownership, some are coupon yields on fixed-interest securities whereas others come in the form rental payments from tenants, interest earnings on bank deposit accounts or as capital gains on financial or non-financial assets owned or sold. Our understanding of inequality trends over the long run requires that we closely examine the nature of these capital incomes and, in particular, the association between the distributions of income and personal wealth.

Unfortunately, few countries offer long run distributional evidence by income source. Figure 5 shows the share of capital income (excluding capital gains) in total income since 1920 for the top percentile (P99–100) and the next nine percentiles in the top decile (P90–99) in four countries: Canada, France, Sweden and the U.S. Some notable results stand out. First, the importance of capital income clearly increases in the income level; in all cases capital is a more important source of income for the P99–100 than for the P90–99 group. Second, there was a sharp drop in the share of capital income around the Second World War, with the capital income share dropping by roughly half. This result clearly matches well with the findings of a similar drop in wealth concentration around the time of the war (see the following section

[38] This stability is even more marked when looking at the lower half of the top decile (P90–95). For example, this share moves around 9-11 percent in Sweden and between 10 and 13 percent in the US over the entire twentieth century.

for further information), whether due to wartime destruction or increased taxation and regulatory pressures.[39] Third, there is no clear uniform trend in recent decades; in the U.S. the importance of capital income seems to decrease, in France and Sweden the opposite appears true, while in Canada no clear trend is discernible.

[Figure 5 about here]

For some countries, such as Sweden, the historical income tax statistics offer a possibility to cross-tabulate taxable wealth and income across both wealth and income distributions for most of the twentieth century (see Roine and Waldenström, 2008, 2009). Although not a complete data source, this allows us to get more insights into the interrelationship between income and wealth and how this matters for the long run evolution of income inequality. The Swedish evidence indicates that the total wealth share held by people in the top income percentile decreased before 1950, in particular in the interwar period. By contrast, the "high-wage" income earners in the P90–95 income fractile increased their wealth share substantially over the same period, mainly in the 1910s and 1930s. The natural interpretation of these changes is that wealth as a source of income for the very rich declined in this period while, at the same time, moderately rich groups with high incomes accumulated new wealth. However, the drastic drops in Swedish capital income shares between 1930 and 1950 in the entire top decile seen in Figure 5 above is not mirrored in their relative wealth share. Possibly this could be due to some wealth not being fully covered in taxable wealth because of definitions of the tax code or tax avoidance.

Capital gains turn out to be an additional important and interesting question. Theoretically capital gains, realized and unrealized, are undoubtedly a source of income in the classic Haig-Simons definition.[40] But in practice, capital gains represent a highly complicated income component to include in an individual's income. First, to the extent that they are observable at all, capital gains only appear on tax returns at the point of realization, making it difficult to properly allocate them in time. In many countries' tax code (e.g., Spain and Sweden up until 1991) parts of the realized capital gains are tax exempt depending on the length of the holding

[39] It is interesting to note that this change in the role of capital is almost equally important in the case of Sweden, that did not take part in the war as in France and the U.S.
[40] According to Haig (1921) and Simons (1938), income is the value of consumption plus any increase in real net wealth, that is, it should include all capital gains, not just the realized ones.

period of the respective assets.[41] Also, if data are grouped in income brackets it is not possible to allocate the capital gains to the right individuals and in the worst case, large one time realizations may elevate individuals with much lower incomes into a one-time high-income position distorting the true underlying distribution. Finally, the economic interpretation of the capital gain depends on what type of asset transaction it emanates from. For example, if it relates to a house sale, the sale of a closely held firm, or the execution of a work-related options program, the interpretation in terms of labor or capital income differs. Tax data typically lump together all capital gains, but in an effort to disentangle them according to the income characteristics of those realizing capital gains Roine and Waldenström (2012) divided the top percentile incomes into work-related (earned by "working rich") and capital-related (earned by "rentiers"). They find that the "working rich" are the largest group both in terms of incomes and numbers but that its share has declined since 1980. This, however, does still not answer if realized capital gains stem from work related activities or if high-income earners also realize capital gains in addition to their incomes.

Problems with observing and accurately dating capital gains have led many inequality researchers to exclude the realized capital gains altogether from inequality data.[42] However, in the top income literature the approach to capital gains has been pragmatic in the sense that, whenever possible, top income shares have been presented both including and excluding realized capital gains (of course making the corresponding adjustments to the reference totals). This has been possible in Canada, Finland, Spain, Sweden, and the U.S. In some countries such as Australia, New Zealand and Norway capital gains are included in the tax base but not reported separately while in other countries, e.g., the U.K., the Netherlands, Switzerland and Japan, realized capital gains are not taxed under the income tax (with some variation over time) and therefore not included in the reported gross income concept.

The impact on top income shares from adding taxable realized capital gains is shown in Figure 6. The figure first illustrates the problem often raised with respect to including realized capital gains namely that there are clear visible spikes in years when realizations are attractive for tax reasons. The clearest example of this is the well-known 1986 Tax Reform Act in the U.S. when the top percentile share was almost twice as high when realized capital gains were

[41] In Sweden during 1976–1990, for gains from sales of assets held longer than two years only 60 percent was taxable, and before that all the gains from sales of assets held over five years were tax exempt.
[42] This is the case for the Luxemburg Income Study, for example.

included, but the spikes in 1991 and 1994 in the case of Sweden are also driven by similar tax incentives.[43] But, second, even if one disregards these peak years there seems to be a trend-wise increase in the importance of realized capital gains as a source of income in the countries. Roine and Waldenström (2012) study to what extent this, in the case of Sweden, is an artifact of increasing turnover and a reflection of different individuals making occasional appearances in the top group. Using micro panel data they can compute average incomes, excluding and including capital gains, of individuals over longer time periods. Their main finding is that it is not mainly different individuals who take turns in appearing in the top group; rather it is mainly top income individuals that earn substantial amounts of capital gains in addition to their other incomes. Armour, Burkhauser and Larrimor (2013) and Burkhauser, Hahn and Wilkins (2013) use survey evidence from household panels in the U.S. and Australia, respectively, to compute both realized and unrealized capital gains and study their impact on measured income inequality. Comparing their results with those found in the top income literature for these two countries, the authors conclude that capital gains are indeed important drivers of inequality but that only using taxable realized capital gains may confuse the timing of inequality changes and also tend to overstate increases in top income shares.

[Figure 6 about here]

Taken together, decomposing income inequality trends with respect to income source turns out to be very important for understanding the developments. Whereas earnings have always comprised the bulk of incomes of most individuals top incomes come from both labor and capital and variation in top income shares can largely be driven by changes in capital income flows. In the beginning of the twentieth century the highest incomes were dominated by capital income and most of the decline is caused by decreasing capital incomes, partly due to shocks to wealth holdings during the World Wars and the Great Depression. This clearly explains some of the differences within the top that we observe in the first half of the century. In contrast, the recent upturn in top income shares is mainly due to increasing top wages and salaries especially in the U.S. and the U.K., but capital is also making a return in some countries.

[43] Auerbach (1988) shows how the one time spike was created by changed tax incentives. See Saez, Slemrod, and Giertz (2012) for further references. In the case of Sweden, Björklund (1998) notes that "…due to changes in the incentives to sell stock, realized capital gains were unusually high in 1991 and 1994" and goes on to treat the values of inequality in those years as outliers.

2.3 The relation between top income data and other measures of inequality

As we pointed out in the introduction, the primary motivation for the top income project was a dissatisfaction with inequality datasets in general. It was a lack of comparable, annual time series of inequality over the long run that was the main problem, more than a lack of data on details within the top. As shown above, detailed information within the top turns out to be important in its own right, and is in fact in many respects crucial for understanding the overall development. But what about the relation between top shares and other measures of inequality that cover the entire population, such as the Gini coefficient? And what about the relationship between top income shares based on tax data and similar top shares based on household surveys? This section seeks to answer these questions.

2.3.1 Comparing tax-based and survey-based estimates of top income shares

Household surveys are a common source for income inequality analysis. Unlike most tax data, surveys allow for household adjustments and, at times, more comprehensive income concepts. Some recent studies recalculate the U.S. top income shares of Piketty and Saez (2003) using some of the largest U.S. household surveys: the Current Population Survey (CPS) (Burkhauser et al. 2012) and the Survey of Consumer Finances (SCF) (Wolff and Zacharias 2009, and Kennickell, 2009). These studies are only able to compute estimates since the 1970s. Nonetheless, they offer valuable points of comparison for the tax-based top income share series, in particular given the potential problems with tax avoidance and other concerns related with the tax data.

The CPS-based analysis produces lower inequality levels overall, and also present a lower trend increase in top shares since the 1970s. Atkinson, Piketty and Saez (2011), however, point out that much of this difference stems from the fact that the CPS data are top-coded, which means that the highest incomes are incompletely observed which may underestimate the top shares. Similarly, the CPS has a lower coverage of capital gains and given their importance in the top (as argued above in this chapter) this omission may account for a fair share of the difference. The survey-evidence based on the SCF suffers less from top-coding and, accordingly, are more in line with the tax-based series of Piketty and Saez. In a similar comparative exercise for Australia, Burkhauser, Hahn and Wilkins (2013) contrasts the tax-based evidence with top shares calculated from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The authors find that top income shares are somewhat lover when

using a more theoretically appropriate income concept based on the survey evidence. Regarding the overall patterns in terms of time trends and income composition, however, there is a high degree of agreement between the two sets of series. In other words, household surveys in Australia, the U.S. or the U.K. do not seem to offer a fundamentally divergent picture from the basic evidence of the top income literature.

2.3.2 Theoretical and empirical relationship between top shares and overall inequality measures

To what extent can top income shares be thought of as a measure of overall income inequality? To answer this question one can refer to desirable properties of inequality measures (see, e.g., Cowell, 2000), the theoretical relationship between top shares and other inequality measures, or to the observed statistical associations between different inequality measures.when based on actual observations.

As previously discussed by Leigh (2007) top income shares meet four basic properties that any measure of inequality should satisfy: they are not affected by any other characteristics of the population than income (anonymity), they remain the same when all incomes are multiplied by the same number (scale independence), top shares remain unchanged if the population is replicated identically (population principle). When it comes to the transfer principle, this is only satisfied in its weak form since a transfer from a high income individual to a low income never increases the measure, but it may remain unchanged. A transfer from the top group to the rest of the population lowers the top income group share, but transfers within the respective groups leave the measure unchanged. A direct consequence is, of course, that top income shares cannot capture changes that happen *within* the lower part of the distribution.

What is the quantitative impact of a top income share change on the Gini coefficient? Atkinson (2007) suggests a useful approximation. If we assume that the top share is negligible in size but has an income share S, the total Gini coefficient (G) can be approximated as $G = S + (1 - S)G'$, where G' is the Gini coefficient for the population excluding the top group. To use the example given by Atkinson (2007), if the Gini in the rest of the population remains at 0.4 but the top percentile group experiences a 14 percentage point increase in their share (as in the US between 1976 and 2006) this leads to an 8.4 percentage point increase in the overall Gini.

What about the correlation between top income shares and Gini coefficients in data? Figure 7 illustrates the overall, average relationship the two for 16 developed countries. The left panel illustrates a positive and high correlation, 0.86, between the *levels* of inequality. The right panel shows that the correlation between average annual inequality *changes* during the period 1985–2005 is lower but still positive and high, 0.57.

[Figure 7 about here]

Looking at the relationship more systematically, Table 4 gives a correlation matrix for the relation between top income shares and broader measures of income inequality. Using data from the Luxembourg Income Study (LIS), the World Income Inequality Database (WIID) and the World Top Income Database (WTID) over the past thirty years, the table shows Pearson correlations between three top income shares (the top percentile, the top decile and the lower nine percentiles in the top decile) and the Gini coefficient, the Atkinson index using two inequality aversion parameters, and the income ratios between the 90th percentile and 10th percentile (P90/P10) and the median (P90/P50). The correlations are the lowest for the WIID Gini coefficients, 0.25 and 0.42 for two of the top share measures. When using the LIS data, correlations are markedly higher, between 0.53 and 0.57 for the top percentile and between 0.64 and 0.74 for the two other income shares.[44]

[Table 4 about here]

Finally, we also examine what the relationship between top income shares and the Gini coefficient looks like over the very long run. We do this by plotting series for two countries, the U.K. and the U.S., where the Gini coefficient spans the entire period since the beginning of industrialization until present day whereas the top income percentile only covers the last century. Figure 8 shows the results from this exercise. The evidence suggests that the twentieth century experiences are quite similar across the two indices of inequality. In both countries the documented equalization appears in both measures with only minor deviations in the magnitudes. These observations thus indicate that had we accessed top income data for the

[44] We also find strong "conditional correlations" using regression analysis where we account for time trends and country effects, similar to what is done by Leigh (2007) and by Morelli, Smeeding, and Thomson (2014) in Chapter 9 of this Handbook.

18th and nineteenth centuries they may have generated similar long run trends since the 1700s as those portrayed in Figure 8, but of course we cannot make any certain statemens without hard evidence.[45]

[Figure 8 about here]

Altogether, this section shows that top income shares are related to well-known measures of overall income inequality such as the Gini coefficient, the Atkinson index or income ratios, both theoretically and empirically. Top income shares fulfill properties for being sensible inequality measures and quantitatively changes in top shares have a non-trivial impact on the Gini coefficient. They are also significantly correlated with overall measures of inequality although they (by definition) do not capture variation within the lower part of the income distribution. Does this imply that we can uncritically assume that top income shares can serve as a proxy for, say, the Gini coefficient? No, of course it doesn't. The correlations we present rely on evidence from time periods when we observe both top shares and enough data to calculate the other inequality measures. In practice, this means relying on data starting in the 1970s. In the few cases when we have data for longer periods these confirm the close relationship when going back in time. However, as shown by Morelli, Smeeding, and Thomson (2014) in Chapter 9 of this Handbook, the relationship is weaker in recent decades as household surveys do not fully capture the developments in the very top of the distribution. In the end, how to use top shares (or any other summary statistic) when aiming to capture overall income inequality, is a question of judgement. Our view is that, based on the evidence we have, and, in particular, given the restrictions in terms of available alternatives, top shares should not be dismisssed as being "only about the top" but are also useful as a general measure of inequality in over time.

2.3.3 Other series over long run inequality: wages, factor prices and life prospects

Much of what we write in this presentation is based on the assertion that the long run evolution of income inequality is meaningfully reflected in the evolution of top income shares, i.e., the shares of income accruing to top fractiles in repeated annual cross-sectional income distributions. Notwithstanding our conclusions in the previous section there are some important limitations to the top income data and it is therefore useful to complement these series with

[45] In fact, both Lindert (2000) and van Zanden (1998) seem to find at least some cases of a deviation in inequality trends in the U.K. and the Netherlands, respectively, across elite status and population-wide measures.

alternative measures. One is the poor coverage of period before 1900; top income data only exist in a handful of countries, none earlier than the 1860s and in most cases only in the form of a few scattered year-observations. Furthermore, top income data are not ideal to study the dynamics between inequality and economic development in relation to industrialization as characterized by some theories such as the Kuznets hypothesis. Lastly, the use of repeated annual income distributions prevents conclusions about trends in the distribution of lifetime incomes, i.e., whether differences in the quality and length of people's life span has changed in such way that the overall inequality trends are either mitigated or boosted depending whether it is the lives of the poor that has improved the most or the least.

In this section, we present some additional evidence on long run inequality that have bearing on these issues. We do this by studying trends in some other measures that are popular in the past literature: wage dispersion across occupations (and regions), factor price differentials and differences in life prospects.

The first measure, wage dispersion, is most often constructed as the wage ratio of rural to urban workers or of professionals (skilled) to blue-collar (unskilled) workers. Besides being available over very long time periods, often well before industrialization, these measures also offer a closer association with the original Kuznets conjecture which was about changes in wage inequality precisely between urban and rural workers within countries over the path of industrialization. A large number of studies have scrutinized this conjecture using different types of wage ratios, and they offer somewhat contradictory evidence (also see section 4.1. below). In his review of this extensive literature, Lindert (2000) asserts that, at least concerning the U.K. and the U.S., historical series are still too incomplete to allow for any firm conclusions. However, at least they do not establish any clear support for strong increasing trends in sectoral or occupational wage differentials as Kuznets' assertion would stipulate.[46] In a study of the evolution of skill premia across occupations during the pre-modern era up until the early twentieth century in the entire Western world, van Zanden (2009, ch. 5) also fails to find any evidence of increased wage dispersion during industrialization. Looking instead at

[46] There are numerous measurement problems that researchers have dealt with. These include how to deal with non-monetary reimbursement that was particularly common in agricultural professions, or the living conditions and health risks exposing workers differently in cities and on the country side. Specifically, Lindert (2000) points out that whenever costs of living differ between rich and poor the dispersion of real wages differ from the dispersion of nominal wages. Lindert points to evidence from 18th century England that the cost of living fell slower for the lowest 80 percent than for the top 20 percent, indicating that real inequality increased more than nominal inequality.

the twentieth century, wage ratios decline almost unanimously in Western countries. Not only does this development fit the acclaimed downturn of the Kuznets curve but it also correlates positively with the inequality trends suggested by the declining top income shares. As Lindert (2000) emphasizes, however, the twentieth century drop in pay differentials does not seem to be driven by the forces suggested by Kuznets. Instead the factors compressing wage ratios were rather aligned to institutional developments such as labor market regulations and the expansion of trade unions, and to the extension of educational attainment for large masses in the population (Goldin and Katz, 2008).

Sweden has in the past literature been referred to as a "clear example of the Kuznets curve" (Morrison, 2000, p. 227), an assertion based largely on Söderberg's (1991) investigation of sectoral wage dispersion. Swedish wage differentials across skilled and unskilled workers seem to have risen between 1870 and 1930, with exception for a sharp drop during the First World War, and then turned downwards until 1950. As Sweden's industrialization can be said to have begun around 1870 and peaked around the turn of the century, the skill-differential in wage indeed matches the Kuznets pattern. However, more recent research using new evidence on wage differentials between rural and urban workers (Bohlin, Lundh and Prado, 2011) and across occupations (Ljungberg, 2006) cannot replicate these results. They find either no trend at all or even a negative trend beginning already in the nineteenth century, casting doubts about the existence of even a Swedish Kuznets curve.[47]

Relative factor prices, typically expressed as the ratio of land rents to real wages, represent another outcome that bears information about inequality trends even if it is primarily motivated by trade theory. One basis the inequality interpretation is offered by Lindert (1986, 2000) who argues that land ownership during the nineteenth century was highly concentrated and changes in its return relative to real wages can reflect changes in the overall income inequality. According to several studies (O'Rourke and Williamson, 1999; Lindert, 2000; Clark, 2008, p.274; van Zanden, 2009), the wage-land rental ratio did not decrease (i.e., inequality did not increase) at all during the nineteenth century in the industrializing world. If anything,

[47] Specifically, Bohlin, Lundh and Prado (2011) compare the wage gap between agricultural (rural) workers and engineering (urban) workers between 1860 and 1945, controlling for differences in non-wage reimbursement and costs of living. They find no secular trend in the wage gap before 1950 but a considerable short-term responsiveness to shocks, e.g., to local living costs. Ljungberg (2006) compares wages of male manufacturing workers with wages of graduate engineers, college engineers and secondary school teachers between 1870 and 2000, finding that unadjusted wage gaps trended downwards but that the pre-First World War trend largely disappeared when controlling for the growth of human capital in the labor force at large.

the wage-rental ratio went up in the decades before the First World War, but whether that reflected a true equalization in the midst of the second industrial revolution or merely the demise of the rural land owners remains an open question.[48]

Finally, while the dispersion of incomes earned during a single year is often a relevant time frame of analysis, there are dimensions of personal welfare when outcomes over longer time spans are of primary concern. If, for example, industrialization allowed the broad masses to live better, eat healthier and work safer, and thereby live longer, without affecting the lives of the rich at all, this would result in an equalization of lifetime incomes even if distribution of annual incomes did not change at all. The literature on differential mortality trends over the long run and their implications for lifetime income inequality trends is quite small. In his review article, Lindert (2000) refers to studies of the U.K. that seem to reach conflicting conclusions, some finding that the biggest gains in life expectancy materialized among the already rich whereas others find the opposite. Clark (2008) looks at the differences in life prospects between "rich" and "poor" before and after industrialization, broadly put. He finds that the rich-poor difference in terms of male stature decreased from 3 percent to 1 percent, in life expectancy from 18 percent to 9 percent, in number of surviving children from 99 percent to –19 percent and in literacy from 183 percent to 14 percent.[49] However, the most recent research on socioeconomic inequalities in death over the long run presents a more sceptical view of the role of industrialization. Using historical longitudinal microdata from several countries aiming at uncovering the causal impact of industrialization on social mortality differences, scholars have not found any clear trend break along with the industrialization and, in general, no clear impact of income on mortality at all.[50]

Altogether, the evidence put forward in this subsection has broadened the focus on long-term trends to also include other measures of inequality such as occupational wage ratios, factor price differentials and lifetime-amended income inequality. These other distributional sources offer insights into pre-1900 inequality trends, the economic dynamics more closely related to the Kuznets conjecture, and into the development of the inequality of lifelong well-being, all of which are unsatisfactorily addressed by the top income data (and not addressed at all by

[48] O'Rourke, Taylor and Williamson (1996) establish the overall trends in the wage-rental ratios, arguing for a crucial role of trade openness as driver of the equalization while Clark (2008, p. 274) emphasizes the fact that land owners failed to keep up with the productivity booms in the industrial sector.
[49] See Clark (2008, table 14.4, p. 283), based on a number of different sources.
[50] See Bengtsson and van Poppel (2011), and the references therein.

other pre-1900 income inequality data sources). The main message from these studies is that there are few indications of an increase in inequality during the nineteenth century, i.e., the era when most Western countries experienced their definitive industrial take-offs. There is hence little empirical support for the first part of the Kuznets inverse-U curve. We would still hesitate to extrapolate our top income shares backwards into the nineteenth century based on the evidence from pay ratios. In terms of lifetime income inequality movements, there are again no clear trend that deviates notably from the one offered by the top income shares. If anything, the twentieth century equalization may be even stronger if would adjust for changes in longevity differences across the distribution, but this conclusion rests on still quite tentative evidence.

2.4 Income inequality over the long run – Taking stock of what we know

Combining all the information above it seems that there are three possible permutations of broad overall trends since the beginning of Western industrialization. To continue the letter-analogue to describe shapes, the question is if we (with a bit of imagination) see an *N*, a *U* or an *L*. The *N*-shape corresponds to an increase in inequality over industrialization followed by a decrease over the twentieth century and again an increase since around 1980. The *U*-shape would be a situation where inequality is high before and during the period of industrialization, then declines over the twentieth century, and increases again after around 1980. Finally the *L*-shape corresponds to the *U*-shape but without the up-turn around 1980.

The questionmarks, thus, revolve around to what extent there was an increase or not during industrialization, and to what extent there has been an increase in recent decades. The answer to the first question is difficult due to lack of clear evidence. There are some signs of increase inequality during industrialization but many studies also point towards high and relatively stable levels before the decrease in the twentieth century.

When it comes to the second question about the increase since around 1980 the evidence is much more solid and clearly points to that the answer depends on the country in question.[51] In some countries, especially the U.S. and the U.K., inequality has risen sharply. This increase has taken place from a level that was already high in relation to others before it started. In

[51] For a closer analysis of the post-1970 inequality trends in the industrialized countries, see further chapter 9 in this handbook (Smeeding, Thompson and Morelli, 2015).

countries like Sweden and Finland, increases have also been substantial but here from internationally low levels to levels that are much higher, but remain among the lowest. In other words, the increase in percentage terms has been almost as large in Sweden and Finland as in the U.S. and U.K. but the level difference is very significant. In some other countries, for example France, Germany and Japan, there is no clear upward trend but in absolut terms inequality remains higher than in the Nordic countries.

To what extent is this picture any different than the one we had before the top income literature and other findings emerged in the past decade? In terms of the broad overall developments, it may actually not be so different. There are some more studies suggesting that the increase in inequality during industrialization is not so clear and the recent upward trend in inequality has been made even clearer, and of course we have a lot more data on inequality over the long run in the form of top income shares. But overall there is nothing dramatically new in terms of the secular trends over the long run.

What is new, however, is the change in our *understanding* of these trends as a result of a number of features in the top income data. First, the detailed analysis of changes *within* the top of the distribution has shown just how much of the development is driven by the top one percent group of the distribution, and conversely how surprisingly stable the income share of the lower half of the top decile has been over the long-run. Second, the decomposition of income according to source has increased our understanding of how the importance of accounting for all sources and how the same broad trend could be driven by entirely different mechanisms depending of the development of capital and wages respectively. This applies both to the aggregate economy and to different groups across the income distribution. Third, the often yearly observations have shown the importance of sufficiently high frequency data. In particular, this aspect of the new series has been an important part of the focus on the role of shocks and war especially in the first half of the twentieth century, thus creating an at least partly new interpretation of the decline in inequality in the first half of the twentieth century. Finally, the relationship between top incomes and other measures of inequality illustrate how this literature has contributed *both* to our understanding of the importance of developments within the top, and the possibilities to use these measures as proxies for overall inequality.

3. Long run trends in wealth inequality

It is fair to say that the majority of reseach on economic inequality has focused on incomes. Much less attention has been given to the role of wealth, which is unfortunate for a number of reasons. As a determinant of people's consumption possibilities, personal wealth is of first-order relevance. The classical Haig-Simons definition of income states that income is what we can consume while keeping our real wealth intact. Wealth can also determine which opportunities individuals have to make investments and pursue different occupations, especially in the presence of credit constraints. The interplay between the distribution of wealth and development is also central to many theories attempting to explain the cross-country differences in long term development.

This section presents and discusses the existing research on the long run evolution of wealth inequality. The ambition is to harmonize the outline with the previous section on the long run trends in income inequality. We begin by presenting the core methods and data issues concerning how to measure wealth, wealth inequality and how to tackle the specific challenges associated with studying historical trends. Thereafter we present ten country case studies for which we have sufficiently good data on wealth concentration since at least a century and in some cases from the beginning of each country's industrialization. Finally, we bring together the pieces of evidence into cross-country mappings of the trends, searching for common patterns that may help us address the overall questions about the relationship between economic development and inequality.

3.1 Data and measurement

Despite the arguments for studying wealth and its distribution, the empirical literature on wealth inequality is still limited, particularly when it comes to the long run perspective. Naturally, there are many reasons for this past neglect, but the problem of agreeing on a managable definition of wealth and then the practical problems associated with measuring it empirically are most likely important.

Sources for studying wealth over time are of different sorts. In their investigation of the analysis of wealth distribution, Davies and Shorrocks (2000) point at the five most common sources of wealth data: wealth tax returns, estate tax returns (or probate records), investment income method (using capital income and some assumed or observed net rate of return),

household surveys, and journalistic rich list. With respect to investigations of long run patterns, perhaps the most consistent of these sources is estate records. They have have existed for centuries with largely the same basic structure of assets and debts of the deceased individuals. Unfortunately, there are few compilations of estate records in most countries over time, why we still lack data on wealth distribution from this source. A few countries have presented tabulated sizes of estate records in relation to estate tax compilations. Wealth tax statistics is another common source, available in a fairly homogenous way in several countries over long periods of time. Here, however, the problems of what components are included in the tax base or how large share of the population that is covered in the statistics are more pressing problems. Surveys, finally, comprise a more recent source for wealth distribution evidence.

Historical evidence on wealth distribution data is primarily based on wealth and estate taxation statistics. These fiscal instruments have been used for centuries and offer consistent source materials. Authorities have often also been interested not only in collecting the revenues but also to calculate the size of each tax base as well as their respective size distribution. Of the historical evidence presented below, series from France, the U.K., and, in part, the U.S., all emanate from the estate tax and, specifically, samples of individual estate tax returns. U.S. wealth distribution data from the latter part of the twentieth century and the beginning of the 21st century are also available in household surveys. Wealth distribution data from Denmark, the Netherlands, Norway, and Switzerland are all based on wealth tax statistics, in most cases as tabulated distributions published by each country's tax authorities. For Finland and Sweden the bulk of the data come from both wealth tax statistics but there are some complementary observations from estate tax returns. For Australia, finally, observations come from estate tax data, wealth surveys and even journalistic rich lists.

3.1.1 The wealth holding unit

The concept of wealth owner varies across the empirical studies covered in this chapter depending on the nature of the data source used. When wealth tax-based data are used (as in the Netherlands, Switzerland and the Nordic countries), the most common unit of observation is *households*. For the most part, this means tax households where married couples (and their under-aged children) count as one, as do children 18 years or older living at home. Many of the survey-based wealth records from recent decades, however, define households as cost-based households, the major difference being that adult children living at home are now included in the parents' household. When studying very long time spans, households sometimes

also included servants, parents or grandparents, slaves, or unregistered immigrants. Shammas (1993) shows that the U.S. historical wealth concentration is sensitive for the treatment of these different subgroups into the reference tax population.[52] Estate tax data and probate inventories (used in France, the U.K., and the U.S.) are instead based on (deceased) *individuals*.[53] Most studies focus on adult individuals, thereby imposing a lower age cut-off normally between 15 and 25 years of age.[54]

To define wealth holding units consistently matters for the distributional estimates. As was pointed out above in the discussion of the distribution of incomes, individual-based data tend to (but must not) give rise to a more unequal wealth distribution than does the household-based data (Atkinson, 2007). Roine and Waldenström (2009) compare shifts in Swedish top wealth shares using household and individual distributions finding no important differences, and Kopczuk and Saez (2004) reach the same conclusions in their analysis of U.S. wealth distribution trends.

3.1.2 The concept of wealth

The definition of personal wealth that is most commonly used in studies of wealth distribution is *net wealth*, also called net worth or net marketable wealth. Net wealth consists of the sum of all non-human real and financial assets less debt. Real (or non-financial) assets primarily consist of housing and land, but they may also include durable consumption goods (see further the discussion below), e.g., cars, boats, furniture and also valuables such as antiquities, jewelry and art. In the distant past, even items such as clothing and other semi-durable consumption goods were often inherited (especially among the less wealthy) and may also be covered among the non-financial assets. Financial assets are cash, bank deposits, corporate stocks, bonds and other claims, and insurance savings which today also include some parts of funded pension assets. Debts, finally, are the sum of housing mortgages and loans for consumption, investment or education.

As already stated, our definition of wealth does not include peoples' inherent or acquired skills, or human capital. This is a natural implication of the wealth definition set out at the

[52] Shammas shows that when including slaves in the population of wealth holders, the top percentile wealth share increased by 15 percent (Shammas 1992, table 1).
[53] Some estate reports include joint property if there is a surviving spouse and the property of a deceased spouse that has not previously been transferred to heirs.
[54] Variation in age cut-off across countries and even within countries over time may introduce problems of comparability (Atkinson and Harrison, chapter 6).

beginning, which focuses on assets that are *marketable* and thus possible to sell or purchase at a market place.[55] Historically, such market for human wealth have existed, namely in association with slavery. In terms of aggregate wealth the total value of "slave assets" was somewhere between 15 and 30 percent of total national wealth (Soltow 1989, p. 180; Piketty and Zucman, 2013, figure 11). According to Soltow (1989, p. 267), slaves were disproportionately held by the wealthy and the inequality in slave ownership was almost three times as large as the inequality in land and dwellings.

Measuring net wealth is sensitive to the valuation of assets. Ideally assets should be valued at current market prices, net of taxes and transaction costs, the theoretical reason being the possibility to convert wealth to consumption. However, most estimates of historical inequality use data where assets are reported in tax-assessed values rather than in market values. Tax laws are typically designed to strike a balance between the revenue needs of government and tax collectability of tax authorities, and the rules regarding asset coverage or valuation criteria may thus not be aligned with what researchers would ideally like to have. But if the discrepancy across tax and market values is similar across the distribution – and historically we think that this was arguably often the case – the biasing effect of valuation on relative wealth *shares* should be small. Only a few studies have dwelled into these questions. Examples are the analyses of inequality trends in the U.S. where Williamson and Lindert (1980a, 1980b) and Wolff and Marley (1989) investigate if tax-driven avoidance distorts the use of tax data for distributional analysis (and they generally find that it does not). Atkinson and Harrison (1978) examine how the valuation of taxed assets may influence inequality, e.g., looking at life policies (table 4.6) and offshore assets (pp. 161f).[56] Roine and Waldenström (2009) study the effect of valuation by using several alternative estimates of aggregate wealth (based on either tax or market values as well as including items which have not been taxable) and also different assumptions about the distribution of the difference between these alternative reference totals and the baseline specification. They find that there are some differences in the levels of wealth shares over the period, but that the trends in wealth concentration remain unchanged. Altogether, we believe that the comparability of the estimated shares presented in this chapter is good over time.

[55] Some scholars have still tried to quantify the value of individuals' lifetime human capital and its distributional characteristics. Reviewing these estimates and their trends over time, Williamson and Lindert (1980b, p. 71) come to the conclusion that "(w)e have, then, two reasons for believing that trends in conventional wealth distributions understate the true leveling in total wealth distributions.". If this result is stable across countries and over longer time periods is an open issue worthy of further inquiry.
[56] See also our subsection below on the role of tax avoidance and evasion.

There are some components that are especially difficult in the analysis of personal wealth. While some of them appear in the wealth data in several countries and time periods, their presence is associated with uncertainty both concerning valuation and conceptual adequacy. In the following we discuss three of the most important "problematic assets" and discuss how they are typically treated in the historical sources. In the end, they do not, however, affect the main conclusions about the long run inequality trends reported below.

i) Pension and social security wealth is a composite term for the net present value of individuals' entitlements to future private and public payments for pensions and other social outlays. These assets are for the most part not included in the historical inequality estimates. Conceptually, scholars have shown that expectations about future public pensions reduce the incentive to accumulate private wealth (see, e.g., Feldstein 1976; Berg, 1983 and Gale, 1998) and thus a comparison of private wealth across systems with differing public pension coverage may be misleading unless retirement wealth is accounted for. Researchers therefore sometimes add social security wealth to the net marketable wealth of households, yielding a concept often called *augmented wealth*. Studies of the concentration of augmented wealth typically find that it is substantially lower than the concentration of marketable wealth. For example, Wolff (2007) finds that the Gini coefficient for the U.S. in 2001 drops by a fifth when going from net worth to augmented wealth, and Frick and Grabka (2013) finds a similar drop for Germany in 2007. The Inland Revenue in the U.K. presented for many years series of the distribution of marketable wealth (Series C) as well as wealth including public and private pension entitlements (Series E), exhibiting Gini coefficients that were about a third lower when including pensions.[57]

However, there are numerous problems associated with defining pension assets, or other "drawing rights" on the social security system, as private property and until questions like those are fully settled we will not see a comprehensive treatment of pension and social security wealth alongside with net marketable real and financial assets. The main issue is how to judge the fact that, on the one hand, not having the public system would have required an individual to save privately, thus decreasing consumption possibilities, but on the other hand,

[57] See Inland Revenue, *Inland Revenue Statistics 1985*, London, HMSO, Table 4.8.

the "drawing rights" are not marketable wealth and can not be converted freely into other consumtion by the individual.[58]

ii) Consumer durables are not always included in the wealth data, and when they are their valuation is difficult. First of all, this asset class is typically completely absent from wealth tax returns or administrative tax registers, primarily for evasion reasons. It is thus not part of the bulk of the distributional estimates examined in this chapter. However, insofar as data are based on probates or estate tax returns or household surveys, durables are more likely to be included because of smaller possibilities (and smaller incentives) to evade.[59] Atkinson and Harrison (1978, p. 43) note that the valuation of consumer goods is difficult, and they often take too low values in estate data. In general, it is actually an open question whether consumer durables should at all be included in the household balance sheet. According to the System of National Account they should not since all consumed goods are assumed to depreciate within one year therefore cannot contribute to any fixed asset formation.[60] However, many durables (e.g., cars, boats, and some electronic equipment) arguably last more than one year, and for this reason some countries (such as the United States) do include durable consumer goods in household balance sheets. Historically, consumption goods like china, furniture, and even clothing were important parts of household inventories and were inherited along with other assets. Waldenström and Ohlsson (2013) estimate the household balance sheet of Swedish households since 1810, finding that durables represented between 10 and 20 percent of non-financial assets throughout the period up until today. Interestingly, durables grew more important in the middle of the twentieth century, which is related to the growth in earnings potential of increasingly educated middle-class households (Roine and Waldenström, 2009).

iii) Foreign wealth holdings have historically been sizeable in many countries, especially co-

[58] For example, pension assets are not fully accessible to their owners upon demand at any time (they are not possible to realize before retirement). Furthermore, they are partly defined in collective forms and are hence not well-defined for all individuals (or households) even within the system. The calculation of current claims on future pensions necessitate a number of complex assumptions about people's life expectancy, future rates of return on the capital markets and so forth. There are also a mix of public and private pensions, some being funded and others un-funded. Finally, it is not obvious where to draw the line in terms of valuing the rights of citizens' claims on the public sphere: how valuable is the claim on childcare, elderly care, unemployment insurance, and even the right to freely travel on public roads or being protected by the country's military defense.

[59] An example of this was shown by the Swedish public investigation Kapitalskatteberedningen (SOU, 1969, table 78, p. 276) in a sample of estate tax returns matched with the deceased individuals' last wealth tax returns (from the preceding year). "Other assets" (*Övriga tillgångar*) were four times larger on the estate tax returns and their largest component, "inner inventories" (*Inre inventarier för personligt bruk*) (durable consumer goods, art, antiquities etc.), was missing altogether from wealth tax returns.

[60] In the realm of corporations, consumption is viewed as firms' running expenses instead of as investments; only the latter results in an accumulation that forms a stock of assets.

lonial powers such as France and the U.K. In a recent investigation, Piketty and Zucman (2013, table A27) found that net foreign wealth represented between a tenth and a quarter of total national wealth in these two countries from the middle of the nineteenth century up to World War I. At the individual level, information about foreign assets such as foreign government stock and bonds and other real estate is most likely completely absent from domestic wealth tax returns, but should in principle be more visible in estate data. As noted by Atkinson and Harrison (1978, p. 161), however, overseas real estate was not taxable before 1962 and therefore not included in wealth inequality estimations before this year. In an attempt to gauge the importance of the acclaimed tax-driven capital flight from Sweden during the period from 1970s to the 2000s, Roine and Waldenström (2009) used residual flows in the Balance of Payments and Financial Accounts to estimate the aggregate offshore wealth held by residents. Assuming that this wealth was primarily held by the richest residents, the authors found that the top percentile wealth share rose from about 20 percent in the 2000s to over 30 percent depending on assumptions about interest rates on foreign capital and whether to include the closely held corporations of super-rich Swedes.[61] Also, without explicit reference to distributional aspects Lane and Milesi-Feretti (2001, 2007) construct estimates of the external wealth of nations since 1970. However, going further back we know very little about the role of offshore wealth in historical eras and can therefore not offer a consistent interpretation of their role for long run inequality trends.

3.1.3 Measuring historical wealth inequality

When we estimate the concentration of wealth, we use a similar methodology as when calculating top income shares. That is, we estimate the *wealth share held by various fractions of the population* by dividing the observed top wealth holdings for specific groups (fractiles) in the top by a reference total for all personal wealth in the economy. Just as in the case of historical income distribution data, the historical wealth distribution data often come in the form of tabulated distributions of grouped data. This means that we observe wealth holders and their net wealth divided into different wealth size classes. In order to get the exact wealth share accruing to certain fractiles in the top, such as the top percentile or the top decile, we use the Pareto interpolation technique described previously.

[61] An alternative approach to estimate the hidden wealth of nations was proposed by Zucman (2013), who instead uses balance sheet statements of countries' portfolio investments in the 2000s to detect systematic mismatches that could be interpreted as evaded capital, presumably of the rich. Zucman did, however, not present any distributional implications of his calculations.

Using top wealth shares as measure of inequality has several advantages for our purposes.[62] Most historical sources of wealth data come from wealth and estate tax returns, and the group most consistently represented in these tax listings throughout history is the rich (i.e., where the wealth was) which makes them the most homogenously observed group over time. Moreover, wealth distributions are heavily skewed – much more so than income distributions – and top wealth holders have often held the vast majority of all personal wealth; between 70 and 90 percent before the Second World War and between 50 and 70 percent thereafter. Studying the top and its wealth therefore means that almost all personal wealth is being studied. Finally, most of the historical wealth inequality estimates constructed by past researchers come in the form of top wealth shares, especially as top wealth percentiles, and this measure is therefore the most appropriate to use for our purposes.

A specific challenge associated with estimating top wealth shares is the measuring of the reference total of net wealth of the whole population. Wealth tax data typically only cover the top households who have paid wealth tax and researchers must therefore limit their observations to years when attempts to measure the corresponding total for the whole population have been made, e.g., in Censuses or special public investigations. In the case of Sweden, for example, there are years for which tabulated top wealth data exists but there is no reliable information about the reference total wealth to be found. Estate data also have problems with constructing population measures but they are of a slightly different kind. Researchers here typically try to collect a sample of estates that is representative for the whole population which thereby enables them to compute the relevant inequality measures using only the sample at hand. However, most of the times the estate data sources are themselves not fully representative for the population, mostly lacking information about people with low levels of personal wealth.[63]

The different wealth data sources also display the wealth distribution for different entities. While wealth tax data and surveys reflect the distribution of the living population, estate tax data and probate inventories reflect the distribution of the deceased. Since those who people who die during a year is not a representative sample of the living population (e.g., since the

[62] Having said this, there are other measures of wealth inequality that may be applicable on the available long-run evidence. In particular, a headcount measure based on the number of wealthy over some cut-off line, which could be defined as a multiple of average incomes, has been proposed by Atkinson (2008b).

[63] The estate tax returns used to calculate U.S. wealth shares over the 20th century only cover the two richest percentiles in the entire population, and reference total wealth was collected from national balance sheets (Kopczuk and Saez, 2004).

old are heavily overrepresented), these two distributions are not immediately comparable. The usual procedure used by researchers to make the comparable is by applying so-called *mortality multipliers*, which are inverse mortality rates for different age, sex or social status groups.[64] In this way, the distribution of estates can be transformed so as to reflect the wealth distribution among the living population.

3.1.4 Tax avoidance and evasion

As already noted using data from administrative tax-based statistics to compute measures of wealth distribution gives rise to some problems relating to tax evasion and avoidance. But, as in the case of the income distribution, the extent to which such activities lead to errors in estimated wealth shares is, however, not clear. If non-compliance and tax planning is equally prevalent in all parts of the distribution – it may of course take very different forms – this affects the reported wealth levels but not the shares. The same goes for comparisons over time and across countries (see section 2.1.5 for more on this). Unfortunately there is little systematic evidence on this. There are overviews, mainly concerned with personal income taxes, suggesting that while avoidance and evasion activities are important in size there are no clear results on the incidence of overall opportunities or on these activities becoming more or less important over time.[65]

Moreover, it is not clear whether to expect more or less avoidance and evasion in countries with higher tax rates. As the incentives to engage in avoidance and evasion become higher when taxes increase, so do the incentives for tax authorities to improve their control.[66] Regarding wealth and estate taxes it may seem plausible to think that estate tax data are more reliable since it is typically in the interest of the heirs to formally establish correct valuations of the estate.[67] At the same time tax planning aimed at avoiding the estate tax is an important industry in the U.S. and elsewhere. This may affect the reliability of the data. For wealth tax data problems of underreporting are likely to be similar to those for income data, with items

[64] The methodology of using inverse mortality rates, preferably adjusted for sex and social class, was pioneered by the works of Coghlan (1906) and Mallett (1908), and was also implemented around the same time by the Swedish statistician Isidor Flodström (Finansdepartmentet, 1910). For a detailed account of the mortality multiplier methodology and theoretical underpinnings, see Atkinson and Harrison (1978, chapter 3).
[65] See Andreoni, Erard and Feinstein (1998), and Slemrod and Yitzhaki (2002).
[66] Friedman, Johnson, Kaufman and Zoido-Lobaton (2000) provide evidence supporting the idea that higher taxes also leads to better administration across a broad sample of countries as they find that higher taxes are associated with less unofficial activity.
[67] For 2001, the most recent for which the IRS has final figures, the tax gap in the U.S. (i.e., the difference between taxes owed and taxes paid) was around 16 percent. Out of the 345 billion dollars that make up the tax gap only about 4 billion were associated with estate and exise taxes.

that are double reported being well captured while other items are more difficult.

Finally, the use of tax havens may be a problem, and as we discussed above there are indications that substantial amounts have been hidden over the past decades (see for example, Johannesen and Zucman, 2013 and references therein). Given the large fixed costs related to advanced tax planning it is likely that such activities are limited to the very top of the distribution. If this has become more important over the past decades – something that seems likely – then estimates of wealth concentration for recent periods may understate wealth holdings in the very top and not be directly comparable with estimates produced for earlier years in this century, in particular top wealth shares may be underestimated for recent decades.

3.2 Evidence on long run trends in wealth inequality

In this section we present evidence on the evolution of wealth inequality in ten Western countries. The length and detail of the series vary but in most cases the first observations are from around 1800 and with relatively frequent observations throughout the whole of the twentieth century. The relatively small number of countries for which we have data allows us to dwell a little deeper into each country case, examining the specificities associated with national histories as well as the structure of historical wealth distribution evidence. After going through the country cases, we compile the series and study to what extent there are common patterns over time.[68]

3.2.1 Country specific evidence

3.2.1.1 Australia

A recent investigation of Australian wealth concentration since the beginning of the twentieth century is the one by Katic and Leigh (2013). The authors estimate top wealth shares using three different sources: estate tax returns, household surveys and journalistic rich lists. The main emphasis is put on the first two, but the very recent trends can also be studied by putting the rich lists into context.

The earliest observation comes from a war wealth survey conducted in 1915 by the Commonwealth Bureau of Census and Statistics. From the 1950s up until the 1970s, tabulated es-

[68] This section is builds partly on the cross-country analysis in Ohlsson, Roine and Waldenström (2008).

tate tax returns were collected and adjusted by using inverse mortality multipliers adjusted for age, sex and social status. From the 1980s onwards, the authors again use wealth surveys, conducted by different entities, but complement them by annual observations of wealth share of the super rich Australians published in the Australian magazine *Business Review Weekly*.

A common theme in all these sources is that they are not extensive in terms of coverage of wealth holders. With a few exceptions, only the very richest citizens are covered and for this reason the only long run time series coming out of the historical evidence are the wealth share of the top 1 and top 0.5 percentiles.

Figure 9 shows the trend in the Australian top wealth percentile share between 1915 and 2008. The share falls from almost 35 percent of total wealth during the First World War down to less than 15 percent in the early 1950s. Due to the lack of observations in between these dates, we cannot tell whether the fall came as a consequence of the immediate post-WWI turmoil, the crisis impact during the Great Depression of the 1930s or the dramatic events during the Second World War and its aftermath. From the 1950s onwards, the top percentile share has hovered around a level of 10–15 percent of total wealth. Internationally, this is a very low wealth share, actually the lowest of all countries covered in this chapter. At this point, the reasons for the low Australian share have not been studied in detail.

[Figure 9 about here]

3.2.1.2 Denmark

For Denmark, historical wealth concentration data exists from as early as 1789 and then more frequently during the twentieth century. The earliest observation comes from a comprehensive national wealth tax assessment in 1789, from which Soltow (1981) collected a large individual sample of the gross wealth of households.[69] The next observation, however, comes over a century later at the time of the introduction of the modern wealth tax. For 1908–1925, Zeuthen (1928) lists tabulated wealth distributions (number of households and their wealth sums in different wealth size classes) for Danish households, adjusted so as to include also those households with no taxable wealth. Similar tabulated wealth tax-based data are published in Bjerke (1956) for 1939, 1944, and 1949 and in various official statistical publica-

[69] See Soltow (1981, table 2).

tions of Statistics Denmark for a few years thereafter until the wealth tax was abolished in 1997.[70]

Figure 10 shows the wealth shares of groups within the top decile between 1789 and 1996. The lowest four percentiles (P90–95) exhibits a flat trend up to 1908 and thereafter doubles its share from 10 to 20 percent over the twentieth century. The next four percentiles (P95–99) lies constant between 25 and 30 percent of total wealth over the entire period whereas the top percentile (P99–100) decreases significantly over the entire period, with particularly marked decreases after the two world wars. When looking at the very top of the distribution, the top 0.1 percentile (P99.9–100), there is no decrease at all up to 1915, but instead there is a dramatic drop by almost two-thirds of the wealth share between 1915 and 1925. Overall, the Danish wealth concentration decreased over the course of industrialization and this continued throughout the twentieth century, although the development was not uniform at all times and across all groups.

[Figure 10 about here]

One way to understand the wealth compression of the Danish industrialization is to compare the identities of the Danish top wealth holders before and after the late nineteenth century. The dominant groups in the top of the wealth distribution in 1789 were owners of large agricultural estates. Soltow (1981, p. 126) cites an historical source saying that "some 300 Danish landlords owned about 90 percent of the Danish soil". By contrast, in 1925 the group with the largest private fortunes was the brokers (*Veksellerere*) although landlords (*Godsejere, Proprietærer og Storforpagterere*) were still wealthy, both groups having more than fifty times larger average wealth than the country average.[71]

The drops in top wealth shares after the two world wars were partly associated the sharply progressive wartime wealth taxes.[72] According to Bjerke (1956, p. 140), however, the fall after the Second World War was also largely due to new routines in the collection and valua-

[70] The estimates in 1995 and 1996 were constructed from evidence on only the tabulated number of wealth holders (families) and the total net wealth in the whole country. Supplementary Danish top wealth shares exist for the 1980s in Bentzen and Schmidt-Sørensen (1994), but unfortunately wealth size has been top-coded in their data and the resulting estimates are not fully comparable with the other tax-based data.
[71] The average net personal wealth in 1925 was Danish kronor (DKR) 6,826 for all of Denmark, DKR 366,000 for brokers and DKR 359,000 for large landlords (Zeuthen 1928: 447).
[72] On the historical development of Danish wealth taxation, see Christensen (2003, p. 8, 14).

tion of wealth information of the tax authorities, which in particular made middle-class wealth more visible. Towards the end of the century, the wealth concentration continued declining up to the 1980s, largely due to increased share of the relatively equally distributed house-ownership in the total portfolio (Lavindkomstkommissionen 1979, chapter 5), but thereafter started to increase up to the mid 1990s.

3.2.1.3 Finland

Finland is another Nordic country for which wealth distribution data exist since the agrarian era and during most of the twentieth century. The country's industrialization came relatively late, in the interwar period, and even around the Second World War Finland was a predominantly agrarian economy focusing on forest industry and small-scale agriculture. Politically Finland was part of Sweden up until 1809 after which it came under Russian rule until 1917 when Finland ultimately gained independence (Eloranta et al., 2006).

Our estimates of the Finnish historical wealth distribution are essentially based on wealth tax statistics.[73] The earliest known observation of wealth distribution in Finland is 1800, coming from a wealth tax assessment levied in Sweden and Finland. Jutikkala (1953) and Soltow (1980) examine this assessment collecting a representative sample of the gross wealth of almost two thousand male household heads. The taxed households represented about one third of the population whereas the other two thirds were exempt because they lacked sufficient amount of personal taxable wealth. The next set of estimates comes from estate data in 1907–1909, 1914 and 1915 compiled and published by Statistics Finland.[74] We compute top wealth shares of the deceased but adjust these with respect to the likely difference between top wealth shares of the deceased and living populations using observed differentials in Sweden around the same time.[75] For the early twentieth century, we use Soltow's (1980) estimates from wealth tax assessments in 1922, 1926 and 1967. All these samples include adjustments

[73] There are some previous studies, e.g., Tuomala and Vilmunen (1988) who analyzed the distribution of wealth using tax data between 1968 and 1983 and Jäntti (2006) analyzing the developments during the latter 1980s and 1990s using mainly survey evidence. There is also a Finnish wealth survey run by Statistics Finland about twice per decade the 1980s, but we do not use these data due to comparability issues with tax data as well as concerns about coverage in the wealth top. See Statistics Finland (2006, 2007). For example, the top decile wealth share in 1987 was as low as 35 percent in the survey whereas it was 51 percent in the wealth tax statistics. The latter corresponds to a top percentile share of 16 percent, which is still in the lower region among Western countries.

[74] Statistics Finland (1911), table "Förmögenhetsförhållanden. A. Kvarlåtenskapsstatistik, 3. Arflåtna bon samt för dem uppburen stämpelskatt år 1909".

[75] In the Swedish investigation Finansdepartmentet (1910), detailed calculations of wealth shares were made for both the deceased population (using estate shares) and the living population (using inverse mortality multiplier-adjusted evidence) for the years 1906–1908. It was found that the top wealth share of the deceased exceed those for the living population by between 10 percent (for the top decile) and 40 percent (for the top 0.01 percentile).

for the share of the population without wealth on which no wealth tax was levied. Finally, we have wealth tax tabulations for the period 1987–2005 using net marketable wealth data retrieved directly from Statistics Finland.[76]

Figure 11 presents the evolution of wealth concentration in Finland from 1800 up to 2005. The top decile held 46 percent of domestic net wealth in 1800 and its share peaked at 70 percent in 1909. Over the period the Finnish top percentile share exhibits an inverse-U shape, setting out at a relatively low share in 1800 which is doubled a century later in the years preceding the First World War. The 1920s saw a strong reduction in the top percentile share, possibly due to the civil war taking place at this time. Later on during the twentieth century, the top percentile's share decreased further, reaching a global low in around 1990 when its share was less than 14 percent of total personal wealth. However, after this Finland experienced the IT-boom, led by the immense success of mobile phone producer Nokia, and the top percentile share increased swiftly during the 1990s and 2000s reaching a level of 22 percent in 2005 (Eloranta et al., 2006). As for the rest of the top decile, the Finnish pattern is similar to that of most other countries studied here. The next four percentile (P95–99) also experienced an inverse-U pattern, but peaked later, in the 1960s, after which its share started to decrease. The bottom half of the top decile hovered around 10–15 percent of total wealth.

Overall, the historical wealth concentration in Finland follows a pattern that looks very much like an inverse-U. The share of total wealth held by the rich (in the top percentile) increased during the nineteenth century and decreased during the twentieth century. The upper middle class (the rest of the top decile), however, did not change their relative position much during the two centuries covered. Also notable is the relatively low level of wealth concentration in Finland, especially in the year 1800 but also during the twentieth century.

[Figure 11 about here]

3.2.1.4 France

The long-run evolution of French wealth inequality is particularly interesting to study given France important role for Europe's economic and political development. Piketty, Rosenthal and Post-Vinay (2006) present new data on wealth concentration for Paris and France over

[76] Data were submitted as a file by Statistics Finland showing taxable wealth by age and net wealth class in eight brackets from –€5,000 up to €500,000– .

almost two hundred years, from the Napoleonic era up to today. No previous study on any country has produced such long homogenous time series, offering complete coverage of wealth inequality over industrialization. The French wealth data comes from estate sizes collected in relation to an estate tax established in 1791 and maintained for more than two centuries. For every tenth year during 1807–1902, the authors manually collected all estate tax returns recorded in the city of Paris – Paris was chosen both for practical reasons but also because it hosted a disproportionally large share of the wealthy in France. Using summary statistics on the national level for the estate tax returns, the top Paris wealth shares were 'extrapolated' to the national level. For the post-1902 period, tabulated estate size distributions published by French tax authorities were used.

Figure 12 shows the evolution of the wealth shares for some fractiles within the top wealth decile in Paris (1807–1902) and France (1947–1994). The estimates are from the population of deceased, i.e., directly from the estate tax returns, but comparisons with the equivalent wealth shares for the distribution of the living population (computed using estate multipliers) reveals practically identical trends and levels.[77] The figure shows that wealth concentration increased significantly for the top 1 and 0.1 percentiles over the nineteenth century, first slowly up to the 1870s then more quickly until its peak at the eve of the First World War. By contrast, the two lower groups in the top decile are much less volatile during the period. The bottom half (P90–95) held about 9 percent of total wealth until the First World War when its share started to increase slowly until it had doubled by the 1980s. The next 4 percent (P95–99) stayed put on a level around 27 percent of total wealth throughout the period. These patterns suggest that the French industrialization, which took off around mid-century, greatly affected personal wealth. It did so already after a couple of decades, but only in the absolute top. This conclusion is further supported by two other observations. First, the composition of top wealth went from being dominated by real estate assets (mainly land and palaces) in the first half of the century to being dominated by financial assets (cash, stocks and bonds), which were supposedly held by successful industrialists and their financiers. Second, over the same period the share of aristocrats among top wealth holders decreased from about 40 percent to about 10 percent.[78] From the First World War to the end of the Second World War, top

[77] Using data in Piketty et al. (2004: tables A2 and A4) over top wealth shares for both the dead and living populations in Paris and France, it is evident that the trends in wealth shares over time is practically the same for all fractiles and even the levels do not differ much, on average 0.4 percent for the top decile and 5.1 percent for the top percentile.
[78] These facts are shown in Piketty et al. (2006: figures 4-6).

wealth shares declined sharply, which according to Piketty (2003) is directly linked to the shocks to top capital holdings that inflation, bankruptcies and destructions meant. The post-war era was quieter with regard to changes in the wealth concentration, although its decline continued most likely in relation to the increase of progressive taxation (Piketty et al. 2006).

[Figure 12 about here]

3.2.1.5 The Netherlands

The Netherlands represents and interesting point of reference to the analysis of long run trends in wealth inequality among Western economies. Although the Netherlands did not industrialize in the traditional sense until the middle of the nineteenth century, its economy was already developed due to its role in the expansion of global trade that started already in the 16th century. According to van Zanden (1998b), this may explain the apparent lack of increase in inequality following the industrial revolution. While inequality grew during the pre-industrial era due to high growth rates but stagnant real incomes, industrialization did not only boost fortunes of the wealthy but there was also an increased demand for all kinds labor, skilled as well as unskilled.

The previous literature on historical wealth inequality in the Netherlands is relatively rich. Soltow (1998) and Vermaas, Verstegen and van Zanden (1998) present a series of estimates of inherited wealth and housing inequality in different Dutch regions from the beginning of the nineteenth century. Unfortunately, defining a trend over the nineteenth century appears to be difficult. The only comparable information between 1808, 1880 and 1908 come from inheritance tax records that cover inheritances to distant heirs, i.e., not spouses and children. The data indicates a slight increase in inequality.[79]

The most comprehensive longitudinal data are offered by the wealth tax statistics, which allow for an estimation of top wealth shares since 1894. The primary source of these observations is Wilterdink (1984), which presented a detailed account of the top vintile and groups within it for selected years between 1894 and 1974. The estimtates stem from wealth tax records, showing the distribution among wealth tax units (mainly individuals), whereas the recent wealth survey data show the distribution among households. For the most recent years,

[79] See Vermaas, Verstegen and van Zanden, 1998, table 7.11, p. 167.

Statistics Netherlands has compiled wealth-tax based distributions for the periods 1993–2000 and 2006–2011.[80]

Figure 13 shows the top wealth shares of the Netherlands from this year up to 2011. Wealth concentration was a high and stable around the turn of the century 1900. Thereafter the top percentile wealth share started decreasing. Both Wilterdink (1984) and van Zanden (1998a) highlight the role of the geopolitical events, and these are clearly seen in the falls in top percentile shares during the two world wars and the depression of the 1930s. However, the researchers also emphasize the role of governmental redistribution, in particular the imposition of heavy wealth taxes after 1946 to finance the reconstruction after the war.

[Figure 13 about here]

3.2.1.6 Norway

Data on Norwegian wealth concentration come mostly from various kinds of wealth taxation. Overall, these data are perhaps the most uncertain presented in the entire chapter and the estimates of top wealth shares presented in this chapter must therefore be interpreted cautiously. The first observation is from 1789, when the wealth tax assessment that also was launched in Denmark came into place (the two countries were in a political union at this time). As in Denmark, both real and financial assets were subject to taxation, including land, houses or farms, factories, livestock, mills, shops inventories and financial instruments. Debts were not deducted, and hence the wealth concept is gross wealth.[81] Our second observation is from 1868, when the Norwegian government launched a national wealth tax assessment. Mohn (1873) presents totals for wealth and households and a tabulation of the wealth held by the top 0.27 percent (P99.73–100) of all households, including a detailed listing of the fifteen overall largest fortunes.[82] For 1912, we use wealth tax returns from the taxation of 1913–1914 (exempting financial wealth) which are presented in tabulated form in Statistics Norway

[80] The data come from Statistics Netherlands and were kindly shared to us by Wiemer Salverda (see Salverda et al., 2013, pp. 47ff, and Statistics Netherlands, 2010, for further description of the data). A tax reform in 2001 introduced a slightly different mode of taxing wealth which reduces comparability of data. Furthermore, we only observe the top 5 percentiles in 1993–2003 (and assume their share of the top decile is the same during 2006–2011) and the top 0.1 percentile share in 2011.

[81] We use Soltow's (1980) distributional estimates based on 'males or families aged 26 and older', which is not identical to what is used for latter years and probably implies that the 1789 inequality should be adjusted upwards to be more comparable.

[82] There is no information about whether it was the gross or net wealth which was taxed.

(1915b).[83] Similarly, for 1930 we use tabulated wealth distributions (number of wealth holders in wealth classes along with totals for wealth and tax units) presented in Statistics Norway (1934).

From 1948 onwards, we use the tabulation of wealth holders and wealth sums in classes of net wealth published annually in the Statistical Yearbook of Statistics Norway. In the early 1980s the wealth statistics started being reporting for individual taxpayers instead of, as before, for households. In order to keep our series as consistent as possible, we attempted to convert the post-1982 observations from reflecting the individual distribution to reflect the household distribution using a listing of both types by Statistics Norway for the year of 1979.[84]

For the period since 1993, we use tabulated wealth distributions published on the Statistics Norway's website.[85] Somewhat ironically, the uncertainty about these data is perhaps largest since both asset coverage and valuations are highly problematic. For example, tax-assessed values of housing are heavily discounted and represent on average no more than a fifth of their true market value, with the discount being larger for more expensive dwellings (Epland and Kirkeberg, 2012). For this reason, household net tax-assessed wealth is negative for practically every Norwegian household. Furthermore, it is not obvious that the distributional trends in tax-assessed net assets are the same as those in market-valued assets if there are also trends in market-to-tax values of dwellings.

In order to shed some additional light on these matters, we refer to what we see as the most reliable estimate of the Norwegian net wealth distribution presented by Epland and Kirkeberg (2012). This investigation brings together a rich microdata material for 2009, carefully estimates market-valued assets and liabilities and computes wealth inequality estimates. The

[83] We use tables of wealth holders in wealth classes in Statistics Norway (1915b: 20-21), corroborated by information about reference wealth and tax unit totals in Statistics Norway (1915a: 13f) and Kiær (1917: 22). The fact that financial assets were exempt in the Norwegian wealth taxation before 1922 is discussed in Statistics Norway (1934: 1).

[84] The Statistical Yearbook of Norway of 1981 tabulates the net wealth of both households (table 380: 316) and personal taxpayers (table 368: 306). In the latter case, however, we have no data on the sum of personal wealth of all wealth holders in each wealth class. We therefore insert the sums of wealth observed in household case into the individual case for the exact corresponding wealth classes. The comparison of wealth shares across these two distributions shows that the individual distribution produces shares that are 25%, 21%, 30%, 44% and 60% higher than the household distribution for the top 10%, 5%, 1%, 0.1%, 0.01% fractiles, respectively.

[85] See www.ssb.no/statistikkbanken (2013-10-28). For the period 1993–1999, see table "Tabell: 08575: Fordeling av skattepliktig brutto- og nettoformue for busette personar 17 år og eldre, etter talet på personar og gjennomsnitt i kroner (avslutta serie)". For the period 2000–2011, see the table "Tabell: 08532: Fordeling av skattepliktig brutto- og nettoformue for bosatte personer 17 år og eldre, etter antall personer og gjennomsnitt".

study finds that the top wealth decile held about 53 percent and the top percentile about 21 percent of all net wealth (Epland and Kirkeberg, 2012, table 8). Interestingly while the above-mentioned tax-based tabulations of net wealth made no sense, the distribution of gross wealth seems less off the chart, producing for 2009 top shares of 54 percent for the top decile and 26 percent for the top percentile. For this reason, we use the time series pattern offered by the tabulated gross wealth of Statistics Norway and scale down the wealth shares to match the Epland-Kirkeberg reference level of 2009.

Altogether, the Norwegian long run wealth concentration estimates are thus highly problematic in several respects. Looking at the overall trend in wealth concentration, however, it appears to be relatively robust to variations in some of our assumptions and it does not deviate much from the long-run inequality trends observed in other countries.

Figure 14 presents the trends in Norwegian wealth concentration between 1789 and 2002. The figure shows the top wealth decile broken up into the bottom 5 percent (P90–95) of wealth holders, the next 4 percent (P95–99), the top percentile, as well as the top 0.1 percentile. Norway's top wealth holders experienced quite different trends in their relative positions over the period. As for the bottom 5 percent of the top decile, its share decreases between 1789 and 1912 and then jumps up sharply between 1912 and 1930 to land on a fairly stable (though slowly declining) level thereafter. The wealth share of the next 4 percent, exhibits an inverse-U shaped pattern, increasing sometime in the nineteenth century (we do not know exactly when due to a lack of data), peaking in 1930 and then declining almost monotonically over the rest of the twentieth century. Finally, the share of the top wealth percentile decreases significantly between 1789 and 1868, both years predating Norway's industrialization period. The share then goes up to slightly 1912 only to start decreasing again. The most dramatic falls occur in the postwar period, with the top percentile dropping from 34.6 percent to 17.5 percent during 1948–1983 and the top 0.1 percentile going from 13.2 percent to 5.7 percent over the same period. In the 1990s, there is a rapid recovery which may be related to the oil fortunes being built up in recent times, and to the rise in world stock markets prices that also produces a rise in the top income shares over this period (Aaberge and Atkinson, 2010). The sizeable increase between 1997 and 1998 can also be explained by a change in the Norwegian tax laws specifying an increase in the assessed values of corporate stock on personal tax re-

turns.[86]

[Figure 14 about here]

Despite the somewhat disparate trends among Norway's top wealth holders and underlying problems with the Norwegian wealth tax-based data series, the evidence presented in Figure 14 nonetheless corresponds relatively well with what one could expect given the economic and political history of Norway over this period. The Norwegian economy was badly hit by the economic crisis after the Napoleonic wars, there was a shift in the political power from the great landlords and landed nobility to a class of civil servants.[87] When merchant shipping expanded in the world after 1850 Norwegian ship owners and manufacturers experienced a tremendous economic boost. When looking at the average wealth of various occupations in 1868 listed in Mohn (1873: 24), the four richest groups were manufacturers (having 160 times the country average household wealth), merchants (124 times), ship owners (96 times) and civil servants (87 times). Half a century later, in 1930, a similar comparison between the wealth of top occupations groups and the country average was made (Statistics Norway 1934, p. 6), and only ship owners had kept the distance to the rest of the population (having 119 times the country average wealth), while merchants (22 times) and manufacturers (19 times) had lost wealth relative to the average.

3.2.1.7 Sweden

In a recent study, Roine and Waldenström (2009) compiled available evidence of historical wealth distribution data for Sweden to construct a homogenous series of top wealth shares from time of the industrial take-off in the late nineteenth century up to the early 2000s.[88] The primary basis for these series was wealth tax statistics published in various sources, including Censuses and special public investigations by tax authorities or the Ministry of Finance. The concept of wealth in these sources is typically net wealth in tax-assessed values. However, these data were complemented by on estate tax material originally presented by Ohlsson, Roine and Waldenström (2008) for a few points in time: 1873–1877, 1906–1908, 1954/55,

[86] The tax-assessed values of stocks were raised in 1998, for stocks listed at the Oslo Stock Exchange from 75 percent to 100 percent of the market value and for non-listed stocks from 30 percent to 65 percent of a stipulated market value.

[87] Historical account taken from the section on Norway's history during 'The Napoleonic Wars and the 19th Century' in *Encylopædia Britannica Online*.

[88] Prior to the study by Roine and Waldenström (2009) and series presented in Ohlsson, Roine and Waldenström, (2008), the long run evolution of Swedish wealth inequality was also studied by Spånt (1979, 1982).

1967, and 2002–2003. A striking resemblance between wealth tax and estate tax data emerges regarding the patterns over the twentieth century. In addition to these sources, there is also an early observation of Swedish gross wealth inequality in 1800 using evidence collected by Soltow (1985) from a national tax assessment.[89] This observation comes from a wealth census that was carried out in 1800 and describes the gross wealth distribution for the population of males aged 20 and older.[90]

Figure 15 shows the evolution of top wealth shares over the past two centuries. Looking first at the pattern over the nineteenth century, our observations indicate a relatively stable wealth distribution which by today's standards was very unequal. As there are no observations between 1800 and 1873 (or actually 1908) there is little that can be said about the nineteenth century development. However, Soltow (1989a) makes attempt to do so using public reports about the amount of citizens in four specified social classes ("destitute", "poor", "moderately rich", "rich") between 1805 and 1855 and some other sources of property distribution. His main conclusion regarding the wealth inequality trend is that overall inequality seems to have decreased over this period and all the way up to the twentieth century.[91] Soltow admits, however, that his calculations do not exclude the possibility that the top 1 or 2 wealth percentiles may have actually increased their share of total private wealth.

Over the twentieth century the picture is much clearer. We are able to use multiple sources which overlap in time and, even though there is still uncertainty about the levels over time, the trends seem relatively certain. The long run trend in wealth concentration in Sweden over the twentieth century is that the top decile has seen its wealth share drop substantially, from around 90 percent in the early decades of the century, to around 53 percent around 1980, and then recovering slightly to a level around 60 percent in recent years. In the bottom half of the Swedish wealth distribution there is a considerable share of households holding negative net wealth, a fact that appears to be partly due to widespread state loans for college studies but partly also because several important assets, e.g., condominiums and private and public pension savings, are not fully covered in the official wealth statistics.

[89] The observant reader notes that Finland experienced a similar tax in the same year. These taxes were part of the same assessments since Finland still was part of Sweden during this period. Our analysis, however, is confined to Sweden's current borders.
[90] About one third of the males were wealth holders, and we adjust for the remaining two thirds when computing the inequality estimates (using data in Soltow, 1985, table 5, p. 18).
[91] See Soltow (1989b, tables 1 and 2, pp. 49–53).

Looking just at this general trend is, however, incomplete if one is to really comprehend the evolution of wealth concentration. Decomposing the top decile as shown in Figure 15, we see that the majority of the top decile actually experiences substantial gains in wealth shares over the first half of the century. The overall drop in the top decile share is explained by such dramatic decreases in the top percentile share that this outweighs the increase for the lower groups in the top decile. In the period 1950–1980 the entire top five percentile experiences declines in wealth shares but the decrease is larger for the top percentile and after 1980 the trend is again the same for both groups but now the gains in wealth shares are somewhat larger for the top percentile.

[Figure 15 about here]

How can we account for these developments? Focusing first at the decreases in the very top of the distribution over the first half of the century we note that most of the decrease takes place between 1930 and 1950, with the sharpest falls in the early 1930s – a time of financial turbulence and in particular the collapse of the Kreuger company empire – and just after the Second World War.[92] The period after 1945 was a time when many of the reforms discussed in the 1930s, but put on hold by the war were expected to happen and politically the Communist Party gained ground forcing the Social Democratic Party to move to the left.[93] In particular, the progressive taxes that had been pushed up during the war remained high and also affected wealth holdings as Sweden had a joint income and wealth tax until 1948.

The main reason for the decreasing share in the very top is, however, likely to be the increasing share for the lower part of the top decile and this, in turn, is likely to be increased wealth accumulation among relatively well-paid individuals. After 1945 the trend of increased accumulation of wealth continues down the distribution. Over the next thirty years the most important change is the increased share of owner-occupied housing in total wealth which increases from being 17 percent of all wealth to 45 percent in 1975 and remains around that in 1997 when adding owner occupied apartments and houses, and vacations homes (Roine and Waldenström, 2009). Even if this type of wealth was far from evenly accumulated across the distribution it accrued to relatively large groups in the distribution causing wealth concentra-

[92] While Sweden was not as affected by the Great Depression as many other countries, the so called Kreuger-crash in 1932, the bankruptcy of Ivar Kruger's industrial empire, led to major loses of wealth in Sweden.
[93] See, for example, Steinmo (1993).

tion to keep falling. Today about half of all households in Sweden own their homes.[94] Over the past decades fluctuations in wealth shares depend largely on movements in real estate prices and share prices. Increases in the former has a tendency to push up the share of the upper half of the distribution at the expense of the very top causing inequality to go down, while increases in share prices makes the very top share larger due to share ownership still being very concentrated causing inequality to increase.[95] In the year 1997 the top percentile in the wealth distribution owns 62 percent of all privately held shares and the top 5 percent holds 90 percent.[96]

3.2.1.8 Switzerland

Data on the Swiss wealth concentration are based on wealth tax returns compiled by tax authorities for disparate years between 1913 and 1997 and analyzed by Dell, Piketty and Saez (2005). The Swiss wealth tax was levied on a highly irregular basis and the authors have therefore spliced several different point estimates from local as well as federal estimates to get a roughly continuous series for the whole country.

Figure 16 depicts top wealth shares within the Swiss top wealth decile over the twentieth century. In stark contrast to the other countries surveyed in this study, wealth concentration in Switzerland appears to have been basically constant throughout the period. The wealth shares at the top of the distribution have decreased but the movements are small compared to all other countries studied.[97] This does not only refer to the top decile vis-à-vis the rest of the population, but perhaps most strikingly also to the concentration of wealth within the top. The highest percentile and the top 0.1 percentile have not gained or lost considerably compared the bottom nine percent of the top decile, except for some short-run fluctuations.

Accounting for this long-term stability of Swiss wealth inequality is not easy. One possibility is the country's relatively low level of wealth taxation, which suggests a low rate of redistribution and small effects on the incentives to accumulate new wealth. The twentieth century

[94] A specific feature of the Swedish wealth distribution in recent decades is the large share of negative net wealth holders, almost a third of the adult population. There are several factors explaining this characteristic, including widespread state loans for higher education and an underreporting of important assets such as condonimiums and private and public insurance savings (see further, e.g., Jansson and Johansson, 2000, and Cowell, 2013).
[95] In their study of the role of capital gains Roine and Waldenström (2012) discuss some agregate asset developments in Sweden since the 1980s. This indicates that the surge in financial asset values has been much larger than overall real estate values.
[96] Jansson and Johansson (2000, p. 38–40).
[97] A simple trend regression yields small but significant negative coefficients.

experience with high taxes on wealth and inheritance appears to have contributed to the low top income and wealth shares in a number of countries, as we discuss elsewhere in this chapter. However, the fact that Switzerland stayed out of both of the world wars cannot alone account for the stable wealth distribution; Sweden also escaped both world wars does not share the Swiss pattern. In any case, the Swiss top wealth share series seriously question the hypothesis that significant economic development always lead to a lower level of wealth inequality over time for reasons of either redistribution or simply relatively quicker accumulation of household wealth among the middle class.

[Figure 16 about here]

3.2.1.9 United Kingdom

There are a number of estimates of the wealth concentration in the U.K. dating back to the country's industrialization in the middle of the 18th century. Prior to 1900, data on wealth distribution are less homogenous and emanate from scattered samples of probate records and occasional tax assessments (see Soltow, 1981, Lindert 1986, 2000). It was not until the Inland Revenue Statistics started publishing compilations of estate tax returns after the First World War that the series are fully reliable (see Atkinson and Harrison 1978; Atkinson, Gordon and Harrison 1989).[98] Still there are some notable breaks in the series. For example, the geographical unit of analysis changes over time, with pre-Second World War numbers almost always being England and Wales while the postwar ones reflect all of the U.K. Data in Atkinson et al. (1989, table 1) show, however, that the differences between these entities are fairly small. More importantly, the tax authority changed some of its methods to compute top wealth shares leading to large breaks in the time series around the Second World War, in 1960 and around 1980. Among the important changes were lowered age-cutoffs, different treatment of life insurance policies and valuation of consumer durables, and also more careful collection routines of the tax authorities.[99]

When England industrialized in the second half of the eighteenth century, the build-up of personal wealth also changed. Looking at the overall wealth concentration in Figure 17 it is evi-

[98] The Inland Revenue actually started publishing estate tax data in 1896 but not divided by age, which precludes estimation of the wealth distribution using the mortality multiplier method. Note also that the mortality multiupliers used by the Inland Revenue were based on age only up until 1923 when they were based on both age and sex.

[99] See further Atkinson and Harrison (1978, chapter 6) and Atkinson et al. (1989) for an extensive discussion of these breaks.

dent that there is great heterogeneity within the top five percentiles of the distribution.[100] Apparently, wealth concentration at the very top increased while, by contrast, the wealth share of the next four percentiles saw its wealth share decline during the same period. Using supplementary evidence on personal wealth, Lindert (1986, 2000) shows that wealth gaps were indeed increasing in the absolute top during the nineteenth century, with large landlords and merchants on the winning side. At the same time, Lindert points out that the middle-class (in this case those between the 60th and 95th wealth percentiles) were also building up a stock of personal wealth, and this is probably what is causing the drop in the share of the next four percent in Figure 17.

[Figure 17 about here]

After the First World War, the pattern was the reversed. While the top percentile wealth share dropped dramatically from almost 70 percent of total wealth in 1913 to less than 20 percent in 1980, the share of the next four percentiles remained stable and even gained relative the rest of the population. Atkinson et al. (1989) argue that this development was driven by several factors, but that the evolution of share prices, the ratio of consumer durables and owner-occupied housing (so called popular wealth) to the value of other wealth were the most important ones. According to the most recent statistics from the Inland Revenue, the top percentile's share has increased by about one third between 1990 and 2003, but this increase has not yet been explained by researchers. Possibly, it reflects the surge in share prices following the financial market deregulation of the 1980s as the financial wealth are most concentrated to the absolute top of the wealth distribution.[101]

3.2.1.10 United States

The historical development of wealth concentration in the U.S. has been extensively studied by economists and historians, and estimates are available back to the time of the American Revolution. In this study, we combine different pieces of evidence to create long and relatively homogenous series of wealth inequality. As acknowledged by previous scholars, there are several problems concerning consistency over time which has spurred some controversy over both definitions of data and conclusions drawn. For these reasons, we compare some of the

[100] The reader should keep in mind that this figure, and several others in this study, contains spliced series coming from different sources which naturally may impede the degree of homogeneity over time.
[101] This is a stylized fact which is true for many developed countries (see, e.g., the overview of 'stylized facts' in Davies and Shorrocks 2000).

complementary series using different sources and wealth definitions to get an idea of how large these problems may be.

Our focus is the evolution of U.S. top wealth shares from colonial times to present day. The main series refer to the distribution of net wealth among households and for these we show wealth shares of fractiles within the entire top decile. Still the figure also presents the top percentile shares in the adult distribution for which there are rich, annual data available over especially the twentieth century. The top wealth shares for the household distribution prior to 1900 are few but important as they determine our notion of the link between industrialization and inequality in the U.S. There has been some disagreement over the pre-1900 inequality trends, with some scholars arguing that pre-industrial U.S. inequality was high and that inequality was basically stable during the nineteenth century (e.g., Soltow, 1971, 1989) while others have argued that U.S. wealth inequality increased markedly between the Revolution and the latter half of the nineteenth century (e.g., Williamson and Lindert 1980a, 1980b, Lindert 2000). In this chapter, we use the observations reported by Lindert (2000). These are essentially the estimates from the seminal contributions of Alice Hanson Jones (see, e.g., Jones 1970, 1972, 1980) which including adjustments to add unfree men and women to the reference total population.

The available evidence for the twentieth century is more unified, with long run series being based on a combination of estate tax returns and survey data (see, e.g., Lampman 1962, Smith 1984, and Wolf and Marley 1989). We use the compilation of those sources by Wolff (1996) for the period up to 1958, and for the period thereafter we use the survey data from the Survey of Consumer Finances and its forerunners presented by Kennickell (2009, 2011).[102] For the adult population, our preferred estimate for 1774 is from Lindert (2000).[103] For the nineteenth century, there are unfortunately only gross wealth estimates for the adult population (see Lindert, 2000) and therefore the next evidence is for the years 1916–2000 provided by Kopczuk and Saez (2004) using mortality multiplier-adjusted federal estate tax returns.

[102] Wolff (2012) also uses Survey of Consumer Finances data to compute a series of U.S. wealth concentration since 1962, but his series deviates from those of Kennickell (2009, 2011). Wolff explains this with his exclusion of consumer durables from the wealth concept, motivated by the fact that these are neither easily marketable nor included in the national accounts-based definition of household wealth. In this chapter, we use Kennickell's series as they match the earlier evidence from U.S. surveys and estates which consistently included consumer durables among household assets.

[103] As Lindert (2000, footnote to table 3) notes, this estimate deviates slightly from that of Shammas (1993) since the latter also includes the wealth of British residents living in the U.S. colonies.

Figure 18 shows the results. Beginning with the two top percentile series, they appear to be inversely U-shaped over the period, with wealth shares increasing slowly between the late eighteenth and the mid-nineteenth century but then much faster between 1860 and 1929, when they more than doubled. The long-run pattern of the lower 9 percent of the top wealth decile, however, exhibit stable or even decreasing shares of total wealth (although based on rather few observations). This inequality increase in the absolute top coincides with the industrialization era in the U.S. around the mid-nineteenth century. Although the few pre-First World War estimates are uncertain, their basic message is supported by researchers using other sources. For example, Rosenbloom and Stutes (2008) also find in their cross-sectional individual analysis of the 1870 census that regions with a relatively high share of its workforce in manufacturing had relatively more unequal wealth distributions (see also Moehling and Steckel 2001). Another anecdotal piece of evidence in support for a linkage between industrialization and increased inequality is that the fifteen richest Americans in 1915 were industrialists from the oil, steel and railroad industries and their financiers from the financial sector.[104]

[Figure 18 about here]

The twentieth century development in Figure 18 suggests that wealth concentration peaked just before the Great Depression when the financial holdings of the rich were highly valued on the markets. In the depression years, however, top wealth shares plummeted as stocks lost almost two-thirds of their real values. Kopczuk and Saez (2004) show that among corporate equity represented more than half of the net wealth of the top 0.1 percentile wealth holders in 1929. Another contributing factor to wealth compression was surely the redistributive policies in the New Deal. After the Second World War, the top percentile wealth shares remained low until the 1980s when the top household percentile's share increased significantly, peaking around mid-late 1990s and then to decline somewhat in 2001. By contrast, the top adult percentile wealth share from the estate series in Kopczuk and Saez (2004) exhibits no such increase, which is surprising given that this period also saw a well-documented surge in U.S. top incomes (Piketty and Saez 2003). Whether the difference in trends between the household and adult distributions reflects inconsistencies in the data or some deeper dissimilarity in the relation between income and wealth accumulation remains to be examined by future research.

[104] See the listing of the top 20 fortunes in 1915 by De Long (1996).

3.2.2 Cross-country trends in long-run wealth concentration

Above we have presented a compilation of recent as well as some new evidence on the long-run evolution of wealth inequality in ten Western countries: Australia, Denmark, Finland, France, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, the United States. As we have already pointed out, the quality of these data differs substantially across countries and in some cases even within single countries over time. Like many previous researchers, we have attempted to adjust the series so as to make them consistent and comparable over time, but naturally some problems remain. Still, we have tried to classify the series (countries) into different quality levels in order to run the analysis on more homogenous subsets, and those exercises do not produce any notably different conclusions with respect to the long-run trends in wealth concentration.[105]

Figure 19 shows the top wealth percentile in each of these countries for various periods during 1740–2011. Furthermore, Figure 20 contrasts the trends in the top percentile against those in the next four percentiles (P95–99). Even though great caution should be taken when comparing these series we still believe that some conclusions can be drawn about the developments of wealth inequality in these countries over the past two hundred years.

[Figure 19 about here]

[Figure 20 about here]

Two broad conclusions can be drawn from the series as summarized by Table 5. First, the evidence does not unambiguously support the idea that wealth inequality increases in the early stages of industrialization. Looking at the development of the wealth share of the top percentile among the countries analyzed here, the Nordic observations indicate fairly stable inequality levels over the initial stages of industrialization (i.e., in the late nineteenth century). The U.K. series (England and Wales) exhibit clearly increasing wealth shares for the top percentile in the period of the two industrial revolutions (1740–1911), as do the U.S. and French series over the nineteenth century. For the Netherlands, the evidence is less certain, indicating

[105] For exanple, there are some countries for which the data are quite composite in terms of data sources, coverage of assets etc. (e.g., Australia, the Netherlands and Norway) but when removing them from the analysis does not change the overall pictures reported. It is more difficult to adjust further for qualitative breaks over time within countries, and both the Norwegian and the U.K. series during the 20th century contain some important break points in data definitions and quality. However, even if we had acted differently when connecting the segments separated by break points for these countries, we would still have observed a marked long-run trend towards wealth compression in both these countries.

either a flat or a slightrly increasing nineteenth century trend (van Zanden, 1998b; Vermaas, Verstegen and van Zanden, 1998). Overall this suggests that going from a rural to an industrial society, with entirely new stocks and types of wealth being created, may, but does not necessarily, give rise to a large increase in wealth concentration. It also suggests that – just as in the case with income inequality series – carefully studying smaller fractiles of the distribution is necessary to get a more complete picture of the development.

Second, although the series do not suggest a clear common pattern over the nineteenth century when industrialization took place (first in the U.K., later in the U.S., France and the Netherlands and towards the end of the century in the Nordic countries) the development over the twentieth century seems more uniform. Top wealth shares have decreased sharply in just about all countries studied in this chapter with the exception of Switzerland, and possibly also the U.S., where the fall has been small, but where the level also was not as high historically as in most European countries. The magnitude of the decrease seems to be that the top percentile lost its share of total wealth by about a factor of two on average (from around 40–50 percent in the beginning of the century to around 20–25 percent today). It also seems that the lowest point in most countries was around 1980 and that the top percentile wealth share has increased in most countries after that. Interestingly, the wealth share of the next 4 percentiles (P95–99) does not display any strong indications of a decreasing trend. Indeed, there are periods of notable equalization also affecting this wealth fractile, but over the course of the entire century Table 5 clearly highlights that this moderately rich group sustained its share of total wealth. This said, there were likely replacements between economic groups and types of actors over time (as also suggested by the country case studies above), indicating that the cross-sectional evidence also needs to be complemented by evidence about mobility within the distribution.[106]

[Table 5 about here]

Similar to the analysis of long run top income shares, we can make a closer examination of the evolution of wealth concentration expressed in terms of wealth shares of the very top groups within the a larger top group. This approach results in a slightly different measure of

[106] See, e.g., the study by Edlund and Kopczuk (2009) which finds that the share of women in the U.S. wealth top fluctuated and that this indicates changes in the relative importance of dynastic versus entrepreneurial wealth.

inequality as it looks at the inequality *within the top* of the wealth distribution and not overall inequality overall. As some theories are especially concerned with widening gap among the rich, investigating inequality among the wealthy can make sense.[107] Furthermore, estimating the reference total wealth held by the full population is associated with potential error. Applying the shares-within-shares measure by dividing the top wealth percentile by the top wealth decile, P99–100/P90–100, we land at a ratio that effectively eliminates the reference total.[108]

Figure 21 depicts the evolution of wealth concentration using the shares within shares estimate. Two countries drop of out the picture (Australia and the Netherlands) due to a lack of long run data on the top wealth decile, and there are also fewer observations for the countries still in the comparison. Still the patterns confirm our previous findings. The equalization of the twentieth century is clearly observed except for in the Swiss (and possibly the U.S.) cases. As for the nineteenth century development, the picture gets a bit blurry, largely due to a lack of data. The Nordic countries exhibit similar inequality trends as above: rising in Finland and Sweden but falling in Denmark and Norway. France also looks quite similar as when the actual top shares are examined. Overall this implies that, notwithstanding the variations, most of the long run wealth inequality trends are driven not by the changes of the very top in relation to those just below, but by the change of the entire wealth top in relation to the rest of the population.

[Figure 21 about here]

3.3 The composition of wealth

Up until this point, the analysis has dealt primarily with the distribution of total net wealth. However, the composition of wealth across asset types (and debts) also matters to wealth inequality trends just as the composition of labor and capital incomes was shown in the previous sections matter for the trends in income inequality. Unfortunately, when it comes to the historical evidence about wealth composition across the wealth distribution, we know almost nothing. As for the aggregate composition of private wealth, we know more thanks to both

[107] There are several theories that in various forms imply an advantage for the very top of the distribution, e.g., the superstar model of Rosen (1981). See section 4 in this chapter for more.

[108] Similar to the result found for top incomes, for top wealth percentile P99–100 = W_{Top1}/W_{All} (with W = Wealth) and top wealth decile P90–100 = W_{Top10}/W_{All}, we get P99–100/P90–100 = $(W_{Top1}/W_{All})/(W_{Top10}/W_{All}) = W_{Top1}/W_{Top10}$.

old and more recent evidence.[109] These data show that agricultural assets practically vanished over the course of the two past centuries. Private housing, by contrast, increased its share of total national wealth from one fifth in the nineteenth and early twentieth centuries to three fifths today, largely corroborating the previously documented postwar rise in "popular wealth", dwellings and consumer goods, among the broad layers of the population.[110]

Among the few studies that contain evidence on the wealth composition across different groups of wealth holders, less than a handful offer some kind of historical evidence. One stylized fact that seems to hold regardless of time period, however, is that financial assets in general, and corporate securities in particular, are consistently more important in the portfolios of the rich than of the rest of the population. For example, Kennickell (2009) and Cowell (2013) show that the share of basically financial assets in the top wealth decile was higher than for the population as a whole (except for savings, which are more important for middle class households between the median and the 90th wealth percentile). Kopczuk and Saez (2004) show that the share of corporate stock in the portfolios of top 0.5 percentile U.S. wealth holders (using estate tax data) was between 40 and 60 percent during 1916–2000 and that this was strictly higher than for the whole population (using national wealth estimates).[111]

In their study of trends in French wealth concentration, Piketty, Postel-Vinay and Rosenthal (2006) document similar patterns for France over the nineteenth century. Specifically, they look at the share of personal estate, which includes all non-real assets, in total assets and find that its share was higher among the richest in the top 0.1 percentile than among the intermediately rich in the rest of the top wealth decile. It was, however, also very high among the broad layers population (the bottom nine wealth deciles). They authors explain this U-shaped pattern by the fact "that real estate is a middle class asset: the poor are too poor to own land or buildings; what little they have is in furniture, cash, or other moveables. In contrast, the rich hold most of their wealth in stocks and bonds." (p. 244).

Altogether, the historical evidence on the composition of wealth across the distribution suggests that housing wealth is more important in the portfolios of the broader population while

[109] See the chapter by Thomas Piketty and Gabriel Zucman in this Handbook, and the references therein.
[110] See Piketty and Zucman (2013, appendix table A18) and, for an early observation of the postwar rise in popular wealth, Atkinson and Harrison (1978).
[111] The relative difference has varied notably from at least double as high (from the 1930s to the 1980s) to less than ten percent (in year 2000).

financial assets dominate the portfolios of the rich. Furthermore, the new long-run evidence on aggregate wealth of the private sector shows that housing wealth became more important in total national wealth after the Second World War, and this fact probably explains a large part of the documented wealth compression witnessed in many Western economies during this period.

3.4 Concluding discussion: What do the long run wealth inequality trends tell us?

What then can we say about the relationship between wealth concentration and economic development based on the data reported in this chapter? Can one talk about common patterns across countries over the development path or are there mainly a set of disparate country-specific histories? Have initial wealth inequalities been amplified or reduced? Taking stock of the series shown here suggests that industrialization was not unambiguously accompanied by increasing wealth inequality. While inequality did indeed increase in the U.K., the U.S. and in France, it probably did not change much in the Netherlands, Finland, Norway and Sweden and even decreased a little in Denmark. Noting that the countries in the first group all were large, central economies which were early to industrialize, while the Netherlands and the Nordic countries were smaller economies which industrialized later, may hold clues to the different experiences but it does not change the fact that industrialization did not increase wealth concentration everywhere.

The experience over the twentieth century appears to be much more homogenous. As the countries continued to develop top wealth concentration also dropped substantially. Looking at the details of the pattern by which different fractiles gain wealth shares indicates that this drop was due to a gradual process of wealth spreading in the population – confirming the role of increasing “popular wealth” identified in, e.g., Atkinson and Harrison (1978). In a sense this pattern is consistent with a Kuznets-type process where inequality eventually decreases as the whole economy becomes developed. However, this development was probably not driven by the kind of process suggested by Kuznets, but mainly by other factors such as political interventions and exogenous shocks. Piketty et al. (2006) argue that it primarily were adverse shocks to top wealth during the period 1914–1945 related with wartime shocks that decreased French wealth inequality, and that the subsequent introduction of redistributive policies that prevented them from recovering. Piketty (2011) and Piketty and Zucman (2013) emphasize that the wartime shocks to capital were only to a limited extent the consequence of outright

destructions of factories, constructions or infrastructure, instead pointing at the importance of capital taxation and regulation. A similar explanation is given by Kopczuk and Saez (2004) for the U.S.[112] This reasoning has been supported by the fact that Switzerland, which did not take part in either of the wars exhibits rather stable top wealth shares. Our data on Sweden, which also did not participate in any of the world wars, shows an example of equalization taking place without decreases in top wealth shares driven by exogenous shocks. Even though events such as the Kreuger-crash in 1932 hit top wealth holders in Sweden as well, this does not explain the entire drop. Policy may, at least in Sweden, have played a more active role in equalizing wealth than merely holding back the creation of new fortunes after the Second World War. Suggesting that rising taxation and increased redistribution has been important for the decline of wealth inequality is also consistent with the largest drops taking place in the Scandinavian countries as well as with the smaller decline in Switzerland, with its smaller government.

Altogether the data presented here suggest that (a) there was a mixed impact of industrialization and (b) in later stages, after countries became industrial, significant wealth holding spread to wider groups, bringing wealth inequality down. In terms of the often discussed inverse U-shape over the path of development the first upward part does not seem to be present everywhere, while the later stage decrease in inequality does fit all countries we have studied. An important addition to this characterization is that this analogy misses an important point which is present in the series. While the inverse U-shape suggests that the distribution of wealth starts at some level in a non-industrialized society, then rises, and later returns to the same level of inequality, all our series indicate that development has unambiguously lowered wealth concentration. The proper characterization of wealth inequality over the path of development hence seems to be that, so far, it follows an inverse J-shape with wealth being more equally distributed today than before industrialization started. The direction of future inequality remains to be seen.

[112] Scheve and Stasavage (2010, 2012) show the increased taxation of capital and high incomes was indeed political developments associated with wartime events.

4. Determinants of long run trends in inequality

How can we understand the trends in the distribution of income and wealth outlined in the previous sections? Do the series systematically relate to other developments in society that have been suggested to influence inequality and, if so, in what ways? How can we connect the observed long-run trends to existing theories about inequality? These are questions that we address in this subsection.

A number of facts that are likely to be important have already been noted in the previous sections along with the characterization of the trends. A first point is that an understanding of the development involves both wage and capital income and thereby the dynamics are at least in part jointly determined by the distributions of income and wealth. For example, the drop in top shares over the first half of the twentieth century was largely a result of decreased capital incomes in the top, which in turn was largely driven by decreasing wealth shares in this group. High marginal tax rates in the decades after World War II made recovery difficult and caused top shares to decrease even further. We will explicitly look at these explanations in section 4.2 below.

When it comes to the increase in top income shares since around 1980 this seems to be primarily related to increasing top wages, especially in the US, but increasing capital incomes in the top also play a role in many countries (such as Sweden), especially after around 1990.[113] The increased earnings dispertion is often attributed to aspects of globalization and technological change. Many have pointed to technological change being skill-biased, usually equated with an increasing education premium, as a possible reason for increasing wage differences. But skill-biased technological change does not automatically lead to increasing wages of the "skilled". The impact on wage dispersion depends on several things, such as the structure of the production function and the change in the supply of educated workers.[114] Unless the dynamics in "the race" between technology and education are made explicit, skill-biased technological change can be consistent with any number of "education premium" profiles over

[113] See Chapter 9 for a detailed view of inequality developments since 1970, where the increasing role of capital income in the top is also noted.

[114] A technology that makes skilled workers more productive *decreases* the wage per unit of skill but *increases* relative demand of skilled workers. This alone can drive the wage of skilled workers both up and down. In addition the response (and the speed of it) in the supply of skills will determine the movement in relative wages of the skilled and unskilled.

time.[115] Furthermore, even if one were to focus on a version of the model where the increased demand for skills actually lead to increasing wage dispertion, it is difficult to see how this would explain that so much of the increase is concentrated to a relatively small top group. To account for such increases within the top it seems necessary to find something that distinguishes a small fraction of the "skilled" from others who are equally educated (at least in terms of obsevables). Examples of such explanations include a number of so called "superstar" theories, where technology and globalization disproportionately has benefitted those who – for various reasons – are most in demand in their field. Others have emphasized the possible role of changing norms. Some of the theories that have been put forth to understand the rise in top earnings over the past decades will be the subject of section 4.3.

Finally, in section 4.4 we present an overview of some recent econometric evidence on correlations over the long run. These regressions do not constitute tests of any particular theory but nevertheless give some insights as to what relationships seem to be present in the data.

We will begin the current section, however, with offering a broad overview of major events and societal trends that have been suggested to influence the distribution of income and how these correspond to our long-run pattern of top income shares. We will also discuss what the new series imply for our understanding of the Kuznets curve. Our conclusion is that, even if some broad trends are consistent with proposed broad explanations, we cannot distinguish between alternatives just based on looking at how inequality has developed. Instead we need to look more carefully at developments in different parts of the distribution, at the source of income and in particular on how income and wealth relate to each other, and also relate all these aspects to predictions from theory.

4.1 A first look at inequality trends, structural changes and shocks

What is the relationship between top income shares and the broad societal changes that have been hypothesized as affecting distributional outcomes? How well do the basic patterns match? Below we will discuss inequality developments in relation to trends in globalization,

[115] See Atkinson (2008a) for an explanation of the textbook model and a thorough discussion of other aspects that need to be considered. On the importance of the dynamics he notes "Surprisingly, the dynamics of wage differentials seem to have been little discussed in the literature of recent years. Yet, there is good historical precedent. In 1959, Arrow and Capron published a paper on dynamic shortage and price rises, with an application to the then shortage of engineers and scientists—an application that seems of contemporary relevance." (Atkinson, 2008a, p. 10).

technological breakthroughs that have altered production in society (often referred to as general purpose technologies, GPT), inequality in relation to wars and shocks to the economy, and finally inequality in relation to economic growth.

Globalization has been suggested to affect inequality in a number of ways. Classical trade theory in the spirit of Eli F. Heckscher and Bertil Ohlin has clear prediction for inequality: In countries relatively abundant in skilled labour and capital ("developed countries") inequality increases, while the reverse is true in (low-skill) labour abundant developing countries where instead inequality goes down.[116] Modern trade theory is less clear-cut. While some effects, like the gains to the largest most productive firms (in models like Melitz, 2003, and Melitz and Ottaviano, 2008) seem to suggest increasing returns in the top, others have pointed to globalization being most beneficial for the top *and* the bottom, while hurting individuals in the middle of the distribution (e.g., Leamer, 2007, Venables, 2008). Yet others have pointed to the possibilities of efficiency gains from globalization being so large that these effects can compensate losses from, for instance, offshoring (Grossman and Rossi-Hansberg 2008).

Looking at the inequality developments over what has been labeled as different waves of globalization the first wave (1870–1914) coincides with flat or increasing inequality, followed by decreasing inequality in the anti-globalization period (1914–1950).[117] As most countries for which we have data belong to the relatively skill and capital abundant this could be seen as in line with theoretical predictions.[118] The second wave of globalization is harder to reconcile. In 1950–1980 measures of globalization (trade flows/GDP, foreign capital as share of GDP) clearly increase while inequality clearly decreases. There are some obvious counterarguments to this. First, one may argue that the level of globalization was not yet sufficiently high for the predicted effects to show, but second, one could also point out that this was a

[116] These effects remain across the many versions of Heckscher-Ohlin type models. See, for example Wood (1994) for a summary of the basic arguments..

[117] Clearly the definition of what constitutes a period of globalization is somewhat arbitrary. Most authors seem to agree that there was a globalization period before 1914, though there is disagreement as to when it started. It is also commonly accepted that the period between 1914 and 1945 was an era of increased protectionism characterized by drastically smaller economic flows between countries. This has gradually been reversed after 1945. To emphasize the difference between the intensity in globalization some refer to the period between 1945-1980 as a second wave (with gradually increasing globalization) as different from the period after 1980 when globalization really takes off. See Lindert and Williamson (2003) and World Bank (2002) for details on different views on periods of globalization.

[118] Note, however, the important point made by Williamson (2006) that the effects depend on the *relative* abundance more than on a country being rich or poor. Inequality developed in opposite directions in the periphery depending on the labour abundance/scarcity.

period when most of capital flows and trade was between developed countries.[119] If one places the start of the recent era of increased globalization around 1980 instead, the pattern is more promising as the period thereafter is characterized by increasing inequality. A problem is of course that during this period inequality has been increasing in developing countries too, counter to the basic Heckscher-Ohlin model.[120]

What about innovations leading to skill-biased technological change? Such shifts play a major role in the large literature trying to explain recent changes in the earnings distribution. Models building on Tinbergen's (1974, 1975) seminal work suggest that the returns to skills are determined by a race between education (creating a supply of skilled workers) and technology (implicitly technology that complements skills). Technological change pushes in the direction of increased wage differences between skilled and unskilled, unless education keeps up and creates an increased supply of skilled workers that keeps down the wage differences. Goldin and Katz (2008) bring much of this work together in a unified framework. Acemoglu and Autor (2011, 2012, 2013) give overviews of much of this literature and also claim that these models have been empirically successful in accounting for recent wage dispersion mainly based on U.S. data (e.g., Katz and Murphy, 1992, Katz and Autor, 1999, and Autor, Katz and Kearney, 2006).

But, as already pointed out, skill-biased technological change does not automatically result in increased wage differences (and even less automatically in increased inequality). Even in the simplest model the outcome depends on the speed of the supply response, and depending on the relative shifts in demand and supply of skills the resulting wage differential between the groups can look different. In particular, this means that even if countries are affected by the same technological change, the impact on the wage distribution may look very different depending on how responsive countries are in terms of improving the skills in the population. See Atkinson (2008) for more details and additional caveats to the simple model.[121]

Another historical aspect of technological change, noted for example by Caselli (1999), is that it has not always been skill-biased. Indeed, some of the technological advances in the late 18th and early nineteenth centuries replaced, rather than complemented, skilled artisans and

[119] This observation is indeed the bases for much of the developments in trade theory since the late 1970s.
[120] See Freeman (2009) for more on the relationship between globalization and inequality.
[121] Also see Atkinson (1999) for an early critique of overly simplified versions of skill-biased explanations.

increased the productivity of low skilled workers (Mokyr 1990). Later advances, such as the electrification of industry in the late nineteenth century, seem to have been more skill-biased. Firms using more electricity paid workers higher wages, workers were more educated, and these firms had higher capital-ratios (Goldin and Katz, 1998). But soon thereafter the introduction of the assembly line at Ford's Highland Park facility in 1913 seems to be another technology shift that increased the relative productivity of unskilled workers.

If (and this is a potentially big "if") one accepts that technology shifts that are skill-biased always lead to increasing inequality, and vice versa for de-skilling technological change, then the basic historical pattern looks promising. The skill-biased electrification coincides with increasing or at least unchanged inequality, the introduction of the assembly line coincides with the start of the long decline in inequality, and the recent ICT revolution starting in the 1970s and 1980s also happens at the time when inequality turns up again. But obviously this does not mean that we can conclude anything about the relationships. In addition to the many assumptions needed there are some other factors that are potentially problematic for a simplistic story of technological change driving common patterns of inequality. One is that technological changes do not take place everywhere at the same time. Comin and Mestieri (2013) give an overview of technology adoption lags and show that these can be very long. Second, given what we know about the role of capital in explaining the declining inequality in the first half of the twentieth century this seems separate from an explanation emphasizing returns to skills and an increasing earnings dispersion. Third, and perhaps most importantly, an explanation that focuses on the returns to higher education surely includes everyone in at least the top decile group. As such it cannot explain the large changes *within* the top and the fact that much of the recent increase has been limited to the income growth in the top percentile rather than a broader top group.

Shocks in the form of wars and major financial crises constitute yet another broad category of explanations. As already noted in our previous sections, these events certainly seem to have had an impact on top shares, especially in some countries, and in particular on capital incomes. The exact degree to which the equalizations following after the wars were due to outright destruction of capital owned by the wealthy or whether taxes and regulations redistributed wealth and increased overall socio-economic mobility seem to have varied across countries. We discuss this issue further below.

Another broad topic concerns the relationship between inequality and economic growth. The crudest possible illustration of this could be done by dividing history since 1870 into four broad periods based on the overall inequality trends and calculating the average yearly growth rate over these. Starting in 1870 the average growth rate until today is 1.82 percent for the countries in the sample. Dividing this period into four subperiods – 1870–1914, characterized by increasing (or unchanged) inequality; 1914–1950 characterized by rapidly decreasing inequality; 1950–1980 when inequality continued to decline but at a slower rate; and finally the period 1980-today when inequality has been increasing – we can examine the average growth rate in each of these periods. It turns out that only one of these sub-periods has an average growth rate higher than the long-run average 1.82 percent, namely 1950–1980 when average growth was 3.18 percent. This period is is characterized by falling top income shares. The lowest growth rates are in the late 1800s and early 1900s when inequality was relatively flat (or rising), and growth rates in-between can be found both in the past 30 years 1980–2010 when inequality has increased, and in the period 1920–1950 when top shares declined. Based on this it is certainly hard to see any clear secular (bivariate) relationship between inequality and growth.

4.1.1 What about the Kuznets curve?

Despite Peter Lindert's (2000, p.173) urge to the profession to "move onto explorations that proceed directly to the task of explaining any episodic movement, without bothering to relate it to the Kuznets curve", we find it difficult to avoid discussing the Kuznets curve in the present chapter. In the end we will however, perhaps even more clearly thanks to the new evidence we have, come to the same conclusion.[122]

In its crudest interpretation, equating the Kuznets curve with the question "Is it true that inequality first increases and then decreases as a country develops?" the answer must clearly be "No". The fact that the broad pattern of decreasing inequality up until around 1980 has been followed by a sharp increase in some countries (but not all) clearly shows a pattern that is not consistent with inequality following an inverse U-shape, nor is it consistent with changes in inequality being the same across countries at similar levels of development. When testing the hypothesis on broad cross-country samples and in particular on developing countries the evidence is mixed and inconclusive (Kanbur, 2000). With a broader interpretation it could be

[122] Also see Piketty (2006, 2007) for an account of how the recent top income literature impacts on the view of the Kuznets curve.

argued that increasing inequality in recent decades is, in fact, the start of a new Kuznets curve. The technological development starting in the 1970s constitute the start of a shift, not from agriculture to industry as in in Kuznets original story, but from traditional industry to an ICT-intensive sector that initially rewards a small part of the population, but eventually will spread, bringing inequality down. This idea would, under a number of assumptions, fit the general pattern better.

But even in its broader interpretation there are a number of aspects that do not fit the Kuznets curve hypothesis. First, when it comes to the first half of the twentieth century, a main finding of the recent top income literature is that most of the decline is a capital income phenomenon. Even if there was a continuous decline in the share of workers in agriculture and a large rural-urban migration their impact on wage inequality was small; low-wage rural workers were mostly replaced by low-wage urban workers (see the discussion in section 2.3.3 above and also Piketty 2006, 2007). The inequality decline was, as evidenced by the timing of the fall, the source of income, and the concentration of the fall to the top percent-group, due to shocks to wealth holders from the wars, the depression and anti-capital policies.[123] Second, the recent increase since around 1980 has the problem that it doesn't fit the predicted earnings dynamics within the distribution. As an increasing number become skilled the difference within the top should decrease, not increase as seems to be the case.[124].

Taken together the above suggests that there is no mechanical relationship between inequality and industrialization or technological change. It is no more unavoidable that inequality increases at early stages of introducing new technology, than it is automatic that inequality eventually goes down. The Kuznets curve conjecture has indeed played an enormous role in shaping the research on long-run changes of inequality, but the recent research has made it even clearer that it is time to follow Peter Lindert's (2000) suggestion to look at long-run changes "without bothering to relate it to the Kuznets curve". In a way, part of the evidence suggests that other aspects also pointed to by Kuznets (1955) deserve more attention. After all, he formulated the famous Kuznets curve as a suggestion of how to explain what he saw as a puzzle of decreasing inequality. It was a puzzle because what he saw as the more obvious forces at play suggested that inequality be *increasing* in the countries he looked at: "there are

[123] As Piketty (2011, p. 10) puts it: "In effect, the 1914–1945 political and military shocks generated an unprecedented wave of anti-capital policies, which had a much larger impact on private wealth than the wars themselves".
[124] See Atkinson (2008), p. 13 for more on this point.

at least two groups of forces in the long-term operation of developed countries that make for increasing inequality in the distribution of income…" (Kuznets 1955, p.7). The first of these forces had to do with the interplay between the concentration of savings, the impact this would have over time on capital incomes, and income inequality. In forces that could counter such a mechanical increase of concentration he pointed to political decisions and taxation. These are all features that play a major role in potential explanations that we will look at in the next section.

4.2 Combining wage earnings and wealth

The relationship between savings, income and wealth discussed by Kuznets (1955) pointed to the need for a theory where individuals both work and receive income from capital, in different proportions. Such a theory was developed by Meade (1964). In his framework individual wealth holdings grow along with savings, s, and returns to capital, r, but diminishes across generations as the wealth is divided among a growing population that is $1 + n$ times larger in every period. If $sr \geq n$ wealth grows without limit but if $sr < n$ then the division of wealth exceeds the growth of wealth and wealth holdings converge to being a multiple of earnings.

Stiglitz (1969) embedded Meade's framework in a general equilibrium model. Assuming that individual output is $f(k)$, with k being capital per worker, a competitive rate of return, r, being the same for everyone and equal to $f'(k)$, and population grows at rate n, aggregate capital converges to a steady state level where $sf(k)/k = n$. This in turn implies that $sr < n$ so that in equilibrium division dominates growth of capital and eventually the only thing determining wealth inequality is differences in earned income. This result however hinges on that estates are divided equally. If one instead assumes that wealth is inherited by one child (as with primogeniture), so that wealth is not divided, long-run wealth inequality is compatible with the $sr < n$.

Furthermore, the resulting distribution will have a Pareto upper tail with Pareto coefficient $\alpha = \frac{\ln(1+n)}{\ln(1+sr(1+t))}$, where $sr(1-t)$ is rate of accumulation out of wealth net of taxes, t (see Atkinson and Harrison, 1978, chapter 8). This also suggests an empirical specification where

we regress $1/\alpha$ on $sr(1-t)/n$.[125] However, even if primogeniture has been applied in the past (and still exists) the assumption of inheritance not being divided is implausible. In fact, today it is not even legal in most European countries. But there are several other assumptions that can be changed with the result that wealth inequality remains in equilibrium even if earnings are the same. Bourguignon (1981) shows that with a convex savings function there can be multiple locally stable equilibria, and with imperfect capital markets individuals with initially low wealth can be stuck in a "poverty trap". Introducing stochastic elements allows for the possibility of escaping such a trap, but also introduces a new source of wealth inequality. Benhabib and Bisin (2007) show how introducing an idiosyncratic rate of return results in a Pareto distribution for wealth that depends on capital income as well as inheritance taxes.[126]

Besides providing the first model to treat individual incomes as jointly determined by income and wealth, Meade (1964) also provided a basis for studying the joint impact of changes in wealth concentration and changing factor shares on the income distribution. To illustrate using the top percentile group, their share of total income can be broken down into one part based on earnings and one part originating from wealth holdings in the following manner:

Share of top percentile = (Proportion of earned income) x (Share of top wage earnings percentile) x (Alignment coefficient for earnings) + (Proportion of capital income) x (Share of top capital income percentile) x (Alignment coefficient for capital income).

The alignment coefficient for earnings is the share in earnings of top percentile of income recipients divided by share of top percentile of wage earners, and defined correspondingly for capital income. This captures the extent to which top wage earners and capital income recipients are also in the top of the total income distribution. In a class model where workers and capitalists are totally separate groups there is zero alignment; workers have only earnings and capitalists only capital income. In a life-cycle savings model with no inheritance, on the other hand, the same individuals inhabit the top of both earnings and capital income distributions, and the alignment is unity.

[125] Approximating $\ln(1+n)$ by n, and $\ln(1+sr(1-t))$ by $sr(1-t)$; see Atkinson, Piketty, and Saez (2011), p.58. See also Atkinson (2007).

[126] Piketty (2000) provides an overview of models of persistent wealth inequality. Recently, much important work has also been done on optimal taxation in models where income stems not only from individual actions over a lifetime but also from bequestflows from previous generations. In general, this changes many of the standard results in important ways. See Piketty and Saez (2013a, 2013b). See also the chapter by Thomas Piketty and Gabriel Zucman in this Handbook, and the references therein.

Using this labor-capital decomposition it is, in principle, possible to attribute shifts in top income shares to shifts in top earnings shares, top capital income shares and factor shares. A practical empirical problem, however, is that in most cases we lack data on the cross distributions over long periods of time. Roine and Waldenström (2008), studying Sweden, is an exception. Thanks to a particular form of combined income and wealth tax it is possible to calculate the distribution of wealth ranked both by wealth and total income.[127] Figure 22 shows that the share of total wealth when ranked by total income is somewhat lower than when ranked by wealth, but the two series are highly correlated suggesting that there is significant overlap between the two distributions.

[Figure 22 about here]

4.2.1 Explaining the drop over the first half of the twentieth century: Wealth shocks and the cumulative effects of taxes

Even if it is in most cases not possible to get a complete picture of the alignment of the distribution of earnings, capital income and total income, a key feature of the top income data is the possibility to decompose income according to source. And, as already discussed in section 2 above, it is clear that the drop in inequality in the first half of the twentieth century is mainly a capital income phenomenon. Combining what we know about the composition of the drop according to income source (almost entirely capital income driven), the timing (in most countries concentrated to wartime and the Great Depression periods), and the development of wealth concentration (large decreases in wealth concentration), declining capital incomes among top earners constitute the main explanation for declining top shares.

It is interesting to note that this development came about even in counties not immediately exposed to all of the great shocks of the twentieth century. Sweden is a case in point. The world wars did affect the Swedish economy, but the country never participated directly in either of them and looking at details in and around these periods it is clear that they did not constitute immediate shocks to Swedish wealth holders. If single events are to be pointed out, the economic crises in the early 1920s, the indirect effects of the Great Depression, which hit

[127] Between 1910 and 1948 Sweden had a form of wealth tax according to which a share of individual wealth holdings (initially 1/60, later 1/100) was added onto other incomes. The tabulations of incomes therefore also contain wealth amounts by income groups. In addition, for a few years wealth and income tax data can be matched on an individual level.

Sweden in 1931, and, in particular, the dramatic collapse of the industrial empire controlled by the Swedish industrialist Ivar Kreuger (the "Kreuger-crash") in 1932, stand out as being most important. These are, however not sufficient to explain the drop in top shares in Sweden. Instead, a trend of decreasing share of capital in value added corresponds well to the declining top income shares. Policy especially sharp increases in top tax rates also stand out as important for explaining especially the drop just after the Second World War.

The general picture thus seems to be that macro shocks explain most of the drop but there is also a role for a shift in policy and probably also in an economy wide shift in the balance between returns to capital and labour.[128]

Assuming that we are satisfied with the explanation of why top shares dropped, we then face the challenge to explain why they did not recover in the decades after the Second World War, but rather continued to decline. Here a key factor seems to be the high rates of marginal taxation facing the top. The long run evolution of statutory top marginal taxes is shown in Figure 23. As a broad generalization, top rates started to increase rapidly in the 1930s and reached high levels in many countries during and just after the Second World War.[129] As shown in Piketty (2001, 2003) the combined effect of shocks to capital holdings and high marginal tax rates is that recovery takes long. Unless adjustments to consumption are not made, current consumption levels can be sustained for some time by running down wealth holdings even further, but this decreases future income from wealth even more. An important point to note is that in these processes the short run effect from taxes looks small. It is the cumulative effect over time that is important.[130]

[Figure 23 about here]

[128] The fact that macroshocks and financial crises led to decreased top shares in this period is not the same as saying that this is the expected outcome of financial crises in general. When wealth concentration is high, a sharp decline in its value translates to decreasing incomes from it. But if top incomes are primarily based on earnings (as in many countries in recent decades) the effect need not be large. Furthermore, it is also possible that in developed financial markets rich wealth holders can protect themselves against shocks using various instruments, or even by altering the rules of the game in their favour (as argued by e.g., Reich, 2010). See Jenkins et al. (2013) for an overview of the recent financial crises pointing to varying effects on inequality across countries.

[129] Note, however, that statutory taxes and actual taxes paid by top income earners are not the same. In particular, during the 1950s and 1960s available evidence suggests that top rates were only paid well above the P99 level (see Roine, Vlachos, and Waldenström, 2009, and references therein). Scheve and Stasavage (2010, 2012) argue that the increased wartime taxation of the rich can be related to a political process of equal sacrifices, where the wars forced the masses to put up with their and in return the rich were forced to put up with their wealth.

[130] Roine, Vlachos, Waldenström (2009) also show that the cummulative effects of the relatively small short run impact of taxes found in their econometric analysis are consistent with much larger effects over time.

How much do taxes impede capital accumulation and the recovery of top income shares? Just to illustrate the order of magnitude, assume a simple case with two groups of income earners; a top group that derives half their income from capital (the rate of return is assumed to be 5 percent) and the other half from wages, while the rest only have a wage income. Initially the income share of the top group is 15 percent of all income and their consumption is such that their capital stock remains unchanged. These assumptions are of course not calibrated to fit any particular economy but the numbers fit an approximate representation of the relationship between the top percentile and the rest of the population, both in terms of the importance of capital (with a broad interpretation) and the income share around World War II.

The combined effect of a tax increase from 30 percent to 60 percent and a shock that leaves the top group with 0.7 times initial wealth causes a gradual decline of both the capital income share (from 50 percent to 37 percent in five years and to 30 percent in 10 years) and total income share for the top group (from 15 to 12.3 in five years, down to 11.1 in 10 years) with wages and consumption being unchanged. Despite the stylized nature of the setup these magnitudes are reasonable when looking at data from the 1930s and following the Second World War. In the scenario with no changes to consumption wealth is eventually used up and capital income goes to zero. Altering consumption too little makes the process longer but in the end the result is the same, while a sufficient adjustment allows for accumulation over time.[131]

4.3 Explaining increasing top wages: Executive compensation, superstar effects and the possibility of changing norms

While shocks to capital income combined with the cumulative impact of high marginal taxes are important in explaining the development between the First World War and around 1980, something else is needed to account for the increasing inequality since. This is especially true for understanding changes in top earnings, most visible in the U.S., but also clear in many other countries (see Atkinson, 2008a, chapter 4).[132] As discussed in section 4.1 above, it has been argued that increasing wage dispersion can be explained by theories of skill-biased technological change (Acemoglu and Autor, 2012, 2013) but also that these theories have some

[131] See Section 4.4, p. 20-24 in Piketty (2001) and Appendix A in Roine, Vlachos, and Waldenström (2009)
[132] It is important to recall that in some countries the recent rise in top shares is not primarily driven by increased wage dispersion but by a return of capital in the top. This may be due partly to work related remuneration taking the form of capital income for tax reasons, but also due to capital actually becoming more important. In this section we will focus on theories that aim to explain increased concentration of earnings in the top.

problems. In particular, it is hard to see how an increased advantage of the skilled, typically equated with the well educated, squares with increased inequality not just in general but also increased inequality *within* the top group.

There are several strands of literature that give insights as to why the top of the earnings distribution may behave differently from the rest and to what factors may govern compensation of top performers. This includes theories of determination of earnings in hierarchical organizations, tournament theory and superstar effects. Research based on these ideas, and sometimes combinations of them, has tried to account for the sharp increase in top wages in recent decades.

In models first developed by Simon (1957) and Lydall (1959) pay is related to the number of individuals supervised and to a (constant) pay increase at each step in the hierarchy. They assume that, first, at every level of the organization individuals supervise a constant number of people at the level below, and, second that the salary of these "managers" at every level is a constant proportion of the aggregate salaries of the people they directly supervise. More precisely, if at every level i of the organization there are y_i employed, then the number of employed at the level below is $y_{i-1} = sy_i$. Furthermore, the wage w_i at any level i is related to the aggregate of those below by a fixed proportion, p such that $w_i = nw_{i-1}p$. Under these assumptions the upper tail of the earnings distribution will be approximately Pareto distributed with exponent $\alpha = \frac{\log s}{\log(1+p)}$.[133] At any level in the organization the people above will earn on average a constant of the wage at that level, the multiple being $\alpha/(\alpha - 1)$.

How much pay increases as one moves up in such an organization is determined by the number of individuals supervised and by the pay increase at every level, but also by the size of the organization. If firms become larger in terms of the total number of employees the salary of the top management can be expected to increase. This basic insight, that large firm pay their top managers more than small firm, was noted by Mayer (1960) and is also a prominent fact in the data on the distribution of CEO pay (see, e.g., the overview by Murphy, 1999). But the hierarchicalmodels have other problems empirically, in particular when it comes to explaining the very top. As noted already by Phelps Brown (1977, p 309) plausible values of the span of control (the number of direct subordinates at each level in the hierarchy) and the pay raise at

[133] See Lydall (1968, pp. 127ff) and also section 2.1.4 for more details.

each step of the hierarchy do not match observed Pareto exponents (see Atkinson 2008a, p. 77). Individuals high up in organizations simply earn more than what the model would predict.

In hierarchical models individuals are not paid based on "ability" but based on "responsibility".[134] But if "ability" determines the growth of a firm and the size of operations then "responsibility" is endogenous, and the matching of ability and position becomes important.[135] In Rosen (1982) the distributions of firm size, span of control, and managerial incomes are modeled as the joint outcome of market assignments of personnel to hierarchical positions. Assuming the process assigns the most able individuals to the highest positions and that the talent of these individuals also multiplies throughout the organization this results in firms of more capable managers being larger and also justifies high rewards to these managers. [136] In particular, it suggests that both the size distribution of firms and pay are skewed relative to the underlying ability distribution. Focusing on CEO pay across different firms Terviö (2008) builds on this kind of assignment model for managerial talent to a distribution of firms, where firm size may be different not just due to managerial ability but for other reasons as well. Under the assumption that the larger firms will have most to benefit from highering the best managers, the pay levels of these individuals across firms will be determined by distributions of firm size and managerial talent. In such a context the value of the highest talent may be significant for the largest firm. In similar spirit, Gabaix and Landier (2008) suggest that even very small ability differences can have large impacts on firm value. They find the six-fold increase of U.S. CEO pay between 1980 and 2003 can be fully attributed to the six-fold increase in market capitalization of large companies during that period.

A common feature in these (and many other) models is the idea that something (exogenous or endogenous) transforms small differences in the underlying ability to large differences in outcomes. Lazear and Rosen (1981) show how compensation based on the outcome of a tourna-

[134] However, the relationship between the success of a firm, its growth and consequently the size of the firm (both in sales and individuals employed) was in this way indirectly related to ability of the management, see Lydall (1968, chapter 4). Also Baumol (1959, p. 46) at the time made the observation that "executive salaries appear to be far more closely correlated with the scale of the opperations of the firm than with its profitability".

[135] This problem is the focus of many so called assignment models, that in general study matching in perfectly competitive markets focusing on the combined effect of indivisibilities and heterogeneity on both sides of the market. In labour markets these features are important when there are complementarities between types of jobs and types of workers (e.g. Sattinger, 1979). See Sattinger (1993) for a review.

[136] The assumption that the process allocates the highest talent to the highest position is a contested one and there is a large literature on executive compensation where many note that executive pay is not always based on performance, e.g., Bertrand and Mullainathan (2001) and Bebchuk and Fried (2004).

ment where only the winner receives compensation can induce the highest effort under certain assumptions.[137] In general, attempts to implement payment schemes that give efforts to perform well has created a growth of performance based pay in many fields. These schemes typically have the effect that the increase the individual returns to "top performers". However, it is not clear that the effect is positive for the economy as a whole or even for the implementing firm.[138] In models following Rosen (1981) a combination of technological change (production that makes replication easier such as printing, recording, etc.) and the size of the market gives the "most talented" disproportionately large rewards.[139] As the market reach of a so called "superstars" increases, the returns to the highest talent also goes up, and at the same time the returns to those just below in the ability distribution goes down. The "global leader" drives out individuals or firms that used to be competitive at a more local level leading to increased concentration in top rewards. Frank and Cook (1995) argue that an increasing number of markets have developed features that fit the superstar model; they have become what they call "winner-take-all-markets". The examples range from activities where broadcasting in a wide sense enlarges the market (such as markets for sportsstars, artists, writers, etc.), to those where hiring a "super-star" may become more important as the amounts that hinges on their performance grows (lawyers, investment bankers, and CEOs), to more standard product markets where decreasing transportation and other trading costs makes increases the potential market.[140]

So to what extent is the top of the distribution composed by such superstars? Kaplan and Rauh (2010) study the representation of four sectors, top executives in non-financial firms, top employees in the financial sector (investment banks, hedge funds, private equity), lawyers, and professional athletes and celebrities, in the top of the US income distribution. They find that financial sector employees comprise a larger share than top executives from other

[137] This is, however, for example not true if the differences between the competitors is too large; see e.g. Freeman and Gelber (2006)

[138] See Fahlenbrach and Stulz (2009) and Bebchuck and Spamann (2009) for overviews of performance based pay in the financial sector. Cahuc och Challe (2009) show how performance pay can attract individual talent to a certain sector but also to possible misallocation of this talent in the economy. Agarwal och Wang (2009) show how a shift to performance based pay results in an increase in earnings dispersion but also to an increase in the amount of risk-taking with negative effects on aggregate performance.

[139] As Rosen notes in his paper the basic idea was clear already to Alfred Marshall (1890/1920). Another early observer of the phenomenon, George Watkins (1907) writes: "The opportunity of the business man in any line to profit by value increase is multiplied by the increase in the breadth and in the number of exchanges" (pp. 62–63) and goes on to note that: "Even very slight changes in price, under modern conditions of a world-wide market and an unprecedented scale of individual transactions, may mean enormous gain or loss" (p. 63).

[140] Gersbach and Schmutzler (2007) and Manasse and Turrini (2001) study how increased market size can drive increasing wage inequality within the top of the distribution.

sectors, and also that their share has grown in the past decades.[141] Athletes and celebrities as well as lawyers are certainly represented in the top but play a comparatively small role. Most striking perhaps is that the aggregate of these four groups account for less than 25 percent of the top income earners. This is due both to missing high earning individuals in these four groups but also to the top of the income distribution consisting of much more than representatives of these groups.

Overall, theories focusing on various ways in which the underlying ability distribution may be magnified in terms of top earnings certainly contribute to our understanding of the recent increase in top income shares. There are also a number of areas where it seems clear these effects have grown over the past decades. But there are also some developments that suggest that these theories are unlikely to be the full explanation, especially if one looks at the longer run developments. Frydman and Saks (2007), study the ratio of CEO to worker pay in the U.S. over the period 1936–2005. They show that this ratio is falling between the 1930s and the 1970s even though firms certainly grew in size over this period. Over this longer period they conclude that relationship between pay and firm growth is weak. In Figure 24 we complement their U.S. data with corresponding data from Sweden for the period 1950–2011. The long-run picture is very similar with faling ratios until around 1980 and then clear upturns thereafter. The level difference between the countries is marked however, as is the fact that the recent increase has been much larger in the U.S. than in Sweden.

[Figure 24 about here]

Another study that has looked at the long run development of wages in a field with features that have been suggested to magnify small differences in ability, namely the financial sector, is Phillippon and Reshef (2012). They find that deregulation of financial markets is closely tied to compensation levels, as well as education levels and innovation, but also that the sector in the 1930s and since the 1990s seems to pay wages that are substantially higher than what can be accounted for by observable factors (such as increased complexity of tasks and education levels). Interestingly, when comparing the relative pay in the financial sector with the top percentile income share in the entire U.S., as is done in Figure 25, the resemblance is striking. The post-depression drop in the 1930s is close to contemporaneous and this is also true for the

[141] Bell and van Reenen (2010) also find that the financial sector is clearly overrepresented in the top of the U.K. income distribution.

strong increase beginning in the late 1970s.

[Figure 25 about here]

Finally, some scholars have pointed to the possibility of changing social norms as the most likely explanation for why top earnings have increased so much in recent decades (e.g., Piketty and Saez, 2003, and Levy and Temin, 2007). Atkinson (2008a, chapter 8) illustrates how, in a setting where individual utility depends on income as well as conforming to a social norm about fair pay (which operates both on the employer and employee side of the market), there can be multiple equilibria for a given distribution of underlying ability.[142] The loss of utility when not adhering to the norm depends on how many others do the same. As a consequence, market forces alone do not uniquely determine the outcome. There can be a situation where most individuals adhere to a norm, according to which pay is determined by a combination of ability and a fixed amount, as well as a situation where few individuals adhere to the norm and pay is determined by individual productivity. Depending on initial conditions different countries can converge on different pay norms and "exogenous shocks" to the economy may cause a shift from one equilibrium to another.

4.4 Econometric evidence on determinants of top income shares

A key objective in the top income project has been to create a sufficiently rich cross-country panel to enable an econometric econometric testing of questions about what determines inequality.[143] In this subsection we will report on the results from a number of such studies.

4.4.1 Determinants of inequality: Correlations over the long run

Roine, Vlachos, and Waldenström (2009) combine top income shares with data on a number of variables that have been suggested to affect inequality. The approach is not to test a particular theory but rather to draw on a large number of models to produce a list of variables of interest in an exploratory fashion (see Atkinson and Brandolini, 2006, for a discussion of the clear limitations with such an approach). Econometrically the adopted method is to analyse first differences (using both first differenced generalized least squares and dynamic (with lagged dependent variable) first differences), assuming a linear relationship at least in this

[142] Similar to the model in Akerlof (1980).
[143] As mentioned above, we focus on questions about what determines inequality but obviously the top income data set has a large number of applications for questions regarding the consequenses of inequality as well.

specification. Panel estimations make it possible to account for all unobservable time-invariant factors as well as common and country specific trends. The potential that the relationships change over time are dealt with indirectly by allowing effects to differ over the level of development and for different country groups etc. This is clearly not the same as testing for the long run effects of various variables on inequality but rather a way of testing what the short run effects look like over the long run.

The main variables included in the analysis are the following. Financial development is measured as the sum of stock market capitalization and total amount of bank deposits divided by GDP. Trade openness is measured either *de facto* as the trade share in GDP (i.e., sum of exports and imports over GDP) or *de jure* as the average tariff rate (total tariffs paid divided by traded volume). Public sector influence is proxied by the share of central government spending in GDP and as the top marginal tax rates. Finally, we also include GDP per capita and population.[144] Given the importance of changes within the top, the income shares of three groups are analysed: the rich (P99–100), the upper middle class (P90–99), and the rest of the population (P0–P90) population.[145]

Table 6 reports the regression results and some basic relationships stand out as constantly robust across all specifications.[146] First, economic growth, i.e., change in GDP per capita, seems to have been pro-rich over the twentieth century. In periods of faster than average growth, top income earners have benefited more than proportionally.[147] A likely reason for this result is simply that top incomes are (and have been) more closely related to performance than other incomes. This result is similar at different levels of development and is not different between Anglo-Saxon and other countries. However, the relation between economic

[144] There are also a number of additional variables, such as measures of democracy (Polity) and proxies for technological development (share of agriculture in GDP, number of patents) that are used in a robustness section. See Roine, Vlachos and Waldenström (2009) for details.

[145] Clearly, any such division is arbitrary but the results are not sensitive to the exact definitions of these top groups. Running the regressions defining the top 0.5 percent or the top 1.5 percent does not have any qualitative impact on the results. A threshold around top 1 percent can be justified by looking at the details of income compositions indicationg that (approximately) the top 1 percent as a whole is very different from the rest of the top decile, especially with regard to capital income share. Also a similar classification, but with respect to wealth, is made in Hoffman, Postel-Vinay and Rosenthal (2007).

[146] In Roine, Vlachos, and Waldenström (2009) the number of countries ranged between 12 and 14. Since then top income data has become available for more countries and we have re-run the regressions. The results largely go through whith the number of countries now ranging between 15 and 20. Here we also report results for some additional variables, such as Polity, that were not included in the results in Roine, Vlachos, and Waldenström (2009).

[147] See also Dew-Becker and Gordon (2005) who find that high productivity growth mainly benefitted the rich in the U.S. postwar era.

growth and income share for the "upper middle class" (P90–99) seem to be the reverse. In high growth periods this group loses out in relative terms. This, again, highlights the importance of distinguishing between groups in the top decile. Second, financial development seems to have been pro-rich over the twentieth century, both in Anglo-Saxon countries and elsewhere and regardless of whether it is approximated using bank deposits or stock market capitalization (often said to be a difference between Continental Europe and Anglo-Saxon countries).[148] High marginal tax rates also have a consistent negative effect on top income, while government spending seems associated with a larger income share for the P0-P90 group. Somewhat surprisingly perhaps, there is little evidence of any clear effects of trade openness on top shares over the long run. Democracy, as measured by the commonly used Polity IV score, turns out to be negatively related to top shares and this effect is larger as countries become richer, suggesting that democracy and development has an equalizing effect. The subsections below look at some of these relations in more detail.

[Table 6 about here]

4.4.2 The effect of top tax rates on top incomes

The theoretical effects of taxes on top incomes are not obvious. Recently much progress has been made in the field optimal taxation both with respect to optimal labor income focusing on top income responses (Piketty, Saez, and Stantcheva, 2013) and in settings dynamic settings where income is determined by labor and capital and also influenced by bequests across generations (Piketty and Saez, 2013a, and 2013b).[149] Taken together the expected effect of higher top rates is to lower top income shares. This also appears to be the consistent finding in recent empirical work. Saez (2004) shows that changes in marginal tax rates over the period 1960–2000 can explain variation in top income shares in the U.S., but also that the effect only seems to hold for the top percentile group. Saez and Veall (2005) show that Canadian top income shares are negatively correlated with top marginal income tax rates. Using a similar specification Roine and Waldenström (2008) conclude that changes in top rates in Sweden also have a significant effect on the Swedish development over the twentieth century, and Jäntti, Riihelä and Sundström (2010) conclude that the drop in top rates is a key determinant

[148] The finding that finance is pro-rich does not preclude that it can also be pro-poor, as has been found in previous research (e.g., Beck, Demirgüç-Kunt and Levine, 2007), but that it is the groups in the middle that seem to benefit the least from financial development.

[149] Persson and Sandmo (2005) however study a tournament setting and show that under some conditions incresed taxation lead to increased inequality.

in the increase of Finnish top shares. Atkinson and Leigh (2013) find that top income shares are highly correlated across Anglo-Saxon countries and that top shares are very responsive to changes in marginal tax rates. Over the period 1970–2000 they estimate that reductions in tax rates can explain between one third and one half of the rise in the income share of the top percentile group. Atkinson and Leigh (2013) also try to estimate the cumulative effect and find that a fall in the marginal tax rate on investment income (based on a lagged moving average) is associated with a rise in the share of the top one percent. Finally, Piketty, Saez, and Stantcheva (2013) show that there is a strong negative correlation between top tax rates and top one income shares in 18 OECD countries since 1960, and also that there is no evidence of high top shares corresponding to higher growth.

4.4.3 Political and institutional factors and the impact of crises

One potential advantage with the new top income data is that it spans a sufficiently long period for there to be sufficient variation in the degree of democracy and other institutional variables.[150] The long time period also makes it possible to potentially capture sufficiently many crises episodes to test effects of these econometrically.

The results in Table 6 include the role of democracy as captured by the well-known Polity IV measure. The results suggest that democracy indeed has an equalizing effect, but that it appears to be confined to reducing the top percentile's income share leaving the share of the the rest of the top decile largely unchanged. Scheve and Stasavage (2009) look at the effect of institutional differences in centralized wage bargaining and partisanship in thirteen countries over the twentieth century but do not find any clear effects.

The effects of financial crises is also addressed in Table 6, and originally by Roine, Vlachos and Waldenström (2009) using data from Bordo et al., 2001 and Laeven and Valencia, 2008, indiciating a negative effect of banking crises, but not currency crises, on the top percentile's income shares.[151] Atkinson och Morelli (2011), however, note that when looking closer at how one might characterize the development after crises episodes it is difficult to find a clear pattern. In many cases data are insufficient to give a clear picture of the direction of develop-

[150] See chapter 22 in this Handbook (Acemoglu, Restrepo and Robinson, 2013) for an overview on the relation between democracy and inequality.
[151] However currency crises and banking crises do not seem to have any clear effects.

ment.[152]

4.5 What do we learn?

The long run development of wealth and income inequality is clearly a result of the joint effect of changes in both distributions. From any starting point, economic, social and technological developments interact with shocks, crises and policy to determine the evolution of both. The dynamics can go in both directions with effects over different time horizons. Exogenous events or policy can lead to wealth concentration going up or down, resulting in capital incomes becoming more or less important in explaining income inequality. But periods where high-income earners, due to exogenous factors or policy, receive a larger share of the total can also lead to increased wealth concentration. Over time this leads to a return of capital incomes and, unless individuals consume all their earnings over their lifetime, inheritance also becomes a factor across generations.

In terms of understanding inequality developments over the past century in the countries studied in this chapter some main themes are worth recapitulating. The drop in inequality over the first half of the century is mainly due to decreased wealth shares of top wealth holders, resulting in declining capital incomes. The wage share of high earners, however, typically looks very stable. The drop in wealth holdings and subsequently in capital incomes seems to be the result of both macro shocks such as the World Wars and financial crises but also to policies pursued in many countries. After these shocks high top marginal tax rates made it difficult to rapidly accumulate new fortunes and inequality levelled out or continued to decline. Such a development can be accounted for in a simple model that combines capital and earnings and uses it to study the effects of exogenous shocks to the capital stock and the effects of taxation.

The recent increase in inequality, observable in many countries but not all, seems to be mainly due to increased top wages. Explaining this turns the focus to a different set of explanations emphazising higher returns on the labor market for some groups (based on higher ability, skill, effort, education, etc.). Two key facts seem important in guiding efforts to understand this change. First, much of the increase is concentrated to a small fraction in the top of the population. This means that theories focusing on changes for broader groups (such as

[152] Bordo och Meissner (2011) use top income data to study if inequality has been related to credit expansion which in turn has been argued to be a good predictor of crises. They find no evidence of such a relationship.

“skilled” and “unskilled”) at least need to be complemented by a mechanism explaining the increase within the top. Second, the degree to which top earnings have increased relative to the average is very different across countries. Thus, a theory based on a common global shift of some kind at least needs to be complemented with mechanisms that can account for the cross-country difference.

Finally, the preliminary econometric evidence points to taxation being important in explaining the developments. Even though magnitudes in the short run may seem small it is important to take the long run dynamic effects into account. Financial development and economic growth being pro-rich also stands out as clear and robust correlates over the whole of the twentieth century, but so far we have only begun to use the data for systematic cross-country analysis.

5. Summary and concluding remarks

In this chapter we have outlined the broad facts about long-run trends in the distribution of income and wealth. Focus has been on findings primarily stemming from the top income literature and recent studies of wealth concentration, using historical tax and estate data. However, we have also tried to relate the new results to previous observations in the economic growth and economic history literatures. The end result is always going to be subjective and we have therefore tried to be as clear as possible on where in the development there is disagreement.

When it comes to *describing* the overall developments of income inequality across the 26 countries studied in section 2 above, there are three possible broad eras that can usefully be distinguished. The first is the period before the First World War, the second is the period from around 1914 until 1980, and the third consist of the time thereafter. In the first period evidence is relatively clear on the fact that inequality was historically high in the beginning of the twentieth century. To what extent this high level was present throughout the nineteenth century or if it gradually increased is, however, still less clear due to the lack of data. There are some signs of increase inequality but many studies also point towards high and relatively stable levels before the twentieth century.

The period from around 1914 to 1980 is characterized by substantial drops in top income shares in almost all countries for which we have data. The top percentile share falls from around 20 percent before 1914 to between 5 and 10 percent around 1980. The decreasing income share for the lower parts of the top decile group are much more modest. In fact, in some countries the income share of lower half of the top decile group (P90–95) remains almost constant throughout the twentieth century. Thus, distinguishing developments within the top group seems important. Large parts of the decreases seem to happen in connection to shocks such as the World Wars or the Great Depression but it is worth noting that decreases also take place in countries that did not take part in sthe war such as Sweden. Also the drop continues after the Second World War throughout the high-growth periods in the 1950s and 1960s. In terms of income composition most of the drop seems related to decreasing capital income.

The development after 1980 is less homogenous. In some countries, especially the U.S. and the U.K., inequality has risen sharply. This increase has taken place from a level that was al-

ready high in relation to others before it started. In countries like Sweden and Finland, increases have also been substantial but here from internationally low levels to levels that are much higher but remain among the lowest. In, for example France, Germany and Japan, there is no clear upward trend but in absolut terms inequality remains higher than in the Nordic countries.

Turning to the development of the wealth distribution in the 10 countries for which we have long-run data, studied in section 3, a picture similar to that of income emerges. In most places (the U.S. being the notable exception) wealth concentration was relatively constant and historically high before the twentieth century. Even if cross-country comparisions should be made with caution there seems to have been important level differences. Estimated top wealth shares at the beginning of the twentieth century were clearly higher in the U.K. and in France than, for example, in the U.S. and in Switzerland, Finland and Norway, with Denmark, Sweden and the Netherlands in between. Starting around the First World War the top percentile group wealth shares decrease substantially until around 1980. Thereafter the development is again more diverse but also much more uncertain and debated than for income

In terms of *understanding* these developments we have, in section 4, discussed a number of suggested theories and empirical regularities that aim at explaining various aspects. The developments over the first half of the twentieth century points to the importance of understanding the joint developments of wealth and income as much of the decrease is related to sharp drops in capital incomes in the top. The cummulative impact of taxation over time also seems important, especially for understanding the lack of recovery of top income shares in the decades after the Second World War. With respect to the different developments after 1980 it seems likely that many factors interact. There are probably important changes in terms of technological change and globalization that affect inequality but the differences across countries also suggest that the impact depends on individual country characteristics (such as the functioning of the labor market, the education systems and other policies). In most countries much of the inequality increase is driven by changes *within* the top, suggesting that an explanation must include a mechanism that gives an increasing income advantage to the very top groups, rather than only accounting for differences between broad groups such as, for example, skilled and unskilled. In addition, the recent increase is not homogenous in terms of income composition. In some countries (the U.S.) an increased earnings dispersion explains most of the recent increase while in other countries (Sweden) capital seems more important.

Finally, we also note that there are cases where data and explanations seem to fit what we observe since the 1980s, but when one applies a long-run perspective the same theory seems less successful (an example being executive pay as explained by the growth of firms). This need not imply that the account for the post-1980 period is incorrect, but it does suggest that most explanations are likely to sensitive to interaction with aspects that change both over time and across countries.

5.1 Going forward

When looking ahead there are a number of areas that seem promising in terms of future research. First, the ongoing work of extending the top income database is obviously important, both in terms increasing the number of countries, but also in terms of adding new dimensions. In at least some countries it could, for example, be possible to distinguish income for men and women over much of the twentieth century. Constructing similar datasets on long-run wealth inequality trends would also represent important constributions.

Second, making use of the top income database seems important. There are numerous aspects of long-run developments that can now be studied over a time span previously void of systematic inequality data. In doing so it is, as emphasized by Atkinson and Brandolini (2006), important to take an integrated approach to theory and estimation, and to use proper econometric techniques to address deficiencies in the data.

Third, results on the importance of changes within the top illustrate how development can be missed or missinterpreted if one focuses soley on overall inequality. These findings also pose challenges for theories trying to explain the recent surge in income inequality. It is in general quite likely that different explanations apply to different parts of the distribution.

Fourth, a number of the recent findings illustrate the importance of the interplay between wealth and work in determining total income. Also, when income is determined not just by actions over an individual's lifetime, inheritance also becomes important. This has important effects on a wide range of issues such as optimal taxation (Piketty and Saez, 2013b) and the future development of inheritance flows (Piketty 2011).

These are some of the research areas that will surely be important for our understanding of long-run inequality trends, their causes and consequences.

References

Aaberge, R., Atkinson, A.B. (2010). “Top Incomes in Norway”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Global Perspective. Oxford University Press, Oxford.

Acemoglu, D. S. Johnson, Robinson, J. (2005). “Institutions as the Fundamental Cause of Long-Run Growth”. In: Aghion, P., Durlauf, S. (Eds.), Handbook of Economic Growth, North-Holland, Amsterdam.

Acemoglu, D., Autor, D.H. (2012). “What Does Human Capital Do? A Review of Goldin and Katz's Race between Education and Technology”. Journal of Economic Literature 50(2), 426–463.

Acemoglu, D., Autor, D.H. (2013). “Skills, Tasks and Technologies: Implications for Employment and Earnings”. In: Ashenfelter, O., Card, D.E. (Eds.), Handbook of Labor Economics, vol. 4, North-Holland, Amsterdam.

Acemoglu, D., Naidu, S., Restrepo P., Robinson, J.A. (2013). “Democracy, Redistribution and Inequality”. In: Atkinson, A.B., Bourguinon, F. (Eds.), Handbook of Income Distribution, vol 2. North-Holland, Amsterdam.

Agarwal, S., Wang, F.H. (2009). “Perverse incentives at the banks? Evidence from a natural experiment”. Working Paper Series WP-09-08, Federal Reserve Bank of Chicago.

Aghion, P., Bolton, P. (1997). “A Theory of Trickle-Down Growth and Development”, Review of Economic Studies 64(2), 151–172.

Aghion, P., Caroli, E., Garcia-Penalosa, C. (1999). “Inequality and Economic Growth: The Perspective of the New Growth Theories”. Journal of Economic Literature 37(4), 1615–1660.

Akerlof, G.A. (1980). “A Theory of Social Custom, of Which Unemployment May be One Consequence”. Quarterly Journal of Economics 94(4), 749–775.

Alvaredo, F. (2010). “The Rich in Argentina over the Twentieth Century: 1932–2004”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes: A Global Perspective, vol. 2. Oxford University Press, Oxford.

Alvaredo, F., Atkinson (2011). “Colonial rule, apartheid and natural resources: top incomes in South Africa, 1903–2007”. CEPR Working Paper No. 8155, Centre for Economic Policy Research, London.

Alvaredo, F., Gasparini, L. (2011). “Post-1970 trends in inequality and poverty in developing and emerging countries”. In: Atkinson, A.B., Bourguinon, F. (Eds.), Handbook of Income Distribution, vol 2. North-Holland, Amsterdam.

Alvaredo, F., Pisano, E. (2010). “Top Incomes in Italy, 1974–2004”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes: A Global Perspective. vol. 2. Oxford University Press, Oxford.

Alvaredo, F., Sandholt Jensen, P., Sharp, P. (2013). ”Inheritance and wealth in Denmark”, Mimeo.

Alvaredo, F., Saez, E. (2009). “Income and Wealth Concentration in Spain from a Historical and Fiscal Perspective”. Journal of the European Economic Association, 7(5), 1140–67.

Alvaredo, F., Vélez (2013). “High incomes and personal taxation in a developing economy: Colombia 1993-2010”, CEQ Working Paper No. 12, Commitment to Equity.

Anand, S. and P. Segal, (2008). “What Do We Know about Global Income Inequality?”. Journal of Economic Literature, 46(1), 57–94.

Anand, S. Segal, P., Stiglitz, J. (Eds.) (2010). Debates on the Measurement of Global Poverty. Oxford University Press, Oxford.

Andreoni, J., Erard, B., Feinstein, J. (1998). “Tax compliance”. Journal of Economic Literature 36(2), 818–860.

Armour, P. Burkhauser, R.V. and Larrimore, J. (2013). ”Deconstructing Income Inequality Measures: A Crosswalk from Market Income to Comprehensive Income”. American Economic Review Papers and Proceedings, 103(3), 173–177.

Atkinson, A.B., Piketty, T., Saez, E. (2010), “Introduction”. In: A.B. Atkinson, and T. Piketty (Eds.), Top Incomes: A Global Perspective. Volume II. Oxford University Press, Oxford.

Atkinson, A.B. (2004). “Income Tax and Top Incomes over the Twentieth Century”. Revista de Economía Pública, 168(1/2004), 123–141

Atkinson, A.B. (2004). “Top Incomes in the U.K. over the Twentieth Century”. Journal of the Royal Statistical Society 168(2), 325–343.

Atkinson, A.B. (2007). “Methodological issues”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.

Atkinson, A.B. (2008a), The Changing Distribution of Earnings in OECD Countries Oxford and New York. Oxford University Press, Oxford.

Atkinson, A.B. (2008b). “Concentration among the rich’”, In: Davies, J.B. (ed.), Personal Wealth from a Global Perspective. Oxford University Press, Oxford.

Atkinson, A.B., Brandolini, A. (2001). “Promise and Pitfalls in the Use of ‘Secondary’ Data-Sets: Income Inequality in OECD Countries as a Case Study”. Journal of Economic Literature 39, 771–799.

Atkinson, A.B., Brandolini, A. (2006). “The Panel-of-Countries Approach to Explaining Income Inequality: An Interdisciplinary Research Agenda.” In: Morgan, S.L., Grusky, D.B., Fields, G.S. (Eds.), Mobility and Inequality: Frontiers of Research in Sociology and Economics, Stanford University Press, Stanford.

Atkinson, A.B., Gordon, J.P.F., Harrison, A. (1989). “Trends in the Shares of Top Wealthholders in Britain: 1923–1989”. Oxford Bulletin of Economics and Statistics 51(3), 315–332.

Atkinson, A.B., Harrison, A. (1978). The Distribution of Personal Wealth in Britain. Cambridge University Press, Cambridge.

Atkinson, A.B., Leigh, A. (2007a), “The Distribution of Top Incomes in Australia”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.

Atkinson, A.B., Leigh, A. (2007b), “The Distribution of Top Incomes in New Zealand” . In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.

Atkinson, A.B., Leigh, A. (2013). “The Distribution of Top Incomes in Five Anglo-Saxon Countries Over the Long Run”. Economic Record 89, Supplement S1, 31–47.

Atkinson, A.B., Piketty, T. (Eds.) (2007). Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.

Atkinson, A.B., Piketty, T. (Eds.) (2010). Top Incomes: A Global Perspective. vol. 2. Oxford University Press, Oxford.

Atkinson, A.B., J. P. F. Gordon, and A. Harrison (1989). “Trends in the Shares of Top Wealthholders in Britain: 1923–1989’, Oxford Bulletin of Economics and Statistics 51(3), 315–332.

Atkinson, A.B., Søgaard, J. (2013). “The long-run history of income inequality in Denmark: Top incomes from 1870 to 2010”. EPRU working paper 2013-01.

Auerbach, A.J. (1989). “Capital Gains Taxation and Tax Reform”, National Tax Journal 42, 391–401.

Autor, D., Katz, L.F., Kearney, M. (2006). “The Polarization of the U.S. Labor Market”. American Economic Review Papers and Proceedings 96(2), 189–194.

Bach, S., Corneo, G., Steiner, V. (2005). “Top Incomes and Top Taxes in Germany”, mimeo, DIW Berlin.

Bager-Sjögren, L., Klevmarken, A.N. (1998). “Inequality and Mobility of Wealth in Sweden 1983/84–1992/93”. Review of Income and Wealth 44(4), 473–495.

Banerjee, A., Piketty, T. (2009). “Top Indian Incomes, 1922–2000”. In: Atkinson, A.B., Piketty, T: (Eds.), Top Incomes: A Global Perspective, vol. 2. Oxford University Press, Oxford.

Banerjee, A.V., Newman, A.F. (1993). “Occupational Choice and the Process of Development”, Journal of Political Economy 101(2), 274–98.

Bardhan, P., Bowles, S., Wallerstein, M. (Eds.) (2006). Globalization and Egalitarian Redistribution, Russell Sage Foundation, New York and Princeton University Press, Princeton and Oxford.

Baumol, W. (1959). “Business behavior, value and growth”. New York: Macmillan, 1959.

Bebchuk, L.A., Fried, J. (2004). Pay Without Performance: The Unfulfilled Promise of Executive Compensation, Harvard University Press, Cambridge.

Bebchuck, L.A., Spamann, H. (2010). “Regulating Bankers’ Pay”. Georgetown Law Journal 98(2), 247–287.

Beck, T., Demirgüç-Kunt, A., Levine, R. (2007). “Finance, Inequality and the Poor”. Journal of Economic Growth 12(1), 27–49.

Becker, G.S., Tomes, N. (1979). “An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility’, Journal of Political Economy 87(6), 1153–1189.
Bell, B., van Reenen, J. (2010). “Bankers’ pay and extreme wage inequality in the UK”. CEP Special Report.
Bengtsson, N., Holmlund, B., Waldenström, D. (2012). “Lifetime versus Annual Tax Progressivity: Sweden, 1968–2009”. UCFS Working Paper, Uppsala University.
Bengtsson, T., van Poppel, F. (2011). “Socioeconomic inequalities in death from past to present: An introduction”. Explorations in Economic History 48, 343–356.
Benhabib, J., Bisin, A. (2007). “The Distribution of Wealth and Redistributive Policies”. Meeting Papers 368, Society for Economic Dynamics.
Bentzen, J., Schmidt-Sørensen, J.B. (1994). “Wealth Distribution and Mobility in Denmark: A Longitudinal Study”. CLS Working Paper 4, Aarhus School of Business: Aarhus.
Berg, L. (1983). Konsumtion och sparande – en studie av hushållens beteende. Ph. D. Dissertation, Department of Economics, Uppsala University.
Bertrand, M., Mullainathan, S. (2001). “Are CEOs Rewarded for Luck? The Ones Without Principals Are”. Quarterly Journal of Economics 116(3), 901–932.
Besley, T., Persson, T. (2009). “The origins of state capacity: Property rights, taxation, and policy". American Economic Review 99, 1218–1244.
Besley, T., Persson, T. (2013). “Taxation and Develoment”. In: Auerbach, A., Chetty, R., Feldstein, M., Saez, E. (Eds.), Handbook of Public Economics. North-Holland, Amsterdam.
Bjerke, K. (1956). “Changes in Danish Income Distribution 1939–52”. Income and Wealth, IV, 98–154.
Björklund, A. (1998). “Income Distribution in Sweden: What Is the Achievement of the Welfare State?”. Swedish Economic Policy Review 5, 39–80.
Björklund, A., Jäntti, M., Lindquist, M.J. (2009). “Family Background and Income during the Rise of the Welfare State: Brother Correlations in Income for Swedish Men Born 1932–1968”. Journal of Public Economics 93(5–6), 671–680.
Björklund, A., Roine, J., Waldenström, D. (2012). “Intergenerational Top Income Mobility in Sweden: Capitalist Dynasties in the Land of Equal Opportunity?”. Journal of Public Economics 96(5–6), 474–484.
Bohlin, J., Lundh, C., Prado, S. (2011). “Markets or Politics? The Swedish urban-rural wage gap, 1865–1945”. Unpublished manuscript, Gothenburg University.
Bordo, M.D., Eichengreen, B., Klingebiel, D., Soledad Martinez-Peria, M. (2001). “Is the Crisis Problem Growing More Severe?”. Economic Policy 16(32).
Bordo, M.D., Meissner, C.H. (2012). “Does Inequality Lead to a Financial Crisis?”. NBER Working Paper 17896, National Bureau of Economic Research.
Borgerhoff Mulder, M., Bowles, S., Hertz, T., Bell, A., Beise, J., Clark, G., Fazzio, I., Gurven, M., Hill, K., Hooper, P., Irons, W., Kaplan, H., Leonetti, D.L., Marlowe, F., Naidu, S., Nolin, D., Piraino, P., Quinlan, R.J., Sear, R., Shenk, P., Smith, E.A., Wiessner, P. (2009). “The Intergenerational Transmission of Wealth and the Dynamics of Inequality in Pre-Modern Societies”. Science 326, 682–688.
Botero, J.C., Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A. (2004). “The Regulation of Labor”. Quarterly Journal of Economics 119(4), 1339–1382.
Bourguignon, F., Morrison, C. (2002). “Inequality among World citizens: 1820-1992”. American Economic Review 92(4), 727–744.
Burkhauser, R.V., Hahn, M., Wilkins, R. (2013), “Measuring Top Incomes Using Tax Record Data: A Cautionary Tale from Australia”. NBER Working Paper No. 19121.
Burkhauser, R.V., Feng, S., Jenkins, S., Larrimore, J. (2012). “Recent Trends in Top Income Shares in the USA: Reconciling Estimates from March CPS and IRS Tax Return Data”. Review of Economics and Statistics 94(2), 371–388.
Cahuc, P., Challe, E. (2009). “Produce or speculate? Asset bubbles, occupational choice and efficiency”. IZA Discussion Paper 4630.
Caselli, F. (1999). “Technological Revolutions”. American Economic Review 89(1), 78–102.
Christensen, H.M. (2003). Skatteberegningsreglerne gennem 100 år, Skatteministeriet: Copenhagen.

Clark, G. (2008). A Farewell to Alms. A Brief History of the World. Princeton University Press, Princeton, NJ.
Comin, D., Mestieri, M. (2013). "If Technology Has Arrived Everywhere, Why has Income Diverged?". NBER Working Papers 19010, National Bureau of Economic Research.
Cowell, F. (2013). "UK wealth inequality in an international context", in Hills, J. (ed.) Wealth in the UK. Oxford University Press, Oxford.
Davies, J.B., Shorrocks, A.F. (2000). "The Distribution of Wealth". In: Atkinson, A.B., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. 1. North-Holland: Amsterdam.
De Long, J.B. (1996). "Billionaires', www.j-bradford-delong.net/Econ_Articles/billionaires.html (accessed 10 July 2006).
Dell, F. (2007). "Top Incomes in Germany throughout the Twentieth Century". In: Atkinson, A.B., T. Piketty (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.
Dell, F., Piketty, T., Saez, E. (2007). "Income and Wealth Concentration in Switzerland over the Twentieth Century". In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.
Dew-Becker, I., Gordon, R.J. (2005). "Where Did the Productivity Growth Go? Inflation Dynamics and the Distribution of Income". Brooking Papers on Economic Activity 2, 67–127.
Easterly, W. (2005). "National Policies and Economic Growth". In: Aghion, P., Durlauf, S. (Eds.), Handbook of Economic Growth. North-Holland, Amsterdam.
Edlund, L., Kopczuk, W. (2009). "Women, Wealth and Mobility". American Economics Review 99(1), 146–178.
Eloranta, J., García-Iglesias, C., Jalava, J., Ojala, J. (2006). "On the road to prosperity: An introduction". In: Ojala, J., Eloranta, J., Jalava, J. (Eds.), On the road to prosperity. An economic history of Finland, SKS, Helsinki.
Epland, J., Kirkeberg, M.I. (2012). "Wealth Distribution in Norway: Evidence from a New Register-Based Data". Statistics Norway, Report 35/2012.
Esping-Andersen, G. (1990). The Three Worlds of Welfare Capitalism, Princeton University Press. Princeton, NJ.
Fahlenbrach, R., Stulz, R. (2009). "Bank CEO incentives and the credit crisis". Journal of Finacial Economics 99(1), 11–26.
Feldstein, M. (1976). "Social Security and the Distribution of Wealth". Journal of the American Statistical Association 71, 800–807.
Financial Structure Database (FSD) (2006). updated version of Beck, T. Asli Demirgüç-Kunt and R. Levine, (2000). "A New Database on Financial Development and Structure", World Bank Economic Review 14, 597-605.
Finansdepartementet (1879). Sammandrag öfver stämpelafgifterna för lagfarter, inteckningar, äktenskapsförord, morgongåfvobref och afhandlingar om lösöresköp under år 1877 samt för boupptecknigar under åren 1873-1877, Finansdepartementet: Stockholm.
Finansdepartementet (1910). Boupptecknigar efter aflidna, inregistrerade vid vederbörande domstolar åren 1906–1908, Finansdepartementet: Stockholm.
Frank, R.H. (2000). "Progressive Taxation and the Incentive Problem", in J. B. Slemrod, editor, Does Atlas Shrug?, New York: Russell Sage Foundation.
Frank, R., Cook, P.J. (1995). The winner-take-all society: How more and more Americans compete for ever fewer and bigger prizes, encouraging economic waste, income inequality, and an impoverished cultural life. Free Press, New York.
Frankel, S.H., Herzfeld, H. (1943). "European income distribution in the Union of South Africa and the effect thereon of income taxation". South African Journal of Economics 11(2), 121–136.
Freeman R. (2008) "Globalization and Inequality". In: Salverda, W., Nolan, B., Smeeding, T.M. (Eds.), The Oxford Handbook on Economic Inequality. Oxford University Press, Oxford.
Freeman R., Gelber, A.M. (2010) "Prize Structure and Information in Tournaments: Experimental Evidence". American Economic Journal: Applied Economics 2(1), 149–164.

Frick, J., Grabka, M. (2013). “Public pension entitlement and the distribution of wealth”. In: Gornick, J.C., Jäntti, M. (Eds), Income inequality. Economic disparities and the middle class in affluent countries, Stanford University Press, Stanford.
Friedman, E. Johnson, S. Kaufman, D., Zoido-Lobaton, P. (2000). “Dodging the grabbing hand: the determinants of unofficial activity in 69 countries”. Jounal of Public Economics 76(3), 459–493.
Frydman, C., Saks, R.E. (2007). “Executive Compensation: A New View from a Long-Term Perspective, 1936–2005”. Review of Financial Studies 23(5), 2099–2138.
Gabaix, X., Landier, A. (2008). “Why Has CEO Pay Increased So Much?”. Quarterly Journal of Economics 123(1), 49–100.
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.
Galor, O., Zeira, J. (1993). “Income Distribution and Macroeconomics’, Review of Economic Studies 60(1), 35–52.
Gersbach, H., Schmutzler, A. (2007). “Does Globalization Create Superstars?”. CEPR Discussion Papers 6222, Centre for Economic Policy Research, London.
Goldin, C., Katz, L.F. (2008). The Race Between Education and Technology, The Belknap Press of Harvard University Press, Cambridge, MA.
Gordon, R., Slemrod, J. (1988). “Do We Collect Any Revenue from Taxing Capital Income?”. In: Summers, L. (Ed.), Tax Policy and the Economy, MIT Press and the National Bureau of Economic Research.
Grossman, G.M., Rossi-Hansberg, E. (2008). “Trading Tasks: A Simple Theory of Offshoring”. American Economic Review 98(5), 1978–1997.
Haig, R.M. (1921). The Federal Income Tax, Columbia University Press, New York.
Harrison, A. (Ed.) (2006). Globalization and Poverty, University of Chicago Press, Chicago.
Hoffman, P.T., Postel-Vinay, G., Rosenthal, J.-L. (2007). Surviving large losses: Financial Crises, The Middle Class, And The Development Of Capital Markets. Harvard University Press, Cambridge, MA.
IMF (2007). World Economic Outlook 2007. Globalization and Inequality. Washington DC: IMF.
Inland Revenue Statistics (2006). “Distribution among the adult population of marketable wealth’, http://www.hmrc.gov.uk/stats/personal_wealth/table13_5.xls (accessed 22.6.2006).
Jansson, K., Johansson, L. (2000). Förmögenhetsfördelningen i Sverige 1997 med tillbakablick till 1975, Statistics Sweden, Stockholm.
Jansson, K., Johansson, S. (1988). Förmögenhetsfördelningen 1975–1987, Statistics Sweden, Stockholm.
Jenkins, S., Brandolini, A., Micklewright, J., Nolan, B. (2013). The Great Recession and the Distribution of Household Income. Oxford University Press, Oxford.
Johansson, F., Klevmarken, A.N. (2007). “Comparing survey and register wealth data”. In: ”Essays on Measurement Error and Nonresponse’, Uppsala University Economic Studies 103, Uppsala.
Jones, A.H. (1970). “Wealth Estimates for the American Middle Colonies, 1774”. Economic Development and Cultural Change 18(4), part 2.
Jones, A.H. (1972). “Wealth Estimates for the New England Colonies about 1770”. Journal of Economic History 32, 98–127.
Jones, A. H. (1980). Wealth of a Nation to Be: The American colonies on the Eve of the American Revolution. Columbia University Press, New York.
Jutikkala, E. (1953). “The distribution of wealth in Finland in 1800”. Scandinavian Economic History Review 1(1), 81–103.
Jäntti, M. (2006). “Trends in the Distribution of Income and Wealth: Finland 1987–1998”. In: Wolff, E.N. (Ed.) International Perspectives on Household Wealth. Edward Elgar, Northampton.
Jäntti, M., Riihelä, M., Sullström, R., Tuomala, M. (2009). “Trends in Top Income Shares in Finland”. in A.B. Atkinson and T. Piketty (Eds.) (2009). Top Incomes: A Global Perspective. Volume II. Oxford University Press, Oxford.
Kanbur, R. (2000). “Income Distribution and Development” In: Atkinson, A.B., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. 1. North-Holland, Amsterdam.
Kaplan, S., Rauh, J. (2010). “Wall Street and Main Street: What Contributes to the Rise in the Highest Incomes?”. Review of Financial Studies 23(3), 1004–1050.

Katic, P., Leigh, A. (2013). “Top Wealth Shares in Australia 1915–2012”. Working Paper, International Water Management Institute.
Katz, L., Autor, D. (1999). “Changes in the Wage Structure and Earnings Inequality”. In: Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Economics, vol. 3, North-Holland, Amsterdam.
Katz, L., Murphy, K. (1992). “Changes in Relative Wages: Supply and Demand Factors”. Quarterly Journal of Economics 107, 35–78.
Kennickell, A. (2009). “Ponds and Streams: Wealth and Income in the U.S., 1989 to 2007”. Finance and Economics Discussion Series 2009-13. Board of Governors of the Federal Reserve System (U.S.).
Kennickell, A. (2011). “Tossed and Turned: Wealth Dynamics of U.S. Households 2007–2009”. Finance and Economics Discussion Series 2011-51. Board of Governors of the Federal Reserve System (U.S.).
Kiær, A.N. (1917). Indtaegts- og formuesforhold efter skatteligningerne for 1913/14 sammenignet med tidligere og senere aar, Departementet for Sociale Saker: Kristiania.
Klevmarken, N.A. (2004). “On the Wealth Dynamics of Swedish Families: 1984–98”. Review of Income and Wealth 50(4), 469–491.
Kopczuk, W., Saez, E. (2004). “Top Wealth Shares in the United States, 1916–2000: Evidence from Estate Tax Returns”. National Tax Journal 57(2), 445–487.
Kopczuk, W., Saez, E., Song, J. (2010). “Earnings Inequality and Mobility in the United States: Evidence from Social Security Data since 1937”. Quarterly Journal of Economics 125(1), 91–128.
Laeven, L., Valencia, F. (2008). “Systemic Banking Crises: A New Database”. IMF Working Paper No. 08/224.
Lampman, R.J. (1962). The Share of Top Wealth-Holders in National Wealth: 1922–56, Princeton University Press: New Jersey.
Lavindkomstkommissionen (1979). Udviklingen i formuefordelingen 1960–1977. Delrapport 2, Lavindkomstkommissionen, København.
Lazear, E.P., Rosen, S. (1981). “Rank-order Tournaments as Optimum Labor Contracts”. Journal of Political Economy 89, 841–864.
Leamer, E.E. (2007). “A Flat World, a Level Playing Field, a Small World After All, or None of the Above? A Review of Thomas L Friedman's The World is Flat”. Journal of Economic Literature 45(1), 83–126.
Leigh, A. (2009). “Top Incomes”. In: Salverda, W., Nolan, B., Smeeding, T. (Eds.), The Oxford Handbook of Economic Inequality. Oxford University Press, Oxford.
Leigh, A., van der Eng, P. (2009). “Top incomes in Indonesia: 1920–2004”. In: Atkinson, A.B. Piketty, T. (Eds.), Top Incomes: A Global Perspective. vol. 2. Oxford University Press, Oxford.
Levy, P., Temin (2007). “Inequality and Institutions in 20th Century America”. NBER Working Paper No. 13106.
Levine, R. (2005). “Finance and Growth: Theory and Evidence”. In: Aghion, P., Durlauf, S. (Eds.) Handbook of Economic Growth. North-Holland, Amsterdam.
Lindahl, M., Palme, M., Sandgren-Massih, S., Sjögren, A. (2012). “Dynastic capital and long-term intergenerational persistence of earnings and educational attainment”. Working Paper, Uppsala University.
Lindert, P.H. (1986). “Unequal English Wealth since 1670”. Journal of Political Economy 94(6), 1127–1162.
Lindert, P.H. (2000). “Three Centuries of Inequality in Britain and America”. In: Atkinson, A.B., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. 1. North-Holland, Amsterdam.
Ljungberg, J. (2006). “The Secular Decline of Professional Relative Earnings in Sweden. Evidence and Explanation”. Unpublished manuscript, Lund University.
LO (2013). Makteliten – klyftorna består. En studie av inkomstutvecklingen för makteliten perioden 1950 till 2011, Landsorganisationen, Stockholm.
Long, J., Ferrie, J. (2007). “The Path to Convergence: Intergenerational Occupational Mobility in Britain and the US in Three Eras”. Economic Journal 117, C61–C71.
Lydall, H. (1968). The structure of earnings, Oxford University Press, London
Manasse, P. and A. Turrini (2001). “Trade, Wages, and ‘Superstars’”. Journal of International Economics 54(1), 97–117.

Marshall, A. (1920). Principles of Economics, Eighth edition. London: Macmillan.
Mayer, T. (1960). “Distribution of Ability and Earnings”. Review of Economics and Statistics 42(2), 189–195.
Meade, J.E. (1964). Efficiency, Equality, and the Ownership of Property. Allen and Unwin, London.
Melitz, M.J. (2003). “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity”. Econometrica 71(6), 1695–1725.
Melitz, M.J. and G. Ottaviano (2008). “Market Size, Trade, and Productivity”. Review of Economic Studies 75, 295–316.
Milanovic, B. (2006). “An estimate of average income and inequality in Byzantium around year 1000”. Review of Income and Wealth 52(3), 449–470.
Milanovic, B. (2013). “The inequality possibility frontier: the extensions and new applications”. Mimeo, World Bank.
Milanovic, B., Lindert, P., Williamson, J.G. (2011). “Pre-Industrial inequality”. Economic Journal 121, 255–272.
Moehling, C.M., Steckel, R. (2001). ”Rising Inequality: Trends in the Distribution of Wealth in Industrializing New England’, Journal of Economic History 61(1), 160–183.
Mohn, J.R. (1873). ”Statistiske bidrag til belysning af privatformuens fordeling i Norge’, Norsk Retstidende 1–2, 1–32.
Mokyr, J. (1990). “The Lever of Riches: Technological Creativity and Economic Progress”. Oxford University Press, Oxford.
Mookherjee, D., Ray, D. (2003). “Persistent Inequality”. Review of Economic Studies 70(2), 369–394.
Mookherjee, D., Ray, D. (2006). ”Occupational Diversity and Endogenous Inequality’, mimeo, Boston University and New York University: Boston and New York.
Moriguchi, C., Saez, E. (2008). “The Evolution of Income Concentration in Japan, 1885–2002: Evidence from Income Tax Statistics”. Review of Economics and Statistics, 90, 713–734.
Murphy, K.J. (1999). “Executive Compensation”. In: Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Economics, vol. 3, North-Holland, Amsterdam.
Nickell, S. (1981). “Biases in Dynamic Models with Fixed Effects”. Econometrica, 1399–1416.
Nolan, B. (2007). “Long Term Trends in Top Income Shares in Ireland”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford.
Office for National Statistics (2011). The effects of taxes and benefits on household income, 2009/10. Further analysis and methodology, London, UK.
Ohlsson, H., Roine, J., Waldenström, D. (2008). “Long-Run Changes in the Concentration of Wealth: An Overview of Recent Findings”. In: Davies, J.B. (Ed.), Personal Wealth from a Global Perspective. Oxford University Press, Oxford.
O’Rourke, K.H., Williamson, J.G. (1999). Globalization and History. The Evolution of the 19th Century Atlantic Economy. MIT Press, Cambridge, MA.
O’Rourke, K.H., Taylor, A. and J. G.Williamson (1996). “Factor price convergence in the late nineteenth century”. International Economic Review 37, 499–530.
Pareto, V. (1897). Cours d’economie politique. Vol ii, Lausanne.
Persson, M., Sandmo, A. (2005). “Taxation and Tournaments”. Journal of Public Economic Theory 7(4), 543–559.
Phelps Brown, H. (1977) “The Inequality of Pay”. University of California Press, Berkeley.
Phillippon, T., Reshef, A. (2012). “Wages and Human Capital in the U.S. Financial Industry: 1909–2006”. Quarterly Journal of Economics 127(4), 1551–1609.
Piketty T. (2006). “The Kuznets' curve, yesterday and tomorrow”. In: Banerjee A., Benabou R., Mookerhee D. (Eds.), Understanding poverty. Oxford University Press, Oxford.
Piketty, T. (1997). “The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing”. Review of Economic Studies 64(2), 173–189.
Piketty, T. (2000). “Theories of Persistent Inequality and Intergenerational Mobility”. In: Atkinson, A.B., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. 1. North-Holland, Amsterdam.
Piketty, T. (2001a). Les hauts revenus en France au 20ème siècle, Grasset, Paris.

Piketty, T. (2001b), “Income Inequality in France, 1900–1998”. CEPR Discussion Paper No. 2876, Centre for Economic Policy Research, London.
Piketty, T. (2003). “Income Inequality in France, 1901–1998’, Journal of Political Economy 111(5), 1004–1042.
Piketty, T. (2005). “Top Income Shares in the Long Run: An Overview”. Journal of the European Economic Association 3(2–3), 1–11.
Piketty, T. (2007). “Income Inequality in France, 1900–1998”. In: Atkinson, A.B., Piketty, T. (Eds.), Top Incomes over the Twentieth Century: A Contrast between European and English-Speaking Countries. Oxford University Press, Oxford
Piketty, T. (2011). “On the Long-Run Evolution of Inheritance: France 1820–2050”. Quarterly Journal of Economics 126(3), 1071–1131.
Piketty, T., Qian, N. (2009). “Income Inequality and Progressive Income Taxation in China and India, 1986-2015”. American Economic Journal: Applied Economics 1(2), 53–63.
Piketty, T., Saez, E. (2003). “Income Inequality in the United States, 1913–1998”. Quarterly Journal of Economics 118(1), 1–39.
Piketty, T., Saez, E. (2006). “The Evolution of Top Incomes: A Historical and International Perspective”. American Economic Review, Papers and Proceedings 96(2), 200–205.
Piketty, T., Saez, E. (2007). “How Progressive is the U.S. Federal Tax System? A Historical and International Perspective”. Journal of Economic Perspectives 21(1), 3–24.
Piketty, T. and E. Saez (2013a), “Optimal Labor Income Taxation”. in Handbook of Public Economics, Vol 5. Amsterdam: North-Holland, Amsterdam.
Piketty, T., Saez, E. (2013b). “A theory of optimal inheritance taxation”. Econometrica 81(5), 1851–1886.
Piketty, T., Saez, E., Stantcheva, S. (2013). “Optimal taxation of Top Incomes: A Tale of Three Elasticities”. American Economic Journal: Economic Policy 6(1), 230–271.
Piketty, T., Postel-Vinay, G. Rosenthal, J.-L. (2004). “Wealth Concentration in a Developing Economy: Paris and France, 1807–1994”. CEPR Working Paper 4631, Centre for Economic Policy Research, London.
Piketty, T., Postel-Vinay, G. Rosenthal, J.-L. (2006). “Wealth Concentration in a Developing Economy: Paris and France, 1807–1994”. American Economic Review 96(1), 236–256.
Piketty, T., Zucman, G. (2013). “Capital is Back: Wealth-Income Ratios in Rich Countries, 1700-2010”. Working Paper, Paris School of Economics.
Rajan, R., Zingales, L. (2003). “The Great Reversals: The Politics of Financial Development in the twentieth century”. Journal of Financial Economics 69, 5–50.
Rodrik, D. (1997). “Has Globalization Gone Too Far?”. Washington DC: Institute for International Economics.
Roine, J., Vlachos, J., Waldenström, D. (2009). “The Long-Run Determinants of Inequality: What Can We Learn from Top Income Data?”. Journal of Public Economics 93(7–8), 974–988.
Roine, J., Waldenström, D. (2008). “The Evolution of Top Incomes in an Egalitarian Society: Sweden, 1903–2004”. Journal of Public Economics 92, 366–387.
Roine, J., Waldenström, D. (2009). “Wealth Concentration over the Path of Development: Sweden, 1873–2006”. Scandinavian Journal of Economics 111(1), 151–187.
Roine, J., Waldenström, D. (2010). “Top Incomes in Sweden over the Twentieth Century”. In: Atkinson, A.B. Piketty, T. (Eds.), Top Incomes: A Global Perspective, vol. 2. Oxford University Press, Oxford.
Roine, J., Waldenström, D. (2011). “Common Trends and Shocks to Top Incomes: A Structural Breaks Approach”. Review of Economics and Statistics 93(3), 832–846.
Roine, J., Waldenström, D. (2012). “On the Role of Capital Gains in Swedish Income Inequality”. Review of Income and Wealth 58(3), 569–587.
Rosen, S. (1981). “The Economics of Superstars”. American Economic Review 71(5), 845–858.
Rosenbloom, J.L., Stutes, G.W. (2008). “Reexamining the Distribution of Wealth in 1870”. In: Rosenbloom, J.L. (Ed.), Quantitative Economic History: The Good of Counting, Routledge, London.
Saez, E., Veall, M.R. (2005), “The Evolution of High Incomes in Northern America: Lessons from Canadian Evidence”. American Economic Review 95, 831–849.

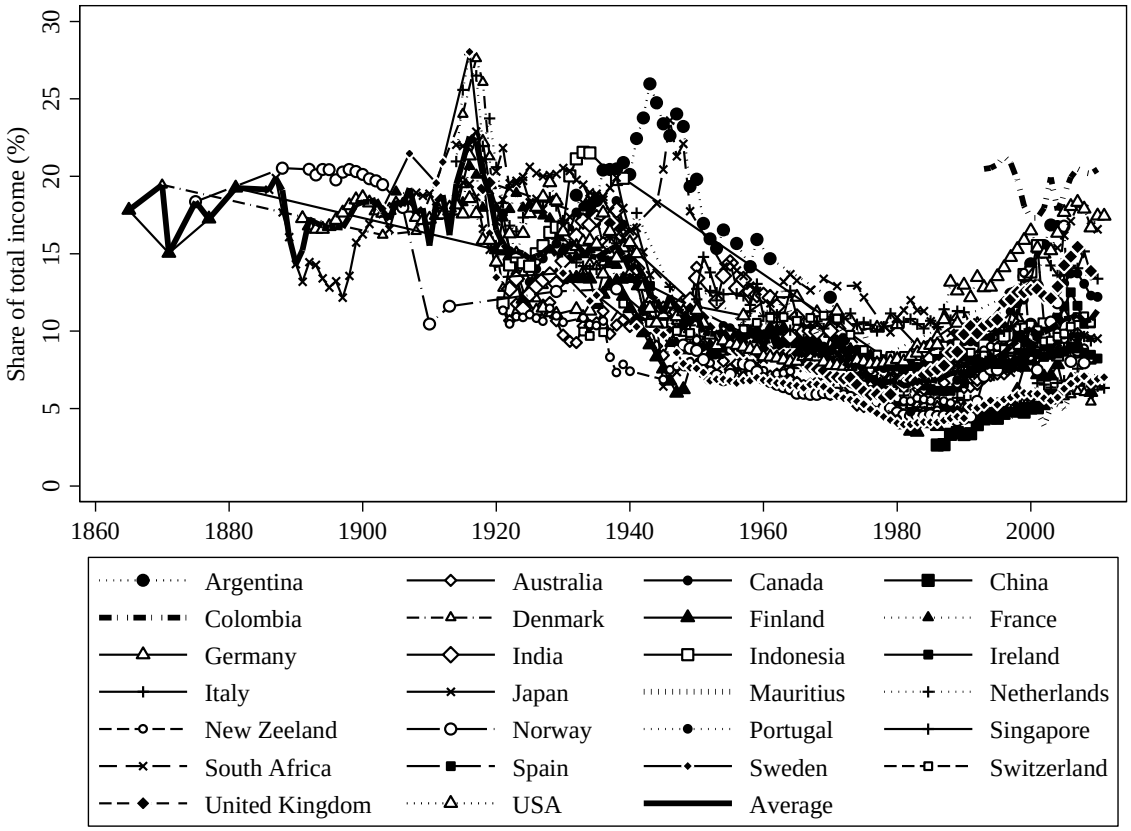
Saez, E. (2004). “Reported Incomes and Marginal Tax Rates, 1960–2000: Evidence and Policy Implications”. In: Poterba, J. (Ed.), Tax Policy and the Economy 18, MIT Press, Cambridge, MA.
Saez, E. Slemrod, J., Giertz, E. (2012). “The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review”. Journal of Economic Literature 50, 3–50.
Salverda, W., Haas, C., de Graaf-Zijl, M., Lancee, B., Notten, N., Ooms, T. (2013). “Country Report for the Netherlands”. Growing inequalities and their impacts in the Netherlands, GINI Project, Amsterdam.
Sattinger, M. (1979). “Differential Rents and the Distribution of Earnings”. Oxford Economic Papers 31, 60–71.
Sattinger, M. (1993). “Assignment Models of the Distribution of Earnings”. Journal of Economic Literature 31, 831-880.
Scheve, K.F., Stasavage, D. (2010). “The Conscription of Wealth: Mass Warfare and the Demand for Progressive Taxation”. International Organization 64(3), 529–561.
Scheve, K.F., Stasavage, D. (2012). “Democracy, War, and Wealth: Evidence from Two Centuries of Inheritance Taxation”. American Political Science Review 106(1), 82–102.
Scheve, K.F., Stasavage, D. (2009). “Institutions, Partisanship, and Inequality in the Long Run”. World Politics 61(2), 215–253.
Shammas, C. (1993). “A New Look at Long-Term Trends in Wealth Inequality in the United States”. American Historical Review 98(4), 412–432.
Simon, H.A. (1957). “The Compensation of Executives”. Sociometry 20, no. I, 32–35.
Simons, H. (1938). Personal Income Taxation: the Definition of Income as a Problem of Fiscal Policy, University of Chicago Press, Chicago.
Slemrod, J., Yitzhaki, S. (2002). “Tax avoidance, evasion, and administration’ in Auerbach, A.J., Feldstein, M. (Eds.), Handbook of Public Economics, vol 3, North-Holland, Amsterdam.
Smeeding, T., Thompson, J., Morelli, S. (2014). “Post-1970 trends in within-country inequality and poverty”. Chapter 9 in Atkinson and Bourguignon (Eds.), Handbook of Income Distribution, vol. 2, North-Holland, Amsterdam.
Smith, J.D. (1984). “Trends in the Concentration of Personal Wealth in the United States, 1958 to 1976”. Review of Income and Wealth 30(4), 419–428.
Soltow (1981a), “Wealth Distribution in Finland in 1800”. Scandinavian Economic History Review 27(1), 21–32.
Soltow, L. (1968). “Long-Run Changes in British Income Inequality”. Economic History Review 21(1), 17–29.
Soltow, L. (1971). “Economic inequality in the United States in the period from 1790 to 1860”. Journal of Economic History 31, 822–839.
Soltow, L. (1980). “Wealth Distribution in Norway and Denmark in 1789”. Historisk Tidsskrift (Oslo), 59: 221–235.
Soltow, L. (1981b). “Wealth Distribution in Denmark in 1789”. Scandinavian Economic History Review 27(2), 121–138.
Soltow, L. (1981c). “The Distribution of Property Values in England and Wales in 1798”. Economic History Review 34(2), 60–70.
Soltow, L. (1985). “The Swedish Census of Wealth at the Beginning of the 19th Century”. Scandinavian Economic History Review 33(1), 1–24.
Soltow, L. (1989). Distribution of Wealth and Income in the United States in 1798, University of Pittsburgh Press.
Soltow, L. (1998). “Inequality of income and wealth at the beginning of the 19th century”. In: Soltow, L., van Zanden, J.L. (Eds.), Income & wealth inequality in the Netherlands 16th–twentieth century, Het Spinhuis, Amsterdam.
Soltow, L., van Zanden, J.L. (1998). Income & Wealth Inequality in The Netherlands 16th–20th century, Het Spinhuis, Amsterdam.
SOU (1957). Arvsbeskattning, betänkande av Arvsskattesakkunniga. SOU 1957:48, Finansdepartementet, Stockholm.
SOU (1969). Kapitalbeskattningen, betänkande av Kapitalskatteberedningen. SOU 1969:54, Norstedt, Stockholm.

SOU (2004). Egendomsskatter: reform av arvs- och gåvoskatter. Slutbetänkande av Egendomsskattekommittén. SOU 2004:66. Fritzes, Stockholm.
SOU (1942). Förutsättningarna för och verkningarna av en engångsskatt å förmögenhet i Sverige. SOU 1942:52. Finansdepartementet, Stockholm.
Spånt, R. (1982). "The distribution of household wealth in some developed countries. A comparative study of Sweden, Denmark, France, Germany, United Kingdom and United States". In: Kessler, D., Masson, A., Strauss-Kahn, D. (Eds.), Accumulation et Répartition de Patrimoines. CNRS and Economica, Paris.
Spånt, R. (1979). "Den svenska förmögenhetsfördelningens utveckling". SOU 1979:9, Fritzes, Stockholm.
Statistics Finland (1911). Bidrag till Finlands officiella statistik, IV. Förmögenhetsförhållanden, Helsingfors: Kungliga senatens tryckeri.
Statistics Finland (2006). Tulo- ja varallisuustilasto 2004, Statistics Finland, Helsinki.
Statistics Finland (2007). Kotitalouksien varallisuus 1988–2004, Statistics Finland, Helsinki.
Statistics Netherlands (2010). Procesbeschrijving statistiek Vermogens huishoudens, Vermogensstatistiek, Centraal Bureau voor de Statistiek: Den Haag/Heerlen.
Statistics Norway (1915a). Indtaegs og formuesforhold efter skatteligningen 1911 i forbindelse med Folketællingen 1910, Kristiania.
Statistics Norway (1915b). Indtaegt, formue og fordelingen av den kommunale skat ifølge skatteligningen for 1913–1914, Kristiania.
Statistics Norway (1934). Folketellingen i Norge 1 desember 1930. 7 hefte. Inntekt og formue efter skatteligningen 1930–31, Oslo.
Statistics Norway (various years), Statistisk Årbok, Oslo.
Steinmo, S. (1993). Taxation and Democracy, Yale University Press: New Haven.
Stiglitz, J.E. (1969). "Distribution of Income and Wealth among Individuals". Econometrica 37(3), 382–397.
Söderberg, J. (1991). "Wage Differentials in Sweden, 1725–1950". In: Brenner, Y.S., Kaelble, H., M. Mark, T. (Eds.), Income Distribution in Historical Perspective, Cambridge University Press, Cambridge.
Terviö, M. (2008). "The Difference That CEOs Make: An Assignment Model Approach". American Economic Review 98(3), 642–668.
Tinbergen, J. (1975). Income Distribution: Analysis and Policies. North-Holland, Amsterdam.
Tuomala, M., Vilmunen, J. (1988). "On the Trends over Time in the Degree of Concentration of Wealth in Finland". Finnish Economic Papers 1, 184–190.
U.S. Census Bureau (2011). Income, Poverty, and Health Insurance Coverage in the United States: 2010, Washington, D.C.
Veall, M. (2010), "Top Income Shares in Canada: Updates and Extensions". Working Paper, McMaster University.
Venables, A.J. (2008). "Rethinking economic growth in a globalizing world: An economic geography lens". Working Paper No. 18, The International Bank for Reconstruction and Development/World Bank, On behalf of the Commission on Growth and Development.
Vermaas, A., Verstegen, S.W., van Zanden, J.L. (1998). "Income inequalitu in the 19th century: Evidence for a Kuznets curve?". In: Soltow, L., van Zanden, J.L. (Eds.), Income & wealth inequality in the Netherlands 16th–twentieth century, Het Spinhuis, Amsterdam.
Watkins G. (1907). The growth of large fortunes; a study of economic causes affecting the acquisition and distribution of property. Macmillan, New York.
Williamson, J.G., Lindert, P. (1980a), American Inequality: A Macroeconomic History. Academic Press, New York.
Williamson, J.G., Lindert, P. (1980b), "Long-Term Trends in American Wealth Inequality". In: Smith, J.D. (Ed.), Modeling the Distribution and Intergenerational Transmission of Wealth. University of Chicago Press, Chicago.
Wilterdink, N. (1984). Vermogensverhoudingen in Nederland. Ontwikkelingen sinds de negentiende eeuw. De Arbeiderspers, Amsterdam.
Winters, A., McCulloch, N., McKay, A. (2004). "Trade Liberalization and Poverty: The Evidence so Far," Journal of Economic Literature 62, 72–115.

Wolff, E.N. (1987). “Estimates of Household Wealth Inequality in the U.S. 1962–1983”. Review of Income and Wealth 33(3), 231–256.
Wolff, E.N. (1996). “International Comparisons of Wealth Inequality”. Review of Income and Wealth 42(4), 433–451.
Wolff, E.N. (2007). “The Retirement Wealth of the Baby Boom Generation,” Journal of Monetary Economics 54(1), 1–40.
Wolff, E.N. (2008). “Changes in Household Wealth in the 1980s and 1990s in the U.S.”. In: Wolff, E.N. (Ed.), International Perspectives on Household Wealth. Edward Elgar, Northampton.
Wolff, E.N. (2011). The Transformation of the American Pension System: Was It Beneficial for Workers?. Upjohn Institute, Kalamazoo, MN.
Wolff, E.N. (2012). The Asset Price Meltdown and the Wealth of the Middle Class, Unpublished manuscript, New York University.
Wolff, E.N., Marley, M. (1989). “Long-Term Trends in U.S. Wealth Inequality: Methodological Issues and Results”. In: Lipsey, R.E., Tice, H.S. (Eds.), The Measurement of Saving. University of Chicago Press, Chicago, IL.
Wolff, E.N., Zacharias, A. (2009). “Household Wealth and the Measurement of Economic Well-Being in the United States”. Journal of Economic Inequality 7(2), 83–115.
Zanden. J.L. van (1998a), “The egalitarian revolution of the 20th century”. In: Soltow, L., van Zanden, J.L. (Eds.), Income & wealth inequality in the Netherlands 16th–twentieth century, Het Spinhuis, Amsterdam.
Zanden. J.L. van (1998b), “In Conclusion”. In: Soltow, L., van Zanden, J.L. (Eds.), Income & wealth inequality in the Netherlands 16th–twentieth century, Het Spinhuis, Amsterdam.
Zanden. J.L. van (2009). The long road to the Industrial Revolution: The European economy in a global perspective, 1000–1800, Brill, Leiden.
Zeuthen, F. (1928). Den Økonomiske Fordeling. Nyt Nordisk Forlag Arnold Busck, Copenhagen.
Zucman, G. (2012). “The Missing Wealth of Nations, Are Europe and the U.S. net Debtors or net Creditors?”. Quarterly Journal of Economics 128(3), 1321–1364.

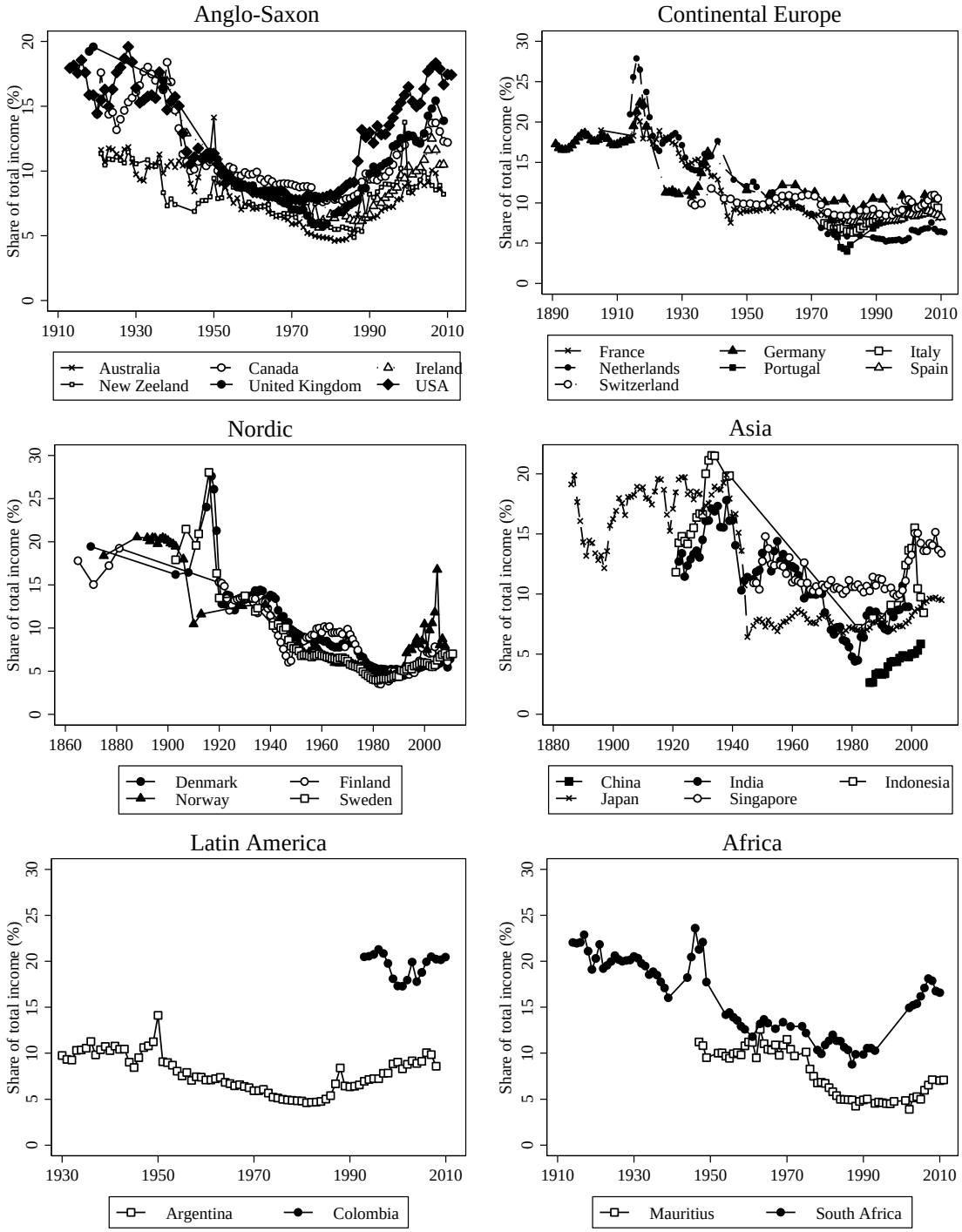
Figures

Figure 1: Top 1% income share in 26 countries, 1870–2010



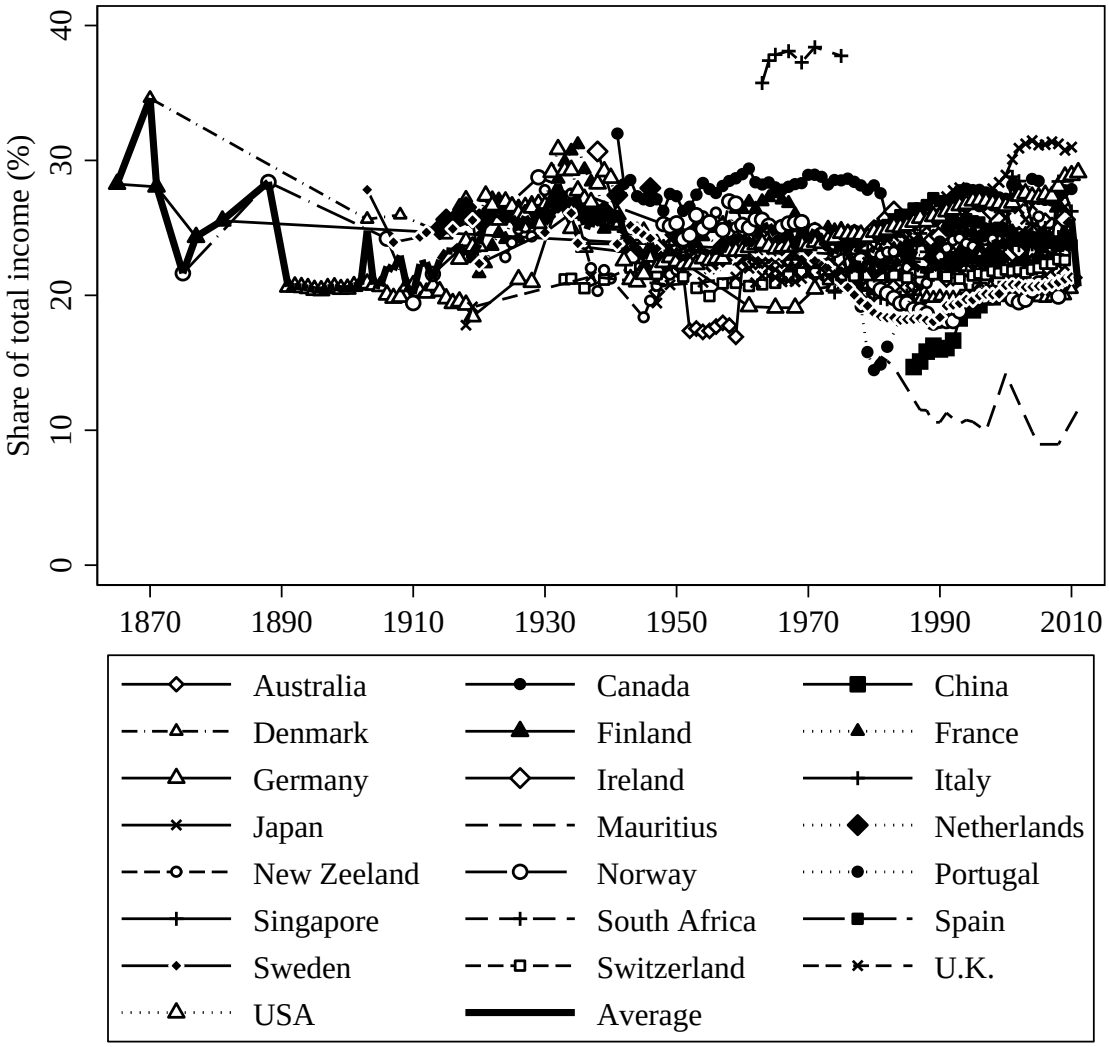
Source: See main text for description of the series and the World Top Income Database for sources.

Figure 2: Top1% across country groups.



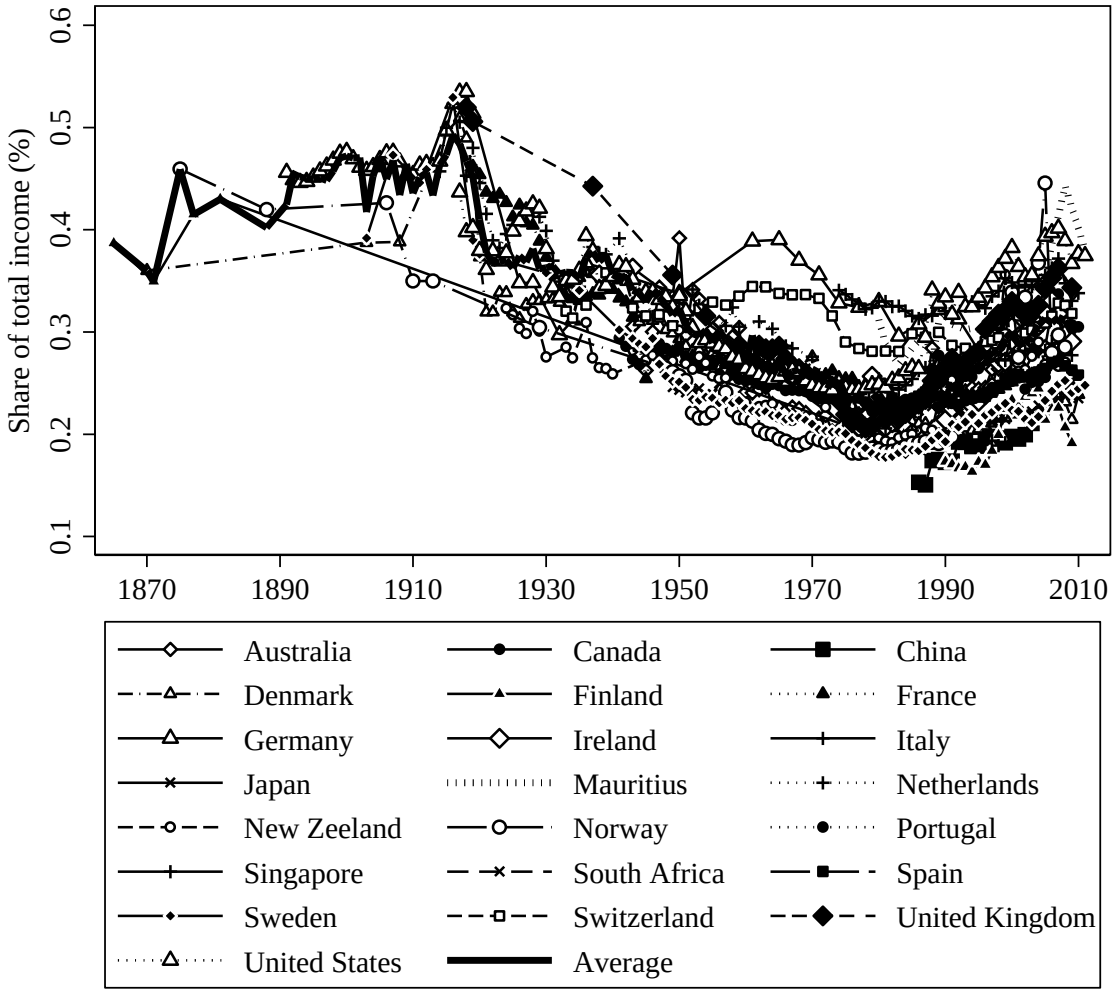
Source: See Figure 1.

Figure 3: Trends in “next 9” percentiles in the top decile (P90–99), 26 countries



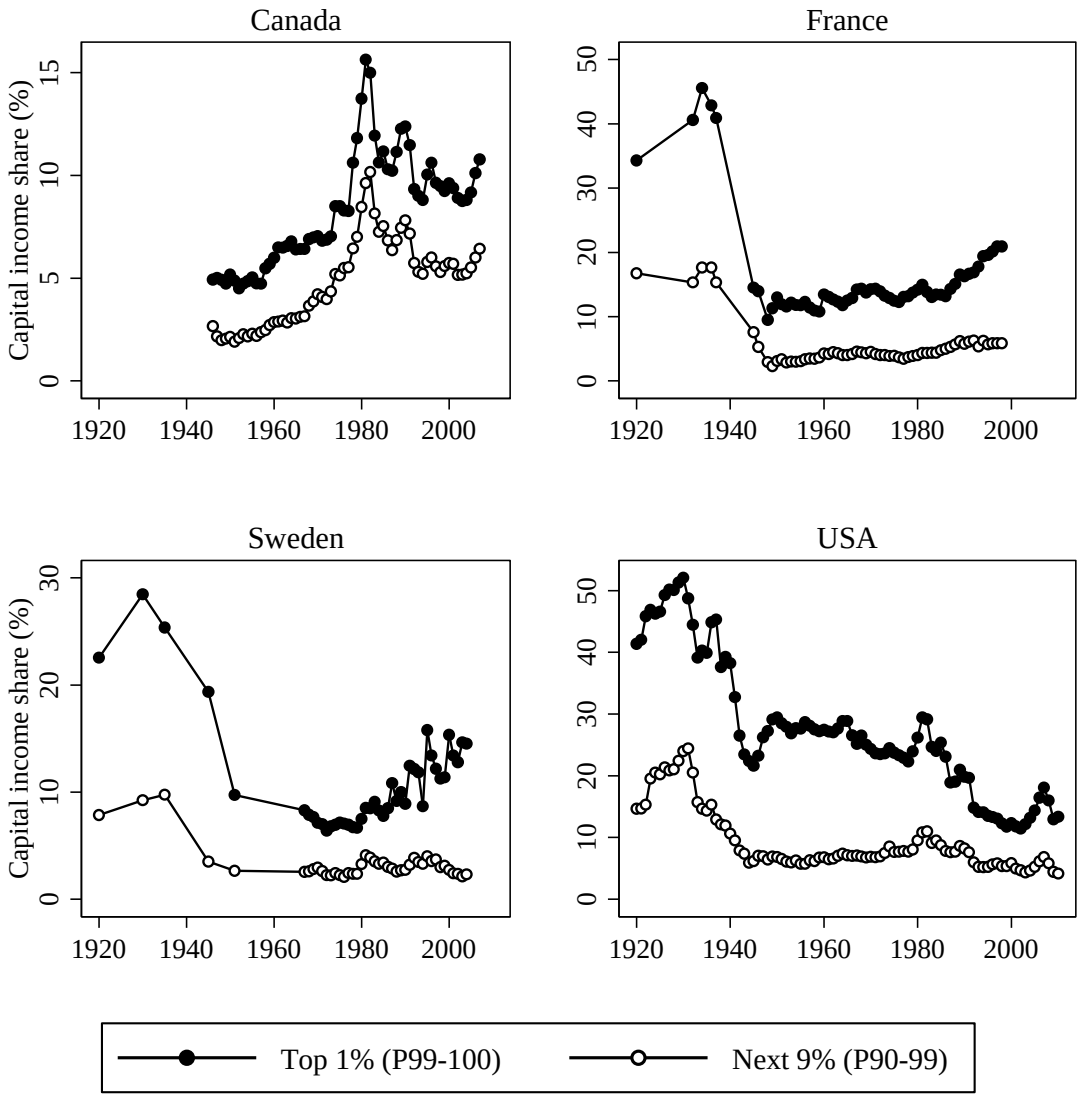
Source: See Figure 1.

Figure 4: Shares-within-shares in top incomes (P99–100/P90–100)



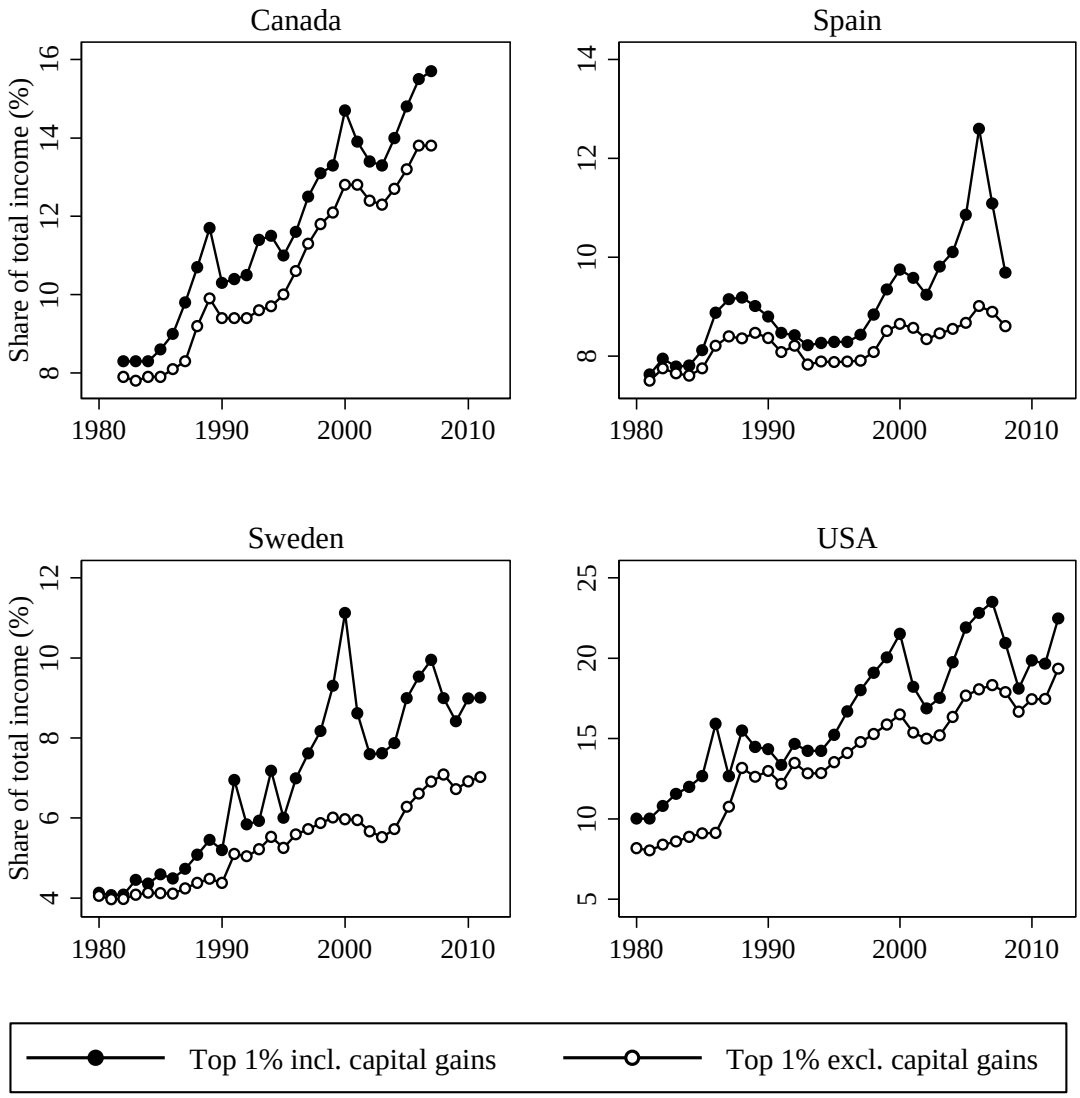
Source: See Figure 1.

Figure 5: Capital income share in total gross income, 1920–2010 (%)



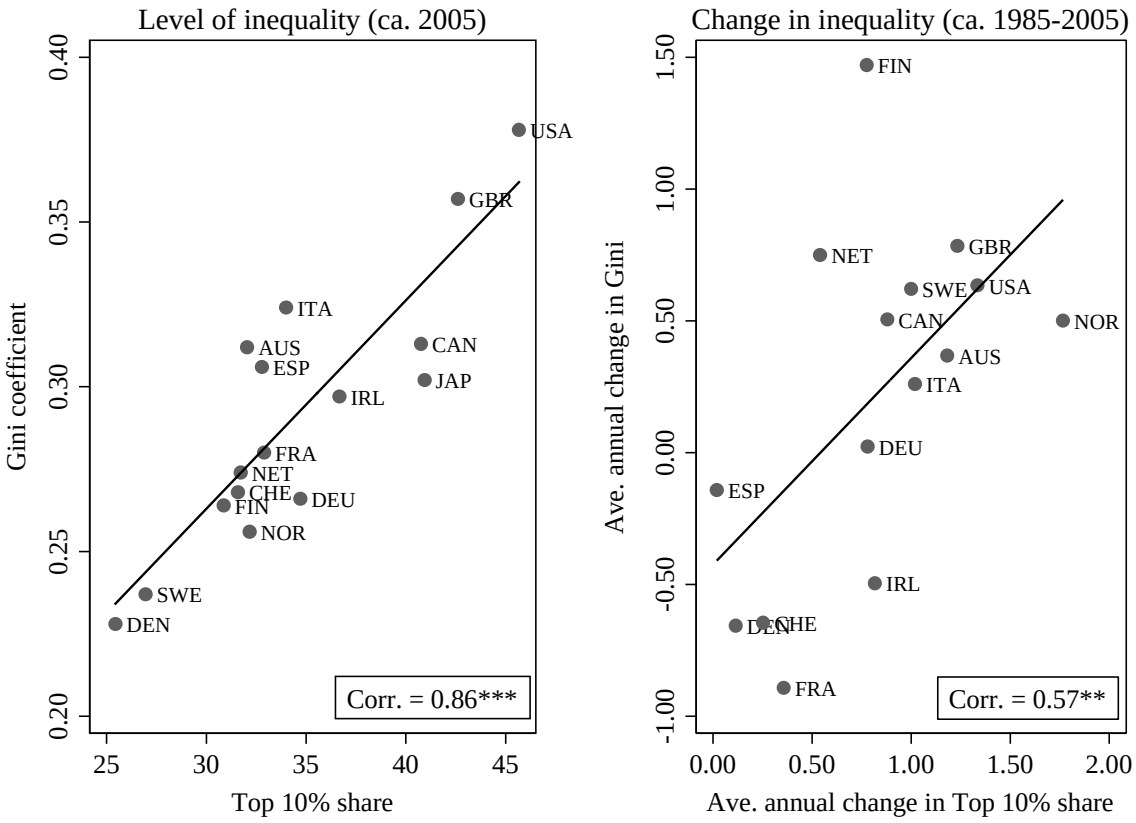
Source: Saez and Veall (2005), Veall (2010) for Canada, Piketty (2001b) for France, Roine and Waldenström (2008, 2010) for Sweden and Piketty and Saez (2003, and updates) for the U.S.

Figure 6: Capital gains in top income percentile, four countries.



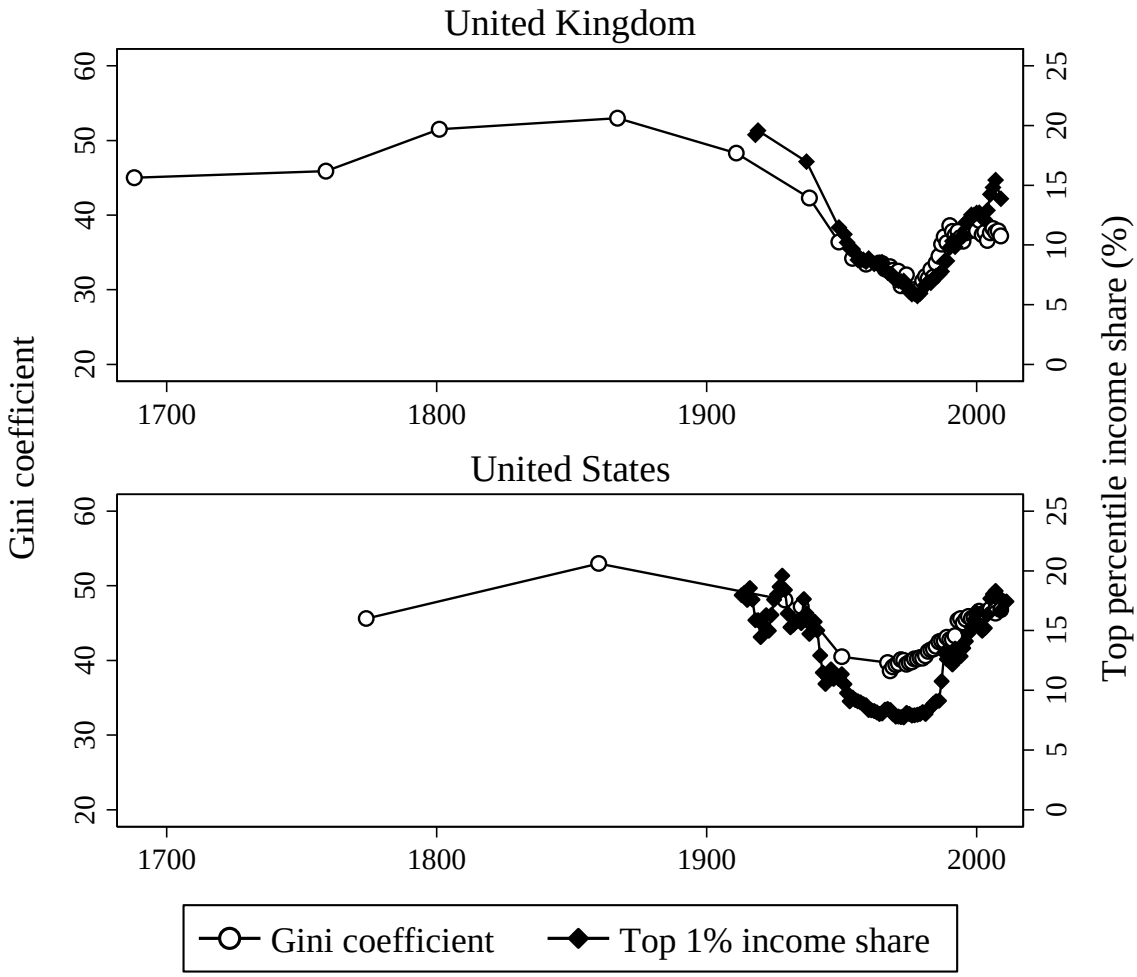
Note: Income earners are ranked separately according to each income concept.

Figure 7: Top income decile and the Gini coefficient



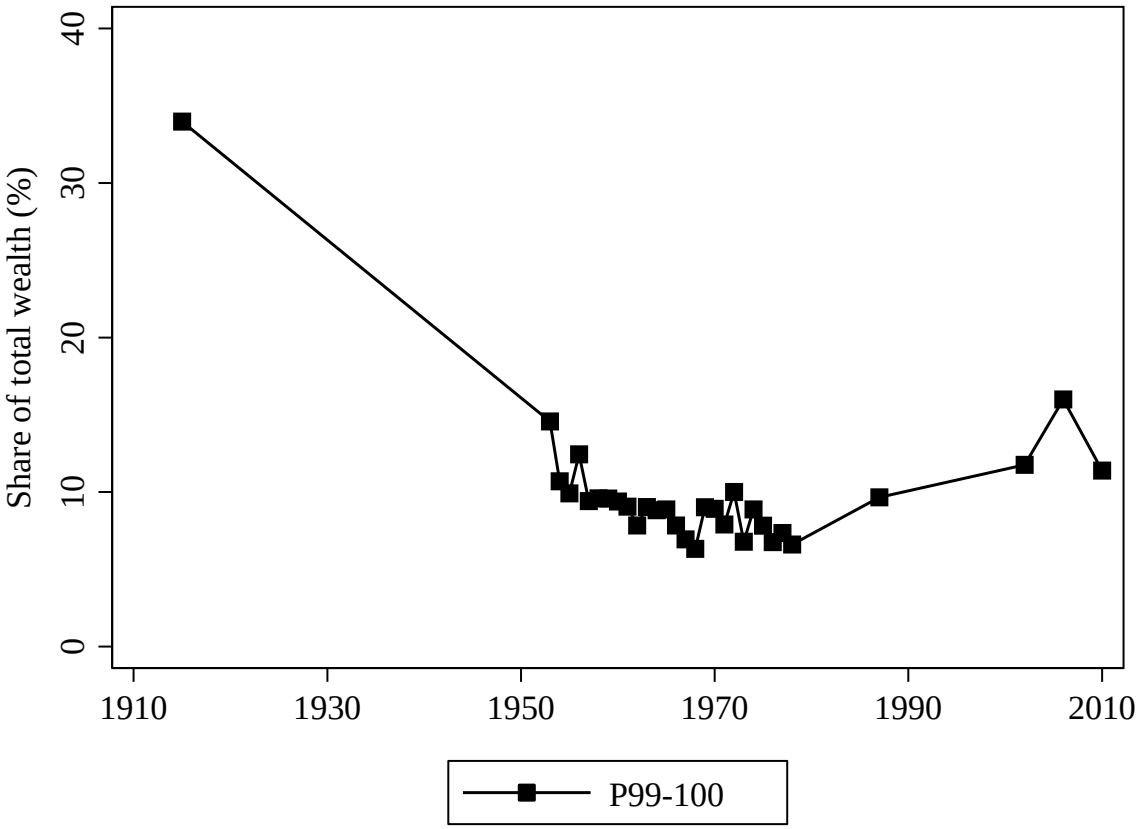
Source: Gini coefficient for disposable incomes of equivalized households are retrieved from the Luxembourg Income Study Datacenter (www.lisdatacenter.org) and top decile gross income shares from the World Top Incomes Database. Pearson correlations are statistically significant at the 1%- (***) and 5%-levels (**), respectively.

Figure 8: Long run inequality trends using Gini and top income percentile share



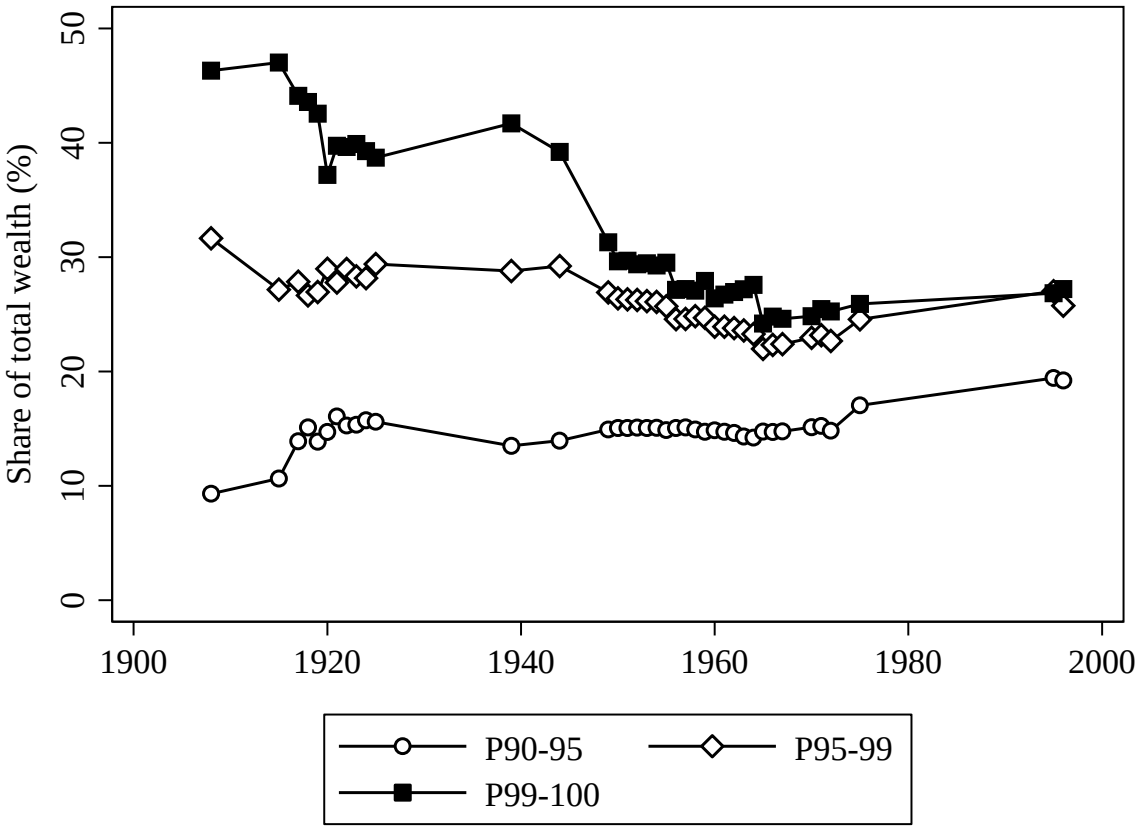
Sources: Gini coefficients for the U.K. from Lindert (2000, table 1), Milanovic (2013, table 1) and Office for National Statistics (2011, table 5), and for the U.S. from the same Lindert and Milanovic sources and U.S. Census Bureau (2011, table A-3). Top income shares from World Top Income Database.

Figure 9: Wealth concentration in Australia, 1915–2010.



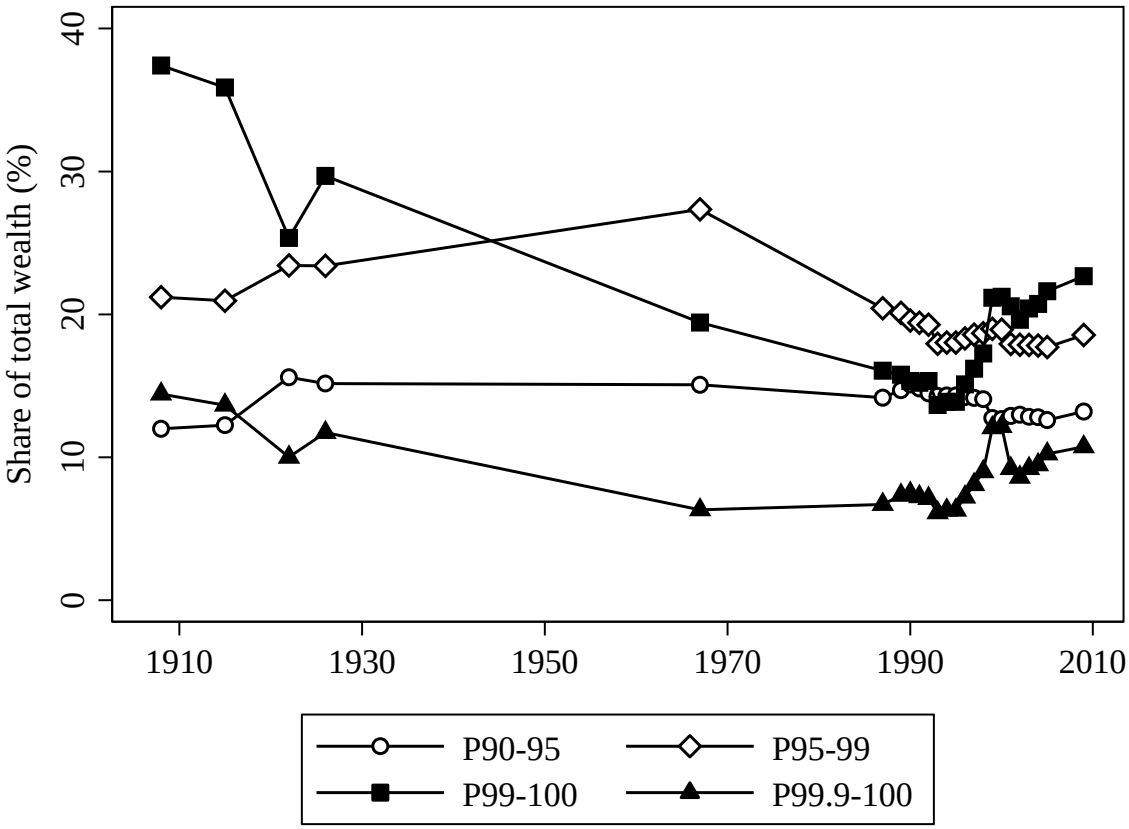
Source: See the Appendix for details about sources and data.

Figure 10: Wealth concentration in Denmark, 1908–1996.



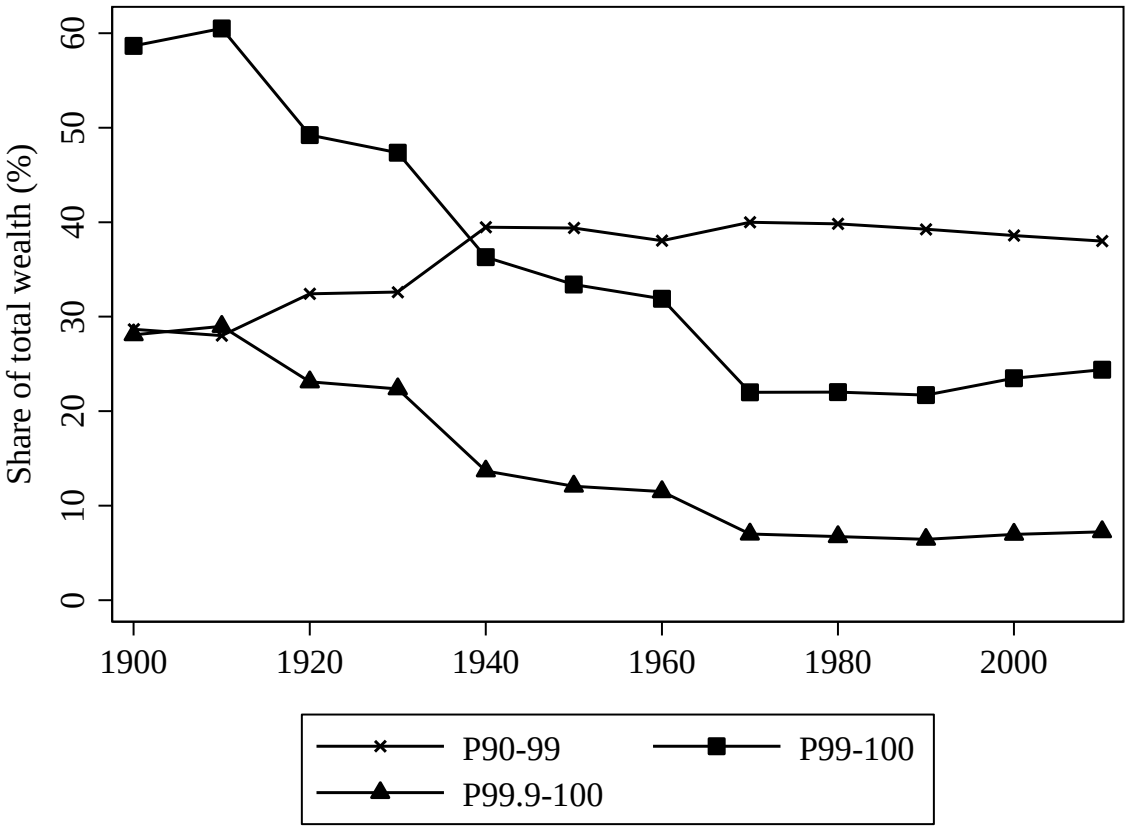
Source: See the Appendix for details about sources and data.

Figure 11: Wealth concentration in Finland, 1908–2009.



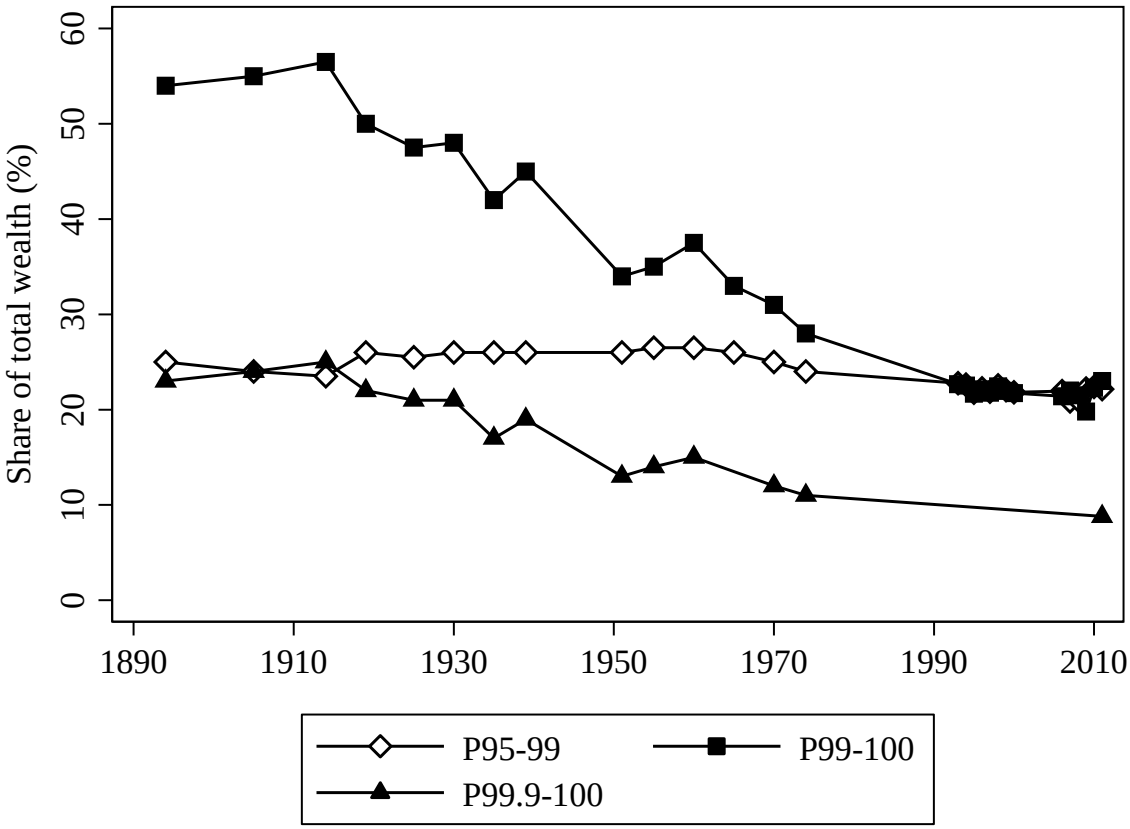
Source: See the Appendix for details about sources and data.

Figure 12: Wealth concentration in France, 1900–2010.



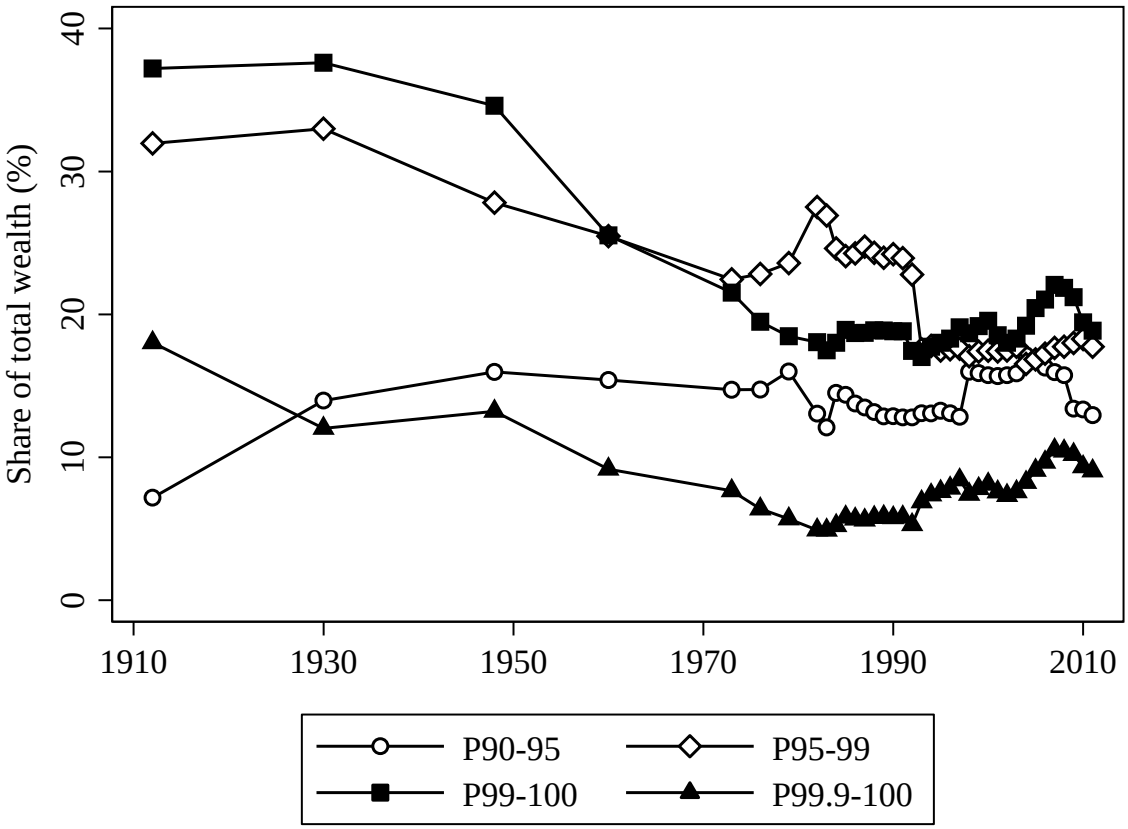
Source: See the Appendix for details about sources and data.

Figure 13: Wealth concentration in the Netherlands, 1894–2011.



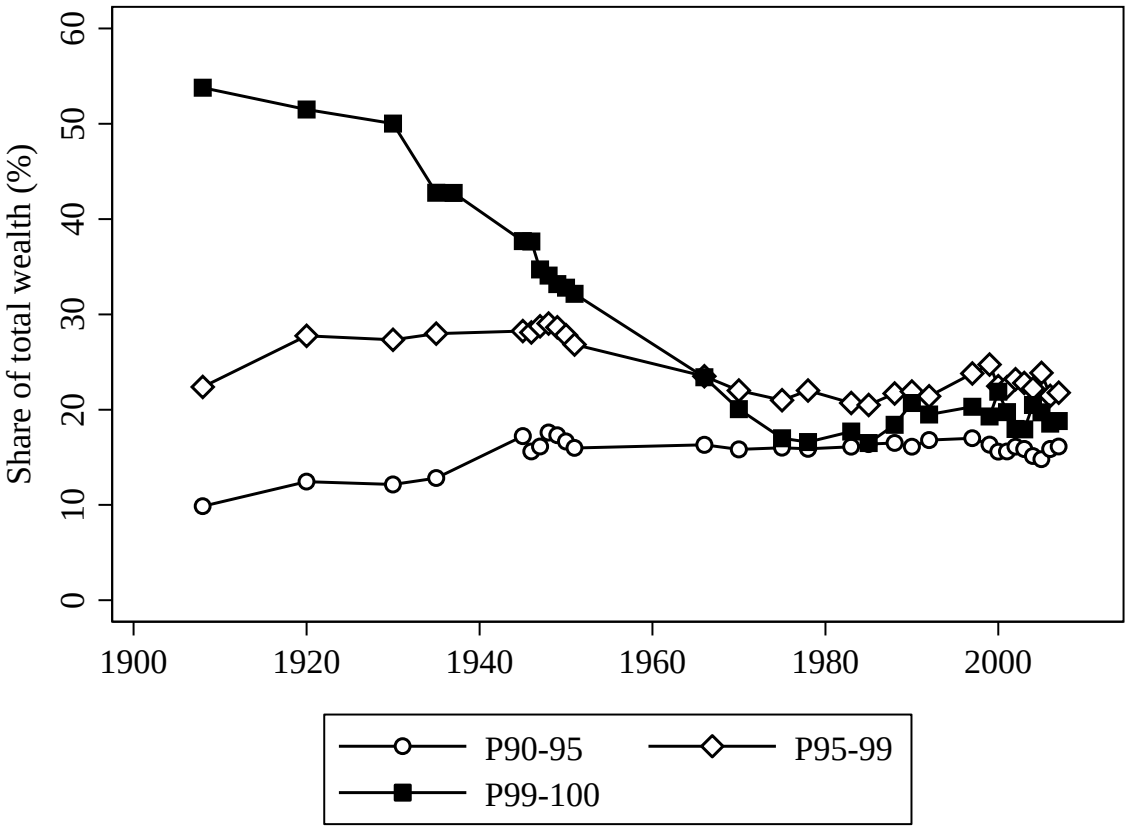
Sources: See the Appendix for details about sources and data.

Figure 14: Wealth concentration in Norway, 1912–2011.



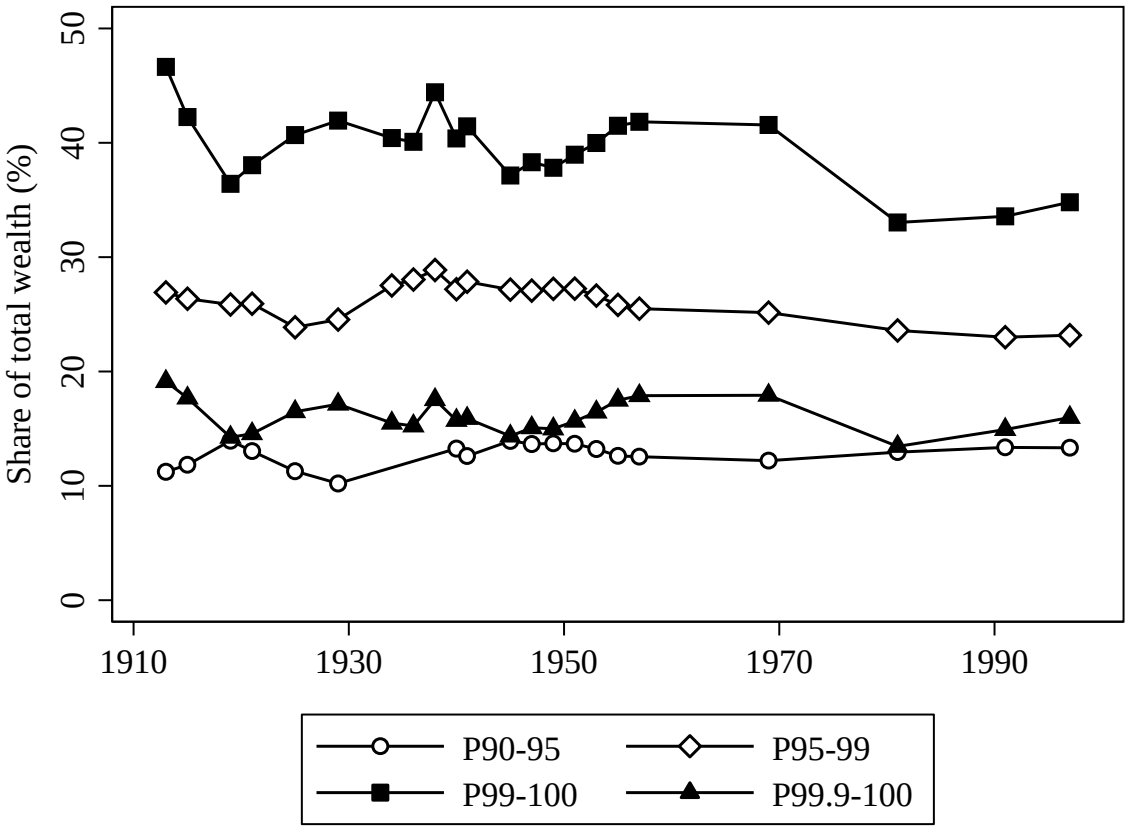
Sources: See the Appendix for details about sources and data.

Figure 15: Wealth concentration in Sweden, 1908–2007.



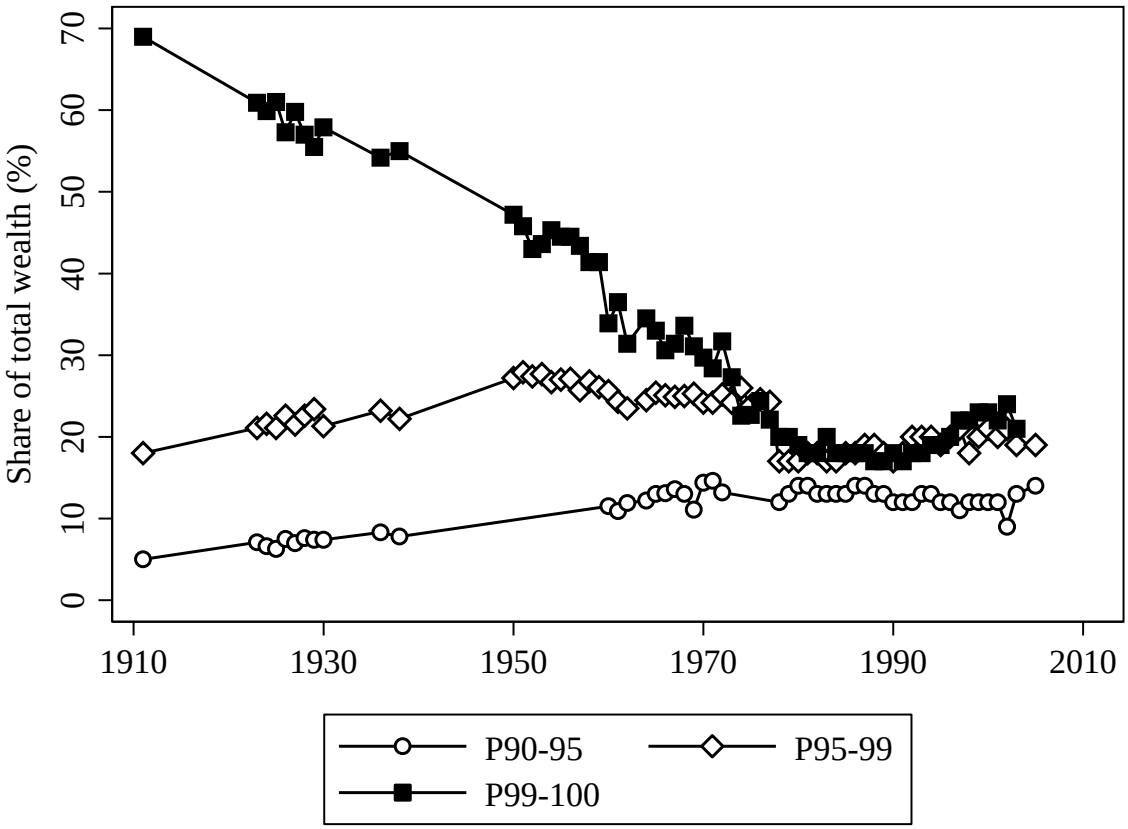
Sources: See the Appendix for details about sources and data.

Figure 16: Wealth concentration in Switzerland, 1913–1996.



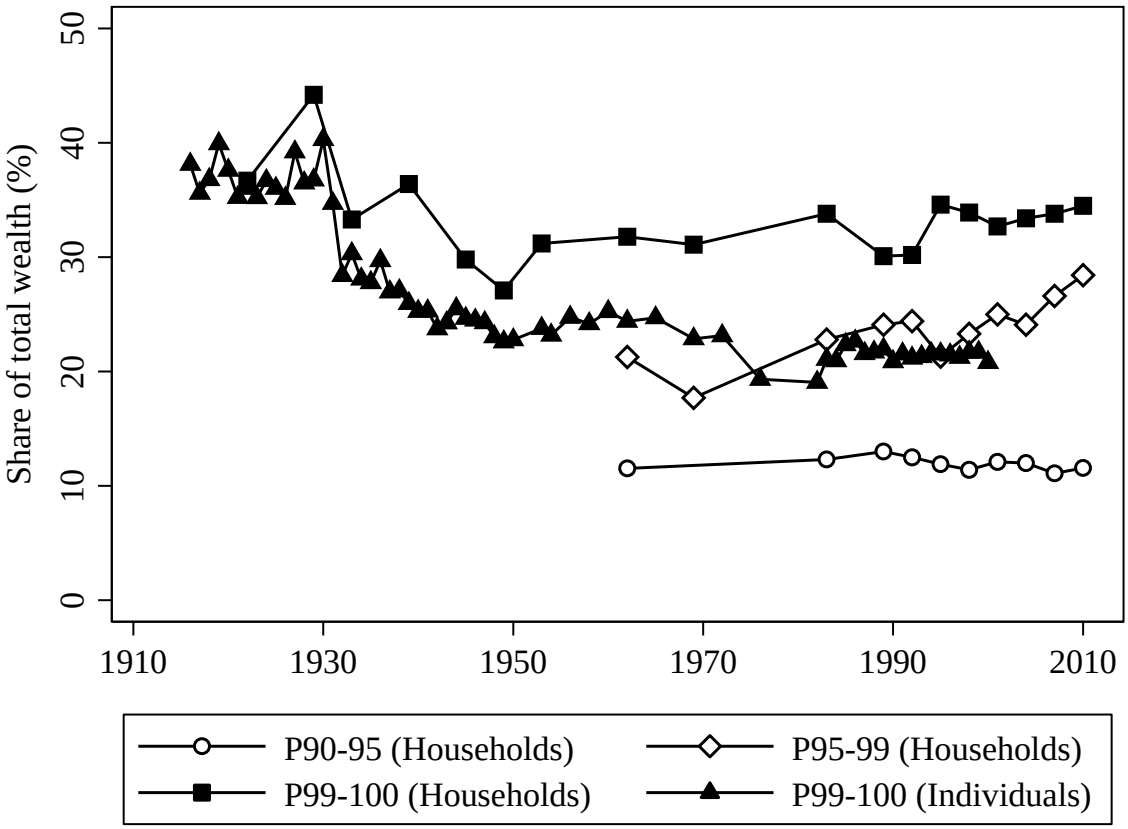
Sources: See the Appendix for details about sources and data.

Figure 17: Wealth concentration in the United Kingdom, 1911–2005.



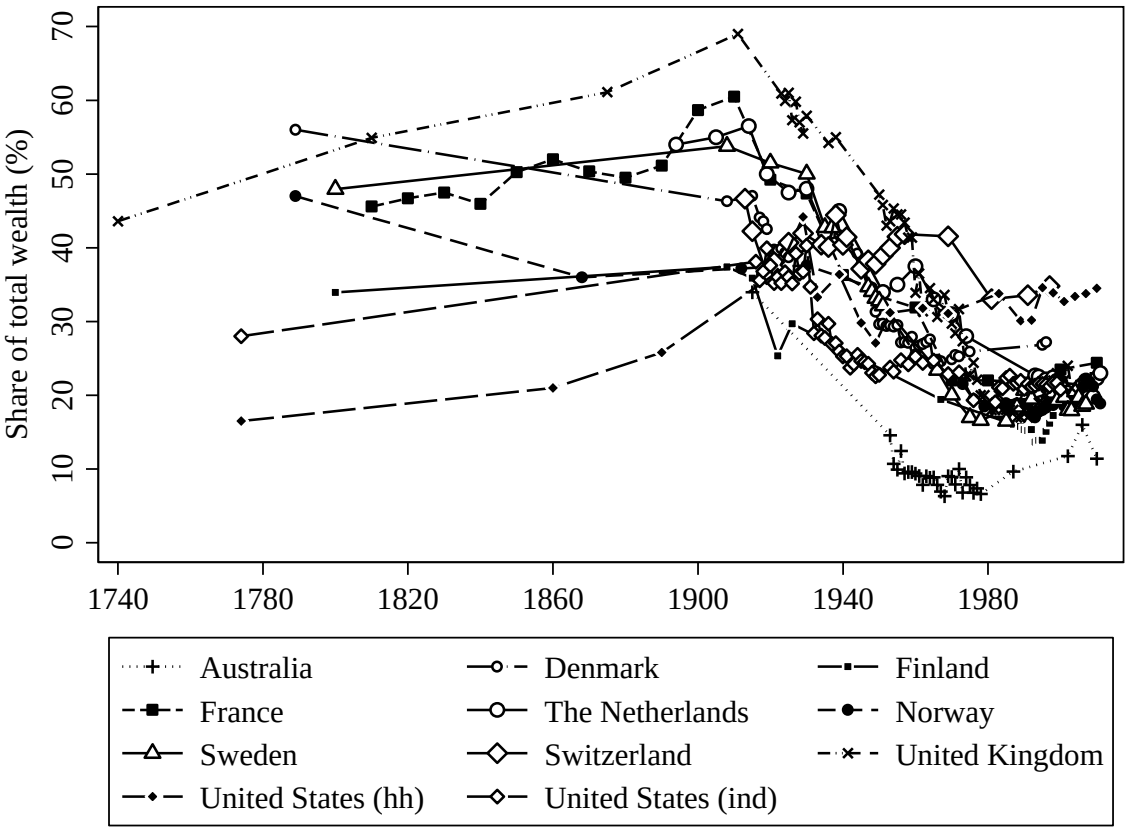
Notes and sources: England and Wales up to 1960, Great Britain thereafter. See the Appendix for details about sources and data.

Figure 18: Wealth concentration in the United States, 1916–2010.



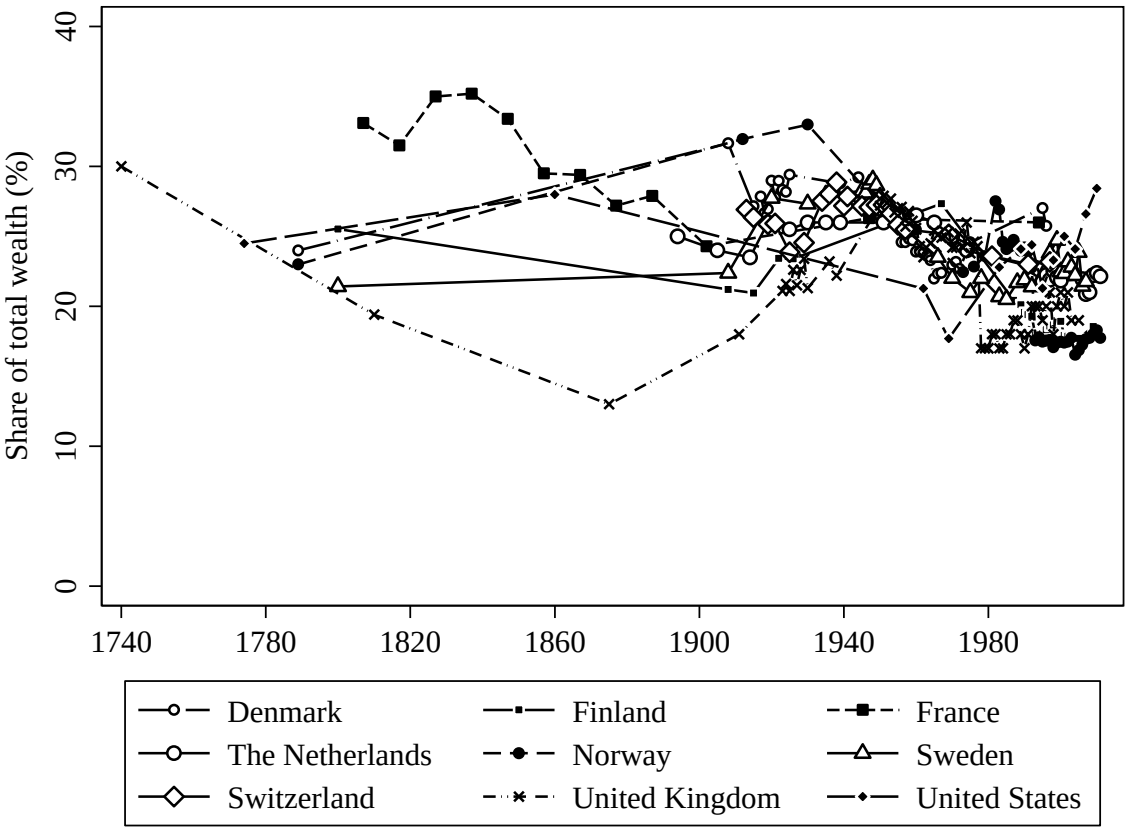
Sources: "Households" and "Individuals" refer to different wealth holder populations. See the Appendix for details about sources and data.

Figure 19: Wealth concentration in ten countries, 1740–2011.



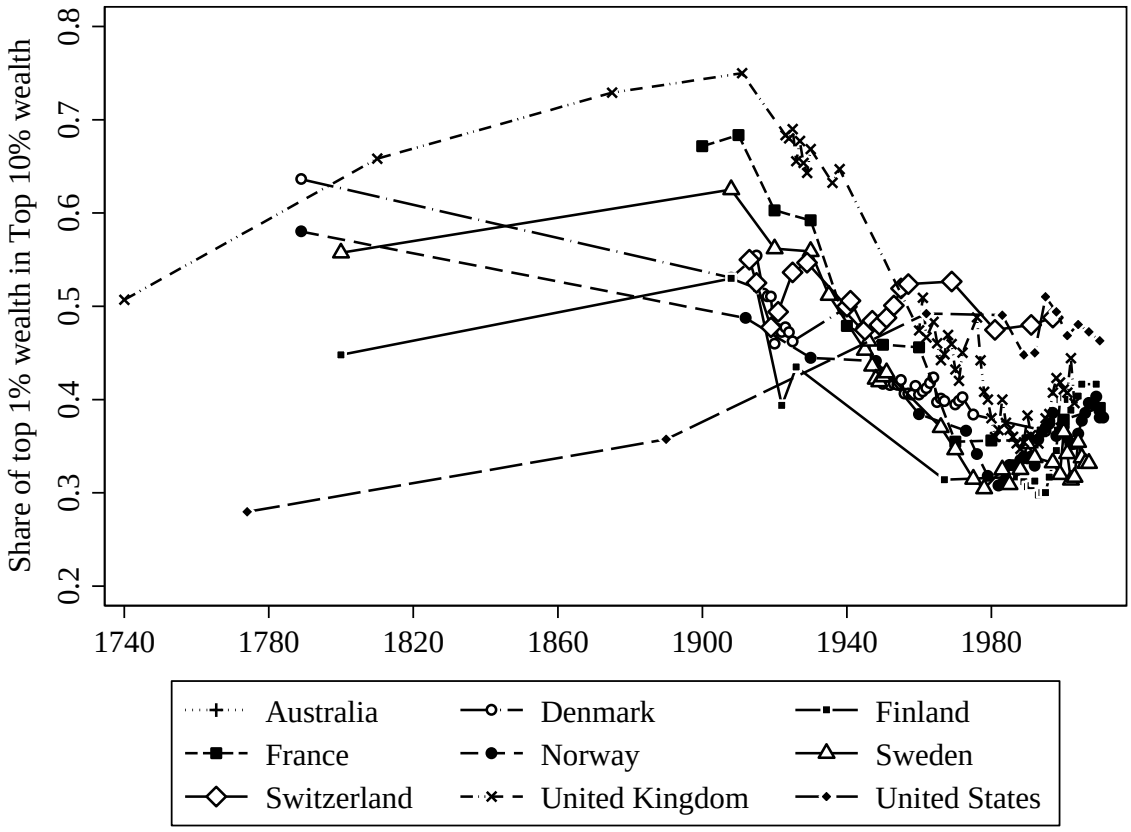
Sources: Graph shows top percentile (P99–100) wealth shares for all countries. See the Appendix for details about sources and data.

Figure 20: Wealth share of the “next four percentiles” (P95–99) in nine countries.



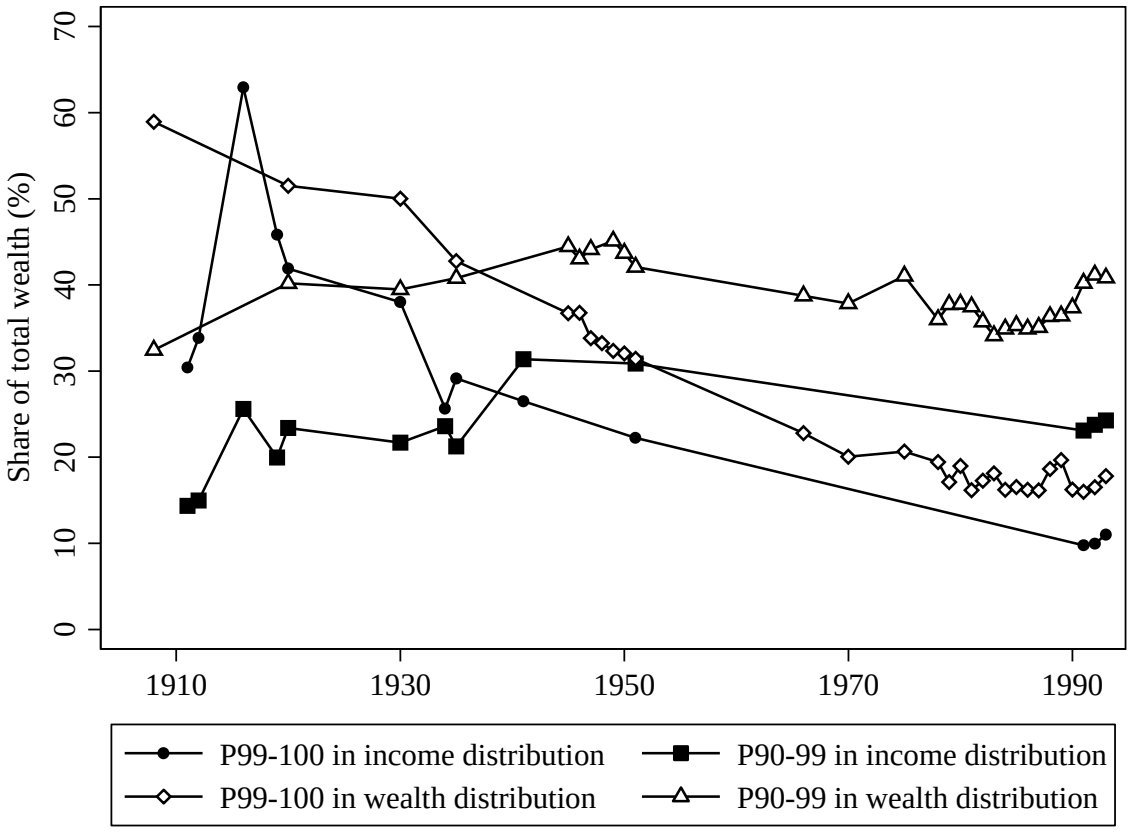
Sources: See the Appendix for details about sources and data.

Figure 21: Shares-within-shares (P99–100/P90–100), nine countries, 1740–2011.



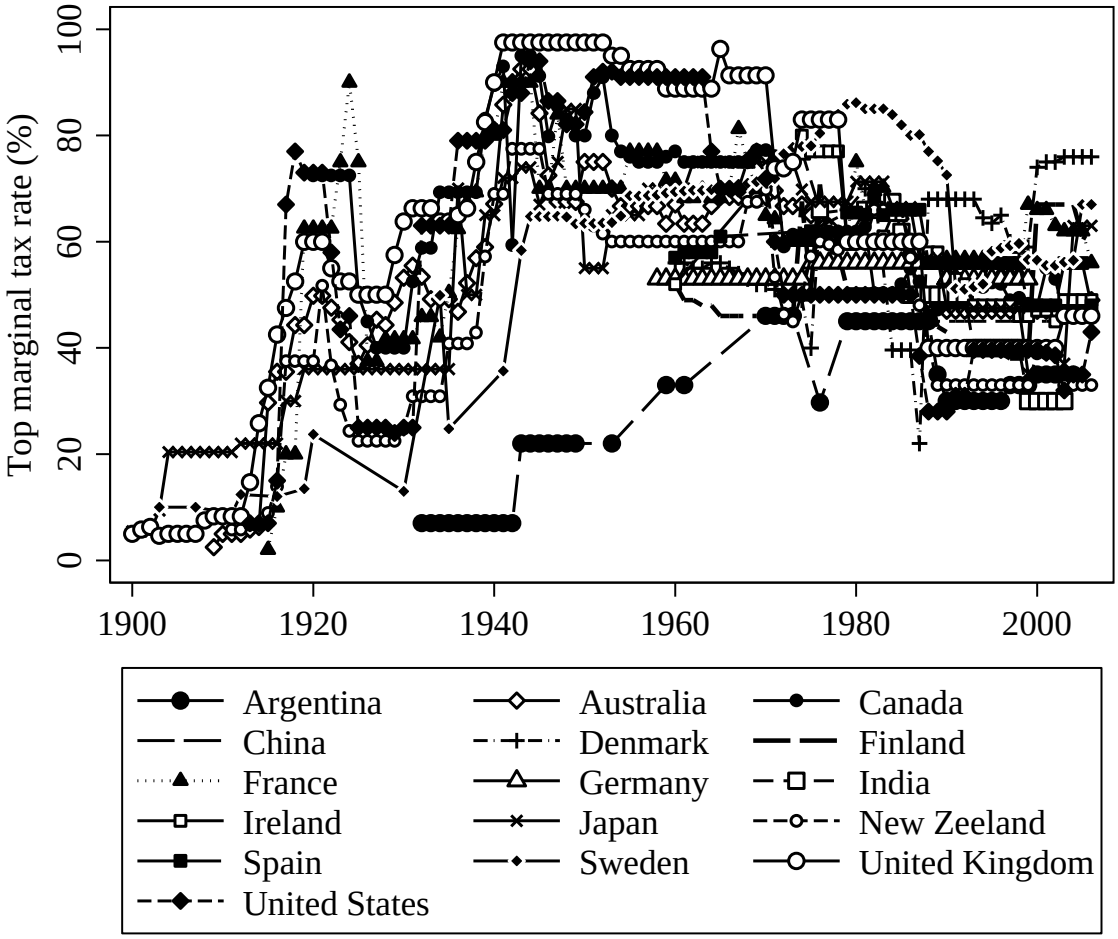
Notes and sources: The shares-within-shares measure is computed by dividing the top wealth percentile (P99–100) by the top wealth decile (P90–100). The resulting measure eliminates the (often separately constructed) reference wealth total from the equation and thereby offers a robustness check of the overall trends. However, the measure also provides a metric of the wealth inequality within the top. See the Appendix for details about sources and data.

Figure 22: Wealth in top income and wealth fractiles in Sweden, 1908–2004.



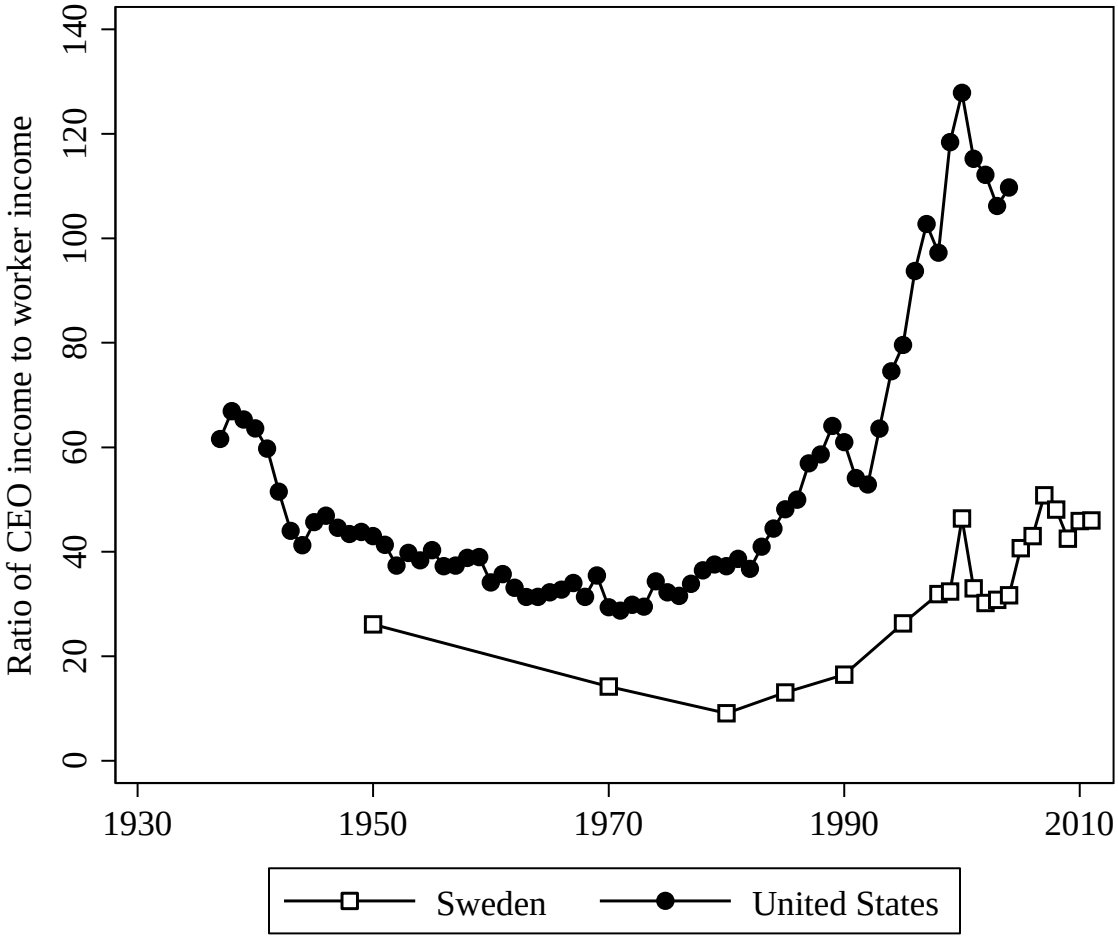
Notes and sources: See main text and Roine and Waldenström (2008) for further details.

Figure 23: Trends in top marginal tax rates, 1900–2006.



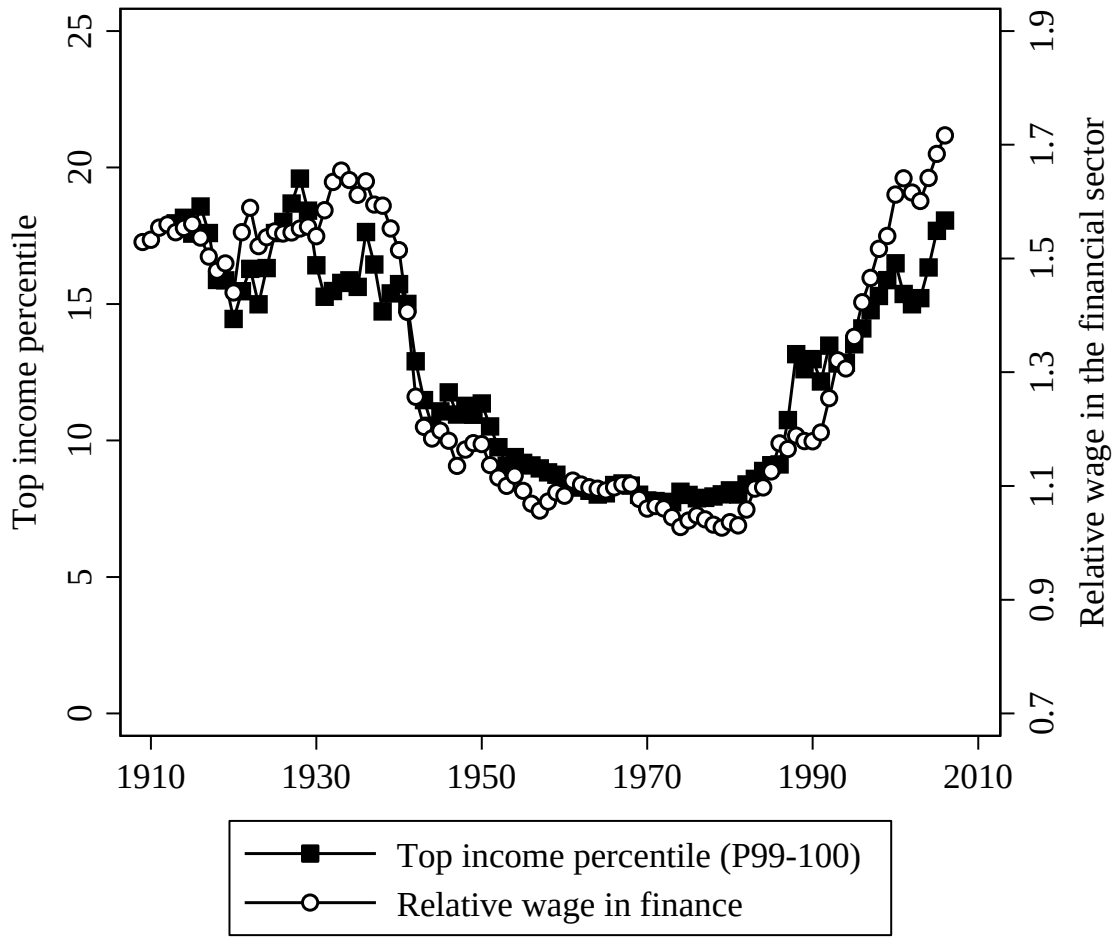
Sources: See main text.

Figure 24: CEO and worker incomes in Sweden and the U.S., 1936–2011



Note and sources: Ratios are based on the following series. U.S. CEO incomes in 2005 US dollars refer to CEOs in the largest 500 corporations in the ExecuComp database, from Frydman and Saks (2007) (including salary, bonus, long-term payments and options granted). This series was generously shared by Carola Frydman. Average income refers to workers in the Social Security Administration database, collected from Kopczuk, Saez and Song (2007, table A2, downloaded at http://www.columbia.edu/~wk2110/uncovering/, 2013-12). Swedish incomes refer to CEOs in the 50 largest Swedish corporations, and male industrial workers, data coming from LO (2013, bilaga 2, "Näringslivet").

Figure 25: Relative wage in the financial sector vs. the top income percentile in the United States, 1909–2006.



Note and sources: Ratio of finiancial sector wages to wages in agricultural and industrial sectors is from Phillipon and Reshef (2012) and U.S. top income share (excluding realized capital gains) are from Piketty and Saez (2003, and updates).

Tables

Table 1: Example of grouped income data from tax statistics: Sweden, 1951.

Income class (tSEK)	Tax units	Income (tSEK)	Average income (tSEK)	Cumulative tax units	Cumulative tax units (%)	Cumulative income (tSEK)	Cumulative income (%)
0–0.6	154,414	43,002	0.3	3,969,635	100.00%	23,274,169	100.00%
0.6–1.0	222,940	111,491	0.5	3,815,221	96.11%	23,231,167	99.82%
1.0–1.5	235,230	261,731	1.1	3,592,281	90.49%	23,119,676	99.34%
1.5–2.0	239,850	392,751	1.6	3,357,051	84.57%	22,857,945	98.21%
2.0–2.5	225,110	503,851	2.2	3,117,201	78.53%	22,465,194	96.52%
2.5–3.0	193,550	552,984	2.9	2,892,091	72.86%	21,961,343	94.36%
3.0–3.5	189,590	591,231	3.1	2,698,541	67.98%	21,408,359	91.98%
3.5–4.0	177,800	682,637	3.8	2,508,951	63.20%	20,817,128	89.44%
4.0–4.5	180,030	761,374	4.2	2,331,151	58.72%	20,134,491	86.51%
4.5–5.0	182,160	917,150	5.0	2,151,121	54.19%	19,373,117	83.24%
5–6	373,140	2,144,387	5.7	1,968,961	49.60%	18,455,967	79.30%
6–7	385,710	2,633,731	6.8	1,595,821	40.20%	16,311,580	70.08%
7–8	345,720	2,753,591	8.0	1,210,111	30.48%	13,677,849	58.77%
8–10	437,440	4,096,471	9.4	864,391	21.78%	10,924,258	46.94%
10–12	177,860	1,927,328	10.8	426,951	10.76%	6,827,787	29.34%
12–15	112,370	1,507,572	13.4	249,091	6.27%	4,900,459	21.06%
15–20	72,140	1,216,108	16.9	136,721	3.44%	3,392,887	14.58%
20–30	43,010	1,005,136	23.4	64,581	1.63%	2,176,779	9.35%
30–50	14,958	621,526	41.6	21,571	0.54%	1,171,643	5.03%
50–100	5,319	341,690	64.2	6,613	0.17%	550,117	2.36%
100–	1,294	208,427	161.1	1,294	0.03%	208,427	0.90%
Sum	3,969,365	23,274,169	5.9				

Source: Statitistics Sweden (1956, table 7). “tSEK” denotes thousand Swedish kronors, current prices.

Table 2: Example of income by source: Sweden, 1951.

Income class (tSEK)	Income from... (million SEK, share of total)						Total gross income
	Labor	Interests and divi-dends	Property	Realized capital gains	Farming	Business	
0–0.6	33 (75%)	6 (14%)	2 (4%)	1 (1%)	1 (1%)	1 (2%)	43 (100%)
0.6–1	99 (88%)	6 (5%)	2 (1%)	1 (0%)	2 (1%)	4 (3%)	111 (100%)
1–1.5	230 (87%)	15 (5%)	3 (1%)	1 (0%)	7 (2%)	7 (2%)	262 (100%)
1.5–2	339 (86%)	21 (5%)	5 (1%)	1 (0%)	17 (4%)	11 (2%)	393 (100%)
2–2.5	424 (83%)	22 (4%)	6 (1%)	2 (0%)	26 (5%)	25 (4%)	504 (100%)
2.5–3	470 (84%)	20 (3%)	7 (1%)	2 (0%)	36 (6%)	20 (3%)	553 (100%)
3–3.5	483 (81%)	16 (2%)	7 (1%)	2 (0%)	52 (8%)	33 (5%)	591 (100%)
3.5–4	546 (79%)	14 (2%)	4 (0%)	3 (0%)	79 (11%)	41 (5%)	683 (100%)
4–4.5	604 (79%)	13 (1%)	5 (0%)	1 (0%)	95 (12%)	45 (5%)	761 (100%)
4.5–5	750 (81%)	17 (1%)	2 (0%)	2 (0%)	95 (10%)	54 (5%)	917 (100%)
5–6	1,772 (82%)	32 (1%)	7 (0%)	3 (0%)	221 (10%)	113 (5%)	2,144 (100%)
6–7	2,252 (85%)	27 (1%)	5 (0%)	3 (0%)	201 (7%)	150 (5%)	2,634 (100%)
7–8	2,403 (87%)	31 (1%)	4 (0%)	5 (0%)	181 (6%)	135 (4%)	2,754 (100%)
8–10	3,470 (84%)	56 (1%)	12 (0%)	10 (0%)	290 (7%)	270 (6%)	4,096 (100%)
10–12	1,550 (80%)	30 (1%)	13 (0%)	9 (0%)	167 (8%)	167 (8%)	1,927 (100%)
12–15	1,124 (73%)	31 (2%)	13 (0%)	13 (0%)	164 (10%)	177 (11%)	1,508 (100%)
15–20	831 (67%)	53 (4%)	12 (1%)	12 (0%)	132 (10%)	187 (15%)	1,216 (100%)
20–30	668 (65%)	48 (4%)	18 (1%)	14 (1%)	92 (9%)	180 (17%)	1,005 (100%)
30–50	390 (61%)	40 (6%)	14 (2%)	11 (1%)	36 (5%)	142 (22%)	622 (100%)
50–100	207 (60%)	28 (8%)	12 (3%)	2 (0%)	16 (4%)	79 (22%)	342 (100%)
100–0	108 (52%)	29 (13%)	8 (3%)	1 (0%)	10 (4%)	53 (25%)	208 (100%)
Sum	18,753 (80%)	552 (2%)	162 (0%)	98 (0%)	1,917 (8%)	1,893 (8%)	23,274 (100%)

Source: Statitistics Sweden (1956, table 7). “tSEK” denotes thousand Swedish kronors, current prices.

Table 3: Key features in top income data

	Main source	Coverage	Tax unit, age cut-off	Income concept	Reference income basis	Capital gains included?
Australia	Atkinson and Leigh (2007a)	1921–2002 (82y)	Ind. 15+	GI	Nat. Acc.	Yes, where taxable
Argentina	Alvaredo (2010)	1932–1973 (39y)	Ind. 20+	GI	Nat. Acc.	No
Canada	Saez and Veall (2005)	1920–2000 (81y)	Ind. 20+	GI	Nat. Acc.	No (but reported after 1971)
China	Piketty and Qian (2009)	1986–2003 (18y)	Ind./Fam.	GI (incl. transfers)	Survey	No
Colombia	Alvaredo and Vélez (2013)	1993-2010 (18y)	Ind. 20+	GI	Tax stat.	Yes
Denmark	Atkinson and Søgaard (2013)	1870-2010 (97y)	Fam. 18+ - 1969; Ind. 15+ 1970-	GI, AI.	Tax stat.	Yes
Finland	Jäntti et al. (2010)	1920–2004 (85y)	Ind. 16+	Gross/AI.	Tax stat.	No
France	Piketty (2001a, 2003)	1900–2006 (92y)	Fam.	GI	Nat. Acc.	No
Germany	Dell (2007 and 2008)	1891–1918 (57y)	Fam. 21+	GI	Nat. Acc.	Yes, where taxable
India	Banerjee and Piketty (2009)	1922–1988 (71y)	Ind.	GI	Nat. Acc.	No
Indonesia	Leigh and van der Eng (2009)	1920–1939, 1982-2004 (34y)	Households	NI (excl. farm inc.)	Nat. Acc. -1939; Survey 1982-	No
Ireland	Nolan (2007)	1922–2000 (68y)	Fam. 18+	NI	Nat. Acc.	No
Italy	Alvaredo and Pisano (2010)	1974–2004 (29y)	Ind. 20+	GI excl. interest inc.	Nat. Acc.	No (but reported after 1981)
Japan	Moriguchi and Saez (2008)	1886–2005 (119y)	Ind. 20+	GI	Nat. Acc.	No
Mauritius	Atkinson (2011)	1933-2008 (74y)	Fam. 15+	GI (with adjustments)	Nat. Acc.	No
Netherlands	Salverda and Atkinson (2007), Atkinson and Salverda (2005)	1914–1999 (55y)	Fam. 15+	GI	Survey	No
New Zealand	Atkinson and Leigh (2008)	1921–2002 (79y)	Fam. -1952; Ind. 1953-; 15+	AI. -1940; GI 1945-	Nat. Acc.	Yes, where taxable
Norway	Aaberge and Atkinson (2010)	1875–2006 (67y)	Ind. 16+	GI	Nat. Acc.	Yes
Portugal	Alvaredo (2009)	1936–2005 (64y)	Fam. 20+	GI	Nat. Acc.	No

	Main source	Coverage	Tax unit, age cut-off	Income concept	Reference income basis	Capital gains included?
Singapore	Atkinson (2010)	1947–2005 (57y)	Ind. 15+	GI	Nat. Acc.	No
Spain	Alvaredo and Saez (2009)	1933–2005 (49y)	Ind. 20+	GI	Nat. Acc.	No (but reported after 1981)
South Africa	Alvaredo and Atkinson (2011)	1913-2007 (71y)	Fam. 15+ - 1989; Ind. 15+ 1990-	GI	Nat. Acc.	No (until 2002)
Sweden	Roine and Waldenstrom (2008)	1903–2006 (75y)	Fam. -1950; Ind. 1951-; 16+	GI	Nat. Acc. -1950; Tax stat. 1951-	Series with and without
Switzerland	Dell, Piketty and Saez (2007)	1933–1995/96 (31y)	Fam. 20+	GI	Nat. Acc.	No
United Kingdom	Atkinson (2005, 2007a)	1908–2005 (95y)	Fam. -1989; Ind. 1990- ; aged15+	GI	Nat. Acc. -1943; Tax stat. 1944-	Yes, where taxable
United States	Piketty and Saez (2003)	1913–2007 (96y)	Fam. 20+	GI	Nat. Acc. -1943; Tax stat. 1944-	No

Note: See also Atkinson and Piketty (2007, 2010), Leigh (2009), Atkinson, Piketty and Saez (2011) and the World Top Income Database for information about the country statistics. Specifically, for several countries there are other studies that have contributed to the series. In column "Coverage", "y" denotes number of year observations. Tax units "Ind" and "Fam" stands for individual and family, respectively. "GI" denotes total income from all sources (labor, capital, business) gross of all deductions, whereas "NI" denotes income net of deductions. All incomes are before taxes and (most) transfers. "Nat. Acc." denotes that the reference income total is based on National Accounts data, typically some share of GDP or the sum of different aggregate income components, whereas "Tax stat." denotes that the reference total is derived from the sum of tax-assessed incomes plus some additional items (e.g., non-assessed income, imputed income from home ownership).

Table 4: Correlations between top income shares and other inequality measures.

	Top 1% (P99–100)	Top 10–1% (P90–99)	Top 10% (P90–100)
World Income Inequality Database (WIID)			
Gini coefficient	0.50	0.25	0.42
Luxembourg Income Study (LIS)			
Gini coefficient	0.62	0.69	0.73
Atkinson index (ε=0.5)	0.61	0.65	0.70
Atkinson index (ε=1)	0.53	0.61	0.64
P90/10	0.59	0.70	0.72
P90/50	0.57	0.65	0.68

Note: The correlations are all statistically significant at the 1%-level. The number of observations for the WIID variables is 300 for Top 1% and 263 for the Top 10–1% and Top 10%, and 63 for all LIS variables.

Table 5: Wealth inequality trends across eras, ten Western countries.

	From industrial take-off to the First World War		From the First World War to 2000	
	P99–100 (Top 1%)	P95–99	P99–100 (Top 1%)	P95–99
Australia	–	–	Decrease	–
Denmark	Decrease	Flat	Decrease	Flat
Finland	Flat	Flat	Decrease	Flat
France	Increase	Flat	Decrease	Flat
Netherlands	Flat?	Flat?	Decrease	Flat
Norway	Flat	Increase	Decrease	Decrease
Sweden	Flat	Flat	Decrease	Flat
Switzerland	–	–	Flat	Flat
United Kingdom	Increase	Decrease	Decrease	Flat
United States	Increase	Flat?	Flat/Decrease	Flat?

Notes: The nineteenth century inequality trends for the Netherlands are not observed directly, but various sources indicate that there was little increase in inequality during the Dutch industrialization since the middle of the century (see further country section on Netherlands).

Table 6: Long-run determinants of top income shares

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ΔTop1	ΔTop1	ΔTop10-1	ΔTop10-1	ΔTop1	ΔTop1	ΔTop1	ΔTop1
ΔGDPpc	4.44***	3.00***	–8.24***	–8.58***	4.28***	6.87***	2.76**	2.80**
	(0.850)	(1.150)	(1.421)	(1.652)	(0.827)	(1.674)	(1.164)	(1.186)
ΔPop	–8.75**	–6.07	–8.93	–7.30	–6.55*	–3.31	3.53	3.59
	(3.576)	(4.687)	(5.470)	(6.752)	(3.470)	(3.940)	(4.250)	(4.257)
ΔGovspend	–0.49	5.75	–7.68*	–9.97*	1.67	2.12	1.55	1.51
	(3.599)	(3.958)	(4.641)	(5.091)	(3.489)	(3.453)	(4.697)	(4.735)
ΔFindev	0.90***	0.94***	–0.25	–0.10	0.87***	0.79***		
	(0.197)	(0.295)	(0.214)	(0.318)	(0.232)	(0.177)		
ΔOpenness	–5.59***	–4.86**	1.51	4.88*	–4.78***	–5.15***	–0.42	–0.43
	(1.550)	(2.022)	(2.190)	(2.515)	(1.539)	(1.437)	(1.233)	(1.235)
ΔMarginaltax		–1.41*		–0.68				
		(0.758)		(0.761)				
ΔDemocracy					–0.82***	–0.54*		
					(0.278)	(0.325)		
ΔDemo.*GDPpc						–2.71*		
						(1.525)		
Bank crisis							–1.13***	–1.12***
							(0.426)	(0.431)
Currency crisis								0.03
								(0.502)
Observations	173	145	147	128	166	166	180	180
Countries	20	20	18	17	19	19	17	17

Note: The regression method and underlying data are described in section 4.4.1 and Roine, Vlachos and Waldenström (2009). "Δ" denotes log change between five-year periods, "GDPpc" is real per capita GDP, "Pop" is population, "Govspend" is central government spending as share of GDP, "Findev" is the sum of banking deposits and stock market capitalization as share of GDP, "Openness" is trade share in GDP, "Marginaltax" is the statutory top marginal income tax rate, "Democracy" is the autocracy score in the Polity IV index and "Bank crisis" and "Currency crisis" are dummy variables for years when such crises occrurred.

Appendix

Table A1: Sources of the historical wealth inequality data

Country	Year(s)	Wealth holder unit	Source
Australia	1915, 1987, 2002, 2006, 2010	households	Katic and Leigh (2013, table A2)
	1953-79	adults	Katic and Leigh (2013, table A1)
Denmark	1789	males > 19 years	Soltow (1985: table 4)
	1908-75	households	Zeuthen (1928: table IV 4: 521) for 1908-25, Bjerke (1956: table 32) for 1939-45, Statistics Denmark, *Statistisk Årbog* for 1950-75. See also Alvaredo, Sandholt Jensen, Sharp (2013) using roughly the same sources.
	1995-96	households	Statistics Denmark (1995, 1996: table 2)
Finland	1800	males > 19 years	Soltow (1980, table 3)
	1922	households	Soltow (1980, table 3)
	1926	households	Soltow (1980, table 3)
	1967	households	Soltow (1980, table 3)
	1987-2005	adults	Statistics Finland, tax statistics
France	1807-2010	adults	Piketty et al. (2004: table A4, 2006), Piketty and Zucman (2014).
Netherlands	1894-1974	adults	Wilterdink (1984)
	1993-2011	households (survey)	Statistics Netherlands (2010), Salverda et al. (2013). Series are submitted by Wiemer Salverda
Norway	1789	households	Soltow (1980: table 3)
	1868	households (?)	Mohn (1873: 10, 30)
	1912	households	Statistics Norway (1915a: 6*, 20*-21*)
	1930	households	Statistics Norway (1934: 63*f)
	1948-2011	households (1983-1993 are adjusted individuals as described in text)	Statistics Norway, *Statistisk Årbok* and Statistikdatabasen (see text).
	2009	households	Epland and Kirkeberg (2012, table 8)
Sweden*	1800	males > 19 years	Soltow (1985: tables 4, 5,)
	1908	households	Finansdepartementet (1910: 31)
	1920	households	Statistics Sweden (1927), Census 1920
	1930	households	Statistics Sweden (1937, 1938), Census 1930
	1935	households	Statistics Sweden (1940), Partial Census
	1937	households	SOU (1942:52)
	1945	households	Statistics Sweden (1951), Census 1945
	1946-50	households	SOS Skattetaxeringarna
	1951	households	Statistics Sweden (1956), Census 1950
	1966	households	SOU (1969:54)
	1970	households	SOS Inkomst och Förmögenhet 1970, Budgetundersökningen

Country	Year(s)	Wealth holder unit	Source
	1975	households	SOU (1979: 9)
	1978-98	households	Jansson and Johansson (2000, table 15)
	1999-2007	households	Own calculations based tabulated household distributions retrieved from Statistics Sweden's Wealth Register (see Roine and Waldenström, 2009, for details).
	1873-77	individuals	Finansdepartementet (1879)
	1906-08	individuals	Finansdepartementet (1910). For 1908 there is also wealth data based on applying the estate multiplier method (Finansdepartementet 1910: 14-34)
	1954	individuals	SOU (1957). See Roine and Waldenström (2009) for details.
	1967	individuals	SOU (1969). See Roine and Waldenström (2009) for details.
	2002-03	individuals	SOU (2004). See Roine and Waldenström (2009) for details.
Switzerland	1913-97	households	Dell, Pikettty and Saez (2005: table 3)
United Kingdom (England and Wales before 1938)	1740, 1810, 1875	adults	Lindert (2000: table 2)
	1911-13	adults	Atkinson and Harrison (1978: table 6.1)
	1923-77	adults	Atkinson et al. (1989: table 1)
	1978-2005	adults	Inland Revenue Statistics (2006: table 13.5)
United States	1774	adults > 19 years	Shammas (1993: table 2)
	1916-2000	adults > 19 years	Kopczuk and Saez (2004: table 3 2)
	1774	households (free adult men and unmarried women)	Lindert (2000, table 3)
	1860	households (free adult male heads of households)	Shammas (1993: table 2)
	1890	families	Lindert (2000: table. 3)
	1922-58	households	Wolff (1996: table 1).
	1962-2010	households	Kennickell (2009, table 4; 2011, table 1)

Note: List of sources and data definitions of the wealth distribution data used in the chapter. See text for further descriptions of the data. The definition of household used here is not exactly identical across (and sometimes even within) country samples. The basic concept is one where individuals (aged 18 or above) and married couples count as one household (see the section on Sweden above for details).

Table A2: Top wealth percentile (P99–100) share of total private wealth in ten countries.

Year	Austra-lia	Den-mark	Fin-land	France	Nether-lands	Nor-way	Sweden	Switzer-land	United King-dom	USA (hh)	USA (ind)
1740									43.6		
1774										16.5	28.0
1789		56.0				47.0					
1800			34.0				48.0				
1810				45.6					54.9		
1820				46.7							
1830				47.5							
1840				46.0							
1850				50.3							
1860				52.0						21.0	
1868						36.0					
1870				50.4							
1875									61.1		
1880				49.5							
1890				51.1						25.8	
1894					54.0						
1900				58.7							
1905					55.0						
1908		46.3					53.8				
1909			37.4								
1910				60.5							
1911									69.0		
1912						37.2					
1914					56.5						
1915	33.98	47.0	35.9					42.3			
1916											35.6
1917		44.1									35.6
1918		43.6									36.8
1919		42.6			50.0			36.4			39.9
1920		37.2		49.2			51.5				37.6
1921		39.7						38.1			35.2
1922		39.6	25.4							36.7	36.0
1923		39.9							60.9		35.2
1924		39.3							59.9		36.7
1925		38.7			47.5			40.7	61.0		36.0
1926			29.7						57.3		35.1
1927									59.8		39.2
1928									57.0		36.5
1929								42.0	55.5	44.2	36.8
1930				47.4	48.0	37.6	50.0		57.9		40.3
1931											34.7
1932											28.4
1933										33.3	30.3
1934								40.4			28.1
1935					42.0		42.8				27.8
1936								40.1	54.2		29.7
1937							42.7				27.0
1938								44.4	55.0		27.1
1939		41.7			45.0					36.4	26.0

Year	Austra-lia	Den-mark	Fin-land	France	Nether-lands	Nor-way	Sweden	Switzer-land	United King-dom	USA (hh)	USA (ind)
1940				36.3				40.4			25.3
1941								41.5			25.3
1942											23.7
1943											24.3
1944		39.2									25.5
1945							37.7	37.1		29.8	24.7
1946							37.7				24.5
1947							34.7	38.3			24.3
1948						34.6	34.1				23.0
1949		31.3					33.2	37.8		27.1	22.6
1950		29.6		33.4			32.8		47.2		22.8
1951		29.7			34.0		32.2	39.0	45.8		
1952		29.4							43.0		
1953	14.576	29.5						40.0	43.6	31.2	23.8
1954	10.707	29.3							45.3		23.2
1955	9.918	29.5			35.0			41.5	44.5		
1956	12.445	27.1							44.5		24.7
1957	9.423	27.2						41.9	43.4		
1958	9.603	27.1							41.4		24.2
1959	9.589	27.9							41.4		
1960	9.39	26.4		31.9	37.5	25.5			33.9		25.2
1961	9.054	26.7							36.5		
1962	7.846	26.9							31.4	31.8	24.4
1963	9.028	27.2									
1964	8.832	27.6							34.5		
1965	8.882	24.2			33.0				33.0		24.7
1966	7.844	24.8					23.4		30.6		
1967	6.943	24.6	19.4						31.4		
1968	6.328								33.6		
1969	9.026							41.6	31.1	31.1	22.9
1970	8.923	24.8		22.0	31.0		20.1		29.7		
1971	7.909	25.5							28.4		
1972	10.004	25.3							31.7		23.1
1973	6.793					21.5			27.3		
1974	8.881				28.0				22.6		
1975	7.831	25.9					17.0		22.7		
1976	6.768					19.5			24.4		19.3
1977	7.357								22.1		
1978	6.615						16.6		20.0		
1979						18.5			20.0		
1980				22.0					19.0		
1981								33.0	18.0		
1982						18.0			18.0		19.1
1983						17.5	17.7		20.0	33.8	21.1
1984						18.0			18.0		21.0
1985						18.9	16.5		18.0		22.4
1986						18.7			18.0		22.7
1987	9.66		16.1			18.7			18.0		21.6
1988						18.9	18.4		17.0		21.7
1989			15.8			18.9			17.0	30.1	22.0
1990			15.3	21.7		18.8	20.7		18.0		20.9
1991			15.2			18.8		33.6	17.0		21.5

Year	Austra-lia	Den-mark	Fin-land	France	Nether-lands	Nor-way	Sweden	Switzer-land	United King-dom	USA (hh)	USA (ind)
1992			15.3			17.5	19.5		18.0	30.2	21.2
1993			13.7		22.1	17.0			18.0		21.3
1994			13.9		22.5	17.7			19.0		21.6
1995		26.9	13.9		20.7	18.0			19.0	34.6	21.5
1996		27.2	15.1		23.0	18.3			20.0		21.4
1997			16.2		22.2	19.1	20.3	34.8	22.0		21.2
1998			17.3		23.6	18.7			22.0	33.9	21.7
1999			21.2		22.2	19.2	19.3		23.0		21.7
2000			21.2	23.5	22.2	19.6	21.9		23.0		20.8
2001			20.6			18.5	19.7		22.0	32.7	
2002	11.76		19.6			18.0	18.0		24.0		
2003			20.4			18.3	17.9		21.0		
2004			20.7			19.2	20.5			33.4	
2005			21.6			20.4	19.7				
2006	16				21.4	21.0	18.5				
2007					22.0	22.1	18.8			33.8	
2008					21.5	21.9					
2009			22.7		19.8	21.2					
2010	11.4			24.4	22.3	19.4				34.5	
2011					23.0	18.9					

Note: Note that many series contain several breaks in data definitions that may severely affect comparability both over time and across countries. See table A1 for sources and section 3 for details. “USA (hh)” denotes top wealth shares in the U.S. distribution of households (with some exception) and “USA (ind)” top wealth shares in the U.S. distribution of adult individuals.

Table A3: Bottom four percentiles i top 5 wealth percentiles (P95–99) as share of total private wealth in nine countries.

Year	Denmark	Finland	France	Nether-lands	Norway	Sweden	Switzer-land	United Kingdom	USA
1740								30.0	
1774									24.5
1789	24.0				23.0				
1800		25.5				21.4			
1807			33.1						
1810								19.4	
1817			31.5						
1827			35.0						
1837			35.2						
1847			33.4						
1857			29.5						
1860									28.0
1867			29.4						
1875								13.0	
1877			27.2						
1887			27.9						
1902			24.3						
1908	31.7					22.4			
1909		21.2							
1911								18.0	
1912					32.0				
1913							26.9		
1914									
1915	27.2	20.9		24.0			26.4		
1917	27.9								
1918	26.7								
1919	26.9						25.9		
1920	29.0					27.7			
1921	27.8			26.0			25.9		
1922	29.0	23.4							
1923	28.3							21.1	
1924	28.2							21.6	
1925	29.4			25.0			23.9	21.1	
1926		23.4						22.6	
1927								21.5	
1928								22.6	
1929							24.6	23.4	
1930				26.0	33.0	27.3		21.3	
1934							27.5		
1935				26.0		28.0			
1936							28.0	23.2	
1938							28.9	22.2	
1939	28.8			26.0					
1940							27.2		
1941							27.9		
1944	29.2								
1945						28.3	27.2		
1946						28.1			
1947			26.3			28.7	27.1		

Year	Denmark	Finland	France	Nether-lands	Norway	Sweden	Switzer-land	United Kingdom	USA
1948					27.8	29.0			
1949	26.9					28.7	27.2		
1950	26.4			26.0		27.8		27.2	
1951	26.3					26.8	27.3	27.9	
1952	26.3							27.4	
1953	26.2						26.6	27.7	
1954	26.1			26.0				26.7	
1955	25.7						25.8	27.0	
1956	24.6							27.1	
1957	24.6						25.5	25.7	
1958	24.8							26.8	
1959	24.7							26.1	
1960	23.9			27.0	25.5			25.6	
1961	23.9							24.3	
1962	23.8							23.5	21.3
1963	23.6								
1964	23.3							24.5	
1965	22.0							25.4	
1966	22.3			26.0		23.5		25.1	
1967	22.4	27.3						24.9	
1968								25.0	
1969							25.2	25.3	17.7
1970	22.9			25.0		22.0		24.2	
1971	23.2							24.2	
1972	22.7							25.2	
1973					22.5			24.2	
1974								26.0	
1975	24.6			26.0		21.0		23.8	
1976					22.8			24.6	
1977								24.3	
1978						22		17.0	
1979					23.6			17.0	
1980								17.0	
1981							23.6	18.0	
1982					27.5			18.0	
1983					26.9	20.7		17.0	22.8
1984					24.6			17.0	
1985					24.1	20.5		18.0	
1986					24.3			18.0	
1987		20.4			24.7			19.0	
1988					24.3	21.7		19.0	
1989		20.1			24.0			18.0	24.1
1990		19.6			24.2	21.9		17.0	
1991		19.4			23.9		23.0	18.0	
1992		19.3			22.8	21.4		20.0	24.4
1993		17.9		23.7	17.6			20.0	
1994		18.0	26.0	22.8	17.8			20.0	
1995	27.0	18.0		22.4	17.5			19.0	21.3
1996	25.8	18.3		22.2	17.6			20.0	
1997		18.6		21.8	17.6	23.8	23.2	21.0	
1998		18.7		22.1	17.1			18.0	23.3
1999		19.0		21.9	17.4	24.7		20.0	

Year	Denmark	Finland	France	Nether-lands	Norway	Sweden	Switzer-land	United Kingdom	USA
2000		18.9		21.4	17.5	22.5		21.0	
2001		17.9			17.4	22.4		20.0	25.0
2002		17.9			17.5	23.2		21.0	
2003		17.9			17.7	22.8		19.0	
2004		17.8			16.5	22.2			24.1
2005		17.7			16.9	23.9		19.0	
2006				21.9	17.2	21.5			
2007				20.9	17.7	21.8			26.6
2008				21.0	17.7				
2009		18.6		22.2	18.0				
2010				22.4	18.3				28.4
2011				22.2	17.7				

Note: Note that many series contain several breaks in data definitions that may severely affect comparability both over time and across countries. For the U.S., the series is based on estimates from mainly the household distribution. See table A1 for sources and section 3 for details.

Table A4: Top wealth decile (P90–100) as share of total private wealth in eight countries

	Denmark	Finland	France	Norway	Sweden	Switzer-land	United Kingdom	USA
1740							86.0	
1774								59.0
1789	88.0			81.0				
1800		75.8			86.0			
1810			79.9				83.4	
1820			81.8					
1830			83.2					
1840			80.4					
1850			82.4					
1860			83.7					
1870			81.8					
1875							83.8	
1880			84.6					
1890			84.7					72.2
1908	87.3				86.0			
1909		70.6						
1910			88.5					
1911							92.0	
1912				76.3				
1913						84.8		
1915	84.8	69.1				80.5		
1917	85.9							
1918	85.4							
1919	83.4					76.3		
1920	80.9		81.7		91.7			
1921	83.6					77.0		
1922	83.9	64.4						
1923	83.6						89.1	
1924	83.2						88.1	
1925	83.7					75.8	88.4	
1926		68.3					87.4	
1927							88.3	
1928							87.2	
1929						76.7	86.3	
1930			80.0	84.6	89.5		86.6	
1935					83.6			
1936							85.7	
1938							85.0	
1939	84.0							
1940			75.8			80.8		
1941						81.9		
1944	82.4							
1945					83.2	78.3		
1946					81.4			
1947					79.6	79.0		
1948				78.4	80.7			
1949	73.2				79.1	78.8		
1950	71.1		72.8		77.3			
1951	71.1				75.0	79.9		
1952	70.7							

Year	Denmark	Finland	France	Norway	Sweden	Switzer-land	United Kingdom	USA
1953	70.7					79.9		
1954	70.5							
1955	70.1					79.9		
1956	66.8							
1957	66.9					79.9		
1958	66.8							
1959	67.4							
1960	65.2		69.9	66.4			71.5	
1961	65.4						71.7	
1962	65.4						67.3	64.6
1963	65.1							
1964	65.1						71.4	
1965	60.9						71.7	
1966	61.9				63.2		69.2	
1967	61.8	61.9					70.0	
1968							71.6	
1969						78.9	67.7	
1970	62.9		62.0		57.9		68.7	
1971	63.9						67.6	
1972	62.8						70.4	
1973				58.7				
1975	67.5				54.0			
1976				57.1			50.0	
1977							50.0	
1978					54.5		49.0	
1979				58.1			50.0	
1980			61.8				50.0	
1981						69.6	50.0	
1982				58.6			49.0	
1983				56.5	54.5		50.0	68.9
1984				57.1			48.0	
1985				57.4	53.4		49.0	
1986				56.7			50.0	
1987		50.7		56.9			51.0	
1988				56.4	56.6		49.0	
1989		50.6		55.7			48.0	67.2
1990		50.0	61.0	55.9	58.7		47.0	
1991		49.5		55.5		69.9	47.0	
1992		49.1		53.0	57.7		50.0	67.1
1993		45.9		47.7			51.0	
1994		46.2		48.6			52.0	
1995	73.3	46.2		48.7			50.0	67.8
1996	72.2	47.6		48.9			52.0	
1997		49.0		49.5	61.1	71.3	54.0	
1998		50.0		51.7			52.0	68.6
1999		52.9		52.5	60.3		55.0	
2000		52.8	62.1	52.8	59.9		56.0	
2001		51.4		51.6	57.7		54.0	69.8
2002		50.5		51.2	57.3		54.0	
2003		51.1		51.9	56.6		53.0	
2004		51.4		52.9	57.8			69.5
2005		51.9		54.2	58.4		54.0	

	Denmark	Finland	France	Norway	Sweden	Switzer-land	United Kingdom	USA
2006				54.6	55.9			
2007				55.7	56.7			71.5
2008				55.3				
2009		54.4		52.6				
2010			62.4	51.1				74.5
2011				49.5				

Note: Note that many series contain several breaks in data definitions that may severely affect comparability both over time and across countries. For the U.S., the series is based on estimates from mainly the household distribution. See table A1 for sources and section 3 for details.