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# Financial Crises: Political and Social Implications

vorgelegt von

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Die übrigen Kapitel dieser Arbeit (Nr. 1, 3-6) wurden in Alleinautorenschaft verfasst und sind zum Zeitpunkt der Einreichung der Dissertationsschrift (November 2016) weder als Working Paper noch als Fachartikel veröffentlicht oder unter Revision.

# Contents

|          |  |            |
|----------|--|------------|
| <b>1</b> | <b>Introduction</b>  | <b>1</b>   |
| <b>2</b> | <b>Going to extremes: Politics after financial crises, 1870-2014</b><br><i>(with Moritz Schularick and Christoph Trebesch)</i> | <b>5</b>   |
| 2.1      | Introduction . . . . .   | 5          |
| 2.2      | Data description . . . . .   | 8          |
| 2.3      | Statistical design . . . . .   | 12         |
| 2.4      | Going to extremes: politics after financial crises . . . . .   | 14         |
| 2.5      | Normal recessions and non-financial macro disasters . . . . .  | 29         |
| 2.6      | Conclusion . . . . .   | 32         |
|          | Appendices . . . . .   | 33         |
| <b>3</b> | <b>Turning right: Recession voting since 1870</b>  | <b>55</b>  |
| 3.1      | Introduction . . . . .   | 55         |
| 3.2      | Data description . . . . .   | 57         |
| 3.3      | Statistical design . . . . .   | 59         |
| 3.4      | Turning right: recession voting since 1870 . . . . .   | 61         |
| 3.5      | Economic voting: historical eras . . . . .   | 69         |
| 3.6      | Conclusion . . . . .   | 72         |
|          | Appendices . . . . .   | 73         |
| <b>4</b> | <b>Short-term pain: Financial crises and the rich, 1914-2014</b>   | <b>83</b>  |
| 4.1      | Introduction . . . . .   | 83         |
| 4.2      | Data description . . . . .   | 85         |
| 4.3      | Statistical design . . . . .   | 87         |
| 4.4      | Short-term pain: financial crises and the rich . . . . .   | 88         |
| 4.5      | Effects on the rest of the distribution . . . . .  | 95         |
| 4.6      | Conclusion . . . . .   | 97         |
|          | Appendices . . . . .   | 99         |
| <b>5</b> | <b>Inequality and savings in the United States, 1984-2007</b>  | <b>109</b> |
| 5.1      | Introduction . . . . .   | 109        |
| 5.2      | Theory and empirical research . . . . .  | 111        |
| 5.3      | Data and statistical design . . . . .  | 119        |
| 5.4      | Saving rates among U.S. income groups, 1984-2007 . . . . .   | 120        |
| 5.5      | Capital gains and household debt . . . . .   | 129        |
| 5.6      | Conclusion . . . . .   | 133        |
|          | Appendices . . . . .   | 135        |
| <b>6</b> | <b>Conclusion</b>  | <b>141</b> |
|          | <b>List of Tables</b>  | <b>145</b> |
|          | <b>List of Figures</b>   | <b>147</b> |
|          | <b>References</b>  | <b>149</b> |
|          | <b>Abstract</b>  | <b>161</b> |
|          | <b>Zusammenfassung</b>   | <b>163</b> |

# Chapter 1

## Introduction

Financial crises are rare events in developed economies, but typically have devastating economic, social and political repercussions. Most prominently, the 1929 financial collapse in the U.S. was followed by the Great Depression of the 1930s, which was the deepest, longest and most widespread economic downturn in modern history. Similarly, today, the global economy is still struggling to find its feet as many advanced countries continue to grapple with the after-effects of the 2008 crisis. This is especially true of Europe, which has been plagued by a plethora of challenges ever since. The debt crisis has put serious strains on the union and its members, both economically and politically. While the northern and central European countries remain persistent on the need for austerity, Europe's financially troubled southern periphery becomes ever more fatigued. Signs of fragmentation can also be witnessed within the member states. In many countries, new eurosceptic, anti-establishment and extremist parties have entered national parliaments and gained ground in recent years, complicating the resolution of the crisis. At least Britain's vote in favor to leave the EU has made uncertainty the new normal for European governments and markets. Likewise, in the U.S., the troubled economy and increasing partisan gridlock, polarization and populist rhetoric have been dominating national politics from the onset of the 2008 financial crisis until today.

It is not without reason that the fear of political and social tensions in the wake of the current crisis enters public debate in the Western world. The European experience of the the 1930s is that prolonged financial and economic instability can ultimately lead to a breakdown of democracy with ruinous consequences. In the U.S., however, the Great Depression eventually led to a political realignment within the existing democratic structures. Against this background, the motivation for this dissertation arose from the need to gain a deeper understanding of financial crises and their implications. What has history to say about the political and social aftermath of financial crises in modern democracies? Can we, over the long-run of modern history, identify systematic shifts in relevant variables after financial crises? Are the political after-effects of financial crises comparable to the political dynamics in other recessions, or are financial crises special?

Since financial crises are rare events, many researchers in this field have opted to go back in time, and use longer time spans of data and larger samples of countries to study crises and their consequences (e.g., Reinhart and Rogoff, 2009a, 2009b, 2014; Atkinson and Morelli, 2011; Bordo and Meissner, 2012; Schularick and Taylor, 2012; Perri and Steinberg, 2012; Kose et al., 2013; Jordà et al., 2013, 2016a,

2016b).<sup>1</sup> A key insight from this literature is that recoveries from financial crises are particularly slow (e.g., Jordà et al., 2016b). A number of authors have argued that increasingly dysfunctional politics after financial crises reduce the chances of reform and therefore make recovery more difficult (e.g., Mian et al., 2014; Frieden et al., 2015; Lo and Rogoff, 2015). This view is supported by empirical evidence of more political polarization (e.g., de Bromhead et al., 2012) and policy uncertainty (e.g., Baker et al., 2013) in the aftermath of financial crisis.<sup>2</sup> In a similar vein, Chwieroth and Walter (2013) show that financial crises tend to systematically increase the probability of leadership turnover. More generally, Giuliano and Spilimbergo (2014) link the personal experience of severe financial and economic crisis to more distrust in political institutions.<sup>3</sup> Some studies also suggest that the degree of social unrest is especially high in the crisis aftermath, leading to more political constraints (e.g., Ponticelli and Voth, 2011; Passarelli and Tabellini, 2013). Broz (2005) stresses the political costs of highly unpopular bailouts for the financial sector in this context. Similarly, many emphasize the association between financial crises and poverty (e.g., Lustig, 2000) as well as income inequality (e.g., Rajan, 2010; Kumhof and Rancière, 2011; Atkinson and Morelli, 2011).

The present dissertation contributes to the growing and important literature on the political economy of crisis in significant ways. It consists of four contributions that empirically analyze the political and social implications of financial and economic hard times. The first two essays seek to broaden our understanding of the political after-effects of systemic banking crises and other macroeconomic downturns. The third essay examines the impact of financial crises on the distribution of income. These three essays utilize long-run cross-country data to study the relationships for a panel of advanced countries with historical perspective. This dissertation generally focuses on advanced economies and intentionally avoids blending the experience of developing and developed economies. The fourth essay takes a micro-level approach and has a special focus on inequality in the U.S. during the decades preceding the 2007-08 financial meltdown.

The first essay provides new evidence that the political aftershocks of financial crises can be severe. The study is based on a newly compiled dataset covering the near-universe of financial crises in 20 advanced economies and more than 800 general elections over the past 140 years. The key result is that political instability rises significantly after financial crises as government majorities shrink, social unrest intensifies and polarization increases. More specifically, voters seem to be particularly attracted to the political rhetoric of the extreme right after a financial crisis. On average, the far left did not profit equally from episodes of financial instability. These findings echo recent studies by de Bromhead et al. (2012), who focus on the electoral consequences of crises in the interwar period, and Mian et

<sup>1</sup>A long-run cross-country perspective is essential when studying financial crises. Reinhart and Rogoff note that “a data set that covers only twenty-five years simply cannot give one an adequate perspective” (2009a, pages xxvii and xxviii). Barro suggests “to use history to gauge the probability and size distribution of macroeconomic disasters, it is hopeless to rely on the experience of a single country” (2009, page 246).

<sup>2</sup>It is well documented that these effects have long-term repercussions on the political economy. For example, Alesina and Tabellini (1990) and Azzimonti (2011) show that more polarized and fragmented political systems produce economic inefficiencies, higher debt and lower growth. Alt and Lassen (2006), Lindqvist and Östling (2010), Azzimonti and Talbert (2014) and Azzimonti (2015) offer empirical evidence supporting this view. Bloom et al. (2007, 2012), Bloom (2009), Bachmann et al. (2013) and Baker et al. (2013, 2014) document that increased policy uncertainty harms investment and productivity growth.

<sup>3</sup>Importantly, however, they also find that individuals who experienced a deep recession when young support more government redistribution.

al. (2014), who show that parliamentary fractionalization typically increases in the wake of financial crises after 1980. The good news from the regressions is that most effects are back to their pre-crisis level after a decade. Importantly, similar political dynamics are not observable in normal recessions or after severe non-financial macroeconomic shocks.

The second essay builds on the approach to group vote shares along ideological dimensions developed in the first essay. It extends the analysis and studies voting behavior along the left-right spectrum in economic downturns in more depth. The research is first to relate historical data on ideology and electoral performance of nearly 650 political parties to economic development in a panel of 20 developed countries since 1870. The empirical exploration shows that right-of-center parties (conservative and far-right parties) typically capitalize on crises, while growth is beneficial to the political left and far-left. This pattern appears to be remarkably constant across historical periods. These results corroborate the impression from recent long-run studies by Brückner and Grüner (2010) and Lindvall (2014), who conclude that a shift to the right is significantly more likely than a shift to the left during economic hard times.<sup>4</sup> Importantly, the results are robust to controlling for the influence of early elections (e.g., Smith, 2004) and the typical punishment of incumbents as a consequence of poor economic performance (e.g., Bartels, 2011; Fair, 2011).

The third essay focuses on the social repercussions of crises. Specifically, the empirical analysis documents the dynamics of income inequality before and after a financial crash exploiting a dataset covering 17 countries and spanning 100 years. The study differs from existing works in that it uses annual data on top income shares and dynamic regression models to systematically explore how the top percentile of earners was influenced by financial turmoil. The results indicate that share of income received by the top one percent grows at an above-average pace in the years preceding a financial crisis. Households in the top one percent likely lose temporarily when a crisis hits.<sup>5</sup> However, their share in total income recovers quickly. Generally, looking at the medium term, both the run-up to and the recovery from a financial crisis appear to be periods of unequal income growth.<sup>6</sup> These patterns are more pronounced in Anglo-Saxon countries than continental Europe and after World War II than before. Moreover, additional tests showed that the temporary crisis-induced income loss among the top percentile of earners does not benefit the bottom 90 percent of the income distribution but rather the remainder of the top decile.

On the data side, the above works exclusively rely on widely used and tested country-specific chronologies of GDP recessions, financial crises other severe macroeconomic downturns (Bordo et al., 2001; Barro, 2006; Barro and Ursúa, 2008, 2011; Laeven and Valencia, 2008, 2012; Reinhart and Rogoff, 2009b; Jordà et al., 2013). Of course, in this context the definition of financial crises is crucial. This study follows Laeven and Valencia (2008) and defines financial crises as events during which a country's banking sector experiences bank runs, sharp increases in default

<sup>4</sup>This interpretation is also consistent with earlier cross-national evidence from the postwar period reported by Stevenson (2001). Margalit (2013) offers micro-level evidence for these claims from the current crisis in the U.S. The findings somewhat contradicts Giuliano and Spilimbergo (2014).

<sup>5</sup>These findings imply that the classic  $\Lambda$ -pattern in top incomes described in Atkinson and Morelli (2010; 2011) and Morelli (2014) for the three major U.S. financial crises and the crises in the Nordic countries in the 1990s is somewhat generalizable to a larger sample of crises and countries. They are also in line with the typically short-term negative impact of banking crisis on the top income share identified by Roine et al. (2009).

<sup>6</sup>This result sits well with the earlier literature on the distributional impact of financial crises in Latin America from the 1970s to the 1990s (e.g., Lustig, 2000).

rates accompanied by large losses of capital that result in public intervention, bankruptcy, or forced merger of financial institutions. Thus, this analysis is restricted to banking distress that is systemic in nature. Isolated bank failures are not considered. So are inflation spurts, currency crises, stock market crashes or debt crises that did not involve systemic banking collapse. The main sources of historical election and parliamentary data are Mackie and Rose (1974, 1991), Nohlen and Stöver (2010) and Döring and Manow (2015). Data on social unrest was derived from Banks and Wilson (2014), and inequality data from the commonly cited World Wealth and Income Database (Alvaredo et al., 2016).

On the methodological side, the present research uses multiple statistical tools employed in closely related studies. These include fixed-effects panel regressions in the sense of a basic event-study approach à la Romer and Romer (1989), for example applied in Mian et al. (2014), standard growth regressions (e.g., Roine et al., 2009; Bordo and Meissner, 2012) and the calculation of dynamic multipliers in a local projection framework following Jordà (2005). Local projections handle asymmetries, non-linearities and richer data structures with great ease, which explains their growing popularity in long-run historical research (e.g., Jordà et al., 2011, 2013). Moreover, all essays provide a wide range of robustness checks of the main estimates.

The fourth contribution to this thesis adopts a micro perspective and examines the relationship between household finance and income inequality in the U.S. in the two decades leading up to the 2007-08 financial crisis. Using detailed information on household portfolios obtained from the Panel Study of Income Dynamics (PSID), the statistical evidence suggests that personal saving has dramatically decreased from the mid-1980s to 2007 in all income groups, except for the top quintile. This is in line with the above finding that financial booms are associated with growing inequality. According to the survey data, potential explanations for these trends include increasing realized capital gains among the asset-rich households at the top together with a wealth effect (e.g., Juster et al., 2004) and unsustainable credit levels among the middle-income households, as suggested by Rajan (2010) and Kumhof and Rancière (2011). The statistical design of the study builds on a comprehensive regression approach developed by Dynan et al. (2004) that controls for the influence of transitory income fluctuations.

The last chapter concludes this dissertation. The conclusion summarizes the main findings of the four essays and discusses their implications, as it outlines possible avenues for future research. The most important insight from the four essays is that the political and social climate is significantly more heated in episodes of financial and economic turmoil than in normal times. Thus, the overall message of the present study for policymakers in Europe and the United States is that the danger of politics and society to go off track in the current crisis is real, and that financial instability and a sluggish economy are key issues in this regard.

## Chapter 2

# Going to extremes: Politics after financial crises, 1870-2014

*with Moritz Schularick and Christoph Trebesch*

**ABSTRACT:** Partisan conflict and policy uncertainty are frequently invoked as factors contributing to slow post-crisis recoveries. Recent events in Europe provide ample evidence that the political aftershocks of financial crises can be severe. In this study we examine the political fall-out from systemic financial crises over the past 140 years. We construct a new long-run dataset covering 20 advanced economies and more than 800 general elections. Our key finding is that policy uncertainty rises strongly after financial crises as government majorities shrink and polarization rises. After a crisis, voters seem to be particularly attracted to the political rhetoric of the extreme right, which often attributes blame to minorities or foreigners. On average, far-right parties increase their vote share by 30% after a financial crisis. Importantly, we do not observe similar political dynamics in normal recessions or after severe macroeconomic shocks that are not financial in nature.

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## Chapter 3

# Turning right: Recession voting since 1870

Many scholars and political commentators are surprised by the fact that the Great Recession has boosted center-right and far-right parties, while the political left was not able to capitalize on a major crisis of the free market. This chapter offers an in-depth analysis of voting behavior along the left-right spectrum in times of economic crisis. The analysis is based on a long-run dataset covering 20 developed countries, 650 political parties and more than 700 elections over the past 140 years. The key finding is that parties on the right of the political landscape are the biggest beneficiaries of economic downturns. In contrast, left-wing parties tend to find more support in times of economic growth. This refers to both moderate and extremist parties respectively. These patterns are remarkably constant over time and across space. Importantly, the results are robust to controlling for the influence of early elections and of the electoral punishment of incumbents due to poor economic performance.

### 3.1 Introduction

The electoral successes of right-wing political parties have dominated headlines across Europe since the onset of the Great Recession. Many commentators have expressed their surprise at the fact that, with very few exceptions, the political left has not been able to benefit from a major crisis of the free market (e.g., Judt, 2010; Harris, 2016; *The Economist*, 2016). Some scholars, however, argue that there is nothing surprising about this pattern looking at modern history, as for example the 1930s Great Depression exhibited a similar rightward swing at the polls in many countries (e.g., Brückner and Grüner, 2010; de Bromhead et al., 2012).

Economic voting theory offers important insights into voting rationales but not into the ideological direction of the vote. In prospective models, voters vote for the party they prefer to manage the economy in the future (e.g., Lewis-Beck and Stegmaier, 2007; Duch and Stephenson, 2008). This may favor center-right parties in times of crises if voters believe in their economic expertise.<sup>1</sup> In contrast, retrospective voting behavior takes the state of the economy into account. Voters

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<sup>1</sup>The conventional wisdom that conservative governments manage the economy better was recently challenged by Blinder and Watson (2016), who show that economic growth has been faster in the U.S. under Democratic presidents than under Republican ones since World War II.

tend to reward governments when the economy grew and to punish them when growth slowed, and that regardless of ideology (e.g., Bartels, 2011; Fair, 2011). Thus, right votes likely increase if a left government drove the country into crisis, and vice versa. More generally, comparative literature on electoral responses to global crises finds that these are a function of cross-class coalitions between different social groups based on their economic interests (e.g., Gourevitch, 1986). Similarly, political economy literature on the politics of distribution argues that the middle class may either ally with the poor or with the rich depending on economic circumstances (e.g., Iversen and Soskice, 2006). More specifically, some earlier cross-country studies (e.g., Stevenson, 2001) and research based on U.S. survey data (e.g., Durr, 1993; Margalit, 2013) suggest that pivotal voters may become less altruistic in hard times as they perceive left-of-center policies as luxury goods.<sup>2</sup> More recently, James (2016) and O'Rourke (2016) have linked the current return to nationalism and isolationism in advanced countries to a "New Globalization Backlash", triggered by the global crisis.

This chapter ties in with the recurring debate about voting in times of crises. Can we, over the long-run of modern history, identify systematic shifts in voting behavior during periods of economic downturns? And if so, in which direction? Does the political left or the right benefit, or both? To answer these questions, this chapter examines voting behavior for the near-universe of economic recessions in advanced economies since the late 19th century. The historical dataset assembled for this purpose covers 20 countries and 140 years, including almost 650 political parties and more than 700 elections between 1870 and 2015.

The main finding is that recessions are followed by substantial changes in voting behavior. Support for the political right increases significantly during economic downturns throughout the past 140 years. On average, parties on the right of the political spectrum have seen an increase in their combined vote share of almost 10% (not percentage points) in recessions. In contrast, the left-wing appears to be the biggest beneficiary of expansionary periods. Importantly, this refers to both moderate and extremist parties respectively. In addition, this pattern is remarkably constant across history and between countries. The key relationships are visible in the data for the pre-World War II period, the interwar era and after World War II. Moreover, they are robust to controlling for country-specific effects, common year shocks, and both. The evidence uncovered here thus confirms the findings of recent long-run cross-country studies that recessions more likely benefit right-wing parties than parties on the left of the political spectrum (e.g., Brückner and Grüner, 2010; Lindvall, 2014).

What explains the rise of the right in times of economic crises? One possibility is that left governments that led a country into recession were systematically replaced by right-wing governments. The results were therefore controlled for the influence of the punishment of incumbent governments in the course of poor economic performance. They did not change meaningfully. Second, it may be that the population has more confidence in right-wing governments to manage the economy. However, non-results with respect to liberal parties in this study (see text below) shed doubt on this hypothesis. The most promising explanation thus remains that voters favor clear-cut traditionalist and nationalist over progressive ideas in times of economic uncertainty, and that both center-right and rightwing populist parties supply this need. Along these lines, many commentators have stressed that the recent return to nationalism is twofold (e.g., Roubini): established center-right parties are challenged by new rightwing populist or far-right parties

<sup>2</sup>The argument dates back to Alt (1979), based on electoral survey data for the United Kingdom.

(e.g., the UKIP), and at the same time are being disrupted by nationalist factions from within (e.g., Donald Trump in the U.S.). The implication is that Europe and the U.S. should be aware of the real danger of moving further right, including the likelihood of turning away from democracy, as long as the most recent crisis is not over. This study provides new evidence that economic growth is a key issue in this regard. Finally, whether these results are driven by more and more successful anti-pluralist recession rhetoric on the right or not, leftwing parties should approach their potentially structural problem to take a stance on the resolution of economic crises that appeals to the electorate.

On the data side, this chapter builds on the approach to group vote shares of political parties along different political ideologies, as defined in Döring and Manow (2015) and their sources. This procedure for the first time allows consistently mapping the detailed distribution of votes across the left-right spectrum for each parliamentary election in the modern history of 20 advanced countries. On the methodological side, this study uses multiple statistical tools to examine the impact of economic crises on voting behavior. Besides simple visual plots of the data, these include fixed-effects OLS panel regressions of vote shares on a recession indicator variable (as for example in Mian et al., 2014) and on the GDP per capita growth rate, as is common in empirical long-run studies of crises (e.g., Bordo and Meissner, 2012). Moreover, the time dimension is taken more seriously by estimating local projections following the methodology developed by Jordà (2005) and applied in a range of related works (e.g., Jordà et al., 2013, 2016a).

The chapter is structured as follows. In the next section, the dataset is introduced. In the third section, the statistical design is discussed. The fourth contains the empirical core of the study and shows how economic downturns resulted in more right voting over the past 140 years. The fifth section examines the persistence of this pattern across historical eras. The last section concludes this chapter.

## 3.2 Data description

This chapter draws on a broad set of historical data on 20 developed economies: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. This section describes the political and economic variables used in the analysis.

The analysis is based on the classification of political parties into *party families* according to their position in an economic (state vs. market) and a cultural (liberty vs. authority) left/right dimension developed by Döring and Manow (2015), building on Castles and Mair (1983), Huber and Inglehart (1995), Benoit and Laver (2006) and Bakker et al. (2015). More precisely, these authors assign each political party to one of nine party families, seven of which can be mapped along a single left-right axis (e.g., Ware, 1996): *communist/socialist*, *social democratic*, *green/ecologist*, *liberal*, *christian democratic*, *conservative* and *far-right*. Two additional party families, whose ideological position can vary, are *agrarian* and *special issue* (for example regional or ethnic parties). The idea of this chapter then is to study with a historical perspective if and how economic recessions systematically changed the voter support for the Döring and Manow (2015) party families. However, their database is limited in three aspects in this regard. First, the record of political parties starts in the year 1900 earliest, and for most countries much later. Second, it reports party families and election results only for parties that gained at least one percent of the total vote or two or more parliamentary seats. Third, it does

not assign electoral alliances and joint lists to a party family. Thus, for the purpose of this analysis the pre-1900 election results of all parties in the Döring and Manow (2015) database were tracked and added. In a second step, historical parties that were not in the database, parties that gained only one parliamentary seat and electoral alliances/joint lists were assigned to a party family. For the latter, the party family was coded according to the most dominant ideology in the alliance (most parliamentary seats).

Appendix Table A1 shows the party names and the party family assigned separately for each country in the sample. The table also lists the mostly historical and/or minor parties that could not be coded (or in rare cases were deliberately not coded) based on Döring and Manow (2015) and shows where the additional coding information for these parties was obtained. The party family variable is time-invariant, while party name changes were accounted for. Using the detailed election statistics in Mackie and Rose (1991), Nohlen and Stöver (2010), Döring and Manow (2015) and official country statistics, any election result for all parties or alliances that met the listing criteria was included in the dataset. Only parties that neither gained a parliamentary seat nor one percent of the total vote throughout their history and independent candidates were not tracked. For a given election, the *vote shares* of the parties were then grouped along the nine party families outlined above, and the residual group of electorally unsuccessful parties, so that the combined share always summed up to a 100 percent.

The vote shares of the communist/socialist, social democratic and green/ecologist party families were further combined to the total vote share of the *political left*, the summed vote shares of the liberal and christian democratic party families result in the vote share of the *political center* and the vote shares of the conservative and far-right party families compose the vote share of the *political right*.<sup>3</sup> The vote shares of agrarian, special issue and unsuccessful parties were added up to the vote share of *other parties*. These categorizations were possible for more than 700 elections with about 650 political parties, where reliable vote share data and a system of political parties and alliances with clearly identifiable ideological platforms existed.<sup>4</sup> The analysis is restricted to parliamentary, nationwide elections. Presidential elections, referendums and regional elections are generally excluded. In cases of bicameral legislatures (e.g., in the U.S.), the elections to the lower house are considered (e.g., U.S. House of Representatives). When an election was repeated in the same year (e.g., Greece in 2012), the result of the last election in the year is considered in the statistical analysis.

The record starts in the 1870s or in the 1880s for the majority of countries. Austria and Ireland are considered from their independence in the interwar period. Australia was no independent state before the 1901 elections. Finland as an autonomous part of the Russian Empire (1907-1917) is included. Spain, Portugal and Greece are considered after the end of their post-World War II dictatorships in the 1970s. A potential drawback is that Italy before World War II had to be dropped for data availability and coding reasons. The same applies to Japan before the 1908 elections. The data collection includes elections in monarchies in the early years of the sample. Elections under undemocratic conditions, i.e., in Germany

<sup>3</sup>Christian democratic parties are classified center(-right) rather than right based on the notion that particularly historical European christian democracy in either economic and cultural terms has integrated various liberal, conservative and socialist viewpoints within a broader framework of centrist christian principles (e.g., Roberts and Hogwood, 1997).

<sup>4</sup>In the 19th century, some parliaments consisted merely of unlinked, nonpartisan candidates. It was therefore not possible to assign members to parties (e.g., the elections in the Netherlands, Norway and Sweden before the mid-1880s).

in the late 1930s, and during the two world wars (1914-1918 and 1939-1945) were coded but are not part of the statistical analysis. Appendix Table A2 shows the elections in the sample per country.

The political data was then combined with data on economic development over time. In the spirit of, for instance, Brückner and Grüner (2010), the main variable under consideration is the annual *growth rate of real GDP per capita*. In addition, spells of economic downturn were separated from periods of growth for each country in the sample. More specifically, economic *recession years* are defined as years with negative real per capita GDP growth. All other years, including years of zero growth, are considered *normal years*. Until the year 2010, the recession dates are determined by means of the historical GDP per capita series provided by Barro (2006), Barro and Ursúa (2008, 2011) and the *Maddison Project Database* (updated 2013 version). For the years from 2011 to 2015, data from the World Bank's (2016) *World Development Indicator Database* on the annual GDP per capita growth rate are used to identify recession years. For each country in the sample, the chronology of normal and recession years starts with the year of the first election coded. Appendix Table A3 shows the recession years per country (including those during periods of global war).

Moreover, the analysis includes a dummy variable that indicates a change in the *party family* of the party of the prime minister/chancellor (in parliamentary systems) or president (in presidential systems) in a given country-year.<sup>5</sup> The idea is to control for increased likelihood of executive turnover or, in other words, the natural punishment of incumbent governments by the electorate in times of recession. More precisely, in the sense of retrospective voting models (e.g., Bartels, 2011) the results on ideology could be influenced by tendencies of the population to replace a government which led a country into recession by a new one, in fact regardless of the particular agendas.<sup>6</sup> Finally, the study exploits a binary variable that indicates early (or snap) elections, which frequently result in increased majorities for the party already in power (e.g., Smith, 2004) and thus could also bias the results on ideological voting.<sup>7</sup>

Appendix Table B1 provides the summary statistics for all political and economic variables used in the analysis. The statistical design of the study is discussed in more detail in the next section.

### 3.3 Statistical design

For each dependent variable, the analysis starts with descriptive evidence on the key relationships in the data, including kernel density estimates and simple bar charts. The second step is to estimate fixed-effects OLS panel regressions and local projections (see Jordà, 2005). In a third step, the results are checked for robustness.

<sup>5</sup>The second chapter of this dissertation contains a list of the sources used to identify the government party. The variable also captures shifts from partisan to nonpartisan governments and back (for example caretaker governments). For monarchies without elected governments in the early years of the sample the variable simply denotes a change in the ideology of the most successful party (in terms of vote shares).

<sup>6</sup>Generally, economic crises are seen to lower the probability of survival for incumbent governments. For instance, Chwioroth and Walter (2013) use long-run historical data to show that banking crises have systematically increased the probability of turnover.

<sup>7</sup>The identification of early elections is based on information obtained from Mackie and Rose (1991), Nohlen and Stöver (2010), Hyde and Marinov (2012) and Döring and Manow (2015).

Following for example Mian et al. (2014), this study uses the following econometric model to estimate the impact of a GDP recessions on vote shares:

$$Y_{it} = \alpha + \beta * rec_{it,t-1} + \gamma * gov_{it} + \rho * snap_{it} + \delta_i + \varepsilon_{it},$$

where  $Y_{it}$  denotes the vote share of a given party family in the most recent election. The recession indicator variable  $rec_{it,t-1}$  has the value of 1 in contemporaneous and lagged<sup>8</sup> country-years with negative real GDP per capita growth; and 0 otherwise. The term  $gov_{it}$  indicates a change in the ideology of the ruling party and  $snap_{it}$  an early election. Also  $\delta_i$  are country fixed effects to account for unobservable country-specific heterogeneity.  $\varepsilon_{it}$  is an error term clustered at the country level. In the next step, year fixed effects  $\mu_t$  are added to account for common year shocks. The resulting model can be written as follows:

$$Y_{it} = \alpha + \beta * rec_{it,t-1} + \gamma * gov_{it} + \rho * snap_{it} + \delta_i + \mu_t + \varepsilon_{it},$$

The fixed-effect regressions discussed above resemble unconditional averaging in the sense of a basic event-study approach à la Romer and Romer (1989) in which every occurrence is treated identically. Therefore, following Brückner and Grüner (2010), this chapter exploits a similar model to directly gauge the influence of real GDP per capita growth on vote shares. Again,  $i$  is the country and  $t$  the time dimension of the data:

$$Y_{it} = \alpha + \beta * growth_{it,t-1} + \gamma * gov_{it} + \rho * snap_{it} + \delta_i + \mu_t + \varepsilon_{it},$$

The dependent variable  $Y_{it}$  is the vote share of a party family, as defined in the above section, in the most recent general election. The main regressor  $growth_{it,t-1}$  is the annual percentage growth rate of real GDP per capita. Importantly, analogous to the recession dummy, the values of this variable are averaged over the contemporaneous and lagged observation to reduce bias due to simultaneity.<sup>9</sup> The control variable  $gov_{it}$  denotes government ideology change  $i$  at time  $t$ , and the binary variable  $snap_{it}$  early elections. Again, country fixed effects  $\delta_i$  eliminate the influence of country-specific unobservables and the year fixed effects  $\mu_t$  capture time trends. Also  $\varepsilon_{it}$  is the error term.

Least-squares are then used to estimate the effect. Brückner and Grüner (2010) emphasize that for the OLS estimator to obtain consistent estimates it is essential that GDP growth and recessions are not systematically influenced by future changes in the vote shares of a respective party family. Thus, the empirical strategy is based on the (strong) assumption that current market decisions are rather independent of political expectations.

Third, following Jordà (2005), the analysis calculates dynamic multipliers directly from the data in order to take the time dimension more seriously. Here, the treatment variable will simply be a business cycle peak  $P$ , which has the value of 1 when both  $GDP_{it-1}$  and  $GDP_{it+1}$  are smaller than  $GDP_{it}$ . More specifically, let  $N$  and  $T$  denote the cross-sectional and time dimension of the panel.  $Y_{it}$  is a

<sup>8</sup>The reason for including the year after the recession is to eliminate bias due to reverse causality. The approach allows variation in the dependent variable, given that it factors in elections in post-recession years, which are likely influenced by the state of the economy in the year before. The results in this chapter are however robust to define a recession more narrowly, i.e., only GDP contraction years or only their lags, and to restrict the dataset to only election years (see Lindvall, 2014).

<sup>9</sup>Again, notice that the results are generally robust to using only the contemporaneous or only the lagged value of GDP per capita growth.

vector of vote share variables variables. For any variable the model estimates the change in that variable from the beginning of the recession (previous peak  $P$ ) at time  $t$  to time  $t + h$ . This response is calculated by estimating a fixed-effects panel model with a discrete business cycle peak treatment:

$$\Delta_h y_{it+h}^k = \alpha_i^k + \theta_P^k P + \sum_{j=0}^p \Gamma_j^k Y_{it-j} + gov_{it} \gamma + snap_{it} \rho + u_{it}^k;$$

$$k = 1, \dots, K; \quad h = 1, \dots, H$$

where  $\theta_P^k$  is the recession treatment ( $P = 1$ ). In addition, contemporaneous and lagged values of the variables  $Y$  at time  $t$  (i.e., at peak) are included, as are  $\alpha_i^k$  country fixed effects. Also,  $u$  is the error term. Again, the binary variable  $gov_{it}$  denotes government ideology change, and  $snap_{it}$  an early election.

### 3.4 Turning right: recession voting since 1870

The main finding of this analysis is that the vote shares of the political left and right respond differently to the state of the economy. Right parties seem to benefit from recessions and experience losses when the economy is growing. In contrast, left parties tend to gain votes in times of growth and to lose voter support during economic hardship. The first part of this section focuses on the broad left-center-right distribution of the vote during times of recession compared to growth periods. The second part digs deeper into the role of particular ideologies in the broad picture. It examines the crisis-induced dynamics in the vote shares of different party families in more detail.

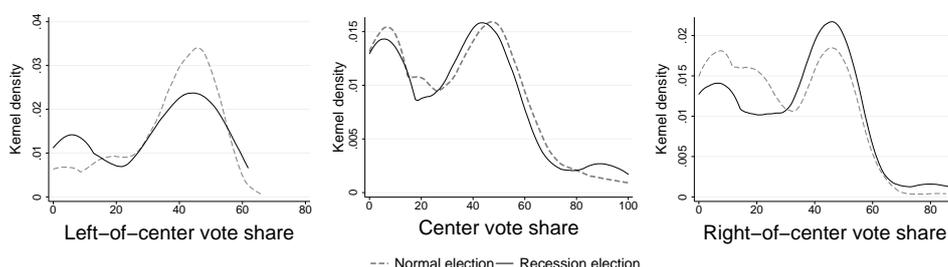
#### 3.4.1 Left, center and right

Figure 3.1 presents kernel density estimates of the combined left-of-center vote shares (communist and social democratic parties), center vote shares (liberal and christian democratic parties) and right-of-center vote shares (conservative and far-right parties). For each variable, the figure shows kernel densities of the vote shares (most recent general election) in normal years (dashed lines) and recession periods (solid lines). The data cover all elections and recessions in the 20 advanced economies over the past 145 years, excluding the two global wars.

The figure suggests substantial changes in voting behavior during recessions over the past 145 years. Most notably, left-of-center votes (left panel) decrease and right-of-center votes (right panel) increase in recession years relative to normal times. Parties at the center of the political spectrum (middle panel) are also negatively affected by economic downturns, but the difference between recession years and the long-run historical distribution is notably smaller than for left parties.

Fixed-effects OLS regressions support the impression given by the kernel density estimates. Table 3.1 compares the recession levels of the combined left, center and right vote shares (most recent general election) to their long-run historical average level. The residual vote shares of “other” parties – agrarian, special issue and unsuccessful parties – are included for completeness. The table shows the results for the full sample (left panel), the pre-World War II sample (middle panel) and the post-World War II period (right panel), while (1) control for country fixed effects and (2) for country and year fixed effects, respectively. Again, years of global wartime and non-democratic spells are always excluded. All regressions

Figure 3.1: Kernel densities of vote shares



**Notes:** The figure shows kernel densities (vertical axes) of three vote share variables (horizontal axes). The dashed lines refer to years with zero or positive GDP growth and the solid lines to years with negative GDP growth. The data cover all elections and recessions in the 20 advanced economies from 1870-2015, excluding single-party elections and the two global wars (1914-1918 and 1939-1945).

include dummies for government ideology change and snap elections (coefficients not reported).

The estimates provide strong evidence that the political right, conservative and far-right parties, is the biggest beneficiary of economic downturns. This is true for both before and after World War II. Depending on the specification, right votes increase by between 2.3 and 2.7 percentage points during recessions. This compares to a mean value (full sample) of about 28%, which suggests almost 10% more right-of-center votes in times of crisis. The coefficient is remarkably stable in size and statistically significant across samples and regression specifications.

Who loses votes to the right during recessions? For the full sample and the pre-World War II sample, in line with the descriptive evidence presented earlier, the results point to the political left more than to the center. Left vote shares decline by between 2.6 and 5.3 percentage points when a country is in recession, again depending on the specification. These differences are statistically significant. In contrast, the combined vote share of center parties appears to be unaffected or, if anything, slightly increased following a recession.<sup>10</sup> These patterns are less pronounced for the post-World War II period, where both the left and the center seem to lose votes to the right (negative coefficients), but the deviation from the normal level is statistically insignificant. The impact of recessions on the vote share of the “other” parties in the sample is negligible.

Figure 3.2 takes the time dimension more seriously and estimates local projections following the methodology pioneered by Jordà (2005) and applied in several closely related studies (Jordà et al., 2011, 2013, 2016a). The figure shows projections of the cumulative change in left, center and right vote shares for years 1-3 after the onset of an economic recession (red lines).<sup>11</sup> The shaded region is a 90%

<sup>10</sup>Notice that adding year dummies causes a notable reduction of the negative recession effect on left votes in the full sample and in the pre-World War II sample, and vice versa for the centrist vote shares. This likely stems from a strong time trend in these variables in the early years of the sample, particularly before World War I when social democracy rose rapidly to the disadvantage of Liberalism. This correlation will be explored later in this chapter.

<sup>11</sup>Of course the length of recessions varies over time and across space. A three-year window appeared to be a reasonable choice since the average length of all recessions in the sample is 3 years and so is the average time between two elections.

Table 3.1: Left, center and right votes: recession dummy

|                      | a) Full sample |          | b) Pre-WWII |          | c) Post-WWII |         |
|----------------------|----------------|----------|-------------|----------|--------------|---------|
|                      | (1)            | (2)      | (1)         | (2)      | (1)          | (2)     |
| Left vote share      | -5.289***      | -2.633** | -3.382*     | -2.866** | -1.092       | -0.718  |
| Robust S.E.          | (1.53)         | (0.98)   | (1.67)      | (1.06)   | (0.94)       | (1.08)  |
| Within-country $R^2$ | 0.111          | 0.682    | 0.117       | 0.689    | 0.010        | 0.192   |
| Observations         | 2052           | 2052     | 742         | 742      | 1310         | 1310    |
| Center vote share    | 2.706*         | 0.483    | 1.069       | 0.666    | -1.330       | -1.687  |
| Robust S.E.          | (1.34)         | (0.72)   | (1.99)      | (1.41)   | (0.82)       | (1.10)  |
| Within-country $R^2$ | 0.084          | 0.587    | 0.066       | 0.622    | 0.012        | 0.302   |
| Observations         | 2052           | 2052     | 742         | 742      | 1310         | 1310    |
| Right vote share     | 2.689***       | 2.292**  | 2.398**     | 2.498*   | 2.371**      | 2.518** |
| Robust S.E.          | (0.88)         | (0.89)   | (0.94)      | (1.45)   | (1.03)       | (1.15)  |
| Within-country $R^2$ | 0.029          | 0.302    | 0.050       | 0.272    | 0.024        | 0.340   |
| Observations         | 2052           | 2052     | 742         | 742      | 1310         | 1310    |
| Others vote share    | -0.106         | -0.143   | 0.085       | -0.298   | 0.051        | -0.113  |
| Robust S.E.          | (0.37)         | (0.53)   | (0.46)      | (0.62)   | (0.24)       | (0.38)  |
| Within-country $R^2$ | 0.016          | 0.313    | 0.031       | 0.385    | 0.012        | 0.146   |
| Observations         | 2052           | 2052     | 742         | 742      | 1310         | 1310    |

**Notes:** This table compares the recession levels of vote shares to their average levels. The dependent variable is the vote share in the most recent general election (the results are similar when including election years only). The explanatory variable is a dummy that indicates whether a country was in recession or not. (a) Full sample: 1870-2015. (b) Pre-World War II sample: 1870-1938. (c) Post-World War II sample: 1946-2015. The estimation method is least squares, where (1) include country fixed effects and (2) country fixed effects and year fixed effects. All regressions include dummies for government ideology change and snap elections (coefficients not reported). Robust standard errors clustered by country are shown in parentheses. Periods of global war (1914-1918 and 1939-1945) and non-democratic spells are always excluded. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

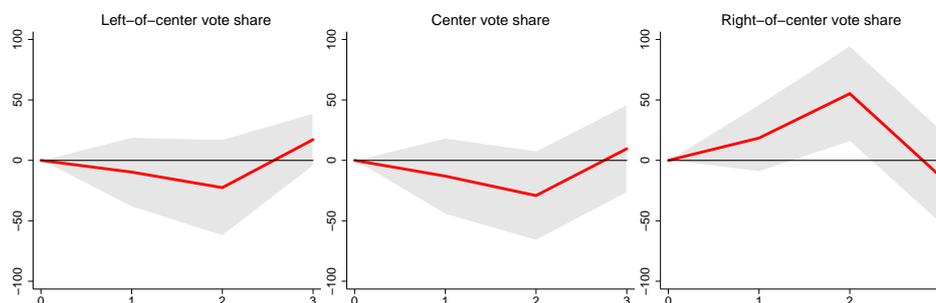
confidence interval. Different from the OLS regressions, the controls are country dummies and the contemporaneous and 1-year lagged values of the dependent variables at the start of the recession.<sup>12</sup> The binary variables indicating snap elections and government punishment remain in the model. The estimates build on all available data from 1870-2015, while the world wars are again excluded.

Considering the full sample, the figure suggests that right votes increase by more than 50%, cumulatively, from the start of the recession to year 2. The coefficient in year 2 is statistically significant at the 5% level (see the results in Appendix Table C1). The right vote shares are, however, back to normal in year 3 after the onset of the crisis. In contrast, the vote shares of left and center political parties do not respond strongly to the recession treatment over the three-year horizon. The vote shares of these groups exhibit a similar (downward) trend, which however is not significantly different from the level at recession peak.

Fixed-effects OLS regressions of the vote shares of right, center and left parties on the real GDP per capita growth rate, as reported in Table 3.2, reinforce the above findings. Again, the results are shown separately for the full sample (left panel), the pre-World War II sample (middle panel) and the post-World War II

<sup>12</sup>The results are similar when removing the lagged dependent variable and/or its lag at peak as a control and when including year fixed effects.

Figure 3.2: Left, center and right votes: local projections



**Notes:** The path shows local projections of the average cumulative change in the vote share (y-axes) relative to the start of the recession for years 1-3 afterwards (x-axes). The shaded region is a 90% confidence interval. The full sample of data is used (1870-2015). Periods of global war (1914-1918 and 1939-1945) and non-democratic spells are excluded. The regressions are control for country fixed effects, snap elections, government ideology changes and the contemporaneous and 1-year lagged values of the dependent variables at the start of the recession (coefficients not reported). For the corresponding regression coefficients see Appendix Table C1.

period (right panel). Similar to Table 3.1, (1) control for country fixed effects and (2) for country and year fixed effects and all regressions are controlled for the influence of government ideology change and snap elections.

The estimates in the second column indicate that a one-percentage-point increase in growth leads to a statistically significant (at the 1% level) increase of half a percentage point in the vote share of left parties in the full sample. The vote share of right parties responds by a one-third percentage point decline (significant at the 5% level). The size of the coefficients is reduced by more than half when adding year fixed effects (third column), but the impact on the left votes remains statistically significant at the 5% level. As shown earlier, the patterns are more distinct for the full sample and the pre-World War II sample. Moreover, common trends appear to affect of the results for the centrist parties. Interestingly, the vote shares of other parties, i.e., special issue and agrarian parties, seem to respond negatively to economic growth.

A sceptic observer might point out that the likelihood of a change in the distribution of votes between elections is zero and that using the vote share in the most recent general election as dependent variable in order to annualize the election data contains bias when the explanatory variables, including the recession dummy, build on “genuine” annual data on GDP per capita. Following Lindvall (2014), the sample was therefore restricted to election years only. The results were similar.<sup>13</sup> Moreover, all of the results were robust to moving the recession dummy variable or the GDP growth rate one year forward or backward. In addition, the estimates did not change meaningfully when removing the snap election dummy or the binary indicator for a change in the ideology of the executive or both. Finally, the results were similar when exploiting the percentage deviation from trend, computed by means of the widely used Hodrick Prescott filter (see Hodrick and Prescott, 1997),

<sup>13</sup>The same is true for using the vote share in the next general election or when linearly interpolating between election years.

Table 3.2: Left, center and right votes: GDP growth

|                      | a) Full sample |          | b) Pre-WWII |        | c) Post-WWII |         |
|----------------------|----------------|----------|-------------|--------|--------------|---------|
|                      | (1)            | (2)      | (1)         | (2)    | (1)          | (2)     |
| Left vote share      | 0.525***       | 0.234**  | 0.381**     | 0.295  | 0.139        | 0.111   |
| Robust S.E.          | (0.10)         | (0.11)   | (0.17)      | (0.17) | (0.10)       | (0.09)  |
| Within-country $R^2$ | 0.104          | 0.682    | 0.106       | 0.687  | 0.023        | 0.182   |
| Observations         | 2028           | 2028     | 735         | 735    | 1293         | 1293    |
| Center vote share    | -0.078         | 0.076    | -0.107      | -0.037 | 0.293*       | 0.158   |
| Robust S.E.          | (0.16)         | (0.61)   | (0.28)      | (0.18) | (0.15)       | (0.13)  |
| Within-country $R^2$ | 0.081          | 0.584    | 0.063       | 0.619  | 0.039        | 0.290   |
| Observations         | 2028           | 2028     | 735         | 735    | 1293         | 1293    |
| Right vote share     | -0.334**       | -0.115   | -0.259      | -0.149 | -0.279       | -0.055  |
| Robust S.E.          | (0.13)         | (0.14)   | (0.17)      | (0.22) | (0.16)       | (0.17)  |
| Within-country $R^2$ | 0.031          | 0.282    | 0.040       | 0.249  | 0.030        | 0.302   |
| Observations         | 2028           | 2028     | 735         | 735    | 1293         | 1293    |
| Others vote share    | -0.114*        | -0.194** | -0.014      | -0.110 | -0.153       | -0.213* |
| Robust S.E.          | (0.07)         | (0.09)   | (0.08)      | (0.12) | (0.09)       | (0.11)  |
| Within-country $R^2$ | 0.029          | 0.339    | 0.036       | 0.394  | 0.058        | 0.211   |
| Observations         | 2028           | 2028     | 735         | 735    | 1293         | 1293    |

**Notes:** This table shows the average effect of an increase in the real GDP per capita growth rate on the vote share levels of left, center and right parties in the most recent general election (the results are similar when including election years only). (a) Full sample: 1870-2015. (b) Pre-World War II sample: 1870-1938. (c) Post-World War II sample: 1946-2015. The estimation method is least squares, where (1) include country fixed effects and (2) country fixed effects and year fixed effects. All regressions include dummies for government ideology change and snap elections (coefficients not reported). Robust standard errors clustered by country are shown in parentheses. Periods of global war (1914-1918 and 1939-1945) and non-democratic spells are always excluded. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

as dependent variable to account for the time trends in the left and center vote shares.

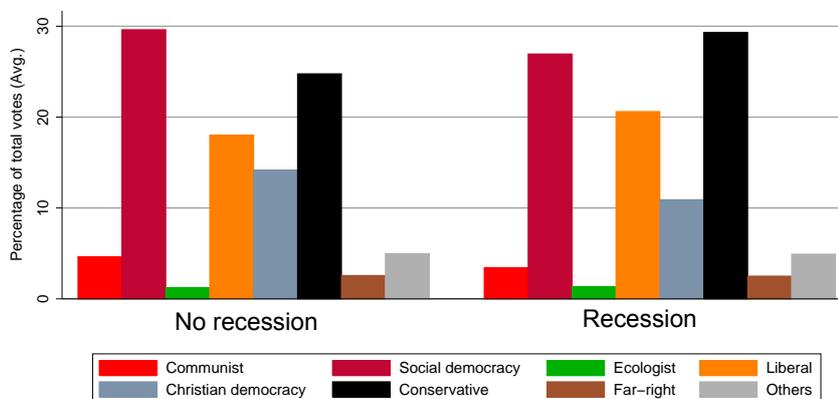
Thus, in the light of modern history, the swing of votes from the left to the right of the political spectrum appears to be a persistent feature of economic recessions. The political left particularly benefits from periods of economic growth. This interpretation is in line with recent empirical studies by Brückner and Grüner (2010), de Bromhead et al. (2012) and Lindvall (2014), which all suggest that the right-shift of politics during economic hardship as observed since the onset of the Great Recession is not a whim of history but rather a constant. What causes the changes in the left-right distribution of the vote with regard to economic downturns? The next part decomposes the aggregate variables and explores the crisis dynamics in the vote share of each underlying party family.

### 3.4.2 Party families

Does the swing in times of crisis relate to established parties or extremist parties, or to both? Which party families on the right, in the center and on the left capitalize on recessions, and which not? The columns in Figure 3.3 represent average vote shares of different party families in normal years (left panel) and during recession periods (right panel). The data cover all elections and recessions in the 20 advanced

economies over the past 145 years, excluding the two global wars.

Figure 3.3: Average vote shares: normal vs. recession



**Notes:** The figure shows averages of vote share variables in normal years (left panel) and recession years (right panel). The data cover all elections and recessions in the 20 advanced economies from 1870-2015, excluding single-party elections and the two global wars (1914-1918 and 1939-1945).

The figure points to a decrease in the vote share of communist and social democratic parties in recession, on average. The communist vote shares drop by about 1.4 percentage points (from about 5% to 3.6% of the vote), and the social democratic votes by 3 percentage points (from 30% to 27%). In contrast, conservative parties, on average, find more support in recessions than in normal times (increase of about 3.6 percentage points). These unconditional mean differences are statistically significant at the 5% level. Far-right votes slightly increase. In the center, christian democratic parties see a decline in their vote share and liberal parties appear to profit in recessions. However, the latter relationships are statistically insignificant.

Do these patterns persist when controlling for country and year fixed effects and elections characteristics? Table 3.3 reports the results of fixed-effects panel regressions of the vote shares of different party families on the recession dummy for the full sample. The specifications are the same as in Table 3.1.

Using all data available and controlling for country and year effects, the regressions of the vote shares on the recession dummy indicate that most of the swing concerns the established parties. The point estimates of -2.56 for the social democratic parties and 1.96 for the conservative parties (third column) are close to those for the broader defined left and right vote share variables in Table 3.1 (-2.63 and 2.29 respectively). However, both on the right and the left, the extremist parties experience a shift in the same direction as the more moderate parties. Communist parties lose more than half a percentage point and far-right parties win more than one-third of a percentage point in recessions. These effects can be considered large, given (full sample) mean values of 4.7% for the communist votes and 2.7% for the far-right votes. Even though the coefficients are statistically insignificant in a fixed-effects approach,<sup>14</sup> they seem to point into the direction

<sup>14</sup>This may be due to the fact that communist and far-right voting are more limited to particular regions, for example continental Europe, and time periods, such as the interwar era. Accordingly,

Table 3.3: Party family vote shares: recession dummy

|                                | (1)         | (2)         |
|--------------------------------|-------------|-------------|
| Communist/socialist vote share | -1.061      | -0.553      |
| Robust S.E.                    | (0.65)      | (0.44)      |
| Within-country $R^2$           | 0.054       | 0.313       |
| Social democracy vote share    | -4.498***   | -2.563**    |
| Robust S.E.                    | (1.30)      | (0.97)      |
| Within-country $R^2$           | 0.068       | 0.569       |
| Green/ecologist vote share     | 0.269       | 0.483*      |
| Robust S.E.                    | (0.20)      | (0.26)      |
| Within-country $R^2$           | 0.035       | 0.595       |
| Liberal vote share             | 3.896**     | 1.116       |
| Robust S.E.                    | (1.38)      | (0.768)     |
| Within-country $R^2$           | 0.065       | 0.609       |
| Christian democracy vote share | -1.190      | -0.633      |
| Robust S.E.                    | (0.75)      | (0.71)      |
| Within-country $R^2$           | 0.032       | 0.267       |
| Conservative vote share        | 2.050**     | 1.964**     |
| Robust S.E.                    | (0.83)      | (0.88)      |
| Within-country $R^2$           | 0.016       | 0.292       |
| Far-right vote share           | 0.638       | 0.328       |
| Robust S.E.                    | (0.59)      | (0.48)      |
| Within-country $R^2$           | 0.017       | 0.268       |
| <i>Observations</i>            | <i>2052</i> | <i>2052</i> |

**Notes:** This table compares the recession levels of vote shares to their average levels. The dependent variable is the vote share in the most recent general election (results are similar when including election years only). The explanatory variable is a dummy that indicates whether a country was in recession or not. Estimation method is least squares, where (1) with country fixed effects and (2) with country fixed effects and year fixed effects. Regressions include dummies for government ideology change and snap elections (coefficients not reported). Robust standard errors clustered by country in parentheses. The data cover 1870-2015. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

that the extreme ends of the spectrum also contribute to the overall shift from left to right voting during times of economic hardship. On the left, green parties are a notable exception, since they experience an *increase* in their vote share of about half a percentage points in recession relative to the long-run average. This difference is statistically significant at the 10% level after controlling for year effects. In the center of the political spectrum, christian democratic parties, if anything, typically find less voter support in bad times. In contrast, liberal parties tend to gain votes, but this is heavily dependent on allowing for time effects (see text below).

The impact of economic development on the moderate and extremist ideological ends of the political landscape becomes clearer from Table 3.4, which reports the

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once the fixed effects are removed, the coefficients turn significant.

results from fixed-effects panel regressions of the party families' vote shares on the real GDP per capita growth rate in the full sample. The regression models are similar to those used for the estimations shown in Table 3.2.

Table 3.4: Party family vote shares: GDP growth

|                                | (1)         | (2)         |
|--------------------------------|-------------|-------------|
| Communist/socialist vote share | 0.202**     | 0.137**     |
| Robust S.E.                    | (0.09)      | (0.06)      |
| Within-country $R^2$           | 0.084       | 0.325       |
| Social democracy vote share    | 0.416***    | 0.148       |
| Robust S.E.                    | (0.10)      | (0.10)      |
| Within-country $R^2$           | 0.053       | 0.565       |
| Green/ecologist vote share     | -0.023***   | -0.051**    |
| Robust S.E.                    | (0.03)      | (0.02)      |
| Within-country $R^2$           | 0.059       | 0.594       |
| Liberal vote share             | -0.395***   | -0.141      |
| Robust S.E.                    | (0.13)      | (0.11)      |
| Within-country $R^2$           | 0.060       | 0.606       |
| Christian democracy vote share | 0.317**     | 0.217*      |
| Robust S.E.                    | (0.14)      | (0.12)      |
| Within-country $R^2$           | 0.063       | 0.274       |
| Conservative vote share        | -0.179*     | -0.027      |
| Robust S.E.                    | (0.09)      | (0.13)      |
| Within-country $R^2$           | 0.090       | 0.274       |
| Far-right vote share           | -0.155**    | -0.088*     |
| Robust S.E.                    | (0.07)      | (0.05)      |
| Within-country $R^2$           | 0.027       | 0.195       |
| <i>Observations</i>            | <i>2028</i> | <i>2028</i> |

**Notes:** This table shows the average effect of an increase in the real GDP per capita growth rate on the vote share of different party families in the most recent general election (results are similar when including election years only). Estimation method is least squares, where (1) with country fixed effects and (2) with country fixed effects and year fixed effects. Regressions include dummies for government ideology change and snap elections (coefficients not reported). Robust standard errors clustered by country in parentheses. The data cover 1870-2015. Global wars and non-democratic spells excluded. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

On the left of the spectrum, the vote shares of social democratic and communist parties seem to respond positively to an increase in growth. Similarly, on the right, conservative and rightwing extremist parties appear to lose support when the economy is growing. Thus, the key finding is that both on the left and on the right, the moderate and the more extreme forces respond in the same way to economic growth. Again, green/ecologist parties are an exception as they see small but highly significant losses in times of growth. Christian democratic parties are among the biggest beneficiaries. This interpretation is in line with the observed decline in their vote share during recessions, as indicated in Table 3.2.

Again, these results were checked for robustness by restricting the sample to election years only and by moving the explanatory variables one year forward or backward. They did not change notably. The estimates were also not altered when removing the indicator variables for snap elections and government ideology change. A potential problem with these results is the changing magnitude of the recession effect with regard to the inclusion of time effects for the social democratic and particularly liberal vote shares. In contrast to with the aggregate centrist vote shares, using the percentage deviation from trend instead of the levels as dependent variables strengthened the impression that time trends play a major role.<sup>15</sup> Moreover, including the vote shares of social democratic parties on the right-hand side of the regression model drastically reduced the recession effect for liberal parties, pointing to a strong negative correlation between liberal and social democratic voting, which in turn could bias results. More specifically, it is visible in the data that this pattern can be assumed to have been more pronounced before World War II than afterwards.<sup>16</sup> The next section sheds light on this matter as it explores the recession response of the different party families during three historical eras.

### 3.5 Economic voting: historical eras

This section contains three separate analyses of economic voting. It starts with the most recent period from the end of World War II until today (1946-2015). The second subsample is restricted to the interwar era (1919-1938). The section concludes with a detailed look at economic voting in the early years of the sample, i.e., in the pre-World War I period from 1870 to 1913.

As a start, Figure 3.4 shows the average distribution of the vote (in the most recent general election) across the party families in the full sample of countries for the years from 1885 to 2015.<sup>17</sup> The figure demonstrates how politics have changed over the past 130 years, and how these changes can be linked to economic developments. Importantly, prior to World War I, Social Democracy rose rapidly to the disadvantage of Liberalism as a reaction to the economic struggles of industrialization. In the interwar Great Depression, despite a short backlash of Liberalism, Communism and Fascism put pressure on all other ideologies. The period from the end of World War II to the 1970s was politically and economically stable. Since then, financial globalization has brought new forces. Ecologist but also rightwing populist parties made it to the mainstream. Finally, the 2008 global crisis has given rise to new Eurosceptic and populist parties from both right and left. These differences across history make it all the more important to examine individual periods separately.

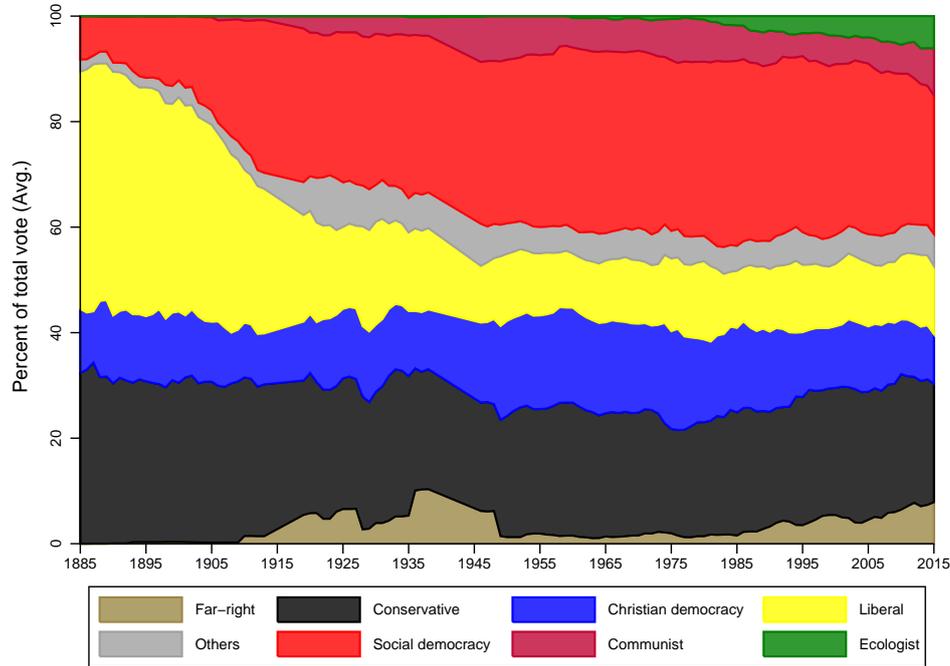
Appendix Table D1 is limited to the years 1946-2015 and shows estimates from regressions of the vote shares on the GDP per capita growth rate (Panel A) and on the recession indicator variable (Panel B). Again, the models in column (1) include country effects and in column (2) country and years effects respectively. The table demonstrates that right parties profited from growth and suffered from recessions

<sup>15</sup>Notice that, different from the remaining vote share variables, unit root tests in the spirit of Fisher (see Choi, 2001) and Im et al. (2003) could not rule out non-stationarity of the liberal vote share.

<sup>16</sup>The social democratic vote share and the liberal vote share show a correlation of -0.60 for the full sample, -0.75 for the pre-World War II sample and -0.25 for the post-World War II sample.

<sup>17</sup>The figure excludes the years 1870-1884 as the average values are not meaningful due to the small number of countries and elections in these early years of the sample.

Figure 3.4: Political ideology in 20 countries from 1885-2015



**Notes:** The figure shows the (20-country) average distribution of votes (in the most recent general election) across eight party families for the years from 1885 to 2015. The two global wars are excluded. The group of other parties (grey area) includes electorally unsuccessful parties (see text above), agrarian parties and special issue parties. The single-party elections in Germany in the late 1930s are included in the figure for illustrative purposes, but they are removed from the statistical analysis throughout this study.

in the postwar era. In general, the left was not able to capitalize on economic recessions. More precisely, the overall picture with regard to the right is due to both conservative and far-right parties. In contrast, on the left, communist/socialist parties seem to lose and green/ecologist parties to win in recessions, while there is no significant impact on social democratic parties. In the center, christian democratic parties make up a large portion of the overall effect. Interestingly, the estimates indicate that economic growth has systematically benefited special issue parties, for example parties that represent regional or ethnic interests, over the past decades. The coefficient is small (about on-fifth of a percentage point) but significant.

Appendix Table D2 presents results for the interwar period (1919-1938), while the regression models are similar to those of Appendix Table D1. The general pattern that economic prosperity is not beneficial for right parties is also present in the results on the interwar years. Specifically, the combined vote share of the parties on the political right responds negatively to growth and positively to the recession dummy. However, compared to the postwar era, most of the effect is driven by the classical conservative parties, and not by the far-right. For the political left, the

effect of growth seems differently for communist/socialist and social democratic parties (green parties did not exist before World War II). Communist parties seem to lose from growth, while social democratic parties somewhat profit. However, the coefficients are small and overall effect is negligible. This is also true for the regressions that use the recession dummy. In the center, both liberal and christian democratic factions seem to have lost support in downturns in the interwar, while the effect is stronger for liberal parties. The vote shares of both party families react negatively to economic growth. There is no notable effect visible in the data for the group of other parties.

Finally, the estimates in Appendix Table D3 are restricted to pre-World War II period (1870-1913). The data for the very early years of the sample confirm the evidence that right is voted in recession and left in good times, even though the picture is somewhat weaker. This is true particularly with regard to the impact of GDP growth, and here especially the right and the far-right, where, in contrast to post-World War I data, no significant effect can be observed. However, in line with the previous findings, the coefficients of the recession dummy are negative for the left vote share and positive for the political right. The difference in the estimates in specification (1) and (2) are the result of the strong time trend in the social democratic and liberal vote shares before World War I. The key message of the table is that the right was able to draw votes from the center and the left also in the recessions in the very early years of the sample.

What can explain these results? Why would the electorate favor right-wing parties over left politics in times of economic downturns? A first potential explanation could be that, in the spirit of the competency models of economic voting, the population has more confidence in right-wing parties to manage the economy, particularly in times of crises. However, this would also apply to liberal parties, for which the measured effects were substantially weaker. Secondly, it may be the case that left governments more often led countries into crises, and that they were simply replaced by conservative governments, as proposed in the retrospective voting models. The results are controlled for the impact changes in the ideology of the ruling party. Third, it could be that left politics are not as flexible as right politics and that left ideology is more deep-rooted. Particularly far-left voters may vote communist/socialist parties regardless of the state of the economy. That is, the share of left-wing parties is simply not as sensitive to GDP as the shares of center parties. On this note, in economic terms, it is possible that the middle class has a tendency to align with the better-off – and not with the poor – in episodes of instability (see Iversen and Soskice, 2006). Less altruistic voting behavior of pivotal voters during recessions may result in more support for conservative parties than for left-wing parties (as stressed by Durr, 1993; Stevenson, 2001; Margalit, 2013).

The most promising explanation is that voter's favor clear-cut traditionalist and nationalist ideas in times of economic uncertainty. The solutions of the political right may be perceived as simpler than the more progressive left-wing approaches. In this context, it is important to note that the evidence of this analysis points to a recession-induced increase in the vote share of extremist *and* moderate right-of-center parties. Thus it may be that established conservative parties adopt a nationalist or populist rhetoric during economic bad times in reaction to pressure from the far-right, as recently observed by Roubini (2016), which accelerates the effect. On the contrary, redistribution and other drastic changes to the economic system as proposed by left agendas may be perceived as complicated and deterrent when the economic situation gets worse.

### 3.6 Conclusion

This chapter studies economic voting with a historical perspective. The evidence from 20 countries and 140 years uncovered here suggests that voting behavior tends to be different in times of economic hardship compared to normal conditions. Specifically, parties on the right of the political spectrum appear to benefit from downturns. Their combined vote share is significantly above the normal level when a country enters a recession. In contrast, the estimates indicate that political left is not able to capitalize when a country faces economic difficulties, but when the economy is growing.

Importantly, the above effects apply to both moderate and extremist parties. More precisely, both conservative and far-right parties typically contribute to the success of the right in the course of economic struggle. Likewise, the decline of the left in the course of recessions is due to less support for social democratic as well as far-left parties. In addition, the study somewhat indicates that votes likely move directly from the left to the right in times of crisis, as the results for the center parties (liberal and christian democratic parties) were less pronounced.

Generally, these patterns are surprisingly persistent across space and over time. First, the main estimates are robust to including country and year effects. Second, the key relationships are visible not only in the full sample, but also in subsamples restricted to the postwar period, the interwar period and to before World War I, respectively. Third, it can be ruled out that the effects are influenced by early elections or the natural punishment of incumbents during recessions due to the statistical design of the study.

Thus, the analysis of long-run historical data lends support to commentaries and empirical research pointing to a systematic link from economic crisis, for example the most recent global crisis or the 1930s Great Depression, to the success of the political right and far-right, at the expense of social democratic and communist factions. Thus the most important implication of this result is that Europe is in real danger of moving further right as long as the most recent crisis is not over. Since, history has taught us that a prolonged crisis situation increases the likelihood of turning away from democracy, policymakers should be aware of the new evidence presented here that economic growth is a key factor in this regard.

## Appendix A. Political and economic variables

Table A1: Political parties and their party family per country, 1870-2015

|                      |  |
|----------------------|--|
| AUS<br>1901-<br>2013 | Protectionist Party (con), Free Trade Party (lib), Labor Party (soc), Revenue Tariff Party (lib), Independent Protectionist (con), Western Australia Party (lib), Liberal Party (con), Nationalist Party (right), National Country Party (con), Independent Nationalist (con), Liberal Party [SA, Vic] (lib), Country Progressives Party (con), United Australia Party (con), State Lang Labor (soc), Emergency Committee (lib), Communist Party (com), Social Credit Party (spec), Liberal and Country League (soc), Independent United Australia (con), Non-Communist Labor (soc), State Labor Party (com), Country-National Party (con), Liberal Country Party [Vic] (agr), One Parliament for Australia (spec), Services Party (spec), Lang Labor Party (soc), Democratic Labor Party (soc), Australia Party (lib), Country Liberal Party (lib), Australian Democrats (soc), Australian Greens (eco), One Nation (right), Family First (con), Liberal National Party (lib), Palmer United Party (lib), Katter's Australian Party (soc)   |
| AUT<br>1919-<br>2013 | Social Democratic Party (soc), Austrian People's Party (chr), Greater German People's Party (con), Czechs (spec), Land League (agr), Carinthian Unity List (spec), Communist Party (com), Unity List (chr), National Socialists (right), Economy Bloc (con), Fatherland Front (right), Freedom Party (right), Democratic Progressive Party (spec), United Greens (eco), Alternative List (eco), The Greens (eco), Liberal Forum (lib), Citizen's Initiative (spec), The Independents (spec), Dr. Martin's List (spec), Alliance for the Future of Austria (right), Citizen's Forum (soc), Team Frank Stronach (lib), New Austria and Liberal Forum (lib)   |
| BEL<br>1870-<br>2014 | Flemish Liberals (lib), Catholic Party (chr), Socialist Party (soc), Liberal-Socialist Cartels (soc), Daensists (chr), Flemish Nationalists (right), Dissident Catholics List (chr), Ex-Servicemen (spec), Middle Class Party (con), Communist Party (com), Rexists (right), Belgian Democratic Union (chr), Independent Socialists (com), Francophone Democrats (lib), Walloon Front (soc), Walloon Labor Party (soc), Flemish Christian Democrats (chr), Humanist Democratic Centre (chr), Walloon Rally (soc), Liberal Reformist Party (lib), Brussels Liberal Party (lib), Workers' Party of Belgium (com), Confederated Ecologists (eco), Green! (eco), Francophone Socialist Party (soc), Socialist Party Different (soc), Flemish Block/Interest (right), Respect for Labor (right), National Front (right), Radical Reformers (lib), Liberal Reformist and Francophone Democrats (lib), Alive (lib), Reformist Movement (lib), New Flemish Alliance (con), Flemish Christian Democrats and New Flemish Alliance (chr), List Dedecker (lib), People's Party (con)   |
| CAN<br>1872-<br>2015 | Progressive Conservatives (con), Liberal Party of Canada (lib), Patrones of the Industry (con), McCarthytites (spec), Labor Party (soc), National Progressive Party (agr), Communist Party (com), New Democratic Party (soc), Reconstruction Party (con), Social Credit Party (spec), Bloc Populaire Canadien (spec), Liberal-Progressive Party (lib), Liberal-Labor (lib), Social Credit Rally (spec), Rhinoceros Party (spec), Reform Party (con), Quebec Bloc (soc), National Party (soc), Canadian Alliance (con), Conservative Party (con)  |
| CHE<br>1872-<br>2015 | Radical Democrats (lib), Catholic Conservatives (chr), Liberal Conservatives (lib), Democrats (soc), Evangelical Right (con), Social Democrats (soc), Farmers Traders Citizens (agr), Gruetli Union (soc), Protestant People's Party (chr), Communist Party (com), Free Market Party (lib), Front Party (right), Independents Party (soc), Young Peasants Party (agr), Republican Movement (right), National Action (right), Autonomous Socialist Party (com), Christian Social Party (chr), Progressive Organizations (com), Greens (eco), Federal Democratic Union (con), Alternative Greens (eco), Free List (lib) Swiss Motorist Party (right), Ticino League (right), Solidarity (com), Green Liberal Party (eco), Geneva Citizens' Movement (right), Conservative Democratic Party (con), Alternative Left (com)   |
| DEU<br>1871-<br>2013 | National Liberals (lib), Centre Party (chr), German Conservatives (con), Free Conservative Party (con), Progressive Party (lib), Liberal Reich Party (lib), Poles (spec), Social Democratic Party (soc), Hanoverian Party (con), Danes (spec), German People's Party [old] (lib), Alsatians (spec), National Liberals and Liberal Union (lib), Liberal Union (lib), Freethinking Party (lib), Anti-Semites (right), Freethinking People's Party (lib), Bavarian Farmers' League (lib), Farmers/Land League (agr), German State Party (lib), National People's Party (right), Independent Social Democrats (com), Bavarian People's Party (con), Communist Party (com), Nazi Party (right), Middle Class Party (con), German Social Party (soc), Farmers' Party (agr), People's Rights Party (spec), Christian People's Service (chr), Conservative People's Party (con), Christian Democratic Union (chr), Free Democratic Party (lib), Christian Social Union (chr), German Party (con), Bavarian Party (con), Economic Reconstruction League (right), German Reich Party (right), All-German Bloc (right), German Peace Union (com), National Democratic Party (right), Party for Democratic Socialism/The Left (com), The Republicans (right), Greens/Alliance 90 (eco), German People's Union (right), Pirate Party (spec), Free Voters (con), Alternative for Germany (right) |
| DNK<br>1884-<br>2015 | Liberal Party (lib), Conservative People's Party (con), Moderate Liberals/left (lib), Social-Liberal Party (lib), Industry Party (lib), Communist Party (com), Schleswig Party (spec), Justice Party (lib), National Socialists (right), Farmers' Party (agr), National Cooperation (con), Danish Union (right), Liberals of the Capital (lib), Independents Party (lib), Socialist People's Party (eco), Liberal Centre (lib), Left Socialists (com), Christian Democrats (chr), Progress Party and Independents Party (lib), Centre Democrats and Schleswig Party (con), Progress Party (lib), Centre Democrats (con), Common Course (com), Greens (eco), Red-Green Alliance (com), Danish People's Party (right), Liberal Alliance (lib), The Alternative (eco)   |
| ESP<br>1977-<br>2015 | Socialist Worker's Party (soc), Communist Party (com), People's Alliance (con), Convergence and Union (con), Basque Nationalists (chr), People's Socialist Party (com), Catalanian Christian Democrats (chr), Basque Left (com), Aragonese Regionalists (spec), Union of the Democratic Centre (lib), Coalition of Christians (chr), Andalusian Party (soc), United People (spec), National Union (right), Party of Labor (com), Democratic and Social Centre (chr), Canary Island Group (spec), Ruiz Mateos List (spec), Galician Nationalists (spec), Worker's Party of Spain (com), Initiative Catalonia Greens (eco), Yes to the Future (con), Union Progress Democracy (spec), Amaiur (spec), United Extremadura (spec), Socialist Party of Catalonia (soc), Citizens (soc), [In common] We can (com), It is Time (com), In Tide (com), Democratic Convergence Catalonia (con), Basque Country Unite (spec)   |
| FIN<br>1907-<br>2015 | Social Democratic Party (soc), Finnish Party/Old Finns (con), Young Finnish Party (lib), Swedish People's Party (lib), Centre Party (agr), Christian Labor Union (soc), National Coalition (con), Liberal People's Party (lib), Socialists/Communists (com), Swedish Left (com), Rural Party (agr), National Coalition and Popular Movement (con), Popular Movement (right), People's Democratic Union (com), Aland Coalition (spec), Liberal League (lib), Social Democratic League (soc), Finnish Christian Union (chr), People's Unity Party (con), Constitutional People's Party (con), Green League (eco), Democratic Alternative (com), Pensioners' Party (spec), Left Alliance (com), Ecological Party (eco), League for Free Finland (spec), Young Finns (lib), True Finns (right), Communist Party (com)  |
| FRA<br>1876-<br>2012 | Conservatives (con), Republicans (lib), Boulangists (con), Left Republicans (lib), Independent Radicals (con), Socialist Party (soc), Liberal Popular Action (con), Radical Socialist Party (con), Socialist Republicans (com), Republican Union (right), Radical Socialist Party and Socialist Republicans (con), Left Republicans and Independent Radicals (lib), French Communist Party (com), Popular Democratic Party (chr), Proletarian Unity (com), Left Republicans and Independent Radicals and Popular Republican Movement (lib), Popular Republican Movement (chr), Gaullists (con), Poujadists (con), Other far-right (right), Union of Democratic Forces (soc), Independent Republicans (con), Unified Socialist Party (com), Centre for Democracy and Progress (chr), Movement of Left Radicals (soc), Workers' Struggle (com), Union for French Democracy (con), Greens (eco), National Front (right), Other ecologist (eco), Other right (con), Other left (soc), Movement for France (con), Union for a Popular Movement (con), Democratic Movement (lib), New Centre (lib), Other far-left (com), Radical Party (con), Centrist Alliance (lib)   |

|                      |   |
|----------------------|---|
| GBR<br>1874-<br>2015 | Conservatives (con), Liberals (lib), Home Rule (spec), Independent Labour (com), Labour (soc), United Ireland (com), Llyod George Liberals (lib), National Democratic and Labour Party (right), Communist Party (com), Scottish National Party (soc), National Labour (soc), National Liberal (lib), Social Democratic Party (soc), National Front (right), Social Democratic and Labour Party (soc), Ulster Unionists Northern Ireland (con), Sinn Fein (com), Green Party (eco), Democratic Unionist Party (con), Ulster Popular Unionist Party (con), British National Party (right), Referendum Party (spec), UK Independence Party (right), Respect (com)  |
| GRC<br>1974-<br>2015 | New Democracy (chr), Centre Union (lib), Panhellenic Socialist Movement (soc), Communist Party (com), National Democratic Union (right), National Alignment (con), Party of New Liberals (lib), Communist Party Interior (com), Progressive Party (con), Democratic Renewal (con), Coalition of the Left (com), Alternative Ecologists (eco), Political Spring (con), Democratic Social Movement (soc), Union of Centrists (soc), Coalition of the Radical Left (com), Popular Orthodox Rally (right), Ecologist Greens (eco), Front of Greek Anticapitalist Left (com), Golden Dawn (right), Independent Greeks (right), Democratic Left (soc), Democratic Alliance (lib), Recreate Greece (con), Action (lib), Recreate Greece and Action (con), The River (soc), Movement of Democratic Socialists (soc), Dot (soc), Popular Unity (com)   |
| IRL<br>1922-<br>2011 | Sinn Fein [old] (com), Family of the Irish (chr), Warriors of Destiny (con), Labour Party (soc), Farmers' Union (agr), National League (con), Business Group (lib), Worker League (com), National Centre Party (con), Party of the Land (agr), Republican Party (con), Ourselves Alone (com), Communist Party (com), National Progressive Democrats (com), Worker's Party (com), Anti H-Block (spec), Socialist Labour Party (com), Progressive Democrats (lib), Democratic Socialist Party (soc), Green Party (eco), Democratic Left (com), National Party (con), Socialist Party (com), People Before Profit (com), Workers and Unemployed (com)  |
| ITA<br>1946-<br>2013 | Communist Party (com), Socialist Party (soc), Communist and Socialist Party (com), Social Democrats (soc), Republican Party (lib), Sardinian Action Party (soc), Action Party (com), Christian Democrats (chr), Common Man Front (con), Liberal Party (lib), Monarchist Party (right), Social Movement (right), Popular Monarchist Party (right), United Socialist Party (soc), Socialist Party of Proletarian Unity (com), Radical Party (soc), Proletarian Democracy (com), Trieste List (soc), Pensioners' Party (spec), Greens (eco), Democrats of the Left (soc), North League (right), Communist Refoundation (com), Movement for Democracy (chr), Freedom Pole/House (con), Alliance of Progressives/Olive Tree (soc), Southern Action League (right), Pact for Italy (chr), Fanella/Bonino List (soc), European Democracy (chr), Italy of Values (lib), Go Italy (con), National Alliance (con), Italian Radicals (soc), Party of Italian Communists (com), UDEUR Populists (chr), The Union Prodi (soc), Union of Christians and the Centre (chr), Autonomy Liberty Democracy (lib), Christian Democracy for the Autonomies (chr), Movement for Autonomy (chr), Democratic Party (soc), Tricolor Flame (right), Left Ecology Freedom (com), Brothers of Italy (con), Five Star Movement (eco), Civic Choice (lib), Civil Revolution (com), Stop the Decline (lib), Democratic Centre (lib) |
| JPN<br>1908-<br>2014 | Rikken Seiyukai (con), Kensei Honto (soc), Daido Club (lib), Yuko Kai (soc), Chuo Club (soc), Rikken Doshikai/Kenseikai (con), Chuseikai (con), Okuma Supporters (con), Reform Party (lib), Rikken Minseitō (lib), Jitsugo Doshikai/Kokumin Doshikai (lib), Labour Farmer Party (com), Socialist People's Party (com), Japan Masses Party (com), Socialist Masses Party (com), Kokumin Domei (right), Showakai (con), Communist Party (com), Japan Liberal Party (com), Progressive/Democratic Party (con), Japan/People's Cooperative Party (lib), Socialist Party (soc), Social Reform Party (com), Left-Wing Socialist (com), Right-Wing Socialist (soc), Hatoyama Liberals (con), Liberal Democratic Party (con), Democratic Socialist Party (soc), Komeito (con), New Liberal Club (con), Social Democratic Foundation (soc), Progressive Party (con), Japan Renewal Party (con), Japan New Party (lib), New Party Sakigake (con), New Frontier Party (con), Democratic Party (con), Democratic Reform Party (soc), New Komeito (con), Liberal Party (con), New Conservative Party (con), Independents Club (lib), Liberal League (lib), People's New Party (con), New Party Nippon (lib), New Party Daichi (lib), Your Party (lib), Restoration Party (con), People's Life First Party (con), Innovation Party (con), Party for Future Generations (right)                                    |
| NLD<br>1888-<br>2012 | Anti Revolutionary Party (chr), Catholics (chr), Liberal Union (lib), Free Liberal League (lib), Radicals (lib), Social Democratic League/Free Socialists (com), Christian Historicals (chr), Social Democratic Workers (soc), Christian Democrats (chr), Communist Party (com), Economic League (lib), Farmers' League/Party (agr), Middle Class Party (lib), Political Reformed Party (con), Socialist Party (com), Liberal States Party (lib), New Reformed State Party (chr), Roman Catholic People's Party (chr), Middle Party for City and Country (lib), Revolutionary Socialist Party (com), League for National Renewal (con), National Socialists (right), Labor Party (soc), Liberal Party (lib), Catholic National Party (chr), Reformed Political Union (con), Pacifist Socialist Party (com), Christian Democratic Appeal (chr), Democrats 66 (lib), Democratic Socialists 70 (con), Middle Class Party (con), Radical Political Party (eco), Roman Catholic Party (chr), Reformed Political Federation (chr), Centre Party/Democrats (right), Evangelical People's Party (chr), GreenLeft (eco), Socialist Party (com), General Senior Union (spec), Fortuyn List (right), Christian Union (chr), Livable Netherlands (right), Party for Freedom (right), Party for Animals (spec), Proud of the Netherlands (right), 50PLUS (lib)   |
| NOR<br>1882-<br>2013 | Liberals (lib), Conservatives (con), Moderates (lib), Labor Party (soc), Worker Democrats (com), Teetotaler Party (spec), Farmers'/Centre Party (agr), Social Democratic Worker's Party (soc), Communist Party (com), Liberal Left (lib), Christian People's Party (chr), Commonwealth Party (chr), National Socialists (right), Socialist People's/Left Party (com), Anders Lange/Progress Party (right), New [Liberal] People's Party (lib), Green Party (eco), Red Electoral Alliance (com), Pensioners' Party (spec), Coastal Party (con)   |
| PRT<br>1975-<br>2015 | Centre Social Democrats (chr), Popular/Social Democrats (lib), Popular Monarchist Party (con), Democratic Movement (soc), Communist Party (com), Socialist Party (soc), Movement of the Socialist Left (com), Popular Democratic Union (com), Popular Socialist Front (com), Christian Democratic Union (chr), Revolutionary Socialist Party (com), Socialist Unity Party (com), Democratic Alliance (lib), Republican and Socialist Front (soc), Democratic Renewal Party (soc), National Solidarity (spec), Bloc of the Left (com), Party for the Animals (eco), Republican Democratic Party (con)  |
| SWE<br>1887-<br>2014 | Protectionists (con), Free Traders (lib), Liberals (lib), Moderate Free Traders (lib), Social Democrats (soc), Conservatives (con), Agrarian/Centre Party (agr), Farmers' Union (agr), Left Socialists (com), Communist Party (com), Swedish Liberal Party (lib), Socialist Left Party (com), Kilbom Communists/Socialist Party (com), National Socialists (right), National League (right), Christian Democratic Union (chr), Citizen's Coalition (con), Ecology Party (eco), New Democracy (right), Senior Citizen Interest (spec), Feminist Initiative (spec), Sweden Democrats (right)  |
| USA<br>1870-<br>2014 | Republicans (con), Democrats (soc), Greenback Labor Party (soc), Populists (agr), Prohibition Party (spec), Socialist Party (com), Progressive Party (soc), Farmer-Labor Party (soc), Wisconsin Progressive Party (soc), American Labor Party (soc), Libertarians (lib)   |

**Notes:** The first column indicates the country (WB 3-letter query) and the elections covered. The second column lists the parties/alliances per country from old to new. The brackets contain the party family, where *agr* = agrarian, *chr* = christian democratic, *com* = communist/socialist, *con* = conservative, *eco* = green/ecologist, *lib* = liberal, *right* = far-right, *soc* = social democratic and *spec* = special issue. Independents and parties that never gained a parliamentary seat or one percent of the vote not listed (coded "other parties"). Party names can differ from official notations, particularly when parties changed their name over time. Coding based on Döring and Manow (2015) and their sources, except for the following parties (source/coding argument behind):

AUS - Revenue Tariff Party, lib: Carr (1999); Independent Protectionist Party, con: ; Independent Nationalist Party, con: coding follows that of Protectionist Party; Liberal Party [SA, Vic], lib: follows Liberal Party; State Lang Labor Party, soc: follows Lang Labor Party; Independent United Australia Party, con: follows United Australia Party; One Parliament for Australia, spec: Le Maistre (1993); Services Party, spec: represented interests of World War I veterans. AUT - Greater German People's Party, con: Jelavich (1987); Czechs, spec: representatives of the Czech-speaking minority; Land League, agr: Haas (2000); Carinthian Unity List, spec: electoral front representing Carinthia; National Socialists, right: de Bromhead, Eichengreen and O'Rourke (2012); Fatherland Front, right: de Bromhead, Eichengreen and O'Rourke (2012). BEL - Daensists, chr: Witte et al. (1997); Ex-Servicemen, spec: Mühlberger (1987); Middle Class Party, con: follows Radical Socialist Party (France); Belgian Democratic Union, chr: Williame (1976); Independent Socialists, com: ; Wallon Front, soc: forerunner of Walloon Rally; Walloon Labor Party, soc: forerunner of Walloon Rally. CAN - Patrones of the Industry, con: Hann (1973); McCarthyites, spec: Miller (1977). CHE - Evangelical Right, con: Stadler (1984); Front Party, right: Payne (2001); Young Peasants Party, agr: Moser (1994); Alternative Left, com: following the manifesto on the official webpage of the party. DEU - National Liberals, lib: Mork (1971); German Conservatives, con: Bergdahl (1972); Free Conservative Party, con: Alexander (2000); Progressive Party, lib: Koch (1981); Liberal Reich Party, lib: Koch (1967); Poles, spec: representatives of the Polish minority; Danes, spec: representatives of the Danish minority. Hanoverian Party, con: McHale (1983); German People's Party (old), lib: forerunner of National Liberals; Alsations, spec: representatives of the Alsatian minority; Freethinking Party, lib: Rubinstein (1935); Anti-Semites, right: Telman (1995); Freethinking People's Party, lib: split from Freethinking Party; Freethinking Union, lib: split from Freethinking Party; Bavarian Farmer's League, lib: Braun (2016); Farmer's/Land League, agr: Ullmann (1988); German State Party, lib: Mommsen (1996); National People's Party, right: de Bromhead, Eichengreen and O'Rourke (2012); Independent Social Democrats, com: Weitz (1997); Bavarian People's Party, con: Stibbe (2010); Nazi Party, right: de Bromhead, Eichengreen and O'Rourke (2012); Middle Class Party, con: Payne (1983); People's Rights Party, spec: Fritsch (1984); Christian People's Service, chr: Opitz (1969). DNK - none. ESP - none. FIN - Young Finnish Party, lib: Vares (2000). Popular Movement, right: de Bromhead, Eichengreen and O'Rourke (2012); True Finns, right: Hartleb (2011). FRA - Republicans, lib: Leroux and Hart (2012); Boulangists, con: Garrigues (1992). GBR - Home Rule Party, spec: Jackson (2004); Llyod George Liberals, lib: Cook (1993); Ulster Unionists Northern Ireland, con: follows Ulster Unionist party; Ulster Popular Unionists Party, con: follows Ulster Unionist Party. GRC - none. IRL - Sinn Fein (old), com: follows Worker's Party; Communist Party, com: Milotte (1984). ITA - none. JPN - Rikken Seiyukai, con: Takenaka (2014); Kensei Honto, soc: Fukui (1985); Daido Club, li: Fukui (1985); Yuko Kai, soc: Fukui (1985); Chuo Club, soc: Fukui (1985); Rikken Doshikai/Kenseikai, con: Sims (1990); Chuseikai, con: Fukui (1985); Okuma Supporters, con: Beasley (1963); Seiyuhonto, con: Fukui (1985); Reform Party, lib: Fukui (1985); Rikken Minseito, lib: Sims (1990); Jitsugo Doshikai/Kokumin Doshikai, lib: Fukui (1985); Socialist People's Party, com: Large (1998); Japan Masses Party, com: Fukui (19985); Socialist Masses Party, com: Fukui (1985); Kokumin Domei, right: Sims (1990); Showakai, con: Fukui (1985); Progressive Party, con: Sims (2001). NLD - Social Democratic League/Free Socialists, com: Bos (2001); Middle Class Party, lib: Vossen (2003); Middle Party for City and Country, lib: Vossen (2003); Roman Catholic Party, chr: split from Catholic People's Party; Evangelical People's Party, chr: Moldenhauer (2001); Party for Freedom, right: Teun (2014); Proud of the Netherlands, right: Geldmacher und Rauch (2008). NOR - none. PRT - none. SWE - Protectionists, con: ; Free Traders, lib: ; Moderate Free Traders, lib: ; National Socialists, right: ; National League, right: . USA - Republicans, con: Volkens et al. (2016); Democrats, soc: Volkens et al. (2016), notice that the results were robust to coding the Democrats as liberal; Greenback Labor Party, soc: Ritter (1997); Populists, agr: Zinn (2005); Prohibition Party, spec: Blocker, Fahey and Tyrrell (2003); Socialist Party, com: Ross (2015); Progressive Party, soc: Milkis (2009); Farmer-Labor Party, soc: Gieske (1979); Wisconsin Progressive Party, soc: Beck (1982); American Labor Party, soc: Kenneth (1980); Libertarians, lib: Boaz and Kirby (2006). Please note that the full names of the country-specific sources are not included in the reference list due to space limitations, but are available upon request.

Table A2: Election years per country, 1870-2015

|     |  |
|-----|--|
| AUS | 1901, 1903, 1906, 1910, 1913, 1914, 1917, 1919, 1922, 1925, 1928, 1929, 1931, 1934, 1937, 1940, 1943, 1946, 1949, 1951, 1954, 1955, 1958, 1961, 1963, 1966, 1969, 1972, 1974, 1975, 1977, 1980, 1983, 1984, 1987, 1990, 1993, 1996, 1998, 2001, 2004, 2007, 2010, 2013   |
| AUT | 1919, 1920, 1923, 1927, 1930, 1945, 1949, 1953, 1956, 1959, 1962, 1966, 1970, 1971, 1975, 1979, 1983, 1986, 1990, 1994, 1995, 1999, 2002, 2006, 2008, 2013   |
| BEL | 1870 (Jun), 1870 (Aug), 1872, 1874, 1876, 1878, 1880, 1882, 1884, 1886, 1888, 1890, 1892, 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1908, 1910, 1912, 1914, 1919, 1921, 1925, 1929, 1932, 1936, 1939, 1946, 1949, 1950, 1954, 1958, 1961, 1965, 1968, 1971, 1974, 1977, 1978, 1981, 1985, 1987, 1991, 1995, 1999, 2003, 2007, 2010, 2014   |
| CAN | 1872, 1874, 1878, 1882, 1887, 1891, 1896, 1900, 1904, 1908, 1911, 1917, 1921, 1925, 1926, 1930, 1935, 1940, 1945, 1949, 1953, 1957, 1958, 1962, 1963, 1965, 1968, 1972, 1974, 1979, 1980, 1984, 1988, 1993, 1997, 2000, 2004, 2006, 2008, 2011, 2015   |
| CHE | 1872, 1875, 1878, 1881, 1884, 1887, 1890, 1893, 1896, 1899, 1902, 1905, 1908, 1911, 1914, 1917, 1919, 1922, 1925, 1928, 1931, 1935, 1939, 1943, 1947, 1951, 1955, 1959, 1963, 1967, 1971, 1975, 1979, 1983, 1987, 1991, 1995, 1999, 2003, 2007, 2011, 2015   |
| DEU | 1871, 1874, 1877, 1878, 1881, 1884, 1887, 1890, 1893, 1898, 1903, 1907, 1912, 1919, 1920, 1924 (May), 1924 (Dec), 1928, 1930, 1932 (Jul), 1932 (Nov), 1933 (Mar), 1933 (Nov), 1936, 1938, 1949, 1953, 1957, 1961, 1965, 1969, 1972, 1976, 1980, 1983, 1987, 1990, 1994, 1998, 2002, 2005, 2009, 2013   |
| DNK | 1884, 1887, 1890, 1892, 1895, 1898, 1901, 1903, 1906, 1909, 1910, 1913, 1915, 1918, 1920 (Apr), 1920 (Jul), 1920 (Sep), 1924, 1926, 1929, 1932, 1935, 1939, 1943, 1945, 1947, 1950, 1953 (Apr), 1953 (Sep), 1957, 1960, 1964, 1966, 1968, 1971, 1973, 1975, 1977, 1979, 1981, 1984, 1987, 1988, 1990, 1994, 1998, 2001, 2005, 2007, 2011, 2015   |
| ESP | 1977, 1979, 1982, 1986, 1989, 1993, 1996, 2000, 2004, 2008, 2011, 2015,  |
| FIN | 1907, 1908, 1909, 1910, 1911, 1913, 1916, 1917, 1919, 1922, 1924, 1927, 1929, 1930, 1933, 1936, 1939, 1945, 1948, 1951, 1954, 1958, 1962, 1966, 1970, 1972, 1975, 1979, 1983, 1987, 1991, 1995, 1999, 2003, 2007, 2011, 2015   |
| FRA | 1876, 1877, 1881, 1885, 1889, 1893, 1898, 1902, 1906, 1910, 1914, 1919, 1924, 1928, 1932, 1936, 1945, 1946 (Jun), 1946 (Nov), 1951, 1956, 1958, 1962, 1967, 1968, 1973, 1978, 1981, 1986, 1988, 1993, 1997, 2002, 2007, 2012   |
| GBR | 1874, 1880, 1885, 1886, 1892, 1895, 1900, 1906, 1910 (Jan), 1910 (Dec), 1918, 1922, 1923, 1924, 1929, 1931, 1935, 1945, 1950, 1951, 1955, 1959, 1964, 1966, 1970, 1974 (Feb), 1974 (Oct), 1979, 1983, 1987, 1992, 1997, 2001, 2005, 2010, 2015   |
| GRC | 1974, 1977, 1981, 1985, 1989 (Jun), 1989 (Nov), 1990, 1993, 1996, 2000, 2004, 2007, 2009, 2012 (May), 2012 (Jun), 2015 (Jan), 2015 (Sep)   |
| IRL | 1922, 1923, 1927 (Jun), 1927 (Sep), 1932, 1933, 1937, 1938, 1943, 1944, 1948, 1951, 1954, 1957, 1961, 1965, 1969, 1973, 1977, 1981, 1982 (Feb), 1982 (Nov), 1987, 1989, 1992, 1997, 2002, 2007, 2011,  |
| ITA | 1946, 1948, 1953, 1958, 1963, 1968, 1972, 1976, 1979, 1983, 1987, 1992, 1994, 1996, 2001, 2006, 2008, 2013   |
| JPN | 1908, 1912, 1915, 1917, 1920, 1924, 1928, 1930, 1932, 1936, 1937, 1942, 1946, 1947, 1949, 1952, 1953, 1955, 1958, 1960, 1963, 1967, 1969, 1972, 1976, 1979, 1980, 1983, 1986, 1990, 1993, 1996, 2000, 2003, 2005, 2009, 2012, 2014   |
| NLD | 1888, 1891, 1894, 1897, 1901, 1905, 1909, 1913, 1917, 1918, 1922, 1925, 1929, 1933, 1937, 1946, 1948, 1952, 1956, 1959, 1963, 1967, 1971, 1972, 1977, 1981, 1982, 1986, 1989, 1994, 1998, 2002, 2003, 2006, 2010, 2012   |
| NOR | 1882, 1885, 1888, 1891, 1894, 1897, 1900, 1903, 1906, 1909, 1912, 1915, 1918, 1921, 1924, 1927, 1930, 1933, 1936, 1945, 1949, 1953, 1957, 1961, 1965, 1969, 1973, 1977, 1981, 1985, 1989, 1993, 1997, 2001, 2005, 2009, 2013   |
| PRT | 1975, 1976, 1979, 1980, 1983, 1985, 1987, 1991, 1995, 1999, 2002, 2005, 2009, 2011, 2015   |
| SWE | 1887 (Mar), 1887 (Aug), 1890, 1893, 1896, 1899, 1902, 1905, 1908, 1911, 1914 (Mar), 1914 (Sep), 1917, 1920, 1921, 1924, 1928, 1932, 1936, 1940, 1944, 1948, 1952, 1956, 1958, 1960, 1964, 1968, 1970, 1973, 1976, 1979, 1982, 1985, 1988, 1991, 1994, 1998, 2002, 2006, 2010, 2014   |
| USA | 1870, 1872, 1874, 1876, 1878, 1880, 1882, 1884, 1886, 1888, 1890, 1892, 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1908, 1910, 1912, 1914, 1916, 1918, 1920, 1922, 1924, 1926, 1928, 1930, 1932, 1934, 1936, 1938, 1940, 1942, 1944, 1946, 1948, 1950, 1952, 1954, 1956, 1958, 1960, 1962, 1964, 1966, 1968, 1970, 1972, 1974, 1976, 1978, 1980, 1982, 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014 |

**Notes:** Listed are all elections for which the combined vote shares of the nine party families could be calculated. The list is limited to general elections (to the national parliament). Presidential and regional elections are excluded. The lower chamber results were considered in cases of bicameral legislatures. The main sources for the election results (vote shares) are Mackie and Rose (1991), Nohlen and Stöver (2010) and Döring and Manow (2015) and official country-specific statistics.

Table A3: Recession years per country, 1870-2015

|     |  |
|-----|--|
| AUS | 1901-1902, 1905, 1911-1912, 1914-1918, 1927-1931, 1939, 1944-1946, 1952, 1957, 1962, 1974, 1977, 1982, 1990-1991, 2009   |
| AUT | 1923, 1930-1933, 1940, 1944-1945, 1975, 1978, 1981, 1984, 1993, 2009, 2013-2014  |
| BEL | 1871, 1873, 1875, 1884, 1888, 1891, 1901, 1914-1915, 1917-1918, 1927, 1931-1934, 1938-1941, 1943, 1952, 1958, 1975, 1981, 1993, 2009, 2012-2013  |
| CAN | 1872, 1875-1876, 1878, 1883, 1885, 1889, 1892-1893, 1895-1896, 1904, 1908, 1914, 1918-1921, 1929-1933, 1945-1946, 1948-1949, 1954, 1957-1958, 1982, 1990-1992, 2008-2009   |
| CHE | 1872, 1876-1879, 1881-1883, 1887, 1891, 1894, 1900-1901, 1903, 1907-1908, 1913-1914, 1917-1918, 1921, 1930-1932, 1934-1936, 1940-1942, 1948-1949, 1952, 1958, 1975, 1982, 1991-1993, 1995, 2002-2003, 2009, 2015 |
| DEU | 1876-1877, 1880, 1891, 1899-1901, 1906, 1909, 1914-1919, 1923, 1929-1932, 1944-1946, 1967, 1975, 1981-1982, 1993, 2002-2003, 2009, 2013  |
| DNK | 1884-1885, 1888, 1912, 1915, 1917-1918, 1921, 1924-1925, 1932, 1940-1941, 1945, 1951, 1963, 1974-1975, 1980-1981, 1988-1989, 1993, 2008-2009, 2012-2013  |
| ESP | 1979, 1981, 1993, 2008-2010, 2012-2013   |
| FIN | 1908, 1914-1915, 1917-1918, 1930-1932, 1939-1940, 1942, 1944-1945, 1953, 1958, 1976, 1990-1993, 2009, 2012-2014  |
| FRA | 1876-1879, 1883-1886, 1893, 1895, 1897, 1901-1902, 1906, 1908, 1910, 1913-1915, 1917-1918, 1921, 1927, 1930-1932, 1934-1935, 1938, 1940-1941, 1943-1944, 1975, 1993, 2008-2009, 2013-2014                        |
| GBR | 1874, 1876, 1878-1879, 1884-1885, 1890-1893, 1897, 1900, 1903, 1908, 1919-1921, 1926, 1930-1931, 1939, 1944-1947, 1952, 1958, 1974-1975, 1980-1981, 1991-1992, 2008-2009, 2011                                   |
| GRC | 1974, 1980-1983, 1987, 1990, 1992-1993, 2009-2013  |
| IRL | 1923-1924, 1926, 1932-1933, 1937, 1939, 1940, 1942-1943, 1945, 1956, 1958, 1976, 1983, 1986, 2008-2010, 2012-2013  |
| ITA | 1975, 1993, 2003, 2005, 2008-2009, 2011-2014   |
| JPN | 1908-1909, 1914, 1920, 1922-1923, 1926-1927, 1930-1931, 1934, 1941-1946, 1974, 1998-1999, 2002, 2008-2009, 2011  |
| NLD | 1890-1891, 1893, 1895, 1900, 1903-1904, 1907, 1914-1918, 1930-1934, 1938, 1940-1944, 1958, 1975, 1981-1982, 2002-2003, 2009, 2012-2013   |
| NOR | 1882-1883, 1886, 1894-1895, 1898, 1903-1904, 1917-1918, 1921, 1924, 1931, 1940, 1942-1944, 1958, 1982, 1988, 2008-2010, 2013   |
| PRT | 1975, 1983-1984, 1993, 2003, 2005, 2008-2009, 2011-2013  |
| SWE | 1887, 1889, 1891, 1900, 1902, 1905, 1908-1909, 1914, 1917-1918, 1921, 1925, 1931-1932, 1940-1941, 1977, 1981, 1991-1993, 2008-2009, 2012   |
| USA | 1874, 1876, 1883-1885, 1888, 1890, 1893-1894, 1896, 1902, 1907-1908, 1910, 1914, 1917, 1919-1921, 1927, 1930-1933, 1938, 1945-1947, 1949, 1954, 1958, 1970, 1974-1975, 1980, 1982, 1991, 2001, 2008-2009         |

**Notes:** Recession years are defined as years with negative real GDP per capita growth rates. The chronologies start with the year of the first election considered in the respective country. The main sources for the dating are Barro (2006), Barro and Ursúa (2008, 2011), the *Maddison Project Database* (updated 2013 version) and the World Bank's *World Development Indicator Database*.

**Appendix B. Summary statistics**

Table B1: Summary statistics

| Variable                           | Obs.        | Mean        | Std.Dev.    | Min.        | Max.        |
|------------------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>Political left vote share</b>   | <b>2245</b> | <b>34.1</b> | <b>16.7</b> | <b>0.00</b> | <b>65.8</b> |
| Communist/socialist vote share     | 2245        | 4.69        | 6.84        | 0.00        | 44.0        |
| Social democracy vote share        | 2245        | 28.1        | 15.4        | 0.00        | 59.4        |
| Green/ecologist vote share         | 2245        | 1.33        | 3.00        | 0.00        | 25.6        |
| <b>Political center vote share</b> | <b>2245</b> | <b>32.9</b> | <b>23.9</b> | <b>0.00</b> | <b>100</b>  |
| Liberal vote share                 | 2245        | 18.7        | 18.4        | 0.00        | 74.1        |
| Christian democracy vote share     | 2245        | 14.2        | 17.7        | 0.00        | 68.8        |
| <b>Political right vote share</b>  | <b>2245</b> | <b>27.8</b> | <b>20.1</b> | <b>0.00</b> | <b>87.1</b> |
| Conservative vote share            | 2245        | 25.1        | 21.0        | 0.00        | 87.1        |
| Far-right vote share               | 2245        | 2.73        | 6.02        | 0.00        | 51.9        |
| <b>Other parties vote share</b>    | <b>2245</b> | <b>5.15</b> | <b>6.65</b> | <b>0.00</b> | <b>32.2</b> |
| Agrarian vote share                | 2245        | 2.87        | 6.47        | 0.00        | 29.6        |
| Special issue vote share           | 2245        | 0.56        | 1.42        | 0.00        | 11.9        |
| Unsuccessful parties vote share    | 2245        | 1.72        | 2.44        | 0.00        | 31.9        |
| Recession year indicator           | 2245        | 0.20        | 0.40        | 0.00        | 1.00        |
| Real GDP per capita growth rate    | 2221        | 2.06        | 5.46        | -66.1       | 67.2        |
| Government ideology change         | 2245        | 0.29        | 0.45        | 0.00        | 1.00        |
| Snap election indicator            | 2245        | 0.28        | 0.45        | 0.00        | 1.00        |

**Notes:** The summary statistics refer to the data collection for all 20 countries and all years from 1870 to 2015, including periods of global war. The elections in Nazi Germany are excluded. The vote shares and the indicator for an early election refer to the most recent general election in the country. Political left vote share = communist/socialist vote share + social democratic vote share + green/ecologist vote share. Political center vote share = liberal vote share + christian democratic vote share. Political right vote share = conservative + far-right vote share. Unsuccessful parties vote share = parties that did not fulfil the listing criteria (neither gained one percent of the total vote or one parliamentary seat throughout their history) and independent candidates. Other parties = agrarian vote share + special issue vote share + unsuccessful parties vote share.

## Appendix C. Local projections of vote shares

Table C1: Local projections of left, center and right vote shares

| (a) Left-of center vote share  | Year 1            | Year 2             | Year 3            |
|--------------------------------|-------------------|--------------------|-------------------|
| Recession                      | -9.68<br>(17.50)  | -22.54<br>(24.23)  | 17.19<br>(13.31)  |
| $R^2$                          | 0.503             | 0.519              | 0.504             |
| Observations                   | 1992              | 1972               | 1952              |
| (b) Center vote share          | Year 1            | Year 2             | Year 3            |
| Recession                      | -13.04<br>(19.18) | -29.12<br>(22.48)  | 9.62<br>(22.14)   |
| $R^2$                          | 0.510             | 0.504              | 0.539             |
| Observations                   | 1992              | 1972               | 1952              |
| (c) Right-of-center vote share | Year 1            | Year 2             | Year 3            |
| Recession                      | 18.46<br>(16.92)  | 55.21**<br>(24.11) | -13.31<br>(23.64) |
| $R^2$                          | 0.500             | 0.507              | 0.525             |
| Observations                   | 1992              | 1972               | 1952              |

**Notes:** \*\* significant at .05. Robust standard errors (clustered by country) in parentheses. Results correspond to local projections of cumulative change in the vote share variable relative to start of the recession for years 1-3 afterwards. The full sample of data is used (1870-2015). Periods of global war (1914-1918 and 1939-1945) and non-democratic spells are excluded. The regressions are control for country fixed effects, snap elections, government ideology changes and the contemporaneous and 1-year lagged values of the dependent variables at the start of the recession (coefficients not reported). See text.

## Appendix D. Economic voting: historical eras

Table D1: Economic voting in the post-World War II period

| Panel A: GDP growth            |           |        |           |        |
|--------------------------------|-----------|--------|-----------|--------|
|                                | (1)       |        | (2)       |        |
| <b>Left vote share</b>         | 0.139     | (0.10) | 0.111     | (0.09) |
| Communist/socialist vote share | 0.233**   | (0.09) | 0.207***  | (0.06) |
| Social democracy vote share    | 0.114     | (0.10) | -0.006    | (0.09) |
| Green/ecologist vote share     | -0.208*** | (0.06) | -0.090*** | (0.03) |
| <b>Center vote share</b>       | 0.293*    | (0.15) | 0.158     | (0.13) |
| Liberal vote share             | -0.151    | (0.11) | -0.148*   | (0.08) |
| Christian democracy vote share | 0.444***  | (0.15) | 0.306***  | (0.10) |
| <b>Right vote share</b>        | -0.279*   | (0.16) | -0.055    | (0.17) |
| Conservative vote share        | -0.074    | (0.11) | 0.028     | (0.14) |
| Far-right vote share           | -0.206*** | (0.07) | -0.084**  | (0.04) |
| <b>Others vote share</b>       | -0.153    | (0.09) | -0.213*   | (0.11) |
| Panel B: Recession dummy       |           |        |           |        |
|                                | (1)       |        | (2)       |        |
| <b>Left vote share</b>         | -1.092    | (0.94) | -0.718    | (1.08) |
| Communist/socialist vote share | -0.690    | (0.55) | -0.650    | (0.59) |
| Social democracy vote share    | -1.580*   | (0.80) | -0.733    | (1.12) |
| Green/ecologist vote share     | 1.178***  | (0.39) | 0.666*    | (0.36) |
| <b>Center vote share</b>       | -1.330    | (0.82) | -1.687    | (1.10) |
| Liberal vote share             | 0.495     | (0.93) | -0.156    | (1.05) |
| Christian democracy vote share | -1.825    | (0.96) | -1.531    | (0.98) |
| <b>Right vote share</b>        | 2.371**   | (1.03) | 2.518**   | (1.15) |
| Conservative vote share        | 1.470     | (1.07) | 2.084     | (1.26) |
| Far-right vote share           | 0.901     | (0.72) | 0.434     | (0.67) |
| <b>Others vote share</b>       | 0.051     | (0.24) | -0.113    | (0.38) |

**Notes:** Panel A shows the average effect of an increase in the lagged real GDP per capita growth rate on the levels of the vote shares of different party families in the most recent general election. Panel B compares the recession levels of vote shares (most recent general election) to their average levels. The explanatory variable is a dummy that indicates whether a country was in recession or not. The estimation method is least squares, where (1) include country fixed effects and (2) country fixed effects and year fixed effects. Robust standard errors (clustered by country) are shown in parentheses behind the coefficients. All regressions include a dummy for government ideology change (coefficients not reported) and early elections. Observations: Panel A: 1273; Panel B: 1310.  $R^2$  not reported due to space restrictions (available upon request). The panels cover the years 1946-2015. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

Table D2: Economic voting in the interwar period

| Panel A: GDP growth            |          |        |          |        |
|--------------------------------|----------|--------|----------|--------|
|                                | (1)      |        | (2)      |        |
| <b>Left vote share</b>         | 0.021    | (0.09) | 0.006    | (0.08) |
| Communist/socialist vote share | -0.039   | (0.04) | -0.107** | (0.05) |
| Social democracy vote share    | 0.060    | (0.08) | 0.113    | (0.08) |
| Green/ecologist vote share     | -        | -      | -        | -      |
| <b>Center vote share</b>       | 0.256*** | (0.09) | 0.286**  | (0.14) |
| Liberal vote share             | 0.182**  | (0.09) | 0.176    | (0.15) |
| Christian democracy vote share | 0.074    | (0.04) | 0.111**  | (0.05) |
| <b>Right vote share</b>        | -0.236*  | (0.12) | -0.180   | (0.13) |
| Conservative vote share        | -0.245   | (0.15) | -0.259   | (0.18) |
| Far-right vote share           | 0.009    | (0.19) | 0.079    | (0.21) |
| <b>Others vote share</b>       | -0.041   | (0.10) | -0.112   | (0.11) |
| Panel B: Recession dummy       |          |        |          |        |
|                                | (1)      |        | (2)      |        |
| <b>Left vote share</b>         | -1.463** | (0.71) | -0.060   | (1.21) |
| Communist/socialist vote share | -0.623   | (0.97) | 0.634    | (1.22) |
| Social democracy vote share    | -0.839   | (1.07) | -0.703   | (1.53) |
| Green/ecologist vote share     | -        | -      | -        | -      |
| <b>Center vote share</b>       | -1.347   | (0.93) | -2.214   | (2.65) |
| Liberal vote share             | -0.939   | (0.83) | -1.664   | (2.60) |
| Christian democracy vote share | -0.407   | (0.43) | -0.555   | (0.36) |
| <b>Right vote share</b>        | 2.828*   | (1.56) | 2.404    | (2.65) |
| Conservative vote share        | 4.170**  | (1.62) | 4.614**  | (2.24) |
| Far-right vote share           | -1.342   | (1.03) | -2.209   | (1.94) |
| <b>Others vote share</b>       | -0.019   | (0.67) | -0.130   | (0.89) |

**Notes:** Panel A shows the average effect of an increase in the lagged real GDP per capita growth rate on the levels of the vote shares of different party families in the most recent general election. Panel B compares the recession levels of vote shares (most recent general election) to their average levels. The explanatory variable is a dummy that indicates whether a country was in recession or not. The estimation method is least squares, where (1) include country fixed effects and (2) country fixed effects and year fixed effects. Robust standard errors (clustered by country) are shown in parentheses behind the coefficients. All regressions include a dummy for government ideology change (coefficients not reported) and early elections. Observations: Panel A: 309; Panel B: 309.  $R^2$  not reported due to space restrictions (available upon request). The panels cover the years 1919-1938. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

Table D3: Economic voting in the pre-World War I period

| Panel A: GDP growth            |          |        |         |        |
|--------------------------------|----------|--------|---------|--------|
|                                | (1)      |        | (2)     |        |
| <b>Left vote share</b>         | 0.332*   | (0.19) | 0.044   | (0.17) |
| Communist/socialist vote share | 0.015    | (0.01) | 0.005   | (0.02) |
| Social democracy vote share    | 0.317    | (0.19) | 0.049   | (0.17) |
| Green/ecologist vote share     | -        | -      | -       | -      |
| <b>Center vote share</b>       | 0.028    | (0.28) | 0.298   | (0.35) |
| Liberal vote share             | 0.043    | (0.28) | 0.365   | (0.39) |
| Christian democracy vote share | -0.016   | (0.02) | -0.068  | (0.08) |
| <b>Right vote share</b>        | -0.301   | (0.23) | -0.291  | (0.31) |
| Conservative vote share        | -0.290   | (0.22) | -0.249  | (0.28) |
| Far-right vote share           | -0.010   | (0.02) | -0.042  | (0.04) |
| <b>Others vote share</b>       | -0.059   | (0.04) | -0.052  | (0.05) |
| Panel B: Recession dummy       |          |        |         |        |
|                                | (1)      |        | (2)     |        |
| <b>Left vote share</b>         | -3.912** | (1.65) | -1.810  | (1.07) |
| Communist/socialist vote share | -0.094   | (0.09) | 0.138   | (0.15) |
| Social democracy vote share    | -3.821** | (1.65) | -1.949* | (1.01) |
| Green/ecologist vote share     | -        | -      | -       | -      |
| <b>Center vote share</b>       | 1.100    | (2.38) | -0.573  | (2.40) |
| Liberal vote share             | 0.709    | (1.81) | -1.83   | (2.33) |
| Christian democracy vote share | 1.287    | (1.02) | 1.261   | (0.86) |
| <b>Right vote share</b>        | 1.775    | (1.02) | 2.101   | (2.03) |
| Conservative vote share        | 1.728*   | (0.93) | 1.777   | (1.84) |
| Far-right vote share           | 0.047    | (0.13) | 0.324   | (0.31) |
| <b>Others vote share</b>       | 0.143    | (0.17) | 0.281   | (0.21) |

**Notes:** Panel A shows the average effect of an increase in the lagged real GDP per capita growth rate on the levels of the vote shares of different party families in the most recent general election. Panel B compares the recession levels of vote shares (most recent general election) to their average levels. The explanatory variable is a dummy that indicates whether a country was in recession or not. The estimation method is least squares, where (1) include country fixed effects and (2) country fixed effects and year fixed effects. Robust standard errors (clustered by country) are shown in parentheses behind the coefficients. All regressions include a dummy for government ideology change (coefficients not reported) and early elections. Observations: Panel A: 431; Panel B: 431.  $R^2$  not reported due to space restrictions (available upon request). The panels cover the years 1870-1913. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

## Chapter 4

# Short-term pain: Financial crises and the rich, 1914-2014

The foregoing chapters have discussed key aspects of the political response to financial and economic downturns. This chapter asks: what are the social implications of crises? Income inequality has regained attention in this regard, particularly in light of the global financial crisis. Depending on the research context, some studies find that inequality has increased after the crash, some find the opposite. Similarly, there is no consensus about the role of inequality in the run-up to the crisis. What has history to say about the relationship between financial crises and inequality? Using a panel of 17 advanced economies and 100 years of data for each country studied, this chapter systematically documents the dynamics of inequality around financial crisis. The main finding is that the inequality-reducing effect of financial crises is marginal. First, the share of income earned by the top one percent grows strongly before a crisis. Second, top incomes fall temporarily but recover quickly after a crisis. Third, the short-term loss at the very top results in a larger share for the rest of the top decile, while the bottom 90% are unaffected.

### 4.1 Introduction

The issue of income inequality has gained widespread attention since the global financial crisis. The 2007 banking crisis in the U.S. was preceded by a long period of rising top income shares, and followed by a temporary fall during the Great Recession. Over the past five years, the share of income received by the top 1% has returned to very high levels (see Saez, 2016). Some suggest that the 1930s Great Depression and the 1980s Savings and Loan Crisis in the U.S. exhibited a similar  $\Lambda$ -pattern (e.g., Kumhof and Ranci ere, 2010; Morelli, 2014). The idea behind the pattern is that a financial crisis typically occurs after a financial boom, which mainly benefits the rich. Naturally, after the financial collapse, this group has lost most.<sup>1</sup> Top incomes however most likely increase again when effects reverse in the

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<sup>1</sup>This view is based on the fact that the share of capital income and occupational income closely tied to the financial markets is typically higher among the rich than among the rest of the population (e.g., Atkinson and Piketty, 2007).

recovery phase.<sup>2</sup>

However, there is limited empirical evidence on the above dynamics beyond the U.S. case. The few existing comprehensive comparative studies are split over the issue. Empirical results by Roine et al. (2009) point to declining inequality in the immediate aftermath of banking crises in advanced economies over the past century. This is at odds with Bordo and Meissner (2011), who differentiate between the pre-World War II period and the post-World War II period. They conclude that in western economies financial crises decreased inequality during the interwar era and led to more inequality after World War II. The latter sits well with the literature on Latin America (e.g., Lustig, 2000), while studies on postwar crises in the rest of the emerging world find an opposite pattern (e.g., Lopez, 2003; Honohan, 2005). Two descriptive analyses by Atkinson and Morelli (2010, 2011) discover no clear-cut pattern, but some evidence that, after a hiatus, crises were typically followed by rising inequality (for example in the Nordic countries and Japan and Italy after the crises of the 1990s). In light of the disagreement in the literature, this study has the aim of clarifying key relationships between income inequality and systemic banking crises.

Do systemic banking crises have common elements with regard to inequality? What has history to say about the dynamics of top income shares before and after a financial crisis? What is the role of financial and economic cycles in this context? To answer these questions, this chapter systematically examines the trajectory of top incomes around 40 major financial crises in 17 advanced countries over the past 100 years, with a special emphasis on the crisis aftermath. The main proxy for income inequality used in this analysis is the share of total income earned by the percentile of tax units with the highest incomes, obtained from the *World Wealth and Income Database* (WID). These data were then related to a chronology of systemic financial crises by Jordà et al. (2013) and a set of important financial and macroeconomic controls.

The key finding is that the classic  $\Lambda$ -pattern, as described in Morelli (2014) for the three U.S. crises and in Atkinson and Morelli (2010, 2011) for the Nordic countries in the 1990s, is largely generalizable to long-run historical data for a panel of advanced countries. The share of income received by the top 1% grows at an above-average pace in the five years preceding a financial crisis. The year of the crisis outbreak and the following year typically show a reduction. Following, top income shares recover quickly and soon reach disproportionately high levels. This conclusion is in line with the finding of a short-term negative impact of banking crisis on the top income share by Roine et al. (2009). An additional result is that the temporary loss at the very top typically produces a larger share in total income for the rest of the top decile, while the bottom 90% are unaffected. Thus, given its short-term nature and the limited impact on the lower parts of the distribution, the overall inequality-reducing effect of banking crises appears to be marginal in the light of modern history. Indeed pre-crisis and post-crisis periods jointly form episodes of above-average growth in inequality from the top.

It is important to note that the general pattern was weaker but still visible after restricting the sample to the interwar period, which is at odds with Bordo and Meissner (2011).<sup>3</sup> Moreover, the key relationships were generally more pronounced in Anglo-Saxon countries than in continental Europe, supporting the view that

<sup>2</sup>Under the assumption that growth in real income per capita is pro-rich (e.g., Dew-Becker and Gordon, 2005) and leaving aside the distributional impact of policy responses to the crisis, as, for example, discussed in Atkinson and Morelli (2011).

<sup>3</sup>This may be due to the fact that they replace the income share of the top 1% with the ratio of wages to GDP per capita as dependent variable when analyzing the interwar era.

top incomes are more sensitive in stock market-based than in bank-based financial systems (e.g., Atkinson and Piketty, 2007). On this note, this study finds no evidence for a positive role of private credit in top incomes, as for example argued by Rajan (2010). This finding corroborates a recent study by Bordo and Meissner (2012).

Methodologically, this analysis exploits the statistical tool of local projections (Jordà, 2005) and projects the path of income shares over a five year horizon from the beginning of a financial crisis. Dynamic multipliers calculated directly from the data handle asymmetries and non-linearities with great ease. The approach therefore allows consistently estimating the post-crisis dynamics in income shares year-wise, which is crucial given the importance of the time dimension in the relationship. The regression set-up controls for observable financial variables, such as stock market growth, private credit, and macroeconomic factors, such as real GDP per capita, that might impact the crisis trajectory of the income share. This makes it far less likely that a financial crisis per se is an independent driver of inequality.

The structure of this chapter is as follows. In the next section, the dataset is introduced. In the third section, the statistical design is discussed. The fourth includes the empirical core of the analysis. It documents how financial crises affected the trajectory of the income share of the top 1% of earners over the past 100 years. The fifth section illuminates the impact of crises on other parts of the income distribution. The last section concludes.

## 4.2 Data description

This chapter draws on a broad set of historical data on income inequality and financial crises. This section describes the main variables used in the analysis. The data cover the years 1914 through 2014 and the following 17 developed economies: Australia, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

The main proxy for income inequality in this analysis is the share of total income earned by the percentile of tax units (households or individuals) with the highest incomes - termed *top 1% share*. This variable was obtained from the World Wealth and Income Database (WID). Using data from income tax records, it is calculated as the ratio of the top earners' incomes divided by national income based on the methodology developed by Piketty (e.g., Piketty, 2003). As in Roine et al. (2009), drawing on Hoffman et al. (2007), two more variables are included in an attempt to broadly capture the rest of the income distribution. Both were constructed by means of data on the income share held by highest 10% from the WID. Specifically, the *top 10-1% share* is defined as the fraction of total income received by the bottom nine percentiles of the top decile.<sup>4</sup> The *bottom 90% share* is simply the residual share held by the lowest ninety percent.

There are some comparability issues in the WID data. Generally, income is defined as labor, business and capital income before taxes and transfers and typically excluding capital gains. For a small number countries, however, realized capital gains are considered income (Australia, Portugal and the United Kingdom).

<sup>4</sup>This measure is also used as a robustness check because the top decile is regarded as heterogeneous. The share of the bottom nine percentiles of the top 10% shows much less fluctuation (across countries and over time) and is less dominated by capital income than the share of the top percentile (e.g., Atkinson and Piketty, 2007).

Moreover, transfer income is included in a few cases. Similarly, Naturally, tax laws vary across countries and over time within nations. This, for instance, refers to the definition of taxable income, the age cut-off for the adult population, the tax year or the tax unit. Specifically, there are two unadjusted shifts from the household to the individual tax unit in the series (Denmark 1968-1970 and the United Kingdom 1989-1990). In another two cases, the source of the data changes over time.<sup>5</sup> Here the analysis exploits the combined series without any adjustments to include as much historical data as possible. In addition, there are a number of gaps within the time series, especially in the early years of the sample and during the world wars. These were not interpolated as this must be regarded highly uncertain.<sup>6</sup> Finally, the sample is skewed towards recent decades (and also Northern Europe) because the time series on Italy, Portugal and Spain start from the 1970s/1980s. However, despite these limitations, this study pools these data to learn with historical perspective about the general relationships between financial crises and top incomes, as for example Bordo and Meissner (2012). Appendix Table A1 describes the raw top 1% share time series in more detail and lists the country-specific sources.

According to Laeven and Valencia (2008), *financial crises* are defined as events during which a country's banking sector experiences bank runs, sharp increases in default rates accompanied by large losses of capital that result in public intervention, bankruptcy, or forced merger of financial institutions. Thus, this analysis is restricted to banking distress that is systemic in nature. Isolated bank failures are not considered. So are less precise definitions of financial crises including inflation spurts, stock market crashes, currency crashes or sovereign defaults. A tested and consistent chronology of systemic financial crises can be found in Jordà et al. (2013), building on Bordo et al. (2001), Laeven and Valencia (2008; 2012) and Reinhart and Rogoff (2009b). Altogether, 50 financial crises could be identified in the 17 countries in the sample over the past 100 years. Sufficient top income data was not available for ten of these, all of which in the interwar era. Thus, the final sample includes 40 financial crises (15 before World War II and 25 thereafter). The baseline variable used for the statistical analysis is a binary dummy that indicates the outbreak of a systemic crisis in a given country-year. Appendix Table A2 shows the history of financial crises per country.

The regressions in this analysis are controlled for potential determinants of the top 1% income share, as for example discussed in Roine et al. (2009). This is done to stack the odds against finding that pre-crisis and post-crisis periods per se explain significant deviations of top incomes from the long-run historical mean. More precisely, eliminating the influence of the boom and bust cycles of the real economy and the financial markets allows for a clearer identification of the changes in inequality relating to the crisis event itself (see text below). Specifically, the *real GDP per capita* growth rate accounts for the development of the real economy and the *CPI inflation* rate for the price level. Two measures capture key aspects of financial development: the growth rate of the *private credit-to-GDP* ratio and the (nominal) *stock price* index. The proxy for trade openness is the ratio of *current account* to GDP. The set of financial and macroeconomic control variables

<sup>5</sup>The estimates for Finland are based on tax data until 1992 and on survey data afterwards. The series on Canada change from tabulated tax data to taxfilers data in the year 2000.

<sup>6</sup>Notice that the results of this study were robust to the choice of separate or joint series in the case of methodological/source breaks and to the choice of discontinuous or interpolated series in the case of missing data. Atkinson and Leigh (2007) and Atkinson et al. (2011) discuss the comparability of top income estimates in more detail.

is derived from the Jordà, Schularick, and Taylor (2013) dataset.<sup>7</sup> Finally, broad trends in political and demographic development are incorporated into the model by including a dummy equal to one when there is a year of *global war* (1914-1918 and 1939-1945) and the *population* size (from the updated 2013 version of the Maddison Project Database) on the right hand side of the equation. Appendix Table A3 shows summary statistics of all variables used in this study.

### 4.3 Statistical design

The goal of the statistical analysis is to systematically explore the dynamics in income share of the top 1% of earners surrounding the outbreak of a financial crisis. The statistical approach follows a number of existing empirical studies using long-run historical data, for example Bordo and Meissner (2012) and Jordà, Schularick and Taylor (2013) and exploits the time series variation within countries. For this purpose, the following equation is used:

$$\Delta \ln(Y_{it}) = \alpha + \text{precrisis}_{it}\beta + \text{postcrisis}_{it}\gamma + \Delta \ln(X'_{it-1})\delta + \text{war}_{it}\rho + \mu_i + \eta_t + \varepsilon_{it}.$$

Specifically, the model examines if financial crises lead to short-term *changes* in the (logged) levels of the top 1% income shares  $Y_{it}$  relative to trend, as the commonly used unit root tests for unbalanced panel data, such as Fisher (see Choi, 2001) and Im et al. (2003), strongly pointed to non-stationarity in levels. In other words, the main research question is whether inequality will grow or decline disproportionately in the years before and after a crisis. These are denoted  $\text{precrisis}_{it}$  and  $\text{postcrisis}_{it}$ , respectively. The time window for the binary indicator variables is five years in the baseline regression model, as for example in the study by Mian et al. (2014), it will however be restricted to single years in more detailed models (see text below).

Further,  $\Delta \ln(X'_{it-1})$  is the vector of financial and macroeconomic control variables. These are lagged one year to reduce concerns of simultaneity and enter the equation in their logged first differences to remove trend. Notice that the lagged value of the dependent variable is not included as a control because non-stationarity of at least some of the first-differenced top income series could not be ruled out (e.g., Keele and Kelly, 2006). Generally, however, Breusch-Godfrey tests (see Wooldridge, 2002) suggested that serial correlation is not a concern in the first-differenced setting. The binary variable  $\text{war}_{it}$  simply has the value of 1 in the years 1914-1918 and 1939-1945, and 0 otherwise. A potential concern here is that naturally the control variables are endogenous to the pre-crisis and post-crisis indicator variables to some degree. The model however explicitly allows this to approximate the *genuine* crisis effect, especially since multicollinearity between any predictors could be ruled out.<sup>8</sup>

Using all available data, Appendix Figure A1 shows annual and country-specific averages of the top 1% income share, at levels and at first differences. The charts indicate that, on average, much of the global trend in the top 1% income share is removed by log-first-differencing while there remains a degree of volatility over time

<sup>7</sup>Central government spending, the top marginal tax rate, the short-term interest rate and investment as factors were also investigated. The estimates are not reported because these variables did not significantly affect the key results and the sample often shrank considerably due to data availability issues.

<sup>8</sup>Exploratory logit regressions suggested that the likelihood of experiencing a pre-crisis or post-crisis year is most likely a function of the economic and financial variables. However, with regard to the baseline regressions, post-estimation tests using variance inflation factors did not find any linear combinations between regressors.

(Panel A.4) and across space (Panel B.4). Country fixed effects  $\mu_i$  therefore capture time-invariant influences on the top 1% share within nations. These may exist, as mentioned, for coding reasons or result from inherent differences. For example, Atkinson and Piketty (2007) have highlighted the diverging growth patterns of inequality in Anglo-Saxon countries and continental Europe.<sup>9</sup> Year fixed effects  $\eta_t$  are added to account for any global shocks that are common to all countries in each year. According to Piketty and Saez (2003), the U-shaped pattern of top incomes (see Appendix Figure A1) over the past 100 years in most of the countries is a result of global events, namely the Great Depression and World War II. Moreover, Appendix Figure A1 clearly shows that including a dummy that eliminates the (negative) influence of the two global wars is crucial.<sup>10</sup>

To measure post-crisis dynamics in more detail, this study follows Jordà (2005) in calculating dynamic multipliers directly from the data. Here the *treatment* variables will simply be the occurrence of a financial crisis following the chronology in Appendix Table A2. Let  $N$  and  $T$  denote the cross-sectional and time dimension of the panel.  $Y_{it}$  is a vector of top income share variables. For any variable, the objective is to estimate the change in that variable from the beginning of the crisis at time  $t$  to time  $t + h$ . This response is calculated by estimating a fixed-effects panel model with a discrete treatment depending on whether there is a financial crisis or not:

$$\Delta_h y_{it+h}^k = \alpha_i^k + \theta_F^k F + \sum_{j=0}^p \Gamma_j^k Y_{it-j} + war_{it} \rho + u_{it}^k; \quad k = 1, \dots, K; \quad h = 1, \dots, H$$

where  $\theta_F^k$  is the *financial crisis* treatment ( $F = 1$ ). Again, lags of the control variables  $Y$  at time  $t$  are included, as is the binary global war indicator  $war_{it}$ . Finally,  $\alpha_i^k$  are country fixed effects and  $u$  is the error term.

## 4.4 Short-term pain: financial crises and the rich

This section presents the historical evidence on the dynamics in top income shares around the onset of financial crisis. More specifically, two main stylized fact from 100 years of data in a panel 17 countries will be discussed. First, a financial crisis is typically both preceded and followed by disproportionate growth in the income share of the top 1%, as measured over the five-year horizon respectively. Second, dynamic models find that the year of the outbreak of the crisis and the year afterwards exhibit a tendency for the income share of the top percentile to contract.

### 4.4.1 Five-year horizon

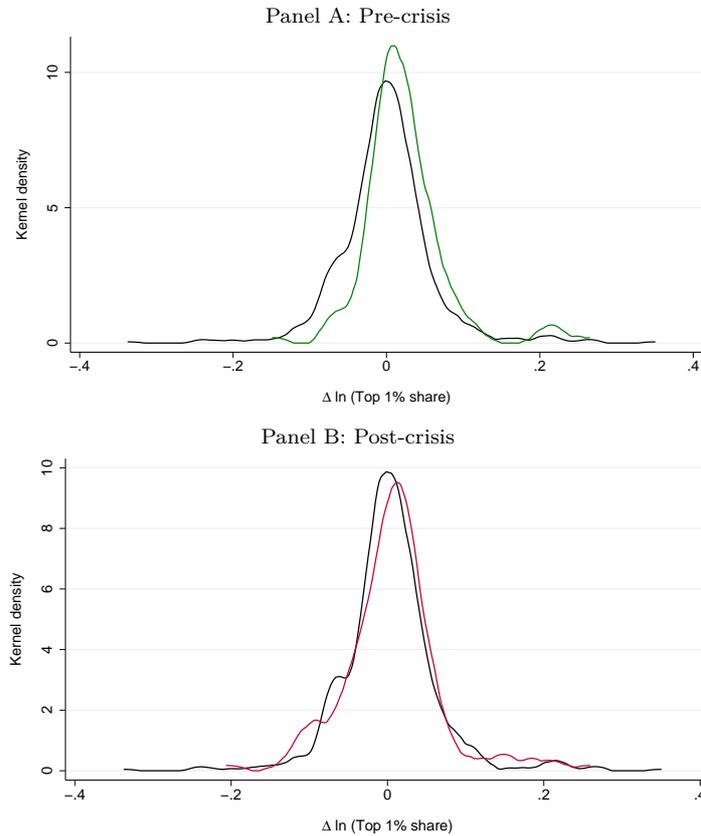
As a start, Figure 4.1 shows kernel density estimates of the logged first-differences of the top 1% shares to give a first impression of growth dynamics before and after a crisis. The green line refers to the five years prior to a financial crisis and the red line to the five years afterwards. The black lines indicate all other years respectively.

<sup>9</sup>Possible explanations include differences in the acceptance of inequality (e.g., Piketty, 2005) and in the structure of the financial system (e.g., Levine, 2005).

<sup>10</sup>To account for trends, one could alternatively decompose the variable into a trend and cyclical component, for instance using a Hodrick-Prescott filter. This was not possible due to the amount of missing data within the series. The use of country-specific time trends did not change the main results in a meaningful way.

The full sample of data is used, while years of global war, crisis outbreak years and years that are simultaneously pre-crisis and post-crisis years are excluded for a clearer identification.

Figure 4.1: Top 1% income shares and crises: kernel density



**Notes:** The figures show kernel density estimates of the annual difference in the natural log of the top 1% income share. Panel A compares five pre-crisis years (green line) to all other years (black line), and Panel B refers to the five years post-crisis (red line). The full sample of data is used (1914-2014). Years of global war, crisis outbreak years and years that are simultaneously pre-crisis and post-crisis years are excluded for comparability. Appendix Table A2 shows the crises by country.

The figure suggests notable changes in the growth rate of the top 1% income shares before and after crises compared to the long-run average (black lines) over the past 100 years. In the five years before a financial crisis (Panel A) top incomes appear to grow above normal, as it is clearly indicated by the rightward shift of the green curve. In contrast, the picture is less distinct with regard to the five-year aftermath of financial crises (Panel B). The impression is that direction of the effect is similar to the pre-crisis dynamics but the difference between the distribution of the variables in post-crisis (red line) and normal years (black line) is substantially smaller.

Do top income shares increase disproportionately in the run-up to a crisis? And does the top percentile of earners benefit or lose after the outbreak of the crisis? The results from fixed-effects OLS regression presented in Table 4.1 offer valuable insights into the key relationships. The table compares the logged first differences of top 1% income shares in pre-crisis and post-crisis episodes to their average levels, controlling for a set of fundamentals. The time windows for pre-crisis and post-crisis are five years. The counterfactual are all other years, respectively. The estimation method is least squares, where (1) are plain, (2) account for country fixed effects and (3) include country and year fixed effects.

Table 4.1: Top 1% income share growth before and after crisis (OLS)

|   | (1)       | (2)       | (3)       |
|---|-----------|-----------|-----------|
| Pre-crisis (5 years)                          | 0.022***  | 0.023***  | 0.019**   |
| Robust S.E.                                   | (0.006)   | (0.007)   | (0.008)   |
| Post-crisis (5 years)                         | 0.009     | 0.011**   | 0.011*    |
| Robust S.E.                                   | (0.006)   | (0.004)   | (0.005)   |
| $\Delta \ln(\text{Real GDP p.c.})_{t-1}$      | 0.151**   | 0.154     | 0.297***  |
| Robust S.E.                                   | (0.074)   | (0.094)   | (0.069)   |
| $\Delta \ln(\text{CPI})_{t-1}$                | -0.183*** | -0.172*** | -0.109**  |
| Robust S.E.                                   | (0.049)   | (0.041)   | (0.050)   |
| $\Delta (\text{Current account/GDP})_{t-1}$   | -0.205    | -0.203    | -0.185    |
| Robust S.E.                                   | (0.152)   | (0.163)   | (0.152)   |
| $\Delta \ln(\text{Stock market index})_{t-1}$ | 0.034***  | 0.034***  | 0.020**   |
| Robust S.E.                                   | (0.010)   | (0.009)   | (0.009)   |
| $\Delta \ln(\text{Private credit/GDP})_{t-1}$ | -0.081**  | -0.078*   | -0.084*   |
| Robust S.E.                                   | (0.037)   | (0.044)   | (0.044)   |
| $\Delta \ln(\text{Population})_{t-1}$         | -0.912    | -1.791    | -0.983    |
| Robust S.E.                                   | (0.592)   | (0.899)   | (1.008)   |
| Global war indicator                          | -0.036**  | -0.387**  | -0.229*** |
| Robust S.E.                                   | (0.015)   | (0.016)   | (0.036)   |
| $R^2$   | 0.081     | 0.085     | 0.240     |
| Observations                                  | 908       | 908       | 908       |

**Notes:** This table compares the logged first differences of top 1% income shares in pre-crisis and post-crisis episodes to their average levels, controlling for a set of economic fundamentals. The time windows for pre-crisis and post-crisis are five years. The estimation method is least squares. (1) plain, (2) with country fixed effects and (3) with country and year fixed effects. Robust standard errors clustered by country are shown in parentheses. The full sample of annual data is used (1914-2014). The results were robust to including the following additional controls (coefficients not reported): short-term interest rate, investment-to-GDP ratio, government spending-to-GDP ratio, top marginal tax rate. \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

The coefficient for the five-year pre-crisis indicator is positive and statistically significant regardless of the specification. It indicates that, on average, switching

from a normal period to a pre-crisis period increases the growth rate of the top income share by about 2%, holding all else constant. The five-year post-crisis dummy is also positive but about half in size and showing less significance. Thus, the results suggest that top incomes tend to deviate significantly from normal both before and after a crisis, while the pre-crisis effect is somewhat stronger. Importantly, the regressions are controlled for the influence of several macroeconomic fundamentals. The finding of an increase in the income share growth rate of about 15-30% (depending on the model) as a consequence of a one-percentage point change in the growth rate of real GDP per capita is supportive of the view that episodes of high growth are pro-rich (e.g., Dew-Becker and Gordon, 2005). On the other, top incomes seem to respond negatively to an increase in lagged inflation.<sup>11</sup>

Second, there is an important asymmetry in the response to the financial variables. The evidence is that when the stock market grows at a pace above its average, the top 1% share also rises above its average growth rate. This is not surprising given the high share of capital income in the top percentile. In contrast, an increase in the amount of private credit in the economy is associated with *reduced* top income growth (negative and statistically significant coefficient). This finding is in line with standard theory predicting that credit expansion benefits the poor rather than the rich in later stages of development (e.g., Greenwood and Jovanovic, 1990, Beck et al., 2007). It also corroborates the recent study by Bordo and Meissner (2012), finding no evidence of any association between credit and inequality (in the spirit of Rajan, 2010) or vice versa. The estimates somewhat contradict Roine et al. (2009), who estimate a positive link between the 5-year average change in credit and the 5-year average change in top incomes.<sup>12</sup> Finally, as expected the two world wars, on average, depressed top income growth rates. The coefficients for the binary global war indicator are negative and statistically significant in all specifications. The effects of lagged population growth and trade openness are only marginal.

A potential concern with these findings is that patterns differ between historical periods and/or groups of countries and thus lead to biased overall estimates. Specifically, Bordo and Meissner (2011) have noted that in contrast to the post-World War II period, crises in the interwar era tended to be associated with a decline of inequality.<sup>13</sup> Moreover, as already shown, volatility in the top incomes was higher before 1950 than after. A first important robustness check is therefore to split the sample across World War II in order to learn about differences between the distributional impact of crises in the interwar and in the postwar period. Appendix Table B1 contains results from regressions similar to those in Table 4.1, while Panel A is restricted to the years 1920-1938 and Panel B to 1950-2014 (the table reports only the pre-crisis and post-crisis coefficients). The sample split suggests that the post-World War II period explains a large portion of the results. However, despite smaller coefficients and the lack of significance, the estimates for the interwar era generally resemble those for the post-1950 period. In both periods, top incomes grew above average surrounding a financial crises, and the upward deviation was stronger before than after the crisis.

The second robustness check involves assessing whether patterns in Anglo-Saxon

<sup>11</sup>For example, Romer and Romer (1998) and Bulíř (2001) have shown that in the short run, high inflation can lead to lower inequality.

<sup>12</sup>However, they do not account for financial booms and busts in their regression model as it is done here.

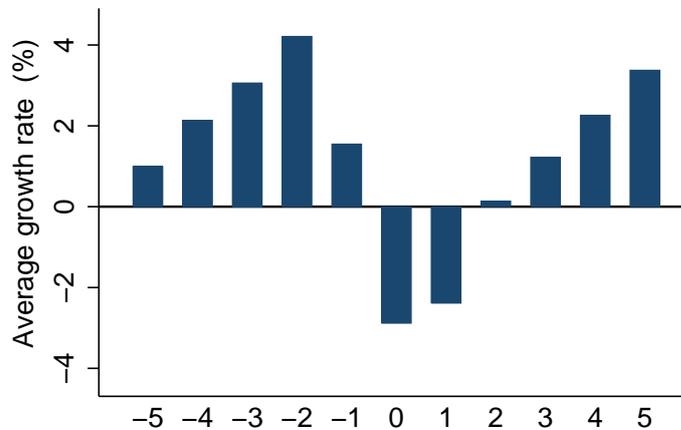
<sup>13</sup>The general argument is that wages rose faster than average and top incomes during the large downturns that came with the Great Depression.

countries differ from continental Europe (and Japan). It may be the case that disproportionate growth in inequality, as documented by Atkinson and Piketty (2007), along with strongly market-based financial systems in the Anglo-Saxon countries leads to biased overall estimates. Appendix Table B2 contains results from regressions using two group specific subsamples of data. Specifically, Panel A includes the Anglo-Saxon countries (Australia, Canada, the United Kingdom and the U.S.) and Panel B the rest of the countries, while both samples cover the years from 1914 to 2014. Even though the general pattern persists across the two groups, the table implies that top income shares grow more strongly before and are more depressed after crisis in Anglo-Saxon countries. Thus, the top percentile in the English-speaking world may be more sensitive to financial booms and busts than in continental Europe.

#### 4.4.2 Annual dynamics

What lies behind the results over a five year horizon? This section analyzes the dynamics of top income shares around the outbreak of a financial crisis in more detail. Figure 4.2 shows the average percentage growth rate (100 times log first difference) of the top 1% income share for the five years before a crisis, the crisis year and the five years thereafter. Analogous to Figure 4.1 in the text above, the full sample of data is used, while years of global war and years that are simultaneously pre-crisis and post-crisis years are excluded for comparability reasons.

Figure 4.2: Top 1% income shares and crises: annual mean



**Notes:** The figure shows the average percentage growth rate (100 times log first difference) of the top 1% income share for the five years before a crisis, the crisis year and the five years afterwards. The full sample of data is used (1914-2014). Years of global war and years that are simultaneously pre-crisis and post-crisis years are excluded for comparability. Appendix Table A2 shows the crises by country.

The annual mean values help to explain why the effects over the five-year estimates horizon are stronger for the pre-crisis period than for the post-crisis period in the regressions reported above. The figure points to a distinct growth pattern of top incomes surrounding a crisis. First, top incomes show, on average,

accelerating growth both towards and also following the crash. Specifically, the average growth rate is positive and increasing in the years from  $t-5$  to  $t-2$  and in the years from  $t+2$  to  $t+5$  respectively). However, the outbreak of the crisis causes growth to slow down in year  $t-1$  and to turn negative in  $t$  and  $t+1$ . How do these rates compare to the long-run historical average when controlling for country and time effects and the set of macroeconomic fundamentals? Table 4.2 reports results from regressions similar to Table 4.1, while the five-year pre-crisis and post-crisis dummies are replaced by a set of annual dummies indicating each year from  $t-5$  to  $t+5$  around the crisis outbreak. A binary indicator for the crisis year itself is also included.

Table 4.2: Top 1% income share growth: annual deviation (OLS)

|                      | (1)                 | (2)                 | (3)               |
|----------------------|---------------------|---------------------|-------------------|
| Pre-crisis year t-5  | 0.004<br>(0.007)    | 0.005<br>(0.007)    | 0.002<br>(0.007)  |
| Pre-crisis year t-4  | 0.027**<br>(0.011)  | 0.029**<br>(0.010)  | 0.014<br>(0.011)  |
| Pre-crisis year t-3  | 0.026***<br>(0.008) | 0.026***<br>(0.011) | 0.008<br>(0.009)  |
| Pre-crisis year t-2  | 0.017<br>(0.013)    | 0.018<br>(0.015)    | 0.031<br>(0.021)  |
| Pre-crisis year t-1  | 0.025<br>(0.015)    | 0.026<br>(0.015)    | 0.030<br>(0.018)  |
| Crisis year t        | -0.013<br>(0.014)   | -0.012<br>(0.017)   | -0.006<br>(0.017) |
| Post-crisis year t+1 | -0.019**<br>(0.009) | -0.017**<br>(0.007) | -0.008<br>(0.009) |
| Post-crisis year t+2 | 0.004<br>(0.010)    | 0.007<br>(0.014)    | 0.009<br>(0.014)  |
| Post-crisis year t+3 | 0.008<br>(0.014)    | 0.010<br>(0.014)    | 0.004<br>(0.014)  |
| Post-crisis year t+4 | 0.016<br>(0.014)    | 0.019<br>(0.012)    | 0.023*<br>(0.012) |
| Post-crisis year t+5 | 0.027**<br>(0.013)  | 0.029**<br>(0.013)  | 0.027*<br>(0.015) |
| $R^2$                | 0.097               | 0.102               | 0.247             |
| Observations         | 908                 | 908                 | 908               |

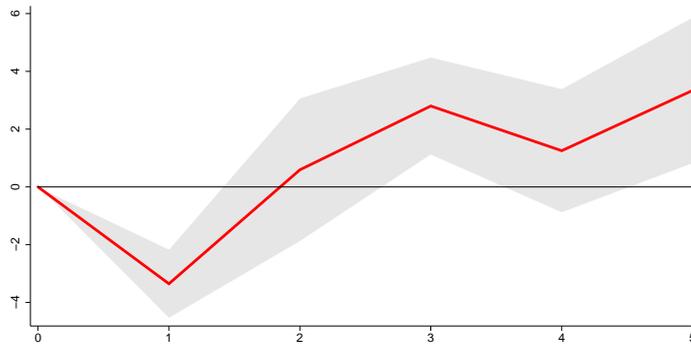
**Notes:** This table compares the logged first differences of top 1% income shares in each of the five years before a crisis, the crisis year and the five years after the crisis to their average levels. The set of control variables is the same as in Table 4.8 (coefficients not reported). The estimation method is least squares. (1) plain, (2) with country fixed effects and (3) with country and year fixed effects. Robust standard errors clustered by country are shown in parentheses. The full sample of annual data is used (1914-2014). \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

Generally, the OLS regressions on annual dummies corroborate the findings from Figure 4.2. The coefficients are negative for the crisis year and the year afterwards (statistically significant at the 5% level). Otherwise, the results indicate

above-average growth of top income shares before and after the financial crises. Specifically, the speed of recovery stands out. For instance, the estimates for year 5 after the crisis are comparable in size and significance to the effects in year 4 or 3 before the crisis. However, it appears that including year effects eliminates a significant portion of the effects.

The pattern of a temporary drop in the growth rate in the immediate aftermath of a crisis followed by a strong phase of recovery is also visible in Figure 4.3. The red line corresponds to local projections of the average cumulative percentage change in the log first difference of the top 1% income share variable (y-axis) relative to crisis year for years 1-5 after crisis (x-axis). The shaded region is a 90% confidence interval. Controlling for country effects and the set of economic and financial variables, cumulative growth relative to the year of the crisis is negative only in the first year. Generally, the path follows an upward trend afterwards, reaching a cumulative change of approximately 3.3% percent in year 5 after crisis.

Figure 4.3: Top 1% income shares after crises: local projections



**Notes:** The path shows local projections of the average cumulative change in the log first difference of the top 1% income share variable (y-axis) relative to crisis year for years 1-5 after crisis. The shaded region is a 90% confidence interval. The full sample of data is used (1914-2014). The set of control variables is the same as in Table 4.8 (coefficients not reported). The regressions include country fixed effects. Appendix Table A2 shows the crises by country. For the corresponding regression results see Appendix Table D1 (Panel A).

This section has shown that the response of top incomes to crises is largely a matter of timing. The use of annual instead of five year dummies indicates that the top percentile of earners experiences a loss of income (negative growth rates) only in the crisis year and the year afterwards. From then on the growth rate of the top 1% share typically recovers quickly. Apart from that, the run-up to a crisis tends to be a period of above-average income growth for the top 1%. Thus, these findings are generally supportive of the inverted V-shape pattern for inequality (a sharp run-up in inequality before a banking crisis and a sharp drop thereafter) in the spirit of Rajan (2010) and Kumhof and Ranci ere (2011). However, as for example also argued by Bordo and Meissner (2012), there is little evidence for any role of credit in this mechanism. Real GDP and stock market growth are the main determinants of top incomes according to the evidence uncovered here. Importantly, however, all results are robust to including or excluding financial and

in control variables. In addition, annual data on top income growth and crises confirms the finding by Roine et al. (2009) that the share of years during a 5-year period that a country was in a banking crises has a negative impact on the change in top income shares over this period. Clearly, the long-run historical data point to an immediate negative impact of crises on top incomes.

There is also some evidence from this study that, after a hiatus, financial crises lead to more inequality relatively quickly as the top income shares tend to grow at an above-average pace in the medium term aftermath of the crisis (years 2-5). This corroborates the view present in the studies by Atkinson and Morelli (2010, 2011). Importantly, as already mentioned, Bordo and Meissner (2011) have stressed that the interwar era stands out as an exception to this general rule. Appendix Figure B1 shows local projections similar to Figure 4.3, while the left panel is restricted to data on the interwar era and the right panel covers the post-World War II period. The post-crisis paths trajectory is comparable, but the picture is much weaker when the interwar era alone is considered. Again, the second robustness check examines differences between Anglo-Saxon countries and continental Europe (and Japan). Appendix Figure B2 presents the local projections. The left panel contains the Anglo-Saxon countries and the right panel the rest of the countries in the sample. Both samples use annual data from 1914 to 2014. It is visible in the data that the top percentile in the Anglo-Saxon world is more vulnerable to a financial crash, but also recovers faster. However, the general pattern of an immediate reduction followed by growth persists across the two groups.

## 4.5 Effects on the rest of the distribution

How do dynamics in the top 1% share affect the rest of the income distribution in times of crisis? This section studies the trajectory of the income share of the next nine percentiles of the top decile (top10-1% share) and the bottom 90% before and after financial crises.

To begin with, Figure 4.4 shows the average percentage growth rates (100 times log first difference) of the top 1% income share (grey columns), the top 10-1% income share (green columns) and the bottom 90% income share (orange columns) for the five years before a crisis, the crisis year and the five years afterwards. The columns are stacked for comparability. The full sample of data is used, excluding years of global war and years that are simultaneously pre-crisis and post-crisis years. The figure clearly shows that the top 1% is more sensitive to financial booms and busts than the top 10-1%, as suggested by Atkinson and Piketty (2007, 2009), and also the bottom 90%. Importantly, the descriptive evidence points to the top 10-1% as the main beneficiary of the crisis-induced contraction in incomes at the very top. The growth rates of the rest of the top decile increase drastically in the two years after the crisis. This effect is much less pronounced among the bottom 90%. Moreover, the latter group sees negative growth rates in both the medium-term run-up to and aftermath of the crisis, on average.

Again, how do these values compare to the long-run historical average? Appendix Table C1 reports results from OLS regressions of the log first difference of income shares on a five-year pre-crisis dummy and annual dummies for the crisis year and each year in the crisis aftermath. Specifically, columns 2 and 3 refer to the top 10-1% share and columns 4 and 5 to the bottom 90% share, as defined earlier. Specification (1) includes country fixed effects and (2) country and year

Figure 4.4: The rest of the distribution: annual mean



**Notes:** The columns show the average percentage growth rates (100 times log first difference) of the top 1% income share (grey), the top 10-1% income share (green) and the bottom 90% income share (orange) for the five years before a crisis, the crisis year and the five years afterwards. The columns are stacked for comparability. The full sample of data is used (1914-2014). Years of global war and years that are simultaneously pre-crisis and post-crisis years are excluded. Appendix Table A2 shows the crises by country.

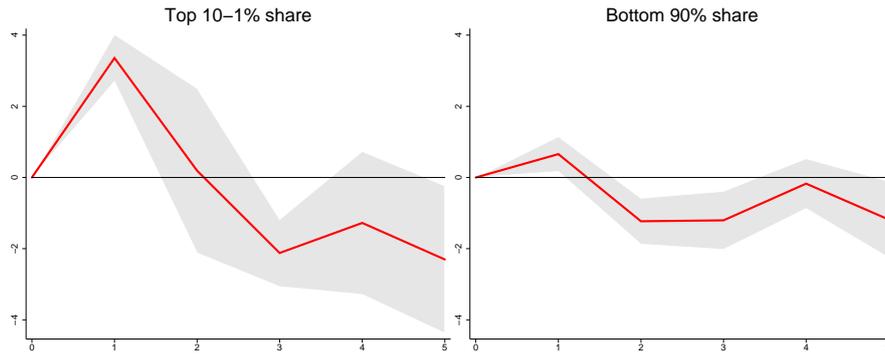
fixed effects, respectively.<sup>14</sup> In line with previous estimates, for the pre-crisis period (five years), the estimates indicate that growth in the top 1% income share more negatively affects the remaining top 10% (coefficient of -0.014) than the bottom 90% (coefficient of -0.007), while both results are statistically significant. Also the loss of income by the top 1% of earners in the immediate aftermath of a crisis (post-crisis year 1) most likely benefits the next nine percentiles (positive and significant coefficient of 0.018) and not the bottom 90%.

The local projections shown in Figure 4.5 support this finding. The left panel refers to the top 10-1% share and the right panel to the bottom 90% share. The red lines correspond to local projections of the average cumulative percentage change in the log first difference of the income share variable (y-axis) relative to crisis year for years 1-5 thereafter (x-axis). The shaded region is a 90% confidence interval, respectively. The left panel reveals that the first year after a crisis tends to accelerate the income share of the bottom nine percentiles of the top 10%. Thereafter, and especially from year 3, growth rates relative to crisis outbreak decrease strongly, potentially complementing the recovery in the growth rate of the top 1% income share. The cumulative path of the bottom 90% growth rate follows a similar direction, but the coefficients are much smaller and the downturn

<sup>14</sup>In contrast to previous regressions, the pre-crisis horizon is included in its entirety (5-year indicator variable) as a control. Figure 4.4 already indicates that, different from the post-crisis horizon, dynamics are quite similar across the five pre-crisis years. Moreover, notice that the sample here is smaller than that of the top 1% share because there are less observations for the top 10% share, by means of which the two variables were constructed. Notice that the results for the regressions of the top 1% share presented earlier were also robust to using the smaller sample limited to country-years where data on both the top 1% share and the top 10% share was available.

sets in earlier (year 2). Thus, generally these estimates point to a substantially stronger crisis response by the top 10-1% share than by the residual 90% share. The evidence shown here indicates that both the run up to and the aftermath of financial crises do not trigger substantial changes in the income distribution as a whole. Rather changes relate to flows in income between the super rich and the working rich among the top 10%.

Figure 4.5: The rest of the distribution: local projections



**Notes:** The paths show local projections of the average cumulative change in the log first difference of the top 10-1% income share variable (left panel) and the bottom 90% income share variable (right panel) relative to crisis year for years 1-5 after crisis. The shaded region is a 90% confidence interval. The full sample of data is used (1914-2014). The set of control variables is the same as in Table 4.8 (coefficients not reported). The regressions include country fixed effects. Appendix Table A2 shows the crises by country. For the corresponding regression results see Appendix Table D1 (Panels B and C).

## 4.6 Conclusion

This chapter studies the dynamics in top income shares surrounding financial crises with a historical perspective. The evidence from 17 countries and (up to) 100 years of data for each country studied shows that the top 1% of earners suffers from the onset of a financial crisis only in the very short term. The top income shares recover quickly and even grow at above-average rates in the medium-term aftermath of a crisis. Moreover, the run up to a crisis is typically marked by accelerating growth in top incomes. Generally, the evidence uncovered here points into the direction that financial crisis are typically surrounded by episodes of increasing inequality. The temporary reduction in top incomes as a consequence of the outbreak is not able to compensate for these general inequality-increasing effects.

The main results of this study are robust to controlling for country-specific effects and common year shocks. The influence of boom and bust cycles of the real economy and, more importantly, financial markets was accounted for in the regression model. This makes it more likely that the observed effects stem from the crisis event per se. The main results are visible in the data both before and after World War II. However, the effects are more pronounced for crises in the

post-World War II period. Moreover, top income shares appear to respond stronger to crises in Anglo-Saxon countries than in continental Europe.

Finally, this study suggests that crisis-induced shifts of income take place mainly between the top 1% and the remainder of the top decile of earners. The short-term income loss among the top 1% benefits the next nine percentiles substantially more than the bottom 90%. Similarly, accelerating growth in the top income share during the run-up to and the recovery from a crisis causes the top 10-1% share to decline more than the share of the bottom 90% of the distribution. Thus, the study indicates that financial crises are associated with a reduction of inequality at the top in the short-term (crisis outbreak), and more inequality at the top in the medium term (before and after the crisis outbreak), while their influence on the income distribution as a whole appears to be limited.

## Appendix A. Variables and summary statistics

Table A1: Top 1% income share series by country (raw data)

| Country        | Period    | Obs. | Gaps | Source break | Tax unit break | Capital gains |
|----------------|-----------|------|------|--------------|----------------|---------------|
| Australia      | 1921-2013 | 93   | -    | -            | -              | yes           |
| Canada         | 1920-2010 | 91   | -    | yes          | -              | -             |
| Denmark        | 1915-2010 | 93   | yes  | -            | yes            | -             |
| Finland        | 1920-2009 | 90   | -    | yes          | -              | -             |
| France         | 1915-2012 | 98   | -    | -            | -              | -             |
| Germany        | 1914-2010 | 43   | yes  | -            | -              | -             |
| Ireland        | 1938-2009 | 37   | yes  | -            | -              | -             |
| Italy          | 1974-2009 | 33   | yes  | -            | -              | -             |
| Japan          | 1914-2010 | 96   | yes  | -            | -              | -             |
| Netherlands    | 1914-2012 | 68   | yes  | -            | -              | -             |
| Norway         | 1929-2011 | 65   | yes  | -            | -              | -             |
| Portugal       | 1976-2005 | 24   | yes  | -            | -              | yes           |
| Spain          | 1981-2012 | 32   | -    | -            | -              | -             |
| Sweden         | 1916-2013 | 78   | yes  | -            | -              | -             |
| Switzerland    | 1933-2010 | 46   | yes  | -            | -              | -             |
| United Kingdom | 1918-2012 | 63   | yes  | -            | yes            | yes           |
| United States  | 1914-2014 | 101  | -    | -            | -              | -             |

**Notes:** The table shows the characteristics of the raw WID top 1% income share data series for each country in the sample. - = no missing data, source/tax unit break and capital gains excluded respectively. The country-specific sources for the series are as follows: Australia: Atkinson and Leigh (2007). Canada: Saez and Vaell (2007); Vaell (2010). Denmark: Atkinson and Sogaard (2013). Finland: Jäntti, Riihelä, Sullström, and Tuomala (2010); Riihelä, Sullström, and Tuomala (2010). France: Piketty (2001; 2007); Camille (2007). Germany: Dell (2007); Bartels and Jenderny (2015). Ireland: Nolan (2007). Italy: Alvaredo and Pisano (2010). Japan: Moriguchi and Saez (2010); Alvaredo, Moriguchi and Saez (2012). Netherlands: Salverda and Atkinson (2007); Salverda (2013). Norway: Aaberge and Atkinson (2010); Aaberge, Atkinson, and Modalsli (2013). Portugal: Alvaredo (2009). Spain: Alvaredo and Saez (2009; 2010). Sweden: Roine, Waldenström (2010). Switzerland: Dell, Piketty, and Saez (2007); Foellmi and Martinez (2012). United Kingdom: Atkinson (2007). United States: Piketty and Saez (2007).

Table A2: Chronology of banking crises

|                |      |      |      |      |
|----------------|------|------|------|------|
| Australia      | 1989 |      |      |      |
| Canada         | 1923 |      |      |      |
| Denmark        | 1921 | 1931 | 1987 | 2008 |
| Finland        | 1921 | 1931 | 1991 |      |
| France         | 1930 | 2008 |      |      |
| Germany        | 1931 | 2008 |      |      |
| Ireland        | 2008 |      |      |      |
| Italy          | 1990 | 2008 |      |      |
| Japan          | 1920 | 1927 | 1997 |      |
| Netherlands    | 1921 | 1939 | 2008 |      |
| Norway         | 1931 | 1988 |      |      |
| Portugal       | 2008 |      |      |      |
| Spain          | 1978 | 2008 |      |      |
| Sweden         | 1922 | 1931 | 1991 | 2008 |
| Switzerland    | 1931 | 1991 | 2008 |      |
| United Kingdom | 1974 | 1984 | 1991 | 2007 |
| United States  | 1929 | 1984 | 2007 |      |

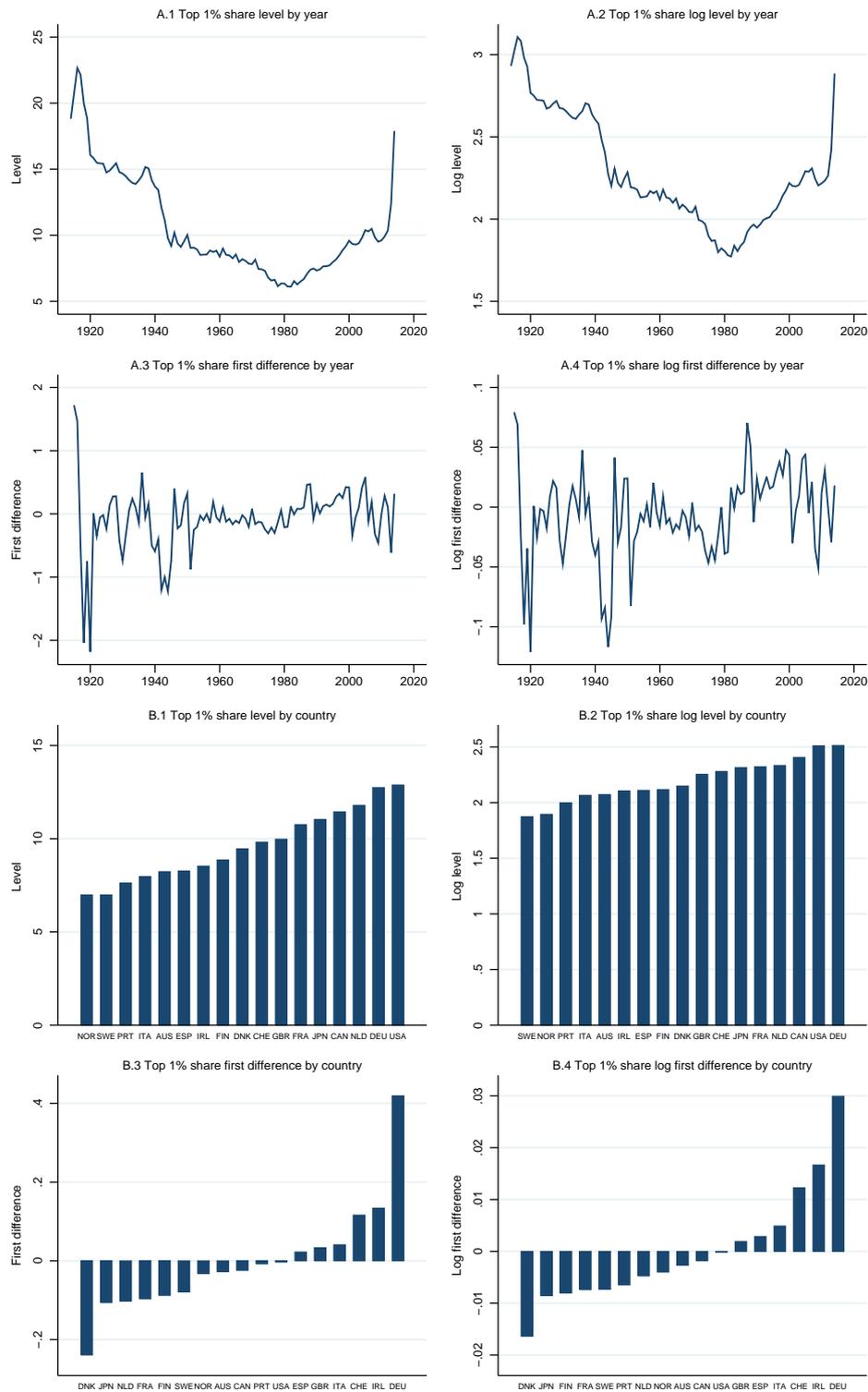
**Notes:** The dates of systemic financial crises are based on Jordà et al. (2013), sources therein, and updates. The table shows 40 financial crisis events in 17 countries from 1914-2014 included in the analysis of this study. Post-1914 crisis dates in Jordà et al. (2013) that were excluded due to top income data constraints: Italy 1921, 1930, 1935; Norway 1922; Portugal 1920, 1923, 1931; Spain 1920, 1924, 1931.

Table A3: Summary statistics

| Variable                | Obs. | Mean  | Std.Dev. | Min.  | Max. |
|-------------------------|------|-------|----------|-------|------|
| Top 1% income share     | 1147 | 9.86  | 4.00     | 3.49  | 28.0 |
| Top 10-1% income share  | 985  | 23.8  | 2.91     | 14.5  | 32.0 |
| Bottom 90% income share | 986  | 66.8  | 5.73     | 45.8  | 81.2 |
| Financial crisis dummy  | 1510 | 0.03  | 0.16     | 0.00  | 1.00 |
| Real GDP per capita     | 1510 | 47.0  | 29.5     | 5.75  | 105  |
| CPI inflation           | 1510 | 0.03  | 0.16     | 0.00  | 1.00 |
| Current account/GDP     | 1280 | -0.01 | 0.04     | -0.21 | 0.02 |
| Stock market index/100  | 1211 | 5.37  | 15.1     | 0.00  | 146  |
| Private credit/GDP      | 1335 | 0.53  | 0.41     | 0.03  | 2.70 |
| Population/1000000      | 1413 | 39.5  | 53.6     | 3.14  | 311  |
| Global war indicator    | 1510 | 0.12  | 0.32     | 0.00  | 1.00 |

**Notes:** Summary statistics refer to the available raw data collection for all 17 countries and all years from 1914 to 2014, including periods of global war (1914-1918 and 1939-1949).

Figure A1: Top 1% shares: level and growth over time and across countries



**Notes:** Panel A shows annual averages and Panel B country-specific averages of the level (1), the log level (2), the first difference (3) and the log first difference (4) of the top 1% income share. The figures use all available data, 20 countries and the years 1914-2014.

## Appendix B. Sample split

Table B1: Top 1% income share and crises: interwar vs. post-WW2 (OLS)

|                                   | (1)      | (2)      | (3)     |
|-----------------------------------|----------|----------|---------|
| Panel A: Interwar sample          |          |          |         |
| Pre-crisis dummy (5 years)        | 0.005    | 0.010    | 0.017   |
| Robust S.E.                       | (0.011)  | (0.013)  | (0.013) |
| Post-crisis dummy (5 years)       | 0.002    | 0.003    | 0.005   |
| Robust S.E.                       | (0.012)  | (0.008)  | (0.012) |
| $R^2$                             | 0.079    | 0.074    | 0.316   |
| Observations                      | 153      | 153      | 153     |
| Panel B: Post-World War II sample |          |          |         |
| Pre-crisis dummy (5 years)        | 0.028*** | 0.031*** | 0.023** |
| Robust S.E.                       | (0.007)  | (0.006)  | (0.009) |
| Post-crisis dummy (5 years)       | 0.013*   | 0.016**  | 0.017** |
| Robust S.E.                       | (0.008)  | (0.006)  | (0.007) |
| $R^2$                             | 0.102    | 0.116    | 0.225   |
| Observations                      | 724      | 724      | 724     |

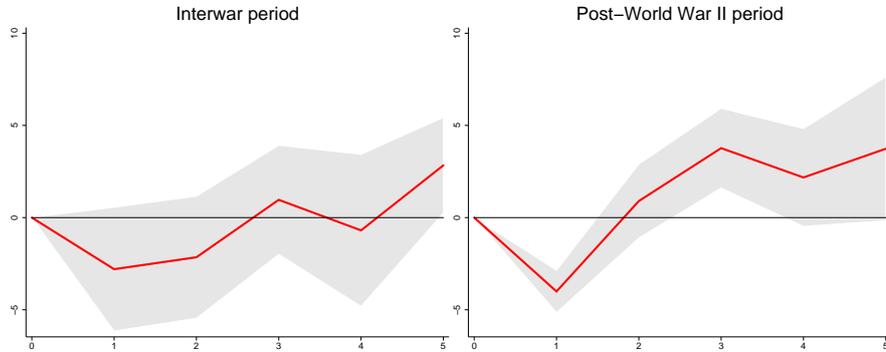
**Notes:** This table compares the logged first differences of top 1% income shares in pre-crisis and post-crisis episodes to their average levels, controlling for a set of economic fundamentals. The time windows for pre-crisis and post-crisis are five years. The estimation method is least squares. (1) plain, (2) with country fixed effects and (3) with country and year fixed effects. Robust standard errors clustered by country are shown in parentheses. The interwar sample (Panel A) is restricted to the years from 1920-1938. The post-World War II sample (Panel B) covers to the period 1950-2014. The regressions include the same set of controls as those reported in Table 4.8 (coefficients not reported). \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

Table B2: Top 1% income share and crises: Anglo-Saxon vs. continental Europe (OLS)

|                                | (1)      | (2)     | (3)     |
|--------------------------------|----------|---------|---------|
| Panel A: Anglo-Saxon countries |          |         |         |
| Pre-crisis dummy (5 years)     | 0.033*** | 0.042   | 0.024   |
| Robust S.E.                    | (0.013)  | (0.019) | (0.011) |
| Post-crisis dummy (5 years)    | 0.002    | 0.009*  | -0.006  |
| Robust S.E.                    | (0.012)  | (0.004) | (0.006) |
| $R^2$                          | 0.105    | 0.127   | 0.556   |
| Observations                   | 310      | 310     | 310     |
| Panel B: All other countries   |          |         |         |
| Pre-crisis dummy (5 years)     | 0.016**  | 0.016** | 0.014   |
| Robust S.E.                    | (0.007)  | (0.005) | (0.010) |
| Post-crisis dummy (5 years)    | 0.010    | 0.010   | 0.017*  |
| Robust S.E.                    | (0.008)  | (0.007) | (0.009) |
| $R^2$                          | 0.098    | 0.089   | 0.233   |
| Observations                   | 598      | 598     | 598     |

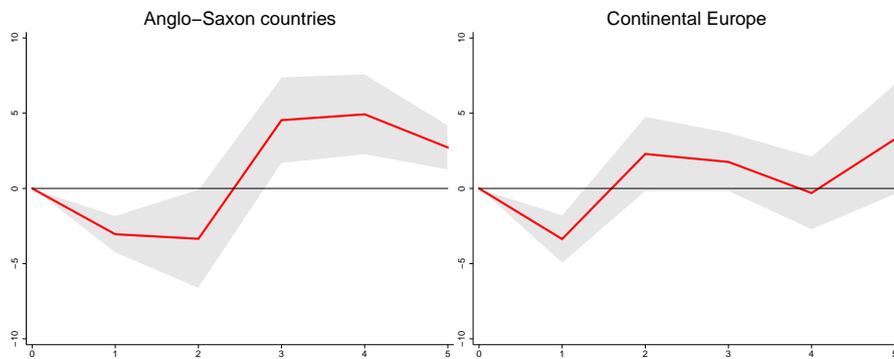
**Notes:** This table compares the logged first differences of top 1% income shares in pre-crisis and post-crisis episodes to their average levels, controlling for a set of economic fundamentals. The time windows for pre-crisis and post-crisis are five years. The estimation method is least squares. (1) plain, (2) with country fixed effects and (3) with country and year fixed effects. Robust standard errors clustered by country are shown in parentheses. The Anglo-Saxon sample (Panel A) is restricted to Australia, Canada, the United Kingdom and the U.S. Panel B covers the rest of the countries. Both samples use annual data from 1914-2014. The regressions include the same set of controls as those reported in Table 4.8 (coefficients not reported). \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

Figure B1: Post-crisis top 1% share growth: local projections (interwar vs. post-WW2)



**Notes:** The path shows local projections of the average cumulative change in the log first difference of the top 1% income share variable (y-axis) relative to crisis year for years 1-5 after crisis. The shaded region is a 90% confidence interval. The left panel covers the years 1920-1938 and the right panel 1950-2014. The set of control variables is the same as in Table 4.8 (coefficients not reported). The regressions include country fixed effects. Appendix Table A2 shows the crises by country. For the corresponding regression results see Appendix Table D2 (Panels A and B).

Figure B2: Post-crisis top 1% share growth: local projections (Anglo-Saxon vs. continental Europe)



**Notes:** The path shows local projections of the average cumulative change in the log first difference of the top 1% income share variable (y-axis) relative to crisis year for years 1-5 after crisis. The shaded region is a 90% confidence interval. The left panel is restricted to Anglo-Saxon countries (Australia, Canada, the United Kingdom and the U.S.). The right panel covers all other countries. Both samples use annual data from 1914-2014. The set of control variables is the same as in Table 4.8 (coefficients not reported). The regressions include country fixed effects. Appendix Table A2 shows the crises by country. For the corresponding regression results see Appendix Table D2 (Panels C and D).

## Appendix C. Effects on the rest of the distribution

Table C1: The rest of the income distribution (OLS regressions)

|   | Top 10-1%<br>(1)     | Top 10-1%<br>(2)     | Bot 90%<br>(1)      | Bot 90%<br>(2)       |
|---|----------------------|----------------------|---------------------|----------------------|
| Pre-crisis (5 years)                        | -0.014***<br>(0.004) | -0.013**<br>(0.004)  | -0.007**<br>(0.003) | -0.008**<br>(0.003)  |
| Crisis year                                 | 0.008<br>(0.012)     | -0.001<br>(0.013)    | 0.001<br>(0.007)    | 0.003<br>(0.008)     |
| Post-crisis year 1                          | 0.018***<br>(0.005)  | 0.003<br>(0.007)     | 0.004<br>(0.003)    | 0.001<br>(0.003)     |
| Post-crisis year 2                          | -0.003<br>(0.012)    | -0.011<br>(0.009)    | -0.010<br>(0.003)   | -0.015***<br>(0.004) |
| Post-crisis year 3                          | -0.012<br>(0.008)    | -0.0135<br>(0.010)   | -0.005<br>(0.006)   | -0.003<br>(0.008)    |
| Post-crisis year 4                          | -0.022*<br>(0.011)   | -0.0186<br>(0.013)   | 0.001<br>(0.000)    | -0.001<br>(0.004)    |
| Post-crisis year 5                          | -0.014<br>(0.011)    | -0.0124<br>(0.013)   | -0.007<br>(0.006)   | -0.015**<br>(0.007)  |
| $\Delta \ln(\text{Real GDP p.c.}) t-1$      | -0.104**<br>(0.040)  | -0.205***<br>(0.068) | -0.003<br>(0.077)   | -0.134*<br>(0.063)   |
| $\Delta \ln(\text{CPI}) t-1$                | 0.107**<br>(0.038)   | 0.042<br>(0.035)     | 0.110**<br>(0.043)  | 0.130***<br>(0.054)  |
| $\Delta (\text{Current account/GDP}) t-1$   | 0.148<br>(0.117)     | 0.182*<br>(0.097)    | 0.139<br>(0.131)    | 0.125<br>(0.108)     |
| $\Delta \ln(\text{Stock market index}) t-1$ | -0.027***<br>(0.009) | -0.015<br>(0.010)    | -0.007*<br>(0.0044) | -0.010<br>(0.006)    |
| $\Delta \ln(\text{Private credit/GDP}) t-1$ | 0.039<br>(0.026)     | 0.053<br>(0.031)     | 0.044<br>(0.032)    | 0.053**<br>(0.024)   |
| $\Delta \ln(\text{Population}) t-1$         | 1.710**<br>(0.716)   | 0.602<br>(0.552)     | 0.702<br>(0.497)    | 0.640<br>(0.606)     |
| Global war indicator                        | 0.011<br>(0.007)     | 0.093***<br>(0.014)  | 0.040**<br>(0.014)  | 0.217***<br>(0.011)  |
| $R^2$                                       | 0.111                | 0.256                | 0.091               | 0.311                |
| Observations                                | 761                  | 761                  | 761                 | 761                  |

**Notes:** This table compares the logged first differences of income shares in pre-crisis and post-crisis episodes to their average levels, controlling for a set of economic fundamentals. The pre-crisis dummy has the value of 1 for the five years prior to a financial crisis. Crisis year is a binary indicator for the year of the crisis outbreak. Post-crisis year 1 to post-crisis year 5 are dummies for each of the five years thereafter. Columns 2-3 use the logged first difference of the income share of the top 10-1% as dependent variable, and columns 4-5 the logged first difference of the income share of the bottom 90%. The estimation method is least square, where (1) include country fixed effects and (2) country and year fixed effects, respectively. Robust standard errors clustered by country are shown in parentheses. The full sample of annual data is used (1914-2014). \*\*\* Significant at .01 \*\* Significant at .05 \* Significant at .1.

## Appendix D. Local projections

Table D1: Local projections of income share growth rates, 1914-2014

| (A) Top 1% share     | Year 1             | Year 2             | Year 3             | Year 4          | Year 5           |
|----------------------|--------------------|--------------------|--------------------|-----------------|------------------|
| Financial crisis     | -3.35***<br>(0.73) | 0.59<br>(1.51)     | 2.80**<br>(1.03)   | 1.25<br>(1.31)  | 3.34**<br>(1.54) |
| $R^2$                | 0.524              | 0.497              | 0.495              | 0.565           | 0.451            |
| Observations         | 876                | 852                | 828                | 809             | 792              |
| (B) Top 10-1% share  | Year 1             | Year 2             | Year 3             | Year 4          | Year 5           |
| Financial crisis     | 3.36***<br>(0.40)  | 0.19<br>(1.41)     | -2.12***<br>(0.58) | -1.28<br>(1.22) | -2.30*<br>(1.26) |
| $R^2$                | 0.537              | 0.500              | 0.515              | 0.574           | 0.471            |
| Observations         | 732                | 711                | 690                | 672             | 655              |
| (C) Bottom 90% share | Year 1             | Year 2             | Year 3             | Year 4          | Year 5           |
| Financial crisis     | 0.66**<br>(0.30)   | -1.23***<br>(0.39) | -1.20**<br>(0.50)  | -0.17<br>(0.43) | -1.18*<br>(0.65) |
| $R^2$                | 0.483              | 0.507              | 0.547              | 0.555           | 0.479            |
| Observations         | 736                | 715                | 694                | 676             | 659              |

Notes: \*\*\* Significant at .01 \*\* significant at .05 \* significant at .1. Robust standard errors (clustered by country) in parentheses. Results correspond to local projections of cumulative percentage change in the log first difference of the income share relative to peak for years 1-5 after the financial crisis. The panels cover the years 1914-2014. The controls are the same as in the regressions in Table 4.8 (coefficients not reported). See text.

Table D2: Local projections of the top 1% income share growth rate: subsamples

| (A) Interwar era       | Year 1             | Year 2          | Year 3           | Year 4          | Year 5          |
|------------------------|--------------------|-----------------|------------------|-----------------|-----------------|
| Financial crisis       | -2.80<br>(2.04)    | -2.15<br>(2.01) | 0.97<br>(1.80)   | -0.69<br>(2.51) | 2.84<br>(1.58)  |
| $R^2$                  | 0.521              | 0.641           | 0.562            | 0.591           | 0.553           |
| Observations           | 148                | 145             | 142              | 140             | 139             |
| (B) Post-World War II  | Year 1             | Year 2          | Year 3           | Year 4          | Year 5          |
| Financial crisis       | -4.01***<br>(0.70) | 0.90<br>(1.22)  | 3.77**<br>(1.31) | 2.18<br>(1.61)  | 3.73<br>(2.37)  |
| $R^2$                  | 0.547              | 0.493           | 0.484            | 0.568           | 0.447           |
| Observations           | 693                | 672             | 651              | 634             | 618             |
| (C) Anglo-Saxon        | Year 1             | Year 2          | Year 3           | Year 4          | Year 5          |
| Financial crisis       | -3.05**<br>(0.76)  | -3.35<br>(2.00) | 4.54*<br>(1.75)  | 4.93*<br>(1.63) | 2.72*<br>(0.91) |
| $R^2$                  | 0.507              | 0.539           | 0.538            | 0.560           | 0.540           |
| Observations           | 300                | 294             | 289              | 286             | 283             |
| (D) Continental Europe | Year 1             | Year 2          | Year 3           | Year 4          | Year 5          |
| Financial crisis       | -3.37***<br>(0.98) | 2.29<br>(1.52)  | 1.76<br>(1.20)   | -0.30<br>(1.49) | 3.27<br>(2.24)  |
| $R^2$                  | 0.534              | 0.480           | 0.479            | 0.574           | 0.410           |
| Observations           | 576                | 558             | 539              | 523             | 509             |

Notes: \*\*\* Significant at .01 \*\* significant at .05 \* significant at .1. Robust standard errors (clustered by country) in parentheses. Results correspond to local projections of cumulative percentage change in the log first difference of the top 1% income share relative to peak for years 1-5 after the financial crisis. Panel A is restricted to the period 1920-1938. Panel B covers the period 1950-2014. Panel C includes Australia, Canada, the United Kingdom and the U.S. (1914-2014). Panel D includes continental Europe and Japan (1914-2014). The controls are the same as in the regressions in Table 4.8 (coefficients not reported). See text.



## Chapter 5

# Inequality and savings in the United States, 1984-2007

The foregoing chapter has discussed the distributional implications of financial crises for a set of advanced countries. This chapter takes a special focus on the United States. The growth in income inequality in the decades preceding the 2007 U.S. financial crisis has recently attracted a great deal of attention. The decline in personal saving over the run-up to the crisis is relatively understudied. These important trends have so far mostly been examined isolated from each other. Using survey data on household portfolios, this chapter examines saving rates among income quintiles in the U.S. during the period from 1984-2007. First, higher quintiles saved more than lower quintiles at any time. Second, all quintile-specific saving rates show a decline. Third, the savings reduction was most pronounced among the middle class, particularly the upper-middle-income group. Capital gains and household debt may play a key role in this regard.

### 5.1 Introduction

The 2007-08 financial crisis has focused renewed attention on two persistent macroeconomic trends in postwar U.S. economic history that until very recently have been treated separately: the enduring decline in personal savings and the sharp increase in income inequality. From the end of World War II to the early 1980s, the savings of American households averaged a stable 10% of disposable income according to official estimates. Since then, the U.S. personal saving rate has been trending down constantly, to approximately 5% in the 1990s, and to near-zero levels after the turn of the century. As documented in Atkinson et al. (2011), income inequality was modest and at stable levels in the U.S. from 1950 to 1980. The share in total income held by the top ten percent of earners seldomly exceeded one third, and the top one percent earned approximately 10% of national income, on average. From the early 1980s until the recent financial crisis, however, income inequality has increased dramatically, resulting in a top decile income share of almost 50% in the year 2007. Similarly, the income share of the top one percent had more than doubled by the mid-2000s, to over 20%.

The coincidence of the two trends is thought-provoking. Rajan (2010) proposed that rising income inequality in the U.S. over the decades prior to 2007 was a contributing factor leading up to the financial crisis and that household finance

was key in this regard. More specifically, the argument is that policy reacted to rising income inequality by bank deregulation and low interest rates in order to provide easier access to credit, particularly in the form of mortgages, which led to anomalies on both sides of the financial market (e.g., Fitoussi and Sacareno, 2009). On the demand side, poor households were willing to borrow beyond reasonable levels to maintain their standard of living despite stagnation in real incomes (e.g., Stiglitz, 2009). Simultaneously, on the supply side, those who benefited from income inequality, the rich, were encouraged to supply ever more credit to riskier borrowers in search for high-return investments. This caused private credit and house prices to grow beyond sustainable levels, which led to a bubble that eventually burst in 2007. Similarly, a theoretical model by Kumhof and Rancière (2011) demonstrates how the concentration of income among the rich leads to a rise in savings for this group, which are used to purchase additional credit to lend to lower- and middle-income households, who borrow to compensate losses of savings and income. These authors present empirical evidence that their model sits well not only with the run-up to the 2007 financial crisis, but also with the decades prior to the 1929 financial meltdown in the U.S.<sup>1</sup>

In a similar vein, some point to capital gains during the 1980s and 1990s booms in house and stock prices as a causal factor of the savings decline related to inequality (Juster et al., 2004). More specifically, the so-called “wealth effect” proposes that households tend to increase spending (and reduce saving) as asset values increase because they perceive themselves to be wealthier. Naturally, this effect can be regarded stronger among lower- and middle-income groups than the actual rich. Thus, the more unequal total income is distributed, the more aggregate saving declines when equity prices increase. More traditionally, Keynesian consumption function theory suggests an increase in a household’s savings as a consequence of income growth, implying that the concentration of incomes should generally lead to a larger amount of overall saving. This perception is at odds with the observed trends in the U.S. over the past decades. These rather corroborate the monetarist view that household saving decisions are independent of changes in income in the long run, so that the income distribution and the distribution of savings act quite isolated from each other (Modigliani and Brumberg, 1954; Friedman, 1957).

This chapter examines potential relationships between the increase in inequality and the drop in personal saving in the U.S., with a special focus on capital gains and household debt. The main research question is how saving has developed among individual U.S. income groups in view of the rise in inequality and the simultaneous reduction in the aggregate saving rate over the period from 1984 to 2007. Did high-income households save a larger fraction of their income or not? Has inequality a role in explaining the overall savings decline? How has the increase in loans and asset prices in the decades prior to the 2007 crisis affected the saving rates of individual groups?

For this purpose, this study calculates quintile-specific saving rates from survey data representative of the US population provided by the Panel Study of Income Dynamics (PSID). The advantage of these data is that they decompose the change

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<sup>1</sup>Generally, the positive relationship between credit booms and the likelihood of financial crisis is one of the most consensual points in the empirical literature (e.g., Kaminsky and Reinhart, 1999; Mendoza and Terrones, 2008; Mian and Sufi, 2010; Schularick and Taylor, 2012). Martin and Philippon (2014) provide another theoretical rationalization of the mechanism. Recent cross-country studies however shed doubt on the inequality part of the Rajan hypothesis beyond the U.S. case. For example, using data on 17 advanced economies over the past 140 years, Bordo and Meissner (2012) find no evidence that inequality has systematically increased credit or the probability of a financial crisis directly.

in total wealth between two surveys into saving in the traditional sense and (realized and unrealized) capital gains. The PSID collects detailed information on different asset types and household debt. This rich data structure allows comprehensive study of the channels outlined above. The econometric analysis builds on a consistent methodology pioneered in Dynan et al. (2004) in order to consistently estimate and compare quintile-specific saving rates in the cross-sectional and time dimension. Moreover, this research uses different proxies for permanent income in the PSID data to eliminate the effects of transitory income. Ultimately, the study investigates the interplay between capital gains, savings and consumer debt across the income distribution and over time.

The first lesson learned from the microdata is that higher quintiles saved a significantly larger fraction of their income than lower quintiles *at any time* between 1984 and 2007. This finding corroborates the results reported by Dynan et al. (2004) for the years 1984-1989 for a substantially longer period. The second key observation is that *all* quintile-specific saving rates show a decline over the run up to the 2007 financial crisis. However, the savings reduction was most pronounced among the middle class, particularly the upper-middle-income group. Finally, there is evidence in the PSID data that capital gains and household debt may play a key role in this regard. Thus this study somewhat supports both the Rajan (2010) argument and the wealth effect hypothesis by Juster et al. (2004). Importantly, all results were robust to using current income or a set of instruments for permanent income to determine income quintiles.

The rest of this chapter is structured as follows. The next part presents and discusses important theoretical models and empirical findings with a special focus on the U.S. The dataset and the methodology are introduced in the third section. The fourth section reports the results from an econometric analysis of the development of saving rates among income quintiles in the U.S. over the period from 1984-2007. The sixth section provides deeper insight into the role of capital gains and household debt in the savings-inequality relationship. The last section concludes.

## 5.2 Theory and empirical research

This section discusses the literature on the relationship between income distribution and household saving. Moreover, it presents broad dynamics in incomes, the income distribution and the saving rate in the U.S. over the past decades. First, the relevant theoretical models are discussed. Second, micro-level and macro-level evidence is summarized. The last part demonstrates important stylized facts on the development of the variables under consideration in the U.S. from 1984-2007.

### Theory

The question of whether rich or poor people save more of their income has been debated in economics for decades. Keynes' Fundamental Psychological Law of Consumption (1936) states that "[m]en are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in their income." (p. 96). Given that saving propensities complement consumption propensities, on the micro-level, the marginal propensity to consume (MPC) implies that household saving rates<sup>2</sup> increase with household income. Respectively, the aggregate saving rate should rise with aggregate income

<sup>2</sup>Henceforth, the term "saving rate" is used in the sense of the average propensity to save, i.e., the ratio of savings to income.

growth. For the matter of income distribution, other things being equal, a transfer of incomes from poor households to rich households, i.e., growing income inequality, should thus result in a higher aggregate saving rate (and vice versa).<sup>3</sup> The view that income inequality harms aggregate demand and promotes aggregate saving and therefore investment and long-term growth is also typically present in the neoclassical literature on economic growth (e.g., Solow, 1956; Swan, 1956; Kaldor, 1957).

Several consumption regression estimates that used U.S. cross-sectional data and short-term aggregate data from the early and mid-20th century were consistent with Keynes' prediction, showing a saving rate that increases with income. Expenditure survey data typically found cross-sectional or household MPCs in the range of .60 to .80 (see, for instance, the review of Bunting, 1989). However, earlier long-run time-series data on aggregate income and savings by Kuznets (1942, 1953) and others presented a remarkably constant aggregate saving rate for the U.S., notwithstanding income growth. Kuznets found stable aggregate consumption ratios of about .90 from 1869 to 1938. Closely related findings include Ferber (1953) and Goldsmith (1955). This phenomenon became well-known as the "Kuznets" paradox.<sup>4</sup>

In response to the empirical ambiguity, Friedman's (1957) "permanent income hypothesis" proposes that consumption is not determined by current income, but is solely a fraction of permanent income, defined as average or expected income.<sup>5</sup> This framework is based on the idea of forward-looking households that desire to smooth out consumption over an infinite time horizon.<sup>6</sup> In this view, all transitory income components, i.e., upward variations from permanent income, are saved to protect consumption against future income losses, which explains the increases in cross-sectional and short-term aggregate saving rates.<sup>7</sup> In the long-run aggregate most transitory components would cancel out, which leads to the stability of the saving rate observed in time-series.

The Modigliani and Brumberg (1954) life-cycle model has become the centerpiece of household saving research. It distinguishes from the permanent income hypothesis mainly in the limited (lifetime) horizon considered and is concerned with the hump-shaped age profile of saving due to the inter-temporal allocation of lifetime income and wealth. It is important to note that in the life-cycle framework, contrary to Friedman's infinite horizon model, smoothing does not mean keeping consumption proportional to permanent income but rather that agents try to keep the marginal

<sup>3</sup>Keynes (1939): "[t]he collective propensity for the community as a whole may depend (inter alia) on the distribution of incomes within it." (p. 129).

<sup>4</sup>Thomas (1989) objects that the early econometric history of the consumption function saw efforts to test Keynes' proposition with whatever data was available. Hence, half of the tests between 1937 and 1940 used cross-sectional data. In contrast, also due to the rapid improvement of national accounting data, 20 of 25 studies between 1941 and 1950 used time-series data (see also Bunting, 2001).

<sup>5</sup>Friedman typically treated permanent income as a trend-adjusted weighted average of past levels.

<sup>6</sup>The concept of forward-looking maximization dates back to Fisher's (1930) model of inter-temporal consumption, even though some express doubts about a direct Fisherian influence on Friedman (see, for example, Laidler, 2012).

<sup>7</sup>Friedman (1957) presented evidence that annual income is a poor proxy for consumption because researchers do not control for the transitory component in current income. This classical errors-in-variables bias leads to a slope coefficient of income that will be attenuated relative to the one obtained from the correct income measure. Consumption-income ratios will be overstated at the bottom and understated at the top, resulting in the observed high cross-sectional saving rates. For a detailed discussions of the statistical argument see Bunting (1989), Deaton (1992), Sabelhaus and Groen (1990), Bunting (2001), DeJuan et al. (2005), Palley (2010) or Rohstein and Wozny (2011).

utility of money constant over the life cycle, which may also involve variable expenditures (see Browning and Crossley, 2001).

Both models share that they fragment responses to income into a large but inertial permanent component that drives consumption, and a flexible but highly transitory and small component that drives saving. This implicitly sheds doubt on the need and effectiveness of interventionist fiscal policy.<sup>8</sup> The bottom line of the argument is that substantial changes in household consumption - and therefore in the long-term path of the aggregate saving rate - only occur when households perceive changes in income as permanent. In this view, short-term income tax cuts to promote consumer spending during recessions or temporary mean-preserving fiscal policies will have no impact on consumption at all. In the short run, and in line with Keynes' Law, the impact of changes in the income distribution and equivalent mean-preserving policies on the household saving rate should be noticeable, when those with higher current income save more than their lower income counterparts to protect against lower future income (e.g., Deaton, 1992; Leigh and Posso, 2009). In the long run, however, given the proportionality of consumption and the cancelling out of transitory increases in the saving rate the "proportion of income saved is essentially independent of income" in monetarist consumption function theory (Modigliani and Brumberg 1954, p. 150).

Whether the permanent/transitory distinction or Keynes' Law is more consistent with actual saving behavior and therefore, has more authority in the matter of public policy, is still subject to recurring discussion. Although Friedman's permanent income hypothesis is widely recognized for its theoretical appeal, empirical tests against real-world household survey data yields mixed results. In an early comprehensive survey of the "new" consumption function literature, Evans (1969) concludes that it remains an open question whether rich or poor individuals save a higher fraction of their income. Well-known empirical tests of the permanent income hypothesis by Mayer (1972) claim evidence against it, even though the author agrees that households plan their consumption ahead to some extent on the basis of income expectations.

Based on the pioneering work on rational expectations by Lucas (1976),<sup>9</sup> the "random walk hypothesis" by Hall (1978) adds an important uncertainty component to the permanent consumption function. It shows that, under the assumption of rational expectations, only unpredictable events in permanent income should affect current consumption, once lagged income is controlled for.<sup>10</sup> This new dichotomy between anticipated and unanticipated fluctuations in income has led to a range of stochastic studies estimating Euler equations that link lagged and current consumption in terms of an inter-temporal optimization problem.

Research typically finds that the sensitivity of consumption to changes in

<sup>8</sup>Friedman (1957): "[c]urrent consumption is adapted to some measure of longer-run income status, [...] a much larger part of current income is interpreted as autonomous and a much smaller part as dependent on current income [...]. The result is a smaller investment multiplier, and an inherently cyclically more stable system." (p. 238); Modigliani and Brumberg (1954): "[o]ur new understanding of the determinants of saving behavior cast some doubts on the effectiveness of a policy of income redistribution for the purpose of (changing) the average propensity to save." (p. 431).

<sup>9</sup>The prominent "Lucas Critique" (1976) formulates that econometric projections of the impact of macroeconomic policy measures which are purely based on previous quantitative evidence typically neglect that the measure itself affects expectations and therefore the behavior of agents that use all information available to maximize utility.

<sup>10</sup>Using postwar aggregate data for the U.S., Hall (1978) finds that neither lagged income nor lagged consumption have any power in predicting a future change in consumption, concluding that consumption follows a random walk with changes over time being unpredictable.

current income (excess sensitivity) is greater than the dynamic optimization theories predict but there is also evidence that consumption behavior is not as myopic as the Keynesian consumption function suggests. Flavin (1981) tested the rational expectations version of the permanent income hypothesis against post-World War II aggregate U.S. consumption data. He found that the consumption response to income innovations was about three times the value predicted by the model. Campbell and Deaton (1989) provide evidence that consumption strongly responds to changes in lagged income in aggregate data. Campbell and Mankiw (1989) detect a strong connection between current income and consumption, suggesting “rule of thumb” consumption behavior but also rapid income growth after periods in which consumption was high relative to income, which indicates forward-looking behavior. Shea (1995), Parker (1999) and Souleles (1999) find significant evidence of excess sensitivity in the response of consumption to predictable wage movements and anticipated tax cuts.<sup>11</sup>

### **Empirical research**

Several early 1990s studies of U.S. household survey data notice a strong positive relationship between saving rates and income. For example, Bosworth et al. (1991) arrange 1963-1985 saving rates derived from two U.S. consumer surveys (Survey of Consumer Finances and Consumer Expenditure Survey) by income group and over time, finding systematically higher saving rates among rich households than among poor ones. Similarly, Avery and Kennickel (1991) estimate real and nominal actual saving in the Survey of Consumer Finances between 1983-1986 and conclude that the overwhelming part of total saving is made up by the top income decile. Bunting (1991), using Consumer Expenditure Survey data from 1961-1987, objects that current saving ratios depend on the distribution of current income and that the MPC decreases with the quintile share of incomes, whereas “[t]he relative distribution of households by saving rate indicates that distinctions between transitory and permanent circumstances provide little insight” (p. 16).

In their careful review of the existing literature, Browning and Lusardi (1996) doubt that “any consumption smoothing story” (p. 1816) is likely to be the main driver in the positive correlation between income and saving in U.S. household survey data. Substantially more cross-section variation in income than within-group variation over time would speak for genuine permanent differences in saving behavior between the rich and the poor. This proposition is supported by evidence for higher age-saving-profiles in highly educated groups than in less educated groups, given the permanent nature of education and the positive correlation between educational attainment and income (e.g., Bernheim and Scholz, 1993; Attanasio, 1998).

With regard to household wealth, Avery and Kennickel (1991) provide evidence that almost all of U.S. net saving in the mid-1980s was made by the top decile of the wealth distribution. Along these lines, Bosworth et al. (1991) find that savings are typically concentrated among asset-rich households. In contrast, Juster et al. (2004) call attention to the spending response to increases in asset values. Their results suggest that U.S. household saving rates declined in part due to perceived wealth increases following capital gains on equity during the 1980s and 1990s stock market and housing booms. Examining retirement saving in the U.S., Gustman and Steinmeier (1999) and Venti and Wise (1999) yield roughly constant wealth-to-income ratios across lifetime income groups, indicating considerable in-

<sup>11</sup>See Jappelli and Pistaferri (2010) for a detailed summary of the literature.

group heterogeneity of retirement wealth. They conclude that most of the observed variation in saving is primarily a result of differences in saving propensities that are not driven by the income level.

Exploiting PSID and other survey data, Dynan et al. (2004) compare median saving rates (1984-89) across current-income groups and permanent-income groups, using education, lagged income and future income as proxies for the permanent income. Controlling for age effects, they find a strong positive correlation between saving and both current and permanent income. Their results also indicate that rich households have a larger marginal propensity to save out of permanent income than poor households. Foellmi (2008) summarizes the state of the art as follows: “[t]he empirical relevance of decreasing MPC is unquestioned. Looking at household data, it is a well-established fact that rich people save more.” (p. 2).

Compared to the bulk of micro-level literature, there has been little effort to examine the relation between income inequality and saving rates on the macro-level.<sup>12</sup> Several early empirical studies on the correlation between aggregate saving and income inequality (e.g., Blinder, 1975; Della Valle and Oguchi, 1976; Musgrove, 1980) find a negative and to the most part insignificant relationship. However, Cook (1995), using developing country data from the 1970s and 1980s, concludes a robust positive effect of several inequality measures on the ratio of gross domestic savings to GDP. Similarly, Hong (1995) obtains a positive effect of the top quintile income share on aggregate saving rates for a set of advanced countries, pointing to more saving in the wake of income inequality. Smith (2001) estimates that a 10 percentage point increase in a country’s Gini coefficient is associated with a significant 1.5 percent increase in the aggregate saving rate. Along these lines, Forbes (2000) finds that an increase in the level of inequality has a significant and positive relationship with economic growth in the short and medium terms. In contrast, for a broad panel of countries, Barro (2000) suggests little overall relation between income inequality and investment as well as growth. Malinen (2011) finds a negative effect of income inequality on private consumption in most European countries, suggesting that saving rates are positively associated with increases in inequality.

Some macro-level cross-country studies point to no effect or even a negative association between the two variables. For example, using panel data for over 30 countries from 1970-92, Edwards (1996) supposes that inequality is not significantly related to private savings. In addition, looking at OECD and different Asian countries, Li and Zou (2004) provide no evidence for a positive correlation between the income share of the rich and the aggregate saving rate. They suggest that income inequality results in a lower aggregate saving rate. Leigh and Posso (2009) estimate the correlation of saving rates and the top income shares in a narrow, long-running panel and observe no significant effect. Similarly, Schmidt-Hebbel and Servén (2000) provide no evidence for a relation between the Gini coefficient and gross national savings.

The mixed evidence in macroeconomic studies may result from the fact that the quality of income distribution data and national savings data differs substantially across countries. Moreover, the high level of aggregation and heterogeneity in the national accounts data poses a challenge. Diverging country-specific measurement approaches of income and aggregate saving make reliable international comparisons complex (e.g., Schmidt-Hebbel and Servén, 2000). Moreover, some argue that

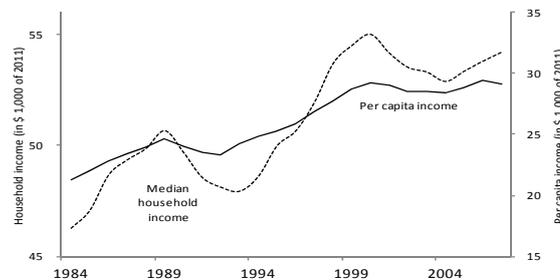
<sup>12</sup>For example, Li and Zou (2004) point to the broad literature that has examined the association of inequality and economic growth without considering the relationship between savings – as a major factor of economic growth – and the income distribution.

the use of national accounts data lacks explanatory power for the actual effect of income inequality on household saving behavior (to which the consumption theories relate) since governmental and corporate savings are often included. As the relevant aggregate variable should be as close as possible to the household saving rate (Deaton, 1992; Alesina and Rodrik, 1994; Perrson and Tabellini, 1994), macro-level studies comparing national savings data and attempts to extrapolate household saving rates from country aggregates can be highly misleading.<sup>13</sup>

### Stylized facts

This part illustrates key trends in American incomes, the savings rate and income distribution over the two decades preceding the 2007 financial crash. To begin with, Figure 5.1 shows real per capita income and median household income in the U.S. in the years 1984-2007. The chart builds on data collected annually by the U.S. Census Bureau (USCB).

Figure 5.1: Trends in personal income



**Note:** The figure shows real per capita income (solid line, right-hand side vertical axis) and median household income (dashed line, left-hand side vertical axis) for the U.S. from 1984-2007. Scale: \$1,000 of the year 2011 (CPI-adjusted). Income figures are derived from data issued annually by the U.S. Census Bureau (USCB). USCB defines money income as income received on a regular basis, i.e., exclusive of realized and unrealized capital gains on assets and before transfers and federal and state taxes. A household consists of all the people who occupy a housing unit.

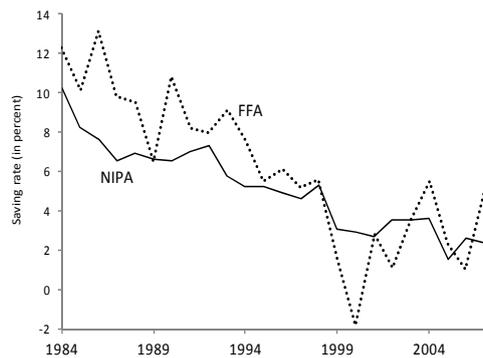
Real average personal income has increased by an annualized growth rate of roughly 1.5 percent from about \$21,000 in the year 1984 to \$29,000 in 2007. Median household income improved by more than 16 percent in real terms during that period, rising from just over \$46,000 to \$54,000. Moreover, the figure indicates that the bulk of personal income growth is attributable to the years before 2000, particularly the late 1990s. From the early 1990s recession to the 2000 dot-com bubble burst, per capita incomes surged by approximately 25 percent, accounting for three quarters of the total increase. After the 2000 crash, per capita income flattened out and averaged roughly \$53,500 in real terms. Median household income shows a similar trend, with the procyclical pattern somewhat more pronounced. The economic downturns of the early 1990s and 2000s resulted in declining income followed by a gradual bounce back, respectively. However, the persistent stock market expansion over the 1990s, and to a smaller extent also the mid-2000s housing boom, have improved household incomes over the long run. In general, it appears

<sup>13</sup>A more reliable measure put forward by Börsch-Supan and Lusardi (2003) may be to base cross-country evidence on household data, which however is difficult to implement given the limited data availability.

from official USCB measures that Americans have experienced substantial growth in real incomes over the 25 years preceding the 2007 financial meltdown.

In contrast, savings have dropped dramatically over the same period. Figure 5.2 shows the most prominent measures of personal saving in the U.S. The “Flow-of-Funds Accounts” (FFA) saving rate and the “National Income and Product Accounts” (NIPA) saving rate. The estimates indicate that the ratio of personal savings to income has dropped from 10-12 percent in the mid-1980s, to about 5-6 percent in the mid-1990s, and to 1-3 percent in the mid-2000s. The NIPA personal saving rate shows a persistent downtrend of approximately half a percentage point per year. Aggregate household saving declined from about 10 percent in the year 1984 to 2.4 percent of disposable income in the year 2007, regardless of the fluctuations in income discussed earlier. The FFA estimates are somewhat above the NIPA personal saving rate in the years before 2000, yet marked by a constant downtrend. FFA personal savings fell from roughly 13 percent in the mid-1980s to approximately 7 percent of personal income in the mid-1990s. During the 2000 burst, the FFA measure of personal saving reached historically low levels of about zero (and even below) before recovering to five percent in the year 2004.

Figure 5.2: Trends in personal saving



**Note:** The figure shows annual U.S. personal saving as a percentage of income in the National Income and Product Accounts (solid line) and in the Flow-of-Funds Accounts (dashed line) from 1984 to 2007. See text for measurement details.

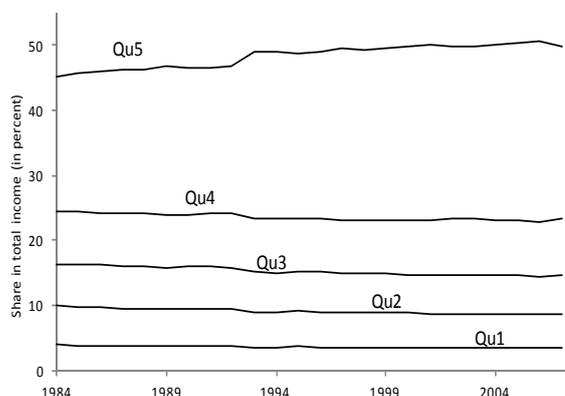
In general, personal saving in the FFAs appears somewhat higher and more sensitive to boom-bust-cycles than in the NIPAs. The variation in the two estimates arises from different perspectives and methodological applications of personal saving. The NIPA concept assesses saving from the residual perspective, i.e., personal saving is equal to income minus taxes and consumption expenditures. Under the FFA, personal saving is a direct measure of the households’ net acquisition of financial and tangible assets less liabilities. The methodologies differ in that FFA treats purchases of durable goods as a form of saving, whereas NIPA regards these expenditures personal consumption. Another issue is the treatment of capital gains. FFA denotes realized capital gains from mutual funds personal income. This item is not included in the NIPA definition of personal income. It is important to note that both the NIPA and FFA concept do not include unrealized capital gains on assets in personal income or saving.<sup>14</sup> Generally, however, the key message from

<sup>14</sup>For a more detailed discussion of the differences and potential shortcomings of the two saving

Figure 5.2 is a strong and persistent downtrend in U.S. personal saving since the mid-1980s, observable in both official measures.

Figure 5.3 illustrates the third key trend, growing income inequality. The figure shows the percentage share of aggregate income (in 2011 CPI-adjusted dollars) received by each fifth of the income distribution for the period 1984-2007. The figure is again based on household income data collected annually by the USCB. In line with previous research (e.g., Atkinson et al., 2011), the chart suggests that pre-government household incomes were distributed unevenly at any time and that inequality has gradually increased over the past 20-30 years. Specifically, for all years it holds that the total income share of the highest quintile (approximately 50.2 percent on average) amounts to 1.5 times the collective income share of the bottom three quintiles (bottom fifth: 3.6 percent, second fifth: 9.1 percent, middle fifth: 15.3 percent). The income of the second-highest quintile makes up approximately a quarter of aggregate income (on average 24 percent).

Figure 5.3: Trends in income inequality



**Note:** The figure shows the shares of five quintiles in total U.S. household income from 1984-2007. Income figures are derived from data issued annually by the USCB. Income is defined as exclusive of capital gains and before governmental transfers and taxes. A household consists of all the people who occupy a housing unit.

In addition, all groups have experienced a constant decline in the fraction of total income received during the past three decades and this is due to the income gains of the top earning quintile. The top fifth's income share increased by almost 5 percentage points from 1984-2007 and peaked at 50.5 percent in 2006. As a result, the lower parts of the income distribution witnessed a contraction of the same dimension. The fraction of total income received declined by about half a percentage point among the bottom fifth, by 1.2 percentage points in the second fifth, by 1.5 percentage points in the middle 20% and by 1.2 percentage points in the upper middle quintile. The largest shift in the income distribution apparently occurred in the early 1990s, when the total income share of the top quintile increased by two percentage points from 1992 (47%) to 1993 (49%). To sum up, Figure 5.3 highlights that national income was distributed (increasingly) unequal across the income quintiles in the period 1984-2007.

concepts, see Wilson et al. (1989), Bradford (1990), Gale and Sabelhaus (1999), Juster et al. (2004), Garner (2006), Guidolin and La Jeunesse (2006).

### 5.3 Data and statistical design

The microdata for this analysis is derived from the Panel Study of Income Dynamics (PSID), a longitudinal panel survey of American households. The data contain micro-level information on economic, social and health factors since 1968. The main unit of analysis is the family. The key feature is that as family members leave their original households they are tracked and included as a new unit in the sample. The success in following young adults as they establish new households and low attrition due to consistently high response rates led to a steady increase in sample size. The number of families featured in the PSID has grown from 4,800 in 1968 to more than 9,000 today. The original PSID sample resembled the overall U.S. demographic. It however became increasingly biased as more new units were added when children left their original PSID household. As a consequence, as time passed the original sample was reduced and four new samples, including two Latino/immigrant samples, were added consecutively. Put differently, the PSID sample has been constantly adjusted and reorganized in order to be capable of representing U.S. demographics. This makes it one of the most widely used micro-level datasets in the social sciences. Moreover, it suits the purpose of this study perfectly because it allows detailed investigation of savings behavior in the cross-section and over time.

The PSID offers a unique measure of saving. Specifically, the change in the net value of a household's total assets between two interviews is divided into capital gains and active saving. The latter refers to the traditional saving in fixed-income assets, for example money in checking or savings accounts. Here the amount saved is simply the change in the net value of the asset. Active saving in assets that are subject to capital gains and losses, for example stocks or home equity, is the net investment in those assets. Capital gains are denoted *passive saving* and are simply the change in net worth minus the amount of active saving. Appendix A provides the detailed calculation of savings in the PSID and describes the asset types considered. Appendix B illustrates the decomposition of (the change in) wealth into the active and the passive saving component. The main PSID income variable is *total family income*, defined as the sum of pre-tax income received by the family members. The largest component is wage income but asset and business incomes are included. Generally, the variable refers to pre-government income, although some transfer income types are included, for instance child support and unemployment benefits. Appendix C describes the elements of the total family income variable in full detail.

The PSID interviews were conducted annually from 1968 to 1997. During this period questions were asked about saving only in 1984, 1989 and 1994. Since 1997 the interviews have been held annually and saving has always been part of the questionnaire. Questions about total family income have been asked in each interview since 1968. Dynan et al. (2004) compute an active saving rate by dividing active saving between 1984-1989 by five times the average inflation adjusted total family income of 1984-1988. Correspondingly, they determine the (annualized) change-in-wealth rate and the passive saving rate. This study follows their approach and calculates the saving rates for the periods 1989-1994, 1994-1999, 1999-2003 and 2003-2007 in a similar way.

Dynan et al. (2004) estimate median regressions with the PSID saving rate as the dependent variable and dummies for income quintiles and age categories as explanatory variables. More precisely, they suppress the constant term and include dummies for all five income quintiles and the 30-39 and 50-59 age groups so that

the coefficient for a given quintile equals the median saving rate for households in that quintile with heads between 40-49 years old. The equation can be written as follows:

$$SR_{qi} = \alpha_1 q_1 + \alpha_2 q_2 + \alpha_3 q_3 + \alpha_4 q_4 + \alpha_5 q_5 + \beta_3 age_3 + \beta_5 age_5 + \varepsilon_{qi},$$

where  $SR_{qi}$  is the saving rate of household  $i$  in age-specific income quintile  $q$ , and the coefficients  $\alpha_1$  to  $\alpha_5$  correspond to the saving rates in quintiles  $q_1$  to  $q_5$ , respectively. Furthermore,  $\beta_3 age_3$  and  $\beta_5 age_5$  are age group dummies times their coefficients, as  $\varepsilon_{qi}$  is the error term. Bootstrapped standard errors are calculated for the statistical significance (at the 5% level) of the difference in the saving rate between quintiles  $q$  and  $q-1$ .

Regressions of household saving rates on dummies for *current* income quintiles can be misleading due to measurement error that stems from the transitory component of income, as outlined earlier. For this reason, following Dynan et al. (2004), four proxies for *permanent* income from the PSID database are considered. Specifically, these are lagged and future labor earnings, current consumption and educational attainment, all of which are both highly correlated with permanent income and uncorrelated with the error term, which affects saving only through its impact on permanent income. In the second step, a simple OLS regression of current income on the respective proxy is conducted first. Then, the income quintiles are rearranged according to the fitted values of income. Following, saving rates are regressed on dummies for the “new” permanent income quintiles and age dummies.<sup>15</sup> In addition to the average propensity to save, the above authors also report cross-section and time-series estimates of the marginal propensity to save (see text below). On the methodological side, it is the main objective of this research to apply the statistical framework developed by Dynan et al. (2004) for estimating quintile-specific saving rates in 1984-1989 to the subsequent periods 1989-1994, 1994-1999, 1999-2003 and 2003-2007.

## 5.4 Saving rates among U.S. income groups, 1984-2007

This section reports and discusses the results from regressions of saving rates on income quintiles using PSID data. Specifically, it shows that richer households have saved a larger fraction of their income at any time between 1984 and 2007. Second, saving rates decreased in all income quintiles over the two decades prior to the 2007 crisis, while the decline is most pronounced among middle and upper-middle-income households. These results are robust to using current income or different proxies for permanent income in the regression models.

Table 5.1 shows median saving rates among *current* income quintiles for five periods, from 1984-1989 (second column) to 2003-2007 (last column). The coefficients for a given quintile refer to households with heads aged between 40 and 49 years. The coefficients for younger (ages 30-39) and older (ages 50-59) working-age households are reported below the reference group’s quintile estimates. In addition, the coefficient on income divided by \$10,000 is reported at the bottom of the table

<sup>15</sup>An exception are the regressions that include the non-continuous educational attainment variable, which assigns households to education groups (“high school diploma”, “no high school diploma” or “college degree or more”). Here saving rates are directly regressed against the education dummies and age controls.

to give a general impression on the relationship between saving and income in the respective period.

Table 5.1: Regressions of saving rate on current income

|                                       | 1984-89         | 1989-94         | 1994-99         | 1999-03         | 2003-07         |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Quintile 1                            | .010<br>(.006)  | .000<br>(.006)  | .000<br>(.003)  | .000<br>(.011)  | .000<br>(.006)  |
| Quintile 2                            | .025*<br>(.005) | .031<br>(.005)  | .012<br>(.007)  | .014*<br>(.011) | .002<br>(.006)  |
| Quintile 3                            | .046*<br>(.006) | .042*<br>(.006) | .033*<br>(.008) | .046*<br>(.014) | .035*<br>(.009) |
| Quintile 4                            | .067<br>(.007)  | .057*<br>(.006) | .039*<br>(.006) | .037<br>(.013)  | .031<br>(.010)  |
| Quintile 5                            | .097*<br>(.011) | .077*<br>(.009) | .062*<br>(.008) | .074*<br>(.011) | .071*<br>(.012) |
| Ages 30-39                            | .001<br>(.004)  | .003<br>(.004)  | .005<br>(.005)  | .007<br>(.006)  | .012<br>(.007)  |
| Ages 50-59                            | -.006<br>(.006) | -.010<br>(.006) | -.011<br>(.006) | -.005<br>(.008) | -.013<br>(.006) |
| Pseudo R <sup>2</sup>                 | .034            | .021            | .011            | .012            | .013            |
| Observations                          | 2,854           | 2,709           | 2,443           | 2,703           | 3,202           |
| Coefficient on income/10 <sup>4</sup> | .013<br>(.002)  | .008<br>(.001)  | .004<br>(.001)  | .005<br>(.001)  | .004<br>(.001)  |

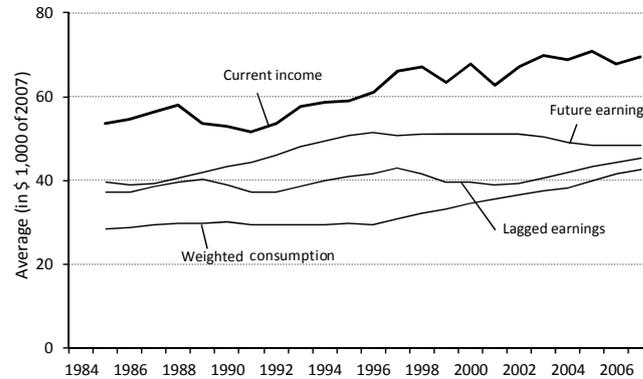
Notes: The heading indicates the time period covered. Quintiles correspond to current income. The dependent variable is the active saving rate calculated from PSID data (excluding capital gains). Regressions suppress the constant term and exclude the age group 40-49, so that the estimated coefficients corresponds to the median saving rate in that group. The quintiles are weighted; regressions are unweighted. Bootstrapped standard errors are shown in parentheses. \* Median saving rate is significantly higher than that for the previous quintile at the five-percent level.

First, with regard to the cross-section, it appears that high-income earners typically save a larger part of current income than low-earning households. The saving rates range from zero values in the lowest quintile to 7-10 percent in the top quintile. Generally, it holds that the higher the income quintile, the higher the saving rate, while the saving rates of the the fourth quintile in the 2000s are an exception. Second, saving as a fraction of current income decreased drastically from 1984 to 2007. Importantly, this can be observed in all income groups, and particularly for quintile 4. The reduction in saving is also visible in the coefficient on income divided by \$10,000. It indicates that the saving rate rose by 1.3 percentage points for each \$10,000 increase in income in 1984-1989, compared to by less than half a percentage point in 2003-2007. The results so far support the hypotheses that saving rates increase with current income, as in Dynan et al. (2004).

Do these patterns persist when the income quintiles are rearranged according to permanent income proxies? As a start, Figure 5.4 shows yearly averages of current income and the three permanent income proxies in the PSID data: future labor earnings, lagged labor earnings and consumption. In general, all proxies show an average path from 1984 to 2007 that follows but is considerably smoother than current income, and thus can be considered capable of eliminating transitory income fluctuations.

The first experiment uses consumption as an “instrument”. A tested measure to obtain the level of household consumption is  $\text{consumption} = 1.930 \cdot \text{food at home}$

Figure 5.4: Permanent income proxies



**Note:** The figure shows current income (thick line) and three proxies for permanent income: future earnings, lagged earnings, and weighted consumption. The lines are annual averages (in \$1,000 of the year 2007) from PSID data.

+ 2.928\*food away from home + 1.828\*rental payments if renter + 0.1374\*house value if home owner. Using this approach, weighted household consumption can be computed for all PSID surveys from 1984-2007. Table 5.2 shows results for income groups according to the consumption-based measure of permanent income instead of to current income.

Concerning the development of median saving rates over time, the results confirm the findings of the estimates that use the current income measure. The saving rate has declined also in all predicted income groups. From 1984-1989 to 2003-2007, saving rates in the top income quintile dropped by one third (9.4 to 6.4 percent), in the fourth quintile by 50 percent (6.9 to 3.5 percent) and in the middle-income group by 70 percent (5.5 to 1.6 percent). In addition, it is important to note that median saving rates are generally lower when using consumption as an instrument.

With regard to the cross-sectional dimension, again it holds for every period that the higher the predicted income quintile the higher the median saving rate. The picture is somewhat more distinct than that from the uninstrumented regressions in Table 5.1. The coefficient on income divided by \$10,000 shows a pattern close to Table 5.1, suggesting that the fraction of money saved out of permanent income has decreased over time, when using current consumption as an instrument.

The next regressions use 10-year lagged labor earnings of the household to determine permanent income quintiles for each period. The results of this approach are shown in Table 5.3. The permanent income quintile coefficients support the previous findings that current saving rates differ across the top and the bottom of the permanent income distribution. We observe higher median saving rates in the highest fifth than among the lower quintiles in every period. Moreover, the table indicates that the use of lagged earnings to obtain income quintiles produces median saving rates that are similar across the three quintiles in the middle of the distribution. Except for the first (1984-1989) and the last period (2003-2007), median saving rates in the second, third and fourth permanent income quintile are in the same range of 3-5 percent. As in the uninstrumented and the consumption-based approaches, median saving rates in the bottom quintile are not

Table 5.2: Instrumental variable regressions: weighted consumption

|                                       | 1984-89         | 1989-94         | 1994-99         | 1999-03         | 2003-07         |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Quintile 1                            | .003<br>(.006)  | .001<br>(.009)  | .000<br>(.005)  | .006<br>(.011)  | .002<br>(.010)  |
| Quintile 2                            | .029*<br>(.007) | .027*<br>(.008) | .024*<br>(.007) | .016*<br>(.011) | .015*<br>(.010) |
| Quintile 3                            | .055<br>(.006)  | .042*<br>(.008) | .035*<br>(.008) | .033*<br>(.010) | .016*<br>(.009) |
| Quintile 4                            | .068*<br>(.008) | .060*<br>(.007) | .036*<br>(.007) | .045<br>(.014)  | .035<br>(.013)  |
| Quintile 5                            | .094*<br>(.009) | .065<br>(.010)  | .050*<br>(.008) | .060*<br>(.010) | .063<br>(.013)  |
| Ages 30-39                            | .002<br>(.005)  | .006<br>(.005)  | .009<br>(.006)  | .004<br>(.008)  | -.001<br>(.007) |
| Ages 50-59                            | -.007<br>(.006) | -.007<br>(.005) | -.006<br>(.006) | .009<br>(.008)  | -.013<br>(.007) |
| Pseudo R <sup>2</sup>                 | .028            | .017            | .010            | .009            | .012            |
| Observations                          | 2,793           | 2,647           | 2,260           | 2,094           | 2,189           |
| Coefficient on income/10 <sup>4</sup> | .012<br>(.002)  | .007<br>(.001)  | .003<br>(.001)  | .006<br>(.001)  | .006<br>(.001)  |

Notes: The top heading indicates the time period covered. The dependent variable is the active saving rate calculated from PSID data (excluding capital gains). Regressions suppress the constant term and exclude the age group 40-49, so that the estimated coefficients corresponds to the median saving rate in that group. Quintiles correspond to permanent income. The instrument used is weighted consumption derived from Bernheim et al. (2001): 1.930 (food at home) + 2.928 (food away) + 1.828 (rent if renter) + 1.374 (house value if owner). The quintiles are weighted; regressions are unweighted. Bootstrapped standard errors are shown in parentheses. \* Median saving rate is significantly greater than that for the previous quintile at the five-percent level.

significantly different from zero. The downward trend in the coefficients of income group dummies proxied by means of lagged earnings is slightly less pronounced than in the previous estimations.

Table 5.4 shows regression results when using future labor earnings to proxy permanent income. More specifically, following Dynan et al. (2004), future labor income is defined as the combined labor income of all household members in the three years following an observation period (for example, earnings in 1989-1991 for the period 1984-1989). Similar to the previous findings, the median saving rate rises significantly from less than 1 percent in the predicted bottom quintile to approximately 7.7 percent in the predicted top quintile. Compared to the estimations using lagged earnings, the trajectory of median saving rates across the income distribution is somewhat steeper. Furthermore, all predicted income groups show a constant downtrend in median saving ratios from 1984-1989 to 2003-2007. This particularly applies to households in the three middle-income quintiles, where saving rates decline between 56 percent (middle fifth) to even 84 percent (second fifth) over the 24 years preceding the 2007 financial crisis. The linear impact of income on saving rates, however, appears somewhat higher when using future earnings as a proxy, compared to lagged earnings and consumption.

Finally, households are grouped into three education groups according to the highest educational attainment achieved by the household head: high-school dropouts (0 to 11 years of education), high school graduates (12 to 16 years of

Table 5.3: Instrumental variable regressions: lagged earnings

|                                       | 1984-89         | 1989-94         | 1994-99         | 1999-03         | 2003-07         |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Quintile 1                            | .000<br>(.008)  | .002<br>(.007)  | .004<br>(.009)  | .006<br>(.007)  | .000<br>(.004)  |
| Quintile 2                            | .019<br>(.009)  | .031<br>(.011)  | .034<br>(.011)  | .035*<br>(.013) | .006<br>(.007)  |
| Quintile 3                            | .030*<br>(.009) | .042*<br>(.006) | .045*<br>(.009) | .033<br>(.012)  | .012<br>(.009)  |
| Quintile 4                            | .059*<br>(.010) | .048<br>(.010)  | .029<br>(.012)  | .049*<br>(.014) | .043*<br>(.013) |
| Quintile 5                            | .077*<br>(.013) | .070*<br>(.013) | .047*<br>(.015) | .071*<br>(.014) | .046*<br>(.005) |
| Ages 30-39                            | .012<br>(.007)  | .002<br>(.008)  | .007<br>(.010)  | -.006<br>(.010) | -.003<br>(.011) |
| Ages 50-59                            | .000<br>(.004)  | -.001<br>(.005) | -.004<br>(.009) | -.011<br>(.010) | -.001<br>(.005) |
| Pseudo R <sup>2</sup>                 | .027            | .017            | .009            | .010            | .007            |
| Observations                          | 1,359           | 1,419           | 1,149           | 1,301           | 1,667           |
| Coefficient on income/10 <sup>4</sup> | .011<br>(.002)  | .067<br>(.001)  | .005<br>(.001)  | .005<br>(.001)  | .005<br>(.001)  |

Notes: The top heading indicates the time period covered. The dependent variable is the active saving rate calculated from PSID data (excluding capital gains). Regressions suppress the constant term and exclude the age group 40-49, so that the estimated coefficients corresponds to the median saving rate in that group. Quintiles correspond to permanent income. The instrument used is 10-year lagged labor earnings of the household. The quintiles are weighted; regressions are unweighted. Bootstrapped standard errors are shown in parentheses. \* Median saving rate is significantly greater than that for the previous quintile at the five-percent level.

education) and college graduates (17+ years of education). Due to the generally fixed nature of the (highest) educational level, the sample contains working age households, permanent income quintiles could not be determined in the two-stage regression approach. The Solution is to estimate median regressions of the saving rate on dummies for the three education groups and age dummies directly (again excluding households with heads aged between 40-49 years). Table 5.5 shows that saving rates increase significantly with a higher educational attainment in all periods considered. They range from 0-2 percent for high-school dropouts to 9.8 percent for college graduates. Still, the downtrend in saving over the past 20 to 30 years is apparent. For example, median saving rates declined by roughly 40 percent for high school graduates and by more than 60 percent for college graduates between the first and the last period under consideration. Along these lines, the coefficient from a linear regression on predicted income indicates a positive relationship.

The estimates presented so far are summarized in Figure 5.5. The median saving rate values (y-axes) are the coefficients from the regressions presented in Table 5.1 up through Table 5.5. The median income values (x-axes) are coefficients from median regressions of current income (the denominator of the saving rate in all specifications) on the income quintiles and age dummies used in the corresponding saving rate regression. The bottom right panel pools all median saving rates and median income levels obtained from the period-specific uninstrumented and instrumented regressions reported in the tables above.

The main finding is twofold. First, except for some variation in the center of the

Table 5.4: Instrumental variable regressions: future earnings

|                                       | 1984-89         | 1989-94         | 1994-99         | 1999-03         | 2003-07         |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Quintile 1                            | .000<br>(.003)  | .004<br>(.005)  | .002<br>(.005)  | .002<br>(.005)  | .000<br>(.003)  |
| Quintile 2                            | .026*<br>(.006) | .056*<br>(.007) | .025<br>(.008)  | .021<br>(.008)  | .004*<br>(.006) |
| Quintile 3                            | .057*<br>(.007) | .048<br>(.009)  | .025<br>(.008)  | .035*<br>(.009) | .015<br>(.007)  |
| Quintile 4                            | .060*<br>(.009) | .063*<br>(.009) | .038*<br>(.008) | .051<br>(.010)  | .026*<br>(.006) |
| Quintile 5                            | .101*<br>(.008) | .083*<br>(.010) | .059*<br>(.008) | .073*<br>(.008) | .072*<br>(.009) |
| Ages 30-39                            | .005<br>(.005)  | -.004<br>(.004) | .005<br>(.007)  | .000<br>(.007)  | .016<br>(.006)  |
| Ages 50-59                            | -.001<br>(.007) | -.014<br>(.009) | -.011<br>(.007) | -.003<br>(.007) | -.003<br>(.005) |
| Pseudo R <sup>2</sup>                 | .032            | .020            | .009            | .010            | .012            |
| Observations                          | 2,471           | 2,764           | 2,030           | 2,210           | 2,927           |
| Coefficient on income/10 <sup>4</sup> | .011<br>(.002)  | .007<br>(.001)  | .004<br>(.001)  | .006<br>(.001)  | .007<br>(.001)  |

Notes: The top heading indicates the time period covered. The dependent variable is the active saving rate calculated from PSID data (excluding capital gains). Regressions suppress the constant term and exclude the age group 40-49, so that the estimated coefficients corresponds to the median saving rate in that group. Quintiles correspond to permanent income. The instrument used is 3-year future labor earnings of the household. The quintiles are weighted; regressions are unweighted. Bootstrapped standard errors are shown in parentheses. \* Median saving rate is significantly greater than that for the previous quintile at the five-percent level.

income distribution, we observe a strong positive relationship between income and the saving rate almost all instrumented and uninstrumented median regressions conducted. Thus, the results generally confirm the conclusion of Dynan, Skinner, and Zeldes (2004), suggesting that saving rates tend to rise with income also for the five periods after 1984-1989. For example, the median saving rates of the two top quintiles are above the median saving rates of the two bottom quintiles in all six figures. Second, however, the median regressions of the saving rate on current and predicted permanent income quintile dummies point to a downturn in saving that has affected all income groups. Moreover, there is also some evidence that the positive association between income and savings has become weaker from 1984-1989 to 2003-2007, which is indicated by the flattening of the curve over the 1990s and 2000s (middle panels), particularly among the upper half of the distribution. The differences between the middle and the lower quintiles maintained somewhat constant or increased, whereas the higher the income quintile, the flatter the gradient. The downward convergence of median saving rates observed for the three highest income quintiles is striking.

### 5.4.1 Marginal saving propensities

To gain deeper insight into the relationship between household saving rates and income levels over time, it is useful to investigate marginal saving propensities. Dynan et al. (2004) propose two approaches that together should result in a

Table 5.5: Regressions of saving rate on education

|                                       | 1984-89         | 1989-94         | 1994-99         | 1999-03         | 2003-07         |
|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| No high school diploma                | .015<br>(.008)  | .008<br>(.006)  | .006<br>(.012)  | .021<br>(.008)  | .000<br>(.002)  |
| High school diploma                   | .046*<br>(.008) | .042*<br>(.006) | .021*<br>(.009) | .028*<br>(.008) | .014*<br>(.006) |
| College degree +                      | .098*<br>(.010) | .058*<br>(.009) | .049*<br>(.009) | .035*<br>(.009) | .069*<br>(.007) |
| Ages 30-39                            | -.005<br>(.007) | .006<br>(.005)  | .012<br>(.005)  | -.001<br>(.008) | .012<br>(.007)  |
| Ages 50-59                            | -.011<br>(.005) | -.008<br>(.007) | -.005<br>(.007) | -.005<br>(.008) | -.009<br>(.007) |
| Pseudo R <sup>2</sup>                 | .018            | .008            | .005            | .003            | .011            |
| Observations                          | 2,840           | 2,920           | 2,391           | 2,582           | 2,987           |
| Coefficient on income/10 <sup>4</sup> | .012<br>(.002)  | .010<br>(.001)  | .006<br>(.001)  | .007<br>(.002)  | .008<br>(.001)  |

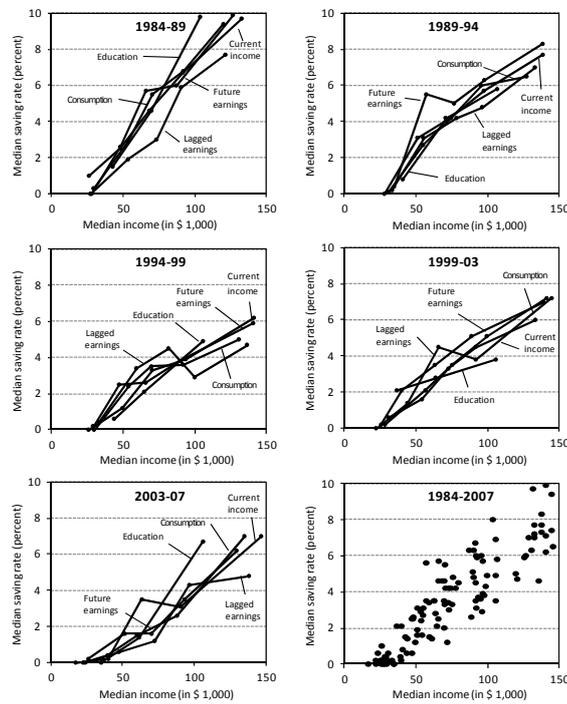
Notes: The top heading indicates the time period covered. The dependent variable is the active saving rate calculated from PSID data (excluding capital gains). Regressions suppress the constant term and exclude the age group 40-49, so that the estimated coefficients corresponds to the median saving rate in that group. The results use average current-period income (as in Table 5.1). The regressions are unweighted. Bootstrapped standard errors are shown in parentheses. \* Median saving rate is significantly greater than that for the previous education level at the five-percent level.

comprehensive account of household saving propensities among income groups over time. The cross-sectional approach is to divide the change in the level of median annual saving (derived from multiplying median annual income by the respective saving rate coefficients from Table 5.1) across the income quintiles by the change in income across these groups. The results are presented in Figure 5.6. The slope of each line connecting the dots is the implicit cross-sectional marginal propensity to save (MPS) in the respective income bracket.

The estimates for the periods 1984-1989 and 1989-1994 exhibit a considerably higher MPS among upper-income groups than in the lower-income groups. They range from about 3 cents per dollar of additional income between the first and second quintiles to approximately 25 cents per dollar between the fourth and fifth quintiles. Moreover, the MPS between the third and fourth quintiles yields a stable 16 cents per dollar. The picture is different for the periods after 1994. While the MPS between the fourth quintile and the top quintiles remains at high levels (about 27 cents per dollar), the implicit MPS between the third and fourth quintile diminishes to about 1 to 4 cents per dollar, values comparable to median marginal saving propensities in the first and second income brackets. The MPS between the second and middle quintiles is in the range of 6 cents in all periods. To sum up, under the assumption that differences in four-year or five-year income averages are of permanent rather than of transitory nature, the cross-section MPS estimates imply that saving rates differ between low and high income working-age households. On the other hand, the results suggest that part of the decline in saving was potentially due to changing saving propensities among upper-middle-income households.

Another approach relates the change in saving across periods for a given

Figure 5.5: Summary of regressions



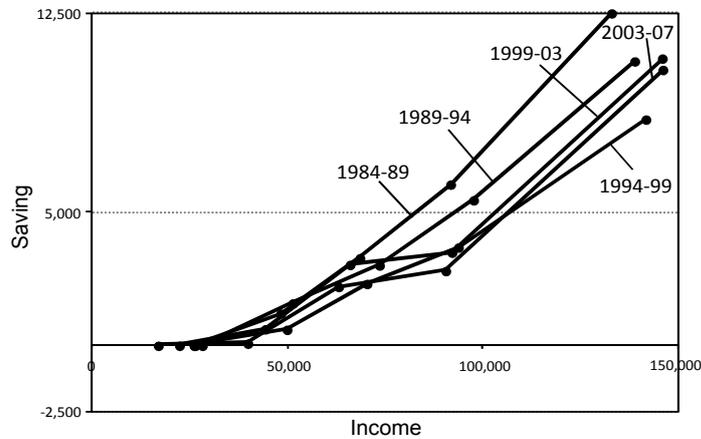
**Note:** The median saving rate values (y-axes) are the coefficients from the regressions presented in Table 5.1 up through 5.5. The median income values (x-axes) are coefficients from median regressions of current income on the same variables used in the corresponding saving rate regression. The bottom right panel pools all median saving rates and median income levels obtained from the period-specific uninstrumented and instrumented regressions.

household to the change in its annual income. Thus, the change in saving is defined as the difference between periods, i.e., over time. The same measure is used to calculate the change in household incomes. The idea is to perform a median regression of the first difference in saving on the first difference in incomes, interacted with age-specific income quintile dummies (referring to the initial period). Moreover, age dummies for household heads aged 30-39 and 50-59 and dummies for the initial (not age-adjusted) income quintiles are added. Suppressing the constant term, this technique estimates quintile-specific coefficients that correspond to a time-series MPS.

Table 5.6 provides the results. Not surprisingly, predicted time-series MPS for the first quintile are small (approximately zero to 3 cents per dollar) and not significantly different from zero. In the second fifth, estimated MPSs rise modestly, ranging from about 3 cents per dollar between 1984-1989 and 1994-19999 to 11 cents per dollar between 1999-2003 and 2003-2007. For the middle-income group, all obtained MPS are statistically significant, peaking at roughly 9 cents per dollar between 1989-1994 and 1994-19999, and remaining at a stable 5-6 cents per dollar thereafter.

Most striking, again, are the results for the high-income groups. The decrease in the estimated MPS from about 13 cents per dollar between 1984-89 and 1989-94

Figure 5.6: Cross-sectional marginal propensity to save



**Note:** The lines connecting the estimated median saving levels reflect an implicit savings function for each period, where the slope of each line is the MPS for that period-specific income bracket. All saving and income measures given in 2007 dollars.

to close to 4 cents per dollar between 1999-03 and 2003-07 in the upper middle fifth is statistically significant. Looking at the late 1990s and the mid-2000s, the marginal propensity to save of the fourth income quintile was lower than that of the middle quintile. Regarding the top income group, we observe a small and not significant MPS coefficient for the early periods. Thereafter, the results imply high marginal saving propensities in the second and last period considered (17 to 21 cents per dollar). However, the MPS for 1994-99 to 1999-03 is 5 cents per dollar, which is below the MPS of both the middle-income and upper-middle-income group. Generally, the time-series MPS regression estimates reinforce the impression that saving propensities differed substantially along the income distribution from 1984-2007, although with a converging tendency among middle-income and upper-income groups in the course of the overall savings decline.

This section has four key findings. On the methodological side, it shows that the statistical framework pioneered by Dynan et al. (2004) for the PSID surveys of 1984-1989 is a valuable tool for investigating saving behavior among income groups at the micro-level in the later period from 1989-2007. The approach to proxy permanent income to eliminate the influence of transitory income could be applied to PSID survey data until 2007 without complications. Second, the results to a large degree confirm the view that saving rates differ substantially between low-income and high-income groups with regard to both current and permanent income. Most of the estimated median saving rates among upper-income groups were above those among lower-income groups. Third, the findings suggest that saving rates declined in all quintiles from the 1980s to the 2000s. Fourth, the estimates based on current income (including the two MPS) and in part also the instrumented regressions give reason to assume that upper-middle income households experienced somewhat larger decreases in the saving rate than other income groups over the decades leading up to the 2007 financial crisis.

What explains the savings reduction spread somewhat unevenly across the (also

Table 5.6: Regression estimates of the marginal propensity to save

|                       | 1984-89<br>to<br>1989-94 | 1989-94<br>to<br>1994-99 | 1994-99<br>to<br>1999-03 | 1999-03<br>to<br>2003-07 |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Quintile 1            | .013<br>(.015)           | .023<br>(.034)           | .002<br>(.041)           | .027<br>(.044)           |
| Quintile 2            | .027*<br>(.009)          | .033*<br>(.018)          | .009<br>(.031)           | .113<br>(.021)           |
| Quintile 3            | .038*<br>(.007)          | .092*<br>(.012)          | .056*<br>(.023)          | .056*<br>(.021)          |
| Quintile 4            | .134*<br>(.006)          | .045*<br>(.013)          | .073*<br>(.010)          | .041*<br>(.017)          |
| Quintile 5            | .003<br>(.003)           | .209*<br>(.005)          | .050*<br>(.006)          | .169*<br>(.006)          |
| Pseudo R <sup>2</sup> | .004                     | .015                     | .006                     | .011                     |

Notes: The top heading indicates the time periods. The first column indicates the income group. The dependent variable is the change in the saving between two periods. Explanatory variables are the changes in household income between the same two periods, interacted with the age-specific income quintile dummy variables (initial period). Also included are age dummies (30-39 and 50-59) and dummy variables for the initial income quintile. Bootstrapped standard errors are shown in parentheses. \* Coefficient is statistically significant at the five-percent level.

increasingly unequal) income distribution? Juster et al. (2004) point to unrealized capital gains on equity as a causal factor of increased consumption. This can be related to inequality as wealth effects may be of different magnitudes in different income groups. Rajan (2010) and Kumhof and Rancière (2011) have stressed the role of inequality in the growth of credit and private debt. Both mechanism are investigated in the following section.

## 5.5 Capital gains and household debt

This section exploits the decomposition of (the change in) wealth in the unique PSID data structure to shed light on the relevance of capital gains and household debt in explaining the findings outlined above. The section starts with the impact of passive saving and then turns to the effects of consumer credit.

The wealth effect hypothesis states that rising equity prices promote consumption due to perceived increases in wealth and thus depress the personal saving rate. Exploring 1984, 1989 and 1994 PSID wealth data, Juster et al. (2004) find a significant negative link between the housing and stock market booms and the saving rate. They conclude that a one-dollar increase in capital gains has reduced saving by about 3 cents in 1984-1994. The results indicate that the effect was larger for stocks than housing.<sup>16</sup>

<sup>16</sup>There exist many studies on the consumption effect of stock market growth, housing booms (and

Appendix Figure D1 illustrates the opposing trends in asset prices and saving between 1984-2007. It shows the FHFA house price index, the S&P 500 stock market index and the NIPA personal saving rate (normalized to the 0-1 range). House prices tripled and the S&P increased tenfold over the period. House prices exhibit an upward pattern in each of the PSID sub-periods (white and grey areas), particularly in the 2000s. Stock values rose gradually from 1984-1994. They surged in the 1994-1999 and 2003-2007 booms and dropped in 1999-2003. In contrast, the saving rate decreased by a total of 70 percent. The rate trended down in all PSID periods, except an hiatus in 1999-2003.

What can we learn about the relationship between asset price growth and saving from PSID data? As a start, Appendix Figure D2 shows the composition of wealth growth per period for the full sample. The black columns represent the percentage of income actively saved. The grey columns equal the ratio of capital gains to income. The white columns are the sum of the two, i.e., the total change in wealth relative to income. Generally, PSID data resembles the trends outlined above. Saving in fixed-income assets declined from 10 percent of income in 1984-1989 to about 5 percent in 2003-2007. Capital gains relative to income, on the other increased from about 2.5 to 17 percent in the same period. Especially the boom periods 1994-1999 and 2003-2007 show a large share of passive saving at the expense of traditional saving.

Before investigating how capital gains on assets may have affected saving among individual income groups, it is useful to get a sense of the composition of wealth in these groups. Appendix Figure D3 shows quintile-specific ownership rates. It becomes clear that for any asset type the higher the income quintile, the larger the share of asset holders. Housing is the main asset of American families, followed by stocks, real estate and businesses. This holds true across all income quintiles. As regards time trends, unreported estimates indicate that stock market participation doubled between 1984 and 2007, on average, and that middle-income and lower-income groups had a large share in this increase. Homeownership increased by approximately 10%, fairly evenly across income groups.

Was there a wealth effect in the run up to the 2007 financial crisis in the U.S.? And if so, was it stronger among the poor or the rich? Figure 5.7 considers the cross-sectional and time dimension. The figure shows the share of active and passive saving in wealth growth (relative to income) per period for four income quintiles.<sup>17</sup>

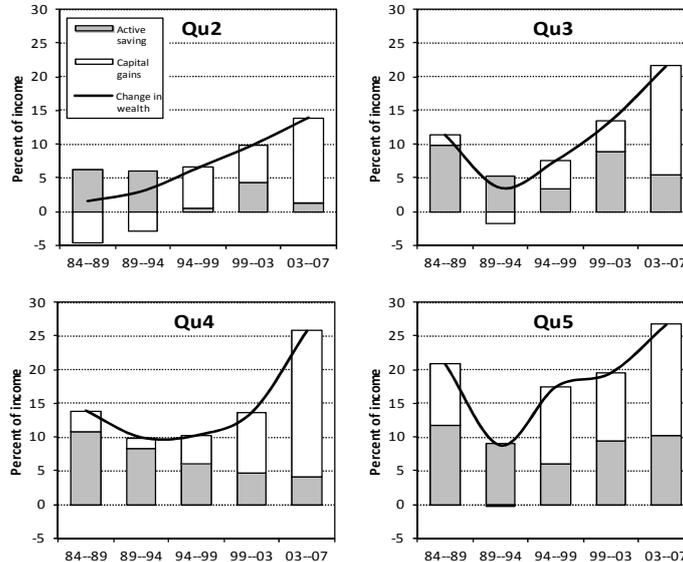
Starting with the second quintile, in the 1980s and 1990s, households experienced wealth growth largely due to active saving exceeding capital losses. This picture reverses with the mid-1990s stock market boom, when capital gains increased and active saving leveled. After a short bounce back in response to the early 2000s crash, the recent housing boom again promoted wealth growth in terms of capital gains, and depressed saving in fixed-income assets. For the middle-income group (quintile 3), passive saving played a minor role prior to 1999. The early decline in saving in this group was due to reduced active saving efforts. Again, the wealth-to-income ratio increased during the 1994-1999 and 2003-2007 booms. Active saving experienced a downtrend, except for 1999-2003. The decline in the active saving rate is most visible among upper-middle-income households (quintile 4). The amount of active saving has declined from period to period, capital gains increased drastically from the mid-1990s to 2007, accounting for most of the change

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their combined impact) in different countries and time periods. The general evidence from this literature is mixed. See for example Case et al. (2005) for a detailed overview.

<sup>17</sup>The bottom quintile is excluded because the (change in) wealth of this group is near zero throughout. A distinction into capital gains and active saving makes not much sense for this group.

Figure 5.7: Saving and capital gains for different income quintiles



**Note:** The figure shows the total change in wealth (black lines), active saving (grey columns) and passive saving (white columns) among four income quintiles over five periods from 1984 to 2007. The first quintile is excluded due to the near-zero changes in wealth between PSID interviews. A distinction between passive and active saving makes not much sense in these cases.

in wealth. On average, the share of capital gains in total wealth growth is highest for the top income earners (quintile 5).<sup>18</sup> However, the top income group also exhibits substantially more stability in active saving than the rest of the income distribution.

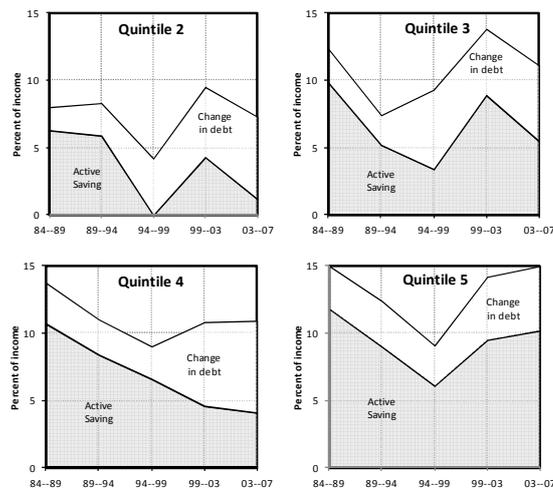
The main observation so far is that all income groups experienced an increase in passive saving in the wake of the equity booms in the run up to the 2007 financial crisis. At the same time, active saving relative to income has declined in all income groups. Generally, these findings lend support to the wealth effect hypothesis in the spirit of Juster et al. (2004). Moreover, the trend described above is most pronounced for the fourth quintile, and least for the top 20% of earners (quintile 5). The implication is that middle-income households, and particularly the upper middle class, may have been more inclined to consume than both the rich and the poor in the face of capital gains. A potential explanation may be that the poor simply do not hold as many assets as the middle class (see Appendix Figure D3). Therefore the effects may have been more stronger at the center of the income distribution. A second explanation may be that the middle class consumed more in order to keep up with the ever richer upper-income strata despite stagnating real incomes, and that unrealized capital gains have fueled this tendency. The latter ties in with the argument made prominent by Rajan (2010) that increasing inequality created the need for unsustainable levels of private credit and debt in the decades prior to 2007.

Appendix Figure D4 reports the ratio of household debt service payments to

<sup>18</sup>An exception is 1989-1994, where passive saving diminished, probably in the wake of the 1987 Dow Jones collapse.

disposable income (dotted line, right vertical axis) and the NIPA saving rate (solid line, left vertical axis) from 1984 to 2007.<sup>19</sup> It is apparent from the figure that debt relative to income increased by almost one third (from about 10% to 14%), while the saving rate declined from 10 to 3 percent.<sup>20</sup> How has the amount of borrowing depressed savings among different income groups? Figure 5.8 shows the change in the PSID consumer debt variable and the change in PSID active saving (as percentages of income) among four income quintiles over the five sub-periods since 1984. The values are stacked on top of the other, respectively.

Figure 5.8: Indebtedness and saving (quintile averages)



**Note:** The figure shows the active saving rate (grey area) and the change in the PSID household debt variable as a percentage of income (white area) in five sub-periods. The values are stacked on top of each other. The panels refer to average values for the respective income quintile. The first quintile is excluded (see text).

First of all, the figure reveals that the changes in household debt show exclusively positive values. In other words, American households got more indebted, regardless of income group or survey period, over the years from 1984-2007.<sup>21</sup> The saving rate would have maintained stable levels of about 10 percent in any given quintile, i.e., values comparable to in the period from 1950 to 1980, if households had not borrowed to the extent they did. Again, the middle class, particularly the fourth quintile, stands out in terms of high debt ratios that have depressed saving.

Appendix Table D1 summarizes much of the effects described above. It shows the composition of saving for the full sample of PSID households (top panel) and among five income quintiles (panels b-e) over the five sub-periods. Reported are average values in U.S. dollars of the year 2007. The change in wealth is decomposed

<sup>19</sup>The data on outstanding debt are derived from the Board of Governors of the Federal Reserve System. Here debt payments are defined as the required estimated payments on both outstanding mortgage and consumer debt.

<sup>20</sup>Naturally, the trend in debt mirrors the trend in the savings rate. Additional indebtedness is a dis-saving component.

<sup>21</sup>Hurst et al. (1998) and Lupton and Stafford (2000) study the PSID debt variable in earlier surveys (1984-1999) and conclude to an American rush to consumer debt over the 1980s and 1990s. This study suggests that this trend in the PSID data has accelerated over the 2000s.

as follows for a given subsample. The first row represents saving in fixed-income assets (1) and the second row saving in fluctuating assets (2). The third row sums (1) and (2) to the amount of active saving. The fourth row contains capital gains (passive saving). The fifth row shows the total change in wealth by summing (3) active saving and (4) passive saving. The sixth line contains average real income over the period, and (7) reports calculates the active saving rates by dividing (3) active saving by (6) average income. Refer to the data section and Appendices A up through C for a detailed description of the variables and their calculation.

First, it stands out that active saving in fixed-income assets, i.e., in the traditional sense of depositing money to bank accounts, was negative in many periods, particularly since the 1990s, indicating debt accumulation. This is visible in the full sample (a) as well as within the quintiles. Second, active saving in the sense of investment in equity experienced a less stark reduction. Generally, it decreased from 1984-1989 to 1994-1999, but recovered again towards 2003-2007. Third, as described earlier, capital gains have increased dramatically since the 1990s, in the full sample and in all income quintiles. Importantly, however, the downward direction of saving went hand in hand with income stagnation among the middle-income groups (particularly the second and third quintiles) since the mid-1990s. Thus, extensive borrowing in combination with a wealth effect among middle-income families in the face of less or no income growth along with accelerating capital and labor incomes at the top may be promising explanations for the overall decline in personal saving.

## 5.6 Conclusion

This chapter studies saving rates among income groups from 1984-2007 using micro-level data representative of the U.S. population from the *Panel Study of Income Dynamics*. The analysis therefore exploits both uninstrumented and instrumented median regressions of household saving rates on income quintile dummies to consistently estimate income group-specific saving rates and compare these in the cross-section and over time.

First, the empirical evidence uncovered here supports the view that the rich typically save a larger fraction of their income. High-income quintiles showed saving rates above those of low-income groups throughout. The fact that inequality increased and overall savings declined over the period under consideration did not lead to a change of this general pattern in the data. On this note, the study confirms a similar conclusion in Dynan et al. (2004) concerning saving between 1984-1989 for the longer period from 1984 to 2007.

Second, with regard to the time dimension of the data, the estimations from the PSID sample indicate that the savings decline from 1984 to 2007 has affected all American households. The share of income saved has decreased in every income quintile over the two decades preceding the 2007 financial meltdown. Importantly, these results were generally robust to determining income quintiles based on current income or different proxies for permanent income, such as lagged/future labor income, weighted consumption or the level of education.

Ultimately, there is some evidence from this research that the savings reduction described above was more pronounced among middle-income households, and particularly the upper-middle class. This study utilizes the unique PSID decomposition of the change in wealth between two surveys into different active and passive saving segments to learn about the mechanisms behind this pattern. The detailed investigation of wealth within individual income quintiles and over time revealed

that passive saving in the form of capital gains and the increase in household debt among middle class households can help to explain a significant portion of the savings decline in the U.S. from 1984 to 2007.

## Appendix A. Active saving

PSID active saving between two survey years is the sum of the three components listed below. Active saving in fixed-income assets and housing (components 1 and 3) is measured in constant 2007 prices using the CPI-U of the Bureau of Labor Statistics. Flow active saving variables (component 2) are deflated to 2007 dollar values by the average of the CPI-U over the respective sub-period:

### 1. Active saving in fixed-income assets:

(Transaction accounts  $t_1$  – transaction accounts  $t_0$ )  
 + (Equity in vehicle  $t_1$  – equity in vehicle  $t_0$ )  
 + (Other assets  $t_1$  – other assets  $t_0$ )  
 + (Non-collaterized debt  $t_0$  – non-collaterized debt  $t_1$ )

### 2. Active saving in assets subject to capital gains:

Net investment in real estate other than main home (between  $t_0$  and  $t_1$ )  
 + Net investment in farm or business (between  $t_0$  and  $t_1$ )  
 + Net investment in corporate equities (between  $t_0$  and  $t_1$ )

### 3. Active saving in housing (computed annually and then added):

a) If household did not move between two interview years:

(Remaining mortgage principle  $t_0$  – remaining mortgage principle  $t_1$ )  
 + Net investments in home improvements exceeding \$10,000

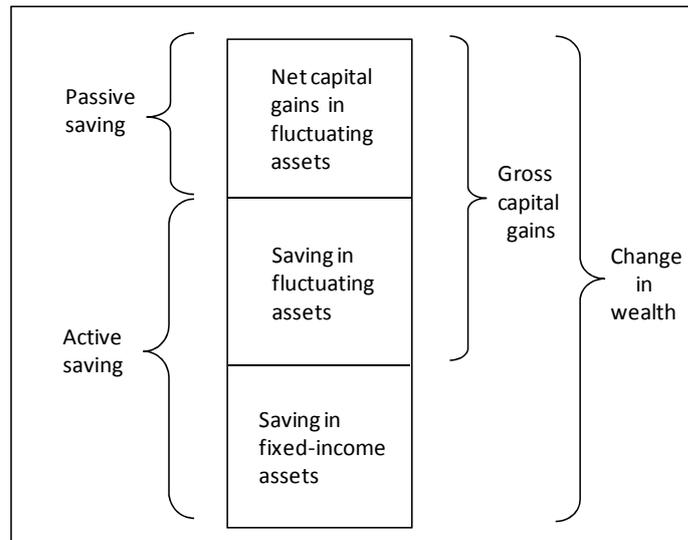
b) If household moved between two interview years

(Home equity  $t_1$  – home equity  $t_0$ )  
 + Net investments in home improvements exceeding \$10,000

*Transaction accounts* include any money in checking or savings accounts, money market funds, certificates of deposit, government saving bonds, and treasury bills. *Vehicle equity* is the net value of cars, trucks, motor homes, trailers, and boats owned by the household. *Other assets* are bond funds, cash value in a life insurance policy, valuable collections for investment purposes, and rights in a trust or real estate. *Non-collaterized debt* is defined as all non-mortgage debt, such as credit card charges, student loans, medical or legal bills, or loans from relatives. *Real estate other than main home* refers to vacation home, land, and rental property. *Farm or business* variable relates to both full ownership and co-partnerships. *Corporate equity* is defined as any shares of stock in publicly held corporations, mutual funds, or investment trusts.

## Appendix B. Passive saving

In the PSID, capital gains for a given household in a given sub-period are defined as the change in total wealth minus the amount of active saving. The figure below highlights the PSID decomposition of the change in wealth between two interview years into a capital gains (passive saving) and active saving component, whereas the former is defined as the valuation change less net investment in housing, real estate, business and financial equity and the latter is simply the difference in the value of fixed-income assets.



## Appendix C. Total family money

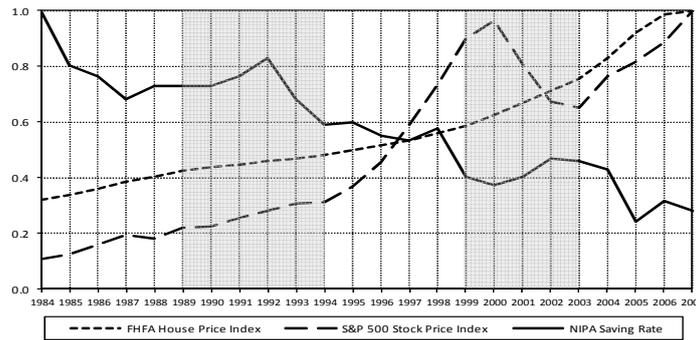
PSID total family money is the sum of annual income received by the household members. The three main classifications of income are taxable income, transfer income, and social security income. The taxable income components are wage and salary income (wages, bonuses, overtime, tips, commissions, market gardening, professional practice, roomers and boarders), asset income (interest income, dividend income, rental income, trust funds), and net income from business and farm. Transfer income sources are child support, pension income, help from relatives and non-relatives, unemployment benefits, welfare payments, workers compensation, and alimonies. In part, transfer income classification names overlap with those of social security income, which includes social security payments received due to disability, retirement, or survivor's benefits.

The active saving rate for a given household in a given sub-period is computed by dividing the computed sum of total active saving by the average of the available annual PSID total family money variable in that period times the years of the period. As with the fixed-income assets, the annual total family money information

is deflated using the respective CPI-U adjusted to the base year 2007.

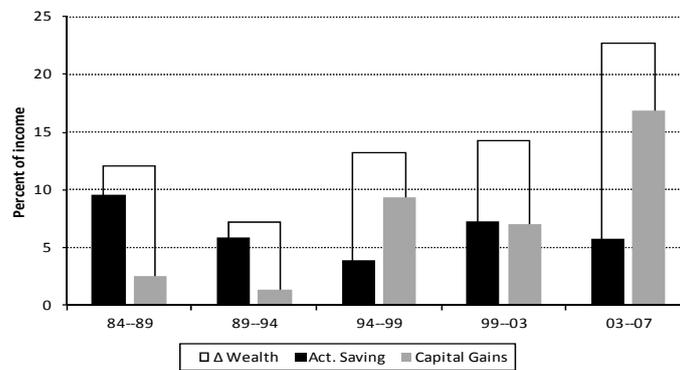
## Appendix D. Capital gains and household debt

Figure D1: Stocks, housing and saving in the U.S., 1984-2007



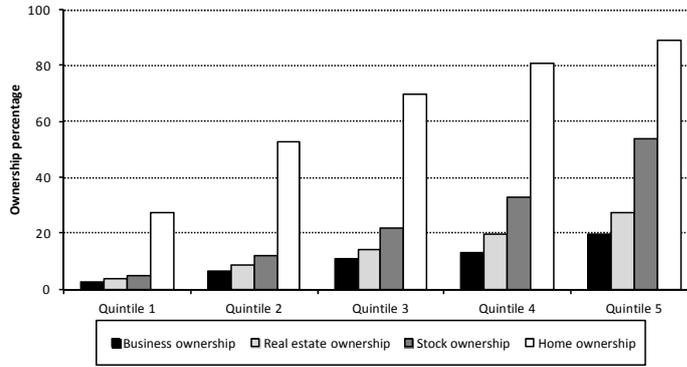
**Note:** All series (see text) are derived from the database provided by the Federal Reserve Bank of St. Louis. The white and grey areas indicate five PSID sub-periods. The series are normalized to the 0-1 range.

Figure D2: Active savings and capital gains in the PSID



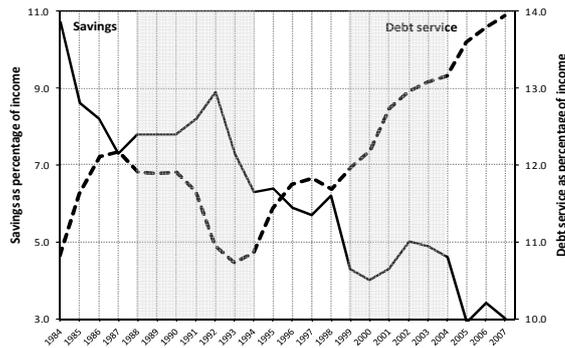
**Note:** The figure shows annualized active saving (black columns), capital gains (black columns) and the change in total wealth (white columns) as a percentage of income in five sub-periods. The full sample of households is used.

Figure D3: Asset ownership among income quintiles



**Note:** The figure shows the share of households that own businesses (black columns), real estate (light grey columns), stocks (dark grey columns) and home equity (white columns) among five income quintiles. The calculation based on all available PSID household data from 1984 to 2007.

Figure D4: Household debt and household saving in the U.S., 1984-2007



**Note:** The figure shows the ratio of household debt service payments to disposable income (dotted line, right vertical axis) and the NIPA saving rate (solid line, left vertical axis) in the U.S. from 1984 to 2007. The debt service ratio is based on data from the Board of Governors of the Federal Reserve System.

Table D1: Composition of saving and wealth by income group (averages)

|   | 1984-89 | 1989-94 | 1994-99 | 1999-03 | 2003-07 |
|---|---------|---------|---------|---------|---------|
| (a) Full sample                               |         |         |         |         |         |
| (1) Saving in fixed-income assets             | 456     | 1,070   | -2,002  | -1,528  | -2,212  |
| (2) Saving in assets subject to capital gains | 6,324   | 4,310   | 5,770   | 7,417   | 7,698   |
| (3) Active Saving (1) + (2)                   | 6,780   | 5,380   | 3,768   | 5,889   | 5,486   |
| (4) Capital gains (passive saving)            | 2,741   | 164     | 5,881   | 6,377   | 13,696  |
| (5) Change in wealth (3) + (4)                | 9,521   | 5,544   | 9,649   | 12,266  | 19,182  |
| (6) Income                                    | 66,243  | 70,864  | 76,168  | 77,660  | 77,661  |
| (7) Active saving rate (3) / (6)              | .102    | .076    | .049    | .076    | .071    |
| (b) Quintile 1                                |         |         |         |         |         |
| (1) Saving in fixed-income assets             | -275    | 781     | -849    | 64      | 714     |
| (2) Saving in assets subject to capital gains | 690     | 461     | 382     | 667     | 675     |
| (3) Active saving (1) + (2)                   | 415     | 1,242   | -467    | 731     | 1,389   |
| (4) Capital gains (passive saving)            | -675    | 259     | 16      | 1,476   | 295     |
| (5) Change in wealth (3) + (4)                | -260    | 1,501   | -451    | 2,207   | 1,684   |
| (6) Income                                    | 16,140  | 16,456  | 19,911  | 20,091  | 17,831  |
| (7) Active saving rate (3) / (6)              | .026    | .075    | -.023   | .036    | .078    |
| (c) Quintile 2                                |         |         |         |         |         |
| (1) Saving in fixed-income assets             | 246     | -190    | -1,538  | -1,872  | -2,948  |
| (2) Saving in assets subject to capital gains | 2,136   | 2,455   | 1,747   | 3,777   | 3,294   |
| (3) Active saving (1) + (2)                   | 2,382   | 2,265   | 209     | 1,905   | 346     |
| (4) Capital gains (passive saving)            | -1,805  | -1,195  | 2,778   | 2,395   | 5,695   |
| (5) Change in wealth (3) + (4)                | 577     | 1,070   | 2,987   | 4,300   | 6,041   |
| (6) Income                                    | 38,281  | 40,231  | 44,391  | 42,575  | 40,574  |
| (7) Active saving rate (3) / (6)              | .062    | .056    | .005    | .045    | .009    |
| Quintile 3                                    |         |         |         |         |         |
| (1) Saving in fixed-income assets             | 636     | 658     | -3,173  | -535    | -1,953  |
| (2) Saving in assets subject to capital gains | 5,235   | 2,659   | 5,486   | 6,195   | 5,465   |
| (3) Active saving (1) + (2)                   | 5,871   | 3,317   | 2,313   | 5,660   | 3,512   |
| (4) Capital gains (passive saving)            | 634     | -731    | 2,963   | 3,055   | 10,561  |
| (5) Change in wealth (3) + (4)                | 6,505   | 2,586   | 5,276   | 8,715   | 14,073  |
| (6) Income                                    | 58,632  | 62,200  | 65,701  | 64,756  | 63,917  |
| (7) Active saving rate (3) / (6)              | .100    | .053    | .035    | .087    | .055    |
| (d) Quintile 4                                |         |         |         |         |         |
| (1) Saving in fixed-income assets             | 951     | 2,367   | -426    | -4,255  | -4,199  |
| (2) Saving in assets subject to capital gains | 7,821   | 4,672   | 5,597   | 8,472   | 7,982   |
| (3) Active saving (1) + (2)                   | 8,772   | 7,039   | 5,171   | 4,217   | 3,783   |
| (4) Capital gains (passive saving)            | 2,752   | 1,215   | 3,780   | 8,572   | 7,982   |
| (5) Change in wealth (3) + (4)                | 11,524  | 8,254   | 8,951   | 12,789  | 11,765  |
| (6) Income                                    | 82,366  | 86,494  | 90,153  | 91,670  | 93,250  |
| (7) Active saving rate (3) / (6)              | .107    | .081    | .057    | .046    | .041    |
| (e) Quintile 5                                |         |         |         |         |         |
| (1) Saving in fixed-income assets             | 720     | 1736    | -4,016  | -1,043  | -2,664  |
| (2) Saving in assets subject to capital gains | 15,713  | 11,286  | 15,598  | 17,921  | 21,030  |
| (3) Active saving (1) + (2)                   | 16,433  | 13,022  | 11,582  | 16,878  | 18,366  |
| (4) Capital gains (passive saving)            | 12,779  | 1,274   | 19,815  | 16,340  | 31,138  |
| (5) Change in wealth (3) + (4)                | 29,212  | 14,296  | 31,397  | 33,218  | 49,504  |
| (6) Income                                    | 135,585 | 148,728 | 160,278 | 168,761 | 172,376 |
| (7) Active saving rate (3) / (6)              | .121    | .088    | .072    | .100    | .107    |

Notes: The figure shows the decomposition of the change in wealth into active and passive saving for the full sample and for five income quintiles in five sub-periods (columns). Given are average values in U.S. dollars of the year 2007. See the data section and Appendices A up through C for a detailed description of the variables and their calculation.



## Chapter 6

# Conclusion

This dissertation is part of a young, yet flourishing, strand of empirical literature on the causes and consequences of financial crises. The first two essays add a new perspective as they integrate newly constructed political datasets into the existing body of work in macroeconomics that studies the implications of financial crises in a long-run, cross-country approach. The third essay allows important insights into the precise dynamics in inequality around the outbreak of a financial crises, over the 100 year period in 17 countries. The fourth essay exploits micro-level survey data in order to broaden our understanding about the much debated inequality-finance nexus in the U.S. in the run up to the recent financial crisis.

The first essay provides new evidence that the political effects of financial crises are particularly disruptive. The analysis builds on a new dataset covering all major financial crises in 20 developed countries and more than 800 national elections since 1870. The key finding is that political uncertainty rises substantially after financial crises. Typically, the political aftermath of a financial crisis in advanced economies reads as follows: fractionalization increases, government support shrinks and polarization increases. Specifically, voters seem to be lured the rhetoric of rightwing populist and extreme right political parties after a financial crisis. Moreover, it appears that the amount of open protest in the streets increases significantly in the following a financial crash, which corroborates recent work by Passarelli and Tabellini (2013). The good news from the regressions is that most of the political variables are back to their pre-crisis level after a decade. Importantly, similar dynamics are not observable after non-financial macroeconomic shocks. Possible avenues of future research include studying the influence of increased fractionalization and polarization on the effectiveness of policy-making in times of crisis in more detail.

The second essay investigates voting behavior along the left-right spectrum in economic downturns in more depth. The work is first to relate a large dataset on ideology and electoral performance of nearly 650 political parties to economic development in a panel of 20 modern democracies since 1870. The evidence from 140 years of data suggests that right-of-center parties (conservative and far-right parties) typically capitalize on crises, while growth is beneficial to the political left and far-left. This pattern appears to be remarkably constant across historical periods. These findings corroborate the impression given by recent long-run studies concluding that a shift to the right is significantly more likely than a shift to the left in economic hard times (Brückner and Grüner; 2010; Lindvall, 2014). This interpretation is also consistent with earlier cross-national studies on economic

voting in advanced countries during the postwar period (e.g., Stevenson, 2001). Margalit (2013) supports these claims from a micro-level investigation of voting preferences in the current crisis in the U.S. Importantly, all results reported in the second essay are robust to eliminating the influence of early elections (e.g., Smith, 2004) and the natural punishment of incumbent governments by the electorate in the wake of poor economic performance of a country (e.g., Bartels, 2011; Fair, 2011). The interpretation is that pivotal voters vote less altruistic and progressive in the course of macroeconomic problems (e.g., Durr, 1993), which is also in line with the impression given by the first essay. In light of the current rise of populism, both from the political fringe and from within the established parties (e.g., Roubini, 2016), it may be valuable to obtain a historical measure of populism in order to investigate if and how anti-establishment agendas capitalize on economic instability.

The third essay deals with the social implications of crises. The empirical analysis deals with the trajectory of income inequality before and after a financial crash based on a dataset covering 17 countries and spanning 100 years. The study applies dynamic regression models to annual data on top income shares in order to systematically document dynamics in the top percentile of earners around the outbreak of financial turmoil. The evidence uncovered here suggests that the share of income received by the top one percent grows disproportionately in the years prior to the outbreak of a financial crisis. This is an important observation since Rajan (2010) and Kumhof and Ranci ere (2011) point to the potentially crucial role of similar upward deviations in the U.S. over the 1930s and 2000s in triggering the two major financial crisis. Secondly, in the top one percent likely experiences transient losses of income when a crisis hits. These findings imply that the classic  $\Lambda$ -pattern in top incomes described in Atkinson and Morelli (2010; 2011), for example in the Nordic countries in the crises of the 1990s is somewhat generalizable. A short-term negative impact of banking crisis on the top income share is also reported in a recent cross-country study by Roine et al. (2009). Importantly, however, the share in total income held by the top percentile recovers quickly. Thus, generally, over the medium term, both the run-up to and the recovery from a financial crisis appear to be periods of unequal income growth. Finally, these patterns are more pronounced in Anglo-Saxon countries than continental Europe and after World War II than before. A potential drawback of the study is that the analysis is limited to top income shares and therefore to inequality from the top. Little is known about overall inequality in the long-run historical perspective of 100 years and more. Generally, the lack of available and comparable historical data remains a constraint in the field of inequality.

The fourth contribution adopts a micro-level approach to learn more about the association between household finance and income inequality in the U.S. in the 25 years preceding the financial crisis of 2007-08. The research exploits detailed information on household finance derived from the Panel Study of Income Dynamics (PSID). The statistical investigation implies that personal saving has decreased from the mid-1980s to 2007 in each income quintile, except for the top 20 percent of the distribution. Thus the long-term run up to the crisis in U.S. was most likely associated with a savings reduction among middle-income and low-income households in the face of stagnating real incomes. According to the survey data, potential explanations for these trends include a wealth effect (e.g., Juster et al., 2004) and unsustainable credit levels among the middle-income groups, which to a great deal supports the prominent claim by Rajan (2010) and Kumhof and Ranci ere (2011). On the methodological side, a core contribution of the fourth essay is that it successfully applies a robust regression approach developed by Dynan

et al. (2004) for survey data from the 1980s to data spanning the years from 1989 to 2007. I leave for future research a full examination of the development of saving rates among U.S. income groups since the outbreak of the recent financial crisis.

To sum up, the most important insight from the present work is that the political and social climate is significantly more heated in episodes of financial and economic turmoil than in normal times. Thus, the overall message of this study for policymakers in Europe and the United States is that the danger of politics and society to go off track in the current crisis is real, and that financial instability and a sluggish economy are key issues in this regard.



# List of Tables

|     |  |     |
|-----|--|-----|
| 2.1 | Far-right and far-left vote shares: post-crisis years vs. normal years | 17  |
| 2.2 | Parliamentary variables: post-crisis years vs. normal years . . . . .  | 22  |
| 2.3 | Political instability in the post-crisis period . . . . .              | 24  |
| 2.4 | Street protest variables: post-crisis years vs. normal years . . . . . | 26  |
| 2.5 | Local projections of far-right vote shares . . . . .                   | 30  |
| 2.6 | Local projections of political variables (post-World War II) . . . . . | 31  |
| 3.1 | Left, center and right votes: recession dummy . . . . .                | 63  |
| 3.2 | Left, center and right votes: GDP growth . . . . .                     | 65  |
| 3.3 | Party family vote shares: recession dummy . . . . .                    | 67  |
| 3.4 | Party family vote shares: GDP growth . . . . .                         | 68  |
| 4.1 | Top 1% income share growth before and after crisis (OLS) . . . . .     | 90  |
| 4.2 | Top 1% income share growth: annual deviation (OLS) . . . . .           | 93  |
| 5.1 | Regressions of saving rate on current income . . . . .                 | 121 |
| 5.2 | Instrumental variable regressions: weighted consumption . . . . .      | 123 |
| 5.3 | Instrumental variable regressions: lagged earnings . . . . .           | 124 |
| 5.4 | Instrumental variable regressions: future earnings . . . . .           | 125 |
| 5.5 | Regressions of saving rate on education . . . . .                      | 126 |
| 5.6 | Regression estimates of the marginal propensity to save . . . . .      | 129 |



# List of Figures

|     |  |     |
|-----|--|-----|
| 2.1 | Far-right vote shares . . . . .  | 15  |
| 2.2 | Far-right and right-wing populist votes in European elections . . . . .            | 16  |
| 2.3 | Far-right vote shares (local projections): financial crisis recessions . . . . .   | 18  |
| 2.4 | Kernel densities of parliamentary variables . . . . .                              | 20  |
| 2.5 | Parliamentary variables (local projections): financial crisis recessions . . . . . | 23  |
| 2.6 | Street protests . . . . .  | 25  |
| 2.7 | Streets protests (local projections): financial crisis recessions . . . . .        | 27  |
| 2.8 | 10-year local projections: financial crisis recessions . . . . .                   | 28  |
| 3.1 | Kernel densities of vote shares . . . . .  | 62  |
| 3.2 | Left, center and right votes: local projections . . . . .                          | 64  |
| 3.3 | Average vote shares: normal vs. recession . . . . .                                | 66  |
| 3.4 | Political ideology in 20 countries from 1885-2015 . . . . .                        | 70  |
| 4.1 | Top 1% income shares and crises: kernel density . . . . .                          | 89  |
| 4.2 | Top 1% income shares and crises: annual mean . . . . .                             | 92  |
| 4.3 | Top 1% income shares after crises: local projections . . . . .                     | 94  |
| 4.4 | The rest of the distribution: annual mean . . . . .                                | 96  |
| 4.5 | The rest of the distribution: local projections . . . . .                          | 97  |
| 5.1 | Trends in personal income . . . . .  | 116 |
| 5.2 | Trends in personal saving . . . . .  | 117 |
| 5.3 | Trends in income inequality . . . . .  | 118 |
| 5.4 | Permanent income proxies . . . . .   | 122 |
| 5.5 | Summary of regressions . . . . .   | 127 |
| 5.6 | Cross-sectional marginal propensity to save . . . . .                              | 128 |



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## Abstract

This dissertation consists of four contributions that empirically analyze the political and social implications of financial and economic crises. The first two essays seek to broaden our understanding of the political after-effects of systemic banking crises and other macroeconomic downturns. The third essay analyzes the impact of financial crises on the distribution of income. Each of these three essays utilizes long-run cross-country data to study the relationships with historical perspective. The fourth essay takes a micro-level approach and has a special focus on household savings and inequality in the U.S. during the decades preceding the 2007-08 financial meltdown.

The first essay provides new evidence that the political aftershocks of financial crises can be severe. The study is based on a new long-run dataset covering the near-universe of financial crises in 20 advanced economies and more than 800 general elections over the past 140 years. The key result is that policy uncertainty rises significantly after financial crises as government majorities shrink and polarization increases. Importantly, voters seem to be particularly attracted to the political rhetoric of the extreme right after a financial crisis. Similar political dynamics are not observable in normal recessions or after severe non-financial macroeconomic shocks.

Building on the idea to group vote shares along ideological dimensions, the second essay extends the analysis and studies voting behavior in growth and recessionary conditions in more depth. The paper is first to relate historical data on ideology and electoral performance of nearly 650 political parties to the trajectory of real GDP per capita in a panel of 20 developed countries. The empirical exploration shows that right-of-center parties typically capitalize on economic downturns, while GDP growth is beneficial to the political left and far-left. This pattern appears to be remarkably constant across historical periods. Importantly, the results are robust to controlling for the typical punishment of incumbents as a consequence of poor economic performance.

The third essay focuses on the social repercussions of crises. Specifically, the empirical analysis documents the dynamics of income inequality before and after a financial crash based on a dataset covering 17 countries and spanning 100 years. The study differs from existing works in that it uses annual data on income shares to systematically explore how exactly the top percentile of earners is influenced by financial turmoil. The results indicate that households in the top 1% likely lose when a crisis hits, but their share in total income recovers quickly. Generally, looking at the medium term, both the run-up to and the recovery from a financial crisis appear to be periods of unequal income growth. Moreover, additional tests showed that the temporary crisis-induced income loss among the top 1% of earners does not benefit the bottom 90% but rather the remainder of the top decile. Thus, the historical data clearly points to an overall limited inequality-reducing effect of

financial downturns.

The fourth contribution to this thesis adopts a micro perspective and examines the relationship between household savings and income inequality in the U.S. in the three decades leading up to the 2007-08 financial crisis. Using detailed information on household finance obtained from the Panel Study of Income Dynamics (PSID), the statistical evidence suggests that personal saving has dramatically decreased from the mid-1980s to the 2007 in all income groups, and particularly the middle class, except for the top quintile. This is in line with the above finding that financial boom episodes can easily result in growing inequality. According to the survey data, potential explanations for this trends include increasing realized capital gains among the asset-rich households at the top and a “wealth effect” (e.g., Juster et al., 2004) among the middle-income groups.

The main insight from this dissertation is that the political and social climate is significantly more heated in episodes of financial and economic turmoil than in normal times. Thus, the overall message for policymakers in Europe and the United States is that the danger of politics and society to go off track is real, and that financial instability and a sluggish economy are key issues in this regard.

## Zusammenfassung

Die vorliegende Dissertationsschrift besteht aus vier Einzelbeiträgen, deren gemeinsamer Schwerpunkt in der Analyse der politischen und sozialen Begleiterscheinungen von finanz- und realwirtschaftlichen Krisen liegt. Die beiden ersten Beiträge befassen sich mit den politischen Folgen solcher Krisen. Der dritte Beitrag dokumentiert den Einfluss von Finanzkrisen auf die Einkommensverteilung. Diese drei ersten Beiträge analysieren die genannten Wirkungsmechanismen jeweils basierend auf langfristigen, historischen Zeitreihen für eine Gruppe Industrieländer. Der vierte Beitrag nimmt eine mikroökonomische Perspektive ein und untersucht den Zusammenhang zwischen dem Sparverhalten amerikanischer Haushalte und der Einkommensungleichheit im Vorlauf der Finanzkrise von 2007/08.

Der erste Beitrag liefert neue Erkenntnisse über die desaströsen Auswirkungen von Finanzkrisen auf die politische Stabilität. Die Studie basiert auf einem historischen Datensatz, der Daten zu sämtlichen Finanzkrisen sowie zu über 800 Parlamentswahlen in 20 Industrieländern während der letzten 140 Jahre beinhaltet. Das Hauptresultat der Analyse ist, dass die politische Unsicherheit nach Finanzkrisen drastisch ansteigt, was sich in geringerer Unterstützung der Regierungen sowie mehr Polarisierung zeigt. Insbesondere Parteien am rechten Rand des politischen Spektrums scheinen nach Finanzkrisen zu profitieren. Im Zusammenhang mit normalen Rezessionen und auch besonders schweren, nicht im Finanzsystem entstandenen Krisen sind vergleichbare Dynamiken hingegen nicht zu beobachten.

Der zweite Beitrag basiert auf der Idee, Stimmanteile entlang politischer Ideologien zu gruppieren, um Unterschiede im Wahlverhalten zwischen Rezessionen und Zeiten des Aufschwungs noch detaillierter analysieren zu können. Die Studie setzt hierbei historische Daten über Ideologie und Wahlergebnisse von fast 650 politischen Parteien mit der Entwicklung des Bruttoinlandsproduktes in 20 Ländern in Zusammenhang. Die empirische Untersuchung zeigt, dass Parteien rechts der politischen Mitte in Zeiten des wirtschaftlichen Abschwungs profitieren, während Wirtschaftswachstum einen positiven Einfluss auf die Stimmanteile linker und linksextremer Kräfte hat. Dieses Muster erscheint auch im historischen Zeitablauf erstaunlich stabil. Die Resultate sind robust gegenüber der Berücksichtigung einer Kontrollvariable für die generelle Tendenz der Bevölkerung, Regierungen in Zeiten wirtschaftlicher Probleme abzuwählen.

Der dritte Beitrag behandelt die sozialen Auswirkungen von Krisen. Die empirische Analyse dokumentiert Dynamiken in der Einkommensverteilung vor und nach Finanzkrisen basierend auf einem Sample von 20 Ländern, das sich über die letzten 100 Jahre erstreckt. Die Studie macht aus, dass sie jährliche Daten nutzt, um exakt bestimmen zu können, wie die Einkommen der Haushalte im obersten Prozent der Verteilung von Finanzkrisen beeinflusst werden. Die Ergebnisse suggerieren, dass das oberste Prozent im unmittelbaren Ausbruch der Krise durchaus Einkommensverluste erleidet, der Anteil am Gesamteinkommen aber sehr schnell

wieder wächst. Mittelfristig hingegen können sowohl der Vorlauf als auch die Erholung von einer Finanzkrise als Perioden steigender Ungleichheit bezeichnet werden. Zusätzliche Tests haben ergeben, dass der ohnehin nur temporäre, krisenbedingte Einkommensverlust im obersten Prozent zudem nicht den unteren 90%, sondern vielmehr dem Rest des obersten Zehntels zugute kommt. Demnach deuten die historischen Zeitreihen klar auf einen äußerst marginalen Reduktionseffekt von Bankenkrisen auf die Einkommensungleichheit hin.

Der vierte Beitrag zu dieser Arbeit wechselt in die Mikro-Perspektive und untersucht den Zusammenhang zwischen dem Sparverhalten amerikanischer Haushalte und der Einkommensungleichheit im Vorlauf der US-Finanzkrise von 2007/08. Anhand detaillierter Informationen über die finanzielle Situation einer repräsentativen Gruppe amerikanischer Haushalte von der *Panel Study of Income Dynamics* (PSID) kann nachgewiesen werden, dass die Sparquote in allen Einkommensgruppen, und insbesondere der Mittelklasse, von Mitte der 1980er Jahre bis 2007 dramatisch gesunken ist – mit Ausnahme des obersten Quintils. Dieses Ergebnis stimmt mit der obigen Interpretation überein, dass gerade finanzielle Booms in steigender Ungleichheit resultieren. Die Umfragedaten lassen auf überproportional gestiegene realisierte Kapitalgewinne für reiche Haushalte in Kombination mit einem “Vermögenseffekt” in den mittleren Einkommensgruppen als mögliche Ursachen schließen.

Die Hauptidee dieser Studie ist, dass sich das politische und soziale Klima im Zusammenhang mit Finanzkrisen wesentlich verschlechtert. Entscheidungsträger in Europa und den Vereinigten Staaten müssen realisieren, dass die derzeitige Krise eine ernsthafte Gefahr für das Funktionieren von Demokratie und Gesellschaft darstellt, und dass mangelnde Finanzstabilität und schleppendes Wirtschaftswachstum dabei die entscheidenden Faktoren sind.

# Veröffentlichungen

Aus dieser Dissertation hervorgegangene Vorveröffentlichungen:

- Manuel Funke, Moritz Schularick, Christoph Trebesch. 2015. Going to Extremes: Politics after Financial Crises, 1870-2014. CEPR Discussion Paper No. 10884.
  - Manuel Funke, Moritz Schularick, Christoph Trebesch. 2015. Going to Extremes: Politics after Financial Crises, 1870-2014. CESifo Working Paper No. 5553.
  - Funke, Manuel, Moritz Schularick, Christoph Trebesch. 2016. Going to extremes: Politics after financial crises, 1870-2014. *European Economic Review* 88: 227-260.
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# Erklärung

Hiermit versichere ich, Manuel Funke, dass ich diese Arbeit selbstständig verfasst und alle Quellen ordnungsgemäß gekennzeichnet habe.

Ich versichere, dass die Dissertation nicht bereits in einem früheren Promotionsverfahren angenommen oder als ungenügend beurteilt worden ist.

Berlin, 5. November 2016

Manuel Funke