War and Inequality*

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Abstract

Using historical data, we show that war reduces inequality, with substantially larger effects on income than on wealth: the top 1 percent income share falls by more than 20 percent, while the top 1 percent wealth share declines by about 10 percent. We measure three drivers of inequality—capital destruction, taxation, and inflation—in the data and quantify their roles using a Heterogeneous Agent New Keynesian (HANK) model. Capital destruction depresses firm profits and thus top incomes, accounting for the bulk of the decline in income inequality. Increased taxation primarily shapes wealth dynamics, while wartime inflation reduces indebtedness at the lower end of the wealth distribution. We validate the model's mechanisms using newly assembled data on inequality across German towns during World War II and cross-country evidence on firm profits.

Keywords: Interstate Wars, Inequality, Income share, Wealth share, Distribution, Capital destruction, Inflation, Taxes, HANK

JEL Codes: F40, F50, E50

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1 Introduction

The history of inequality cannot be told without war. Seminal contributions by Piketty (2014) and Scheidel (2018) argue that war acts as a "Great Leveler," compressing inequality. Given the inherently destructive nature of war, this view is particularly compelling for wealth inequality: large-scale conflict destroys capital and may disproportionately affect the wealthy. Yet, despite the central role of war in historical accounts of inequality, systematic evidence on its distributional effects and underlying mechanisms remains limited. In this paper, we reassess the Great Leveling hypothesis by providing a macroeconomic analysis of the effects of war on inequality and its transmission channels.

Our first contribution is to establish evidence that refines the leveling effect of war. We show that wars reduce *income* inequality far more than *wealth* inequality. Relative to prewar levels, the top 1% income share declines by more than 20%, whereas the top 1% wealth share falls by only about 10%. These estimates are identified from within-country variation and pertain to economies that experience fighting on domestic soil; effects are substantially weaker for belligerent countries spared such destruction, underscoring the central role of physical destruction in shaping the distributional consequences of war.

Against this background, the income inequality's stronger response may be surprising. To interpret it, we conduct a simple accounting exercise in the spirit of Meade (1964). Capital income accounts for a disproportionate share of income at the top of the distribution. As a result, war-induced reductions in capital income—reflected in a sharp decline in the capital-income share—compress the income distribution more than the wealth distribution. However, the accounting model can explain at most half of the observed decline in inequality.

Motivated by this residual, our second contribution is to develop a general equilibrium perspective based on a Heterogeneous Agent New Keynesian (HANK) model. The calibrated model successfully replicates both the magnitude of the observed decline in inequality and its underlying drivers—not only capital destruction but also increased taxation and inflation. Capital destruction accounts for the bulk of the decline in inequality through its effect on firm profits, the primary source of income at the top of the distribution. Increased top-end taxation plays an important role in reducing wealth inequality, while wartime inflation primarily benefits the lower end of the wealth distribution. We validate the model's mechanism using newly assembled data and show that firm profits fall sharply during and after wars—war is bad for business.

To study the impact of war on inequality, we assemble a new long-run macroeconomic dataset, building on a research program that has compiled inequality data for countries across the world (Piketty, 2014). We construct additional time series that capture the forces shaping the income and wealth distribution over time, allowing us to identify the mechanisms of wartime leveling in the HANK model. Our main focus is on war sites—countries that experienced significant warfare on their territory, as defined in Federle et al. (2026a). War destroys capital, and we collect data on both the amount and, where available, the distribution of capital destruction in the wars we study. As an alternative indicator of the situation of capitalists during wartime—less prone to the challenges of directly measuring capital destruction—we use the capital share, sourced from Bengtsson and Waldenström (2018). We also gather data on top marginal tax rates to quantify the wartime rise in tax progressivity, as well as on inflation rates and the capital stock.

We trace out the consequences of wars over a 15-year period after the start of the war using panel local projections. In a first step, we quantify the effects of war on inequality, measured by the share of total income or wealth of the top-1%. We find large leveling effects for *income* inequality. Relative to pre-war trends, the top percentile income share drops by more than 20%. This effect is long-lasting and persists well after the end of the war. In contrast, for *wealth* inequality, we find a decline of the top percentile share by only up to 10%.
War is a shock with multiple economic dimensions, which we measure in turn. Most directly, war destroys physical capital. Directly observable measures suggest that approximately 10% of the capital stock is destroyed during war. However, we find that, over time, the capital stock declines by about 20% in the average war site, suggesting that war also depresses investment. The capital-income share likewise falls sharply during wars—by about 25% over the medium run. The rise in progressive taxation during wartime leads the top marginal tax rate to increase by up to 50%. Finally, war has a substantial inflationary effect, with the price level rising by around 70% over a 10-year horizon.
The distributional consequences of war have not only been noted in countries that are war sites themselves, but also in countries that engage in large scale warfare on foreign soil, most prominently the U.S. (Goldin and Margo, 1992). We investigate those countries separately and find important heterogeneities. The top-1% wealth share declines by as much as in war sites, and taxes respond as strongly, if not stronger. Yet along other dimensions, the responses

are weaker. Notably, the drop in the top-1% income share is weaker and much less persistent, and the decline in the capital stock is not even half as large as in war-site economies. This supports the notion that physical destruction—the salient feature of war sites—is indeed a key driver of war's impact on inequality. To further support this notion, we offer additional micro-level evidence using a panel of German towns during World War II. These data allow us to identify the differential impact of destruction on income inequality directly while holding macroeconomic conditions fixed. Destruction lowers inequality at the town-level: Increasing the share of the housing stock destroyed by one percentage point lowers the top-1% income share by 0.3%. This effect is confirmed in an instrumental-variables setting leveraging variation in the distance to London.
As a first step in rationalizing the evolution of income and wealth inequality, we develop a simple accounting framework following Meade (1964) that takes the decline in the capital-income share as given and quantifies—all else equal—its implication for each margin. Top earners derive more income from capital, whereas overall income is more heavily skewed toward labor. Thus, shocks to capital have stronger effects on the distribution of income than the distribution of wealth. The accounting framework can explain the evolution of inequality in the cross-section of German towns holding macroeconomic conditions fixed. However the framework cannot, quantitatively, explain the decline in top income or wealth shares in the time series.

We therefore quantify the importance of different shocks for inequality in general equilibrium extending the HANK model developed by Bayer et al. (2024). In the model households are heterogeneous in both income and wealth, such that we can study how inequality evolves in response to shocks. The New Keynesian features—monopolistic competition and infrequent price adjustments—are also essential. First, under monopolistic competition, firms earn pure rents or profits in equilibrium. These profits are a source of capital income for households, supplementing the return they receive for the capital they lend to firms. Second, the sticky-price assumption is particularly plausible in our context. Price controls are a pervasive feature of the wars in our sample and directly limit firms' ability to adjust prices. As a result, markups—and, by extension, the capital-income share—fluctuate over time; this would not happen if prices were flexible. We calibrate the model to match initial levels of income and wealth inequality and use impulse response matching to pin down key parameters. The calibrated model successfully replicates the observed decline in inequality as well as its

potential drivers: destruction, taxation and inflation.

Quantitatively, the model attributes the bulk of the decline in income inequality to the destruction shock, operating through its effect on firm profits, which constitute the lion's share of income at the top. The destruction shock raises marginal costs which are only partially passed through into prices during times of war. As a result, firms experience a squeeze on profit margins. The distinction between profits—which accrue to the very rich—and other forms of capital income allows the model to replicate the decline in the top-1% income share, even though the capital share moves by the same amount as in the accounting exercise. Top wealth shares are less affected, because, consistent with the data, the direct effects of the destruction shock affect wealth owners more proportionally, leaving inequality unaffected.

In contrast, we find a smaller role for taxation in leveling the income distribution. This is because our results on income inequality concern pre-tax inequality, due to data availability and in line with the prior literature. In our model, labor supply elasticities are relatively low, consistent with the data as reviewed for example in Saez et al. (2012), so that pre-tax income inequality is not affected strongly by changes in tax rates. However, we find that rising tax progressivity, in addition to the fall in capital returns, is key for the decline in wealth inequality, as it reduces the post-tax disposable income out of which the rich accumulate wealth (Piketty, 2018).[1]

We find no role for inflation in explaining income or wealth inequality at the top. Applying the approach of Doepke and Schneider (2006), we show that this is the case because the inflation exposure of the portfolio of the top-1% is similar to the average. However, the model allows us to study the bottom of the wealth distribution, which we do not observe in historical data. We document important redistributive effects from inflation at the bottom of the wealth distribution.

Do profits decline in war? We validate the model mechanism using newly constructed cross-country data on firm profits: in the data, profits also fall sharply. While profits initially boom during the military buildup in many economies, this boom quickly reverses once the war turns violent and profits contract sharply—not least because, as anecdotal evidence suggests and in line with the mechanism at the core of the model, wartime price controls restrict firms' ability to pass on cost increases. In sum, consistent with Scheidel (2018), we find that

[1] Auray et al. (2026) find that rising markups increased income inequality in France since 1980, whereas taxation plays a larger role for wealth inequality in a heterogeneous-agent model.

the wartime leveling of incomes primarily reflects violent forces, rather than a peaceful expansion of the welfare state. In contrast, peaceful forces can explain part of the decline in wealth inequality (Waldenström, 2024).

The paper is organized as follows. In the remainder of the introduction, we place the paper in the context of the literature and clarify its contribution. Section 2 introduces the data and econometric framework. We present our empirical results in Section 3. We outline the HANK model in Section 4, explain how and under which conditions it can account for the evidence, and inspect the transmission mechanism through model simulations. A final section concludes.

Related Literature. The original contribution of our paper is to study the impact of war on inequality through the lens of a fully-specified general equilibrium model. In doing so, we bridge two important strands of research.

First, we build on a literature in economic history that studies the long-run determinants of inequality (Kuznets, 1955; Piketty, 2014; Lindert and Williamson, 2016; Scheidel, 2018; Alfani, 2021; Waldenström, 2024). This literature has studied various determinants of inequality, relying on a major data collection effort by researchers around the world who have carefully constructed historical inequality series for individual countries.[2] While there is some agreement that wars are important determinants of inequality, with some contributions deemphasizing their role (Kuznets, 1955; Lindert and Williamson, 2016; Waldenström, 2024), little is known about the quantitative effect of war on inequality and the importance of different channels of wartime leveling.

Our contribution to this literature is to comprehensively measure the leveling effects of war and their underlying channels empirically—highlighting the distinction between income and wealth inequality—and to specify the underlying causes in a state-of-the-art HANK model.[3] This allows us, for the first time, to quantify the channels through which wars reduce inequality. Here, we join a small literature that uses quantitative models to assess historical drivers of inequality (Albers et al., 2023; Gabaix et al., 2016; Hubmer et al., 2021).

[2]For an incomplete list see Goldin and Margo (1992) and Saez and Zucman (2016) for the U.S., Albers et al. (2022) and Bartels (2019) for Germany, Alvaredo et al. (2018) for the U.K., Garbinti et al. (2021) for France, Moriguchi and Saez (2008) for Japan, and Toussaint et al. (2022) for the Netherlands. Roine and Waldenström (2015) provide a summary.

[3]Heldring et al. (2022) study the causal impact of bombing on wealth inequality using variation across British regions and also find small effects, consistent with our results on the effect of wealth inequality across countries. Our evidence on the effects on income inequality across German towns underscore the importance of distinguishing inequality in income and wealth.

Second, an important literature investigates the macroeconomic consequences of wars and disasters focusing on many aspects such as trade, capital flows, and asset prices (Braun and McGrattan, 1993; Barro, 2006; Ursùa and Barro, 2010; Gabaix, 2012; Gourio, 2012; Nakamura et al., 2013; Farhi and Gabaix, 2016; Auray and Eyquem, 2019; Horn et al., 2020; Federle et al., 2026b; Marzian and Trebesch, 2025). Ramey and Shapiro (1998) study the macroeconomic impact of military buildups in a neoclassical two-sector model. We complement these works by zooming in on how disasters affect inequality—an issue that has so far been considered mainly by economic historians. We show empirically that disasters matter for inequality and put forward a heterogeneous-agent model that can rationalize the evidence. Song et al. (2023) and Panon and Conteduca (2024) find that large natural disasters reduce income inequality and firm markups respectively, consistent with the evidence we present for wars.

Quantitative incomplete-markets models have become the workhorse for studying inequality. These frameworks—pioneered by Huggett (1993) and Aiyagari (1994) and extended to incorporate entrepreneurs (e.g. Castaneda et al., 2003; Cagetti and De Nardi, 2006)—successfully reproduce the right tail of the wealth distribution and its response to taxation (Kaymak and Poschke, 2016). Building on this foundation, Heterogeneous Agent New Keynesian (HANK) models now dominate research on the *dynamic* distributional effects of aggregate shocks. The transmission and distributional consequences of monetary policy (e.g. Kaplan et al., 2018; Auclert, 2019; Luetticke, 2021) and fiscal policy (e.g. Bayer et al., 2023; Ferrière and Navarro, 2025) are by now well documented. What is more, portfolio and asset-return heterogeneity have emerged as a distinct driver of inequality: Kuhn et al. (2020) and Bayer et al. (2024) show that asset-return movements account for much of the cyclical variation in top-wealth shares.

2 Data and Econometric Framework

To study the distributional consequences of wars we build a historical database, that combines data from existing studies and complements it with several newly constructed indicators. In this section, we describe the data and introduce the econometric framework that we use in the subsequent analysis.

2.1 Sample and Data

In our baseline sample, we focus on major wars (with more than 10K casualties) in *war sites*, that is, the countries that experience military action on their own soil. For this, we rely on the classification of Federle et al. (2026a), who aggregate battle-level data to the country level in order to geolocate war sites. Our focus on war sites as a baseline sample rests on the premise that war affects inequality through its destructive nature, and that its impact will therefore differ systematically between war sites and non-sites. We test this conjecture below by comparing our baseline sample of war sites to a sample of non-sites.

In practice, we are strongly limited by the availability of inequality data—there are already few observations when it comes to wars, and there are even fewer wars with available inequality data. Table 1 shows the wars in our sample with available inequality data before and after the war. We choose to focus not only on the world wars to establish as much external validity as possible. Nevertheless, for many additional variables that we construct, we are restricted to the world wars. When we restrict the analysis to only the world wars below, we show that results are similar to the full sample. In additional analyses, we further extend our study to include wars fought on foreign soil (*non-war sites*) and smaller wars (with less than 10K casualties). These are listed in Table B.4 in the Appendix.

Wars may induce changes in borders and the population that can have mechanical impacts on measured income and wealth inequality. For the wars in our sample, border changes are negligible except for the case of Germany during both World Wars. For Germany, the analysis of Albers et al. (2022) finds that border changes had negligible effects on inequality at the top, given the size and composition of the affected regions. Similar arguments apply to war deaths.[4] In Appendix B.4, we show that war deaths cannot mechanically account for the changes in inequality we document, in fact they could even increase measured inequality.

Inequality. Our baseline inequality measures are the share of the top percentile in the wealth and income distribution, which provide the longest historical

[4]Federle et al. (2026a) classify war sites based on present-day borders, according to which Germany is not a war site. We consider Germany a war site in World War I because the historical inequality statistics for Germany do not adjust for changes in borders; see again Albers et al. (2022). This allows us to capture the potential effects on inequality of the large battles and associated destruction in what was then German East Prussia, as well as the loss of land after the war. Our results remain unchanged when dropping individual war sites (Figure B.8).

Table 1: War Sites

Country	Year	Country	Year
Germany*	1914	France*	1940
France*	1914	India	1944
Finland*	1939	Japan*	1944
Germany*	1939	India	1962
Belgium*	1940	India	1971
Netherlands*	1940	Bosnia and Herzegovina	1992
United Kingdom*	1940	Afghanistan	2001
Norway*	1940	Iraq	2003

Notes: This table shows war sites with available inequality data. Year refers to the start of the war in Federle et al. (2026a). Starred wars indicate world wars, for which we construct additional data as explained in the text.

coverage. We obtain these data primarily from the World Inequality Database (WID). In a few countries we deviate slightly from the baseline WID series and instead rely on other published research papers which cover a longer historical period (for instance, Bartels, 2019; Roikonen, 2022; Moriguchi and Saez, 2008), see Table A.1 for these cases.[5] Income refers to *pre-tax* income in all countries.[6] In our sample, inequality data is usually based on tax tabulations, which capture inequality at the top of the distribution accurately (Roine and Waldenström, 2015). Our estimation controls for country fixed effects to account for variations in the income concept between countries. We also show below that our findings are not driven by individual countries. Wealth shares are computed based on market prices, with underlying studies making corrections for assets that are difficult to value, such as business assets.

We also take up potential caveats regarding the inequality measures. First, a recent literature discusses the reliability of income and wealth inequality data, focused on the U.S. (Geloso et al., 2022; Smith et al., 2023). We show in Appendix A that this concerns mostly the level of inequality and that war-time trends are similar across series.[7] In terms of wealth inequality, many advanced

[5]The income concept in these series is usually 'fiscal income', that is, income as reported in income tax returns. By contrast, WID makes imputations for income not reported in tax returns. In countries where both series are available, trends are very similar across both.

[6]Data on post-tax income inequality is not available for most countries over a long time period. Bozio et al. (2024) argue that long-run shifts in inequality, such as the ones we are interested in largely reflect changes in pre-tax income inequality, studying France and the U.S., for which post-tax data is available. We compare pre- and post-tax income shares in Figure A.1.

[7]Inequality trends around wars have also been consistent when researchers have updated studies with newer methods and data, see e.g., Bartels (2019) and Dell (2007) for Germany.

economies had wealth taxes in place throughout most of 20th century, which were only abolished towards the turn of the millennium (Saez and Zucman, 2022). Therefore, arguably, coverage of top wealth holders is as reliable as in modern data, which often relies on surveys or income capitalization methods to measure wealth inequality in the absence of a wealth tax.

Second, in some cases, there are gaps in the series of top income and wealth shares, which we interpolate linearly in our baseline specification. This conservative procedure means that we may underestimate the true equalizing effects of wars, because some of the reduction in inequality that occurs after wars is attributed to a pre-war decline. We conduct robustness checks in Appendix B.3, including a specification in which we attribute the entirety of the decline in inequality between gaps to the war; the results do not differ in a quantitatively meaningful way.

Drivers of Wartime Leveling. We collect additional times series to inform our analysis of the channels through which war affects inequality. We start from existing studies and fill gaps during war years, which are usually not the focus of these papers. To measure the impact of war on capital, we use capital shares from Bengtsson and Waldenström (2018) and capital-stock data from Bergeaud et al. (2016). These cover a host of advanced economies since 1890.[8] We construct our own estimates of war destruction based on country-level sources to adjust the capital stock as well as to study how the leveling effects of war vary with its destructiveness. The destruction estimates are reported and discussed in Table C.8. In the countries with the largest destruction, we also show how to account for the incidence of destruction in Appendix C.3. To study asset prices and inflation, we rely on the macrohistory database (Jordà et al., 2017), extended in Funke et al. (2020).

War brings about not only destruction, but also large changes in the fiscal regime. We construct data on government consumption during wars, for which there exists no coherent database to date. To account for shifts in tax progressivity, we obtain data on top marginal tax rates from Scheve and Stasavage (2018). We estimate how top marginal tax rates change in response to war, and discuss how these translate into the tax system considered in the HANK model below. We provide details in Appendix A.2.

Before turning to our econometric framework, a general remark on the quality

[8] We add data on the capital share in Japan during WW2 from the statistical yearbook (Statistics Bureau of Japan, 1949 – 2023).

of our data is in order. Much of the economic data comes from a time period in which modern practices of national accounting were not yet established. Building national accounts is hard, and even more so during times of wars. That said, we focus on variables which have been been subject to great scrutiny over time. The outcomes we consider are central economic variables such as inflation, the capital share, and top marginal tax rates that have been revisited frequently by researchers and economic historians in the respective countries. The effects we document persist long after the war itself has ended, so they do not rely on war-time data alone. Because the government takes on an outsized role during wars, data on government activities is among the best war time data and has been studied by many economic historians.

2.2 Econometric framework

To identify the consequences of wars, we assume that the onset of wars is exogenous to business cycle and inequality dynamics in the war sites. The evidence suggests that this assumption is warranted: Federle et al. (2026a) offer a systematic classification of the casus belli for all wars in our sample based on a range of historical sources and find that the causes of war are generally unrelated to the current economic conditions, but rather related to broader nationalist or ideological causes.[9] Moreover, narrative historical work by Scheidel (2018) and many others identifies war and its aftermath as the trigger for inequality dynamics, directly through destruction and indirectly through the responses of governments. The weight of the historical evidence thus suggests that war was the cause of the subsequent inequality changes. Below, we also provide additional evidence on pre-trends, as well as a comparison to non-war-participants, which corroborates the interpretation war itself triggered the subsequent inequality dynamics.

Conceptually, we view war as a multi-faceted shock composed of several underlying structural shocks (e.g., capital destruction, taxation, inflation, ...). We trace out the economic consequences of the composite shock using panel local projections. Denoting by i the country and t the year, for any outcome variable

[9] They also find that interstate wars are not Granger-caused by lags of output growth—unlike civil wars which we do not include in our data; there is evidence that inequality causes civil wars (Alesina and Perotti, 1996; Baten and Mumme, 2013).

$y_{i,t}$ we estimate the following linear specification:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i + \beta_h \text{War Start}_{i,t} + \gamma_h X_{i,t} + \varepsilon_{i,t+h}, \quad h = 0 \dots 14, \tag{1}$$

where α_i is a country fixed effect and $X_{i,t}$ is a vector of controls. Our baseline specifications control for 4 lags of the dependent variable and the regressor, we cluster standard errors at the country level. Including lagged variables captures trends in the outcome prior to the war, as is common in macroeconomic data. This is important, as inequality is falling in most advanced economies throughout the first half of the 20th century. Our specification isolates the effects of wars beyond this trend.

In our baseline specification, we define War Start$_{i,t}$ as a dummy variable, which takes on a value of one when a country becomes a war site and is zero otherwise. Hence, our estimates capture the effect of the average war onset in our sample. The specification also accommodates wars of different duration: β_h in specification (1) measures the development of inequality in the war site h years after the start of the 'average war', independent of its duration.

The outcome variables are measured in changes relative to the pre-war value, so that the total effect of the shock on variables of interest can be read off directly from the β_h coefficients. Note that our specification accommodates the case where the effect of war is permanent (Stock and Watson, 2018), and indeed, we estimate impulse responses at long horizons—up to 15-years following the start of the war—to allow for long-lasting effects of wars. We do so, first, because our sample consists mostly of wars that are fought over multiple years, so that effects likely take a few years to fully materialize. Second and more importantly, the historical literature on the leveling effects of wars thinks of these as long-lasting shocks (Piketty, 2014; Scheidel, 2018), and we want to take into account the effects of wars at longer durations as well. Jordà et al. (2020) show that local projections, when appropriately augmented with lags as in our case, are able to detect the effects of shocks at very long horizons.[10]

We consider variations of specification (1) below and report on robustness in Section B.3. In particular, we also use a quantitative shock measure that proxies for the intensity of the war using destruction relative to the pre-war capital stock. Moreover, in other robustness analyses, we vary the construction of the war dummy, study the effects of wars on belligerent countries which do not experience war on their own soil and consider variations of our baseline sample.

[10]Local projections form the backbone of a literature analyzing the long-run effects of other shocks, such as temperature shocks (Bilal and Känzig, 2026) or pandemics (Jordà et al., 2022).

3 The Distributional Impact of War

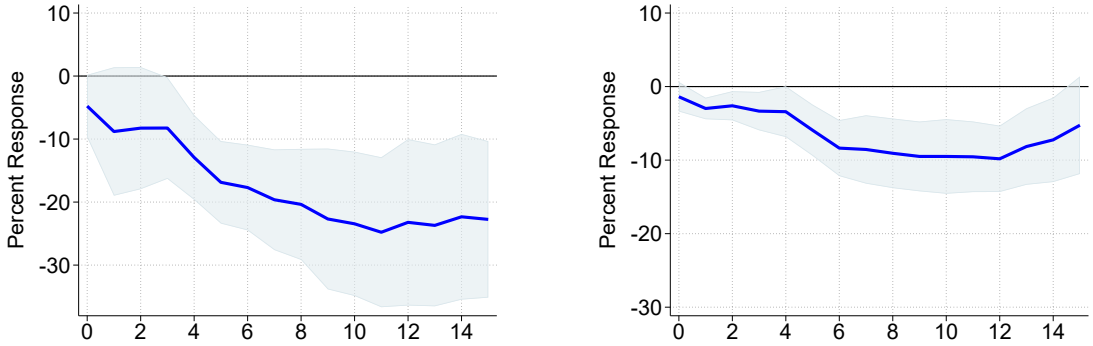
In this section, we present new time-series evidence on the distributional impact of war and on the adjustment of key drivers that feature prominently in the historical narrative on war and inequality. We complement this with micro-level evidence for German towns during WWII which isolates the direct impact of war destruction on inequality. We conclude by introducing a simple accounting framework to rationalize the findings.

3.1 Time-Series Evidence

Inequality. Figure 1 shows the response of top-1% income and wealth shares to the war shock. The solid line reports the point estimates, while the shaded areas indicate 90 percent confidence intervals. The estimates are based on specification (1), introduced above, and thus represent the impulse responses to the war onset in the war site. The horizontal axis measures time in years since the war onset. Income and wealth shares are log-transformed, so the vertical axis measures the percentage change relative to the pre-war trend.
The top-1% income share, shown in the left panel, drops by more than 20%. The top-1% wealth share (right panel) also falls, but the effect is weaker—less than half of the decline in the top-1% income share. In both cases, the effect is persistent and the reversal at the end of our estimation period is far from complete. To put these numbers into perspective, note that the income share of the top-1% ranges between 5-20% over the 20th century, while the top-1% wealth share ranges from 20% to as much as 60% over the 20th century (Piketty and Saez, 2014; Roine and Waldenström, 2015). The percentage decline in top income and wealth shares reported in Figure 1 corresponds to a decline of around three percentage points for both top income and wealth shares, see Appendix Figure B.4. However, because top wealth shares stand at far higher levels, similar absolute declines imply much smaller relative declines for wealth than for income.
In sum, our findings are consistent with and quantify the historical narrative in Scheidel (2018). However, we also provide an important qualification: War reduces income inequality much more strongly than wealth inequality.

The impact of war on wealth inequality is limited, even though wealth inequality has been declining strongly during the first half of the 20th century (top-1% wealth shares decline from around 60% in 1900 to 20-30% in 1980, see Figure B.10, Panel (a)). Against this background, we find that it is important to ac-

Figure 1: Response of Top Income and Wealth Shares to War Shock



(a) Top-1% Income Share

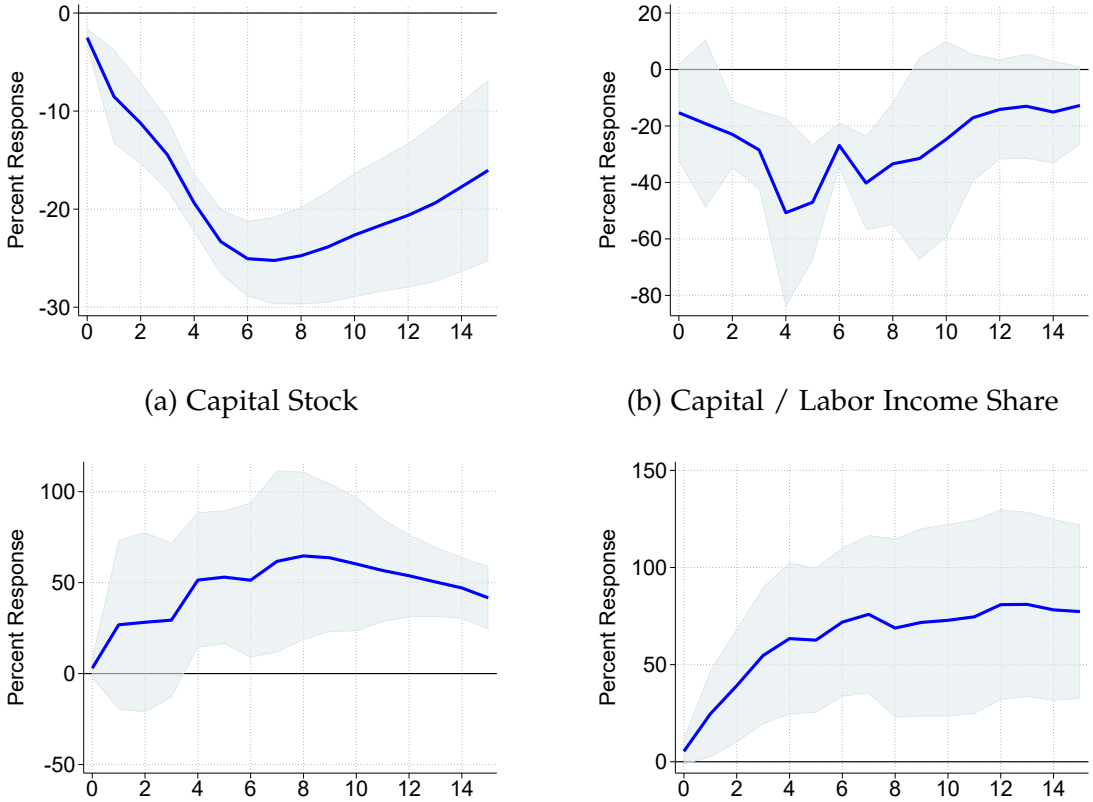
(b) Top-1% Wealth Share

Notes: Solid line shows response to war shock in war site, estimated based on specification (1); start of war as specified in table 1. Shaded areas indicate 90% confidence intervals. Horizontal (vertical) axes measure years since start of war (deviation from pre-war level in percent).

count for the declining trend in wealth inequality via the inclusion of lags in specification (1). With no lags in the estimation, results would suggest that war leads to a stronger decline in wealth inequality, as we illustrate in Figure B.10, Panel (b). However, wars do not represent very large breaks in the steady decline of wealth shares for most economies: our estimates attribute the bulk of the change of wealth inequality around wars to the secular decline happening throughout the 20th century, rather than to the war shock. This conclusion aligns with Waldenström (2024) who notes that wars do not constitute large breaks in wealth inequality series and stresses other explanations for the long-run evolution of wealth inequality, such as the rise in 'popular wealth' owned by the middle class. Further, Heldring et al. (2022) show that across U.K. districts, bombing did not have a causal effect on wealth inequality on average.
The divergence between income and wealth inequality extends to the top decile, as we show in Appendix Figure B.4. As with the top percentile, we find that top decile income shares fall more than top decile wealth shares. The top-10% income share declines by around 10%, while the top-10% wealth share remains relatively unchanged.

Drivers of Wartime Leveling. The historical literature identifies destruction, taxation and inflation as key driving forces of wartime leveling (Scheidel, 2018). We examine key indicators for each force in Figure 2. Panel (a) shows that there is a long-lasting drop in the capital stock, which declines by around 25% in

Figure 2: Response of Key Drivers to War Shock



(a) Capital Stock

(b) Capital / Labor Income Share

(c) Top Marginal Tax Rate

(d) Price Level

Notes: Solid line shows response to war shock in war site, estimated based on specification (1); start of war as specified in table 1. Shaded areas indicate 90% confidence intervals. Horizontal (vertical) axes measure years since start of war (deviation from pre-war level in percent).

response to the war and does not return to the pre-war level by the end of our estimation period. The maximum decline exceeds the historical evidence on war destruction for most countries reported in Table C.8 by a wide margin. This suggests that the capital stock declines not only due to destruction, but because investment declines in response to the war, too (Federle et al., 2026a).

Next, to complement the measure of capital destruction, we turn to the functional distribution of incomes, that is, the split of income into capital and labor. Panel (b) shows the adjustment of the ratio of capital to labor income. Returns to capital decrease in wartime and the capital share falls strongly relatively to the labor share: the capital-labor ratio drops by about 30-40% in the medium run. This shows that the wartime decline in income hits capital incomes in particular. Panel (c) plots the response of top marginal tax rate in war sites. Wars and the associated fiscal expansions are usually financed by raising taxes and tax

progressivity (Vélez, 2014). According to our estimates, the top marginal tax rate increases by up to 50% in response to war, and the tax-and transfer system remains more progressive for a considerable amount of time after the war has ended. We discuss in Appendix A.2 how the response of the top marginal tax rate maps into the HANK model we employ below.
Finally, we consider the response of prices in Panel (d): Wars sharply increase the price level, which rises by about 70% relative to the trend. This is consistent with the evidence in Barro (2006), who notes that wars are generally accompanied by high inflation and low asset returns.[11]

Additional Outcome Variables. To characterize the economic developments in the countries under study, we examine the adjustment dynamics of several additional outcome variables. We show these in Figure B.5 in the Appendix and summarize them here to economize on space. First, we find that wars lower output in the war site considerable, in line with the notion that wars are the quintessential macroeconomic disasters (Barro, 2006). Consistent with this, we find large declines in asset returns, for both risky and safe assets, see Table B.3. We further document the large fiscal expansion during wartime, both in government expenditure and in the more narrowly defined measure of government consumption. Wars lead to a substantial increase in government consumption—by more than 50 percent—driven to a large extent by military spending, which we report separately. Later, that is, after the average war, this expansion reverses, and government consumption falls substantially below its pre-war trend, in line with the notion of spending reversals (Corsetti et al., 2012). Finally, we also consider changes in the total population as well as in total hours worked to inspect the impact of war on the labor market (Goldin and Margo, 1992). While the population drops by around 3-4% (and then slowly recovers), hours remain stable or even rise in the first year after the war and only then decline, so that there is a muted overall effect.The Appendix additionally reports the response of real wages in D.16a; together with total hours, these outcomes do not point to a persistent contraction in labor supply or a significant increase in real wages, as a negative labor-supply shock would imply. We therefore do not include a separate negative labor-supply shock in the baseline model and instead focus on capital destruction.

[11]We drop the years affected by the German Hyperinflation after WWI (post 1922) from the response of prices (also for the response of wages, reported in the Appendix).

Evidence for non-war sites. The distributional consequences of war have not only been noted in countries that are war sites, but also in countries that engage in large scale warfare on foreign soil, most prominently the U.S. (Goldin and Margo, 1992; Lindert and Williamson, 2016). We investigate those countries separately and compare outcomes in war sites, non-sites that are participants in war, and (selected) non-participants. This comparison provides an initial understanding of the mechanisms through which wars affects inequality, as the underlying economic shocks differ across these categories (for instance, there is no direct physical destruction in non-war sites). As with war sites, we include only non-sites with more than 10K casualties in a war, thereby focusing on belligerents with significant involvements in foreign wars (see Table B.4 for the sample).

Comparing impulse responses reveals that the impact of war on inequality is generally more moderate in non-sites (see Figure B.6). The response of the top-1% income share is noisier and it declines by only about half as much as in war sites. In contrast, effects on the top-1% wealth share are only slightly weaker than in war sites. The response of other variables is also generally weaker—except for taxation, where the top marginal tax rate actually increases more in non-sites. This is consistent with work in political science, which highlights that countries experiencing destruction were economically and politically constrained in their ability to levy high taxes on the rich (Haffert, 2019). We can similarly split the sample into winners and losers of war and find that losers tend to see much larger responses in terms of income inequality, while effects are similar in terms of wealth inequality (Figure B.6, Panels (g) and (h)).

One potential concern is that the effects we document stem from countries experiencing simultaneous global shocks that lead to declining inequality around the time of the World Wars. We therefore estimate the response of inequality to the world war years in countries that are not party to the world wars (such as Switzerland). Although this is an imperfect check due to the international spillovers of wars and the small set of countries with available data, we still find that 'placebo wars' do not lower inequality (panel (d) of Figure B.10). This suggests that trends specific to these time periods, but unrelated to war are unlikely to explain our findings.

Robustness. We check the robustness of our findings to both alternative sample constructions and variations of the dependent and independent variable. We first show results for both a smaller sample which considers the world wars

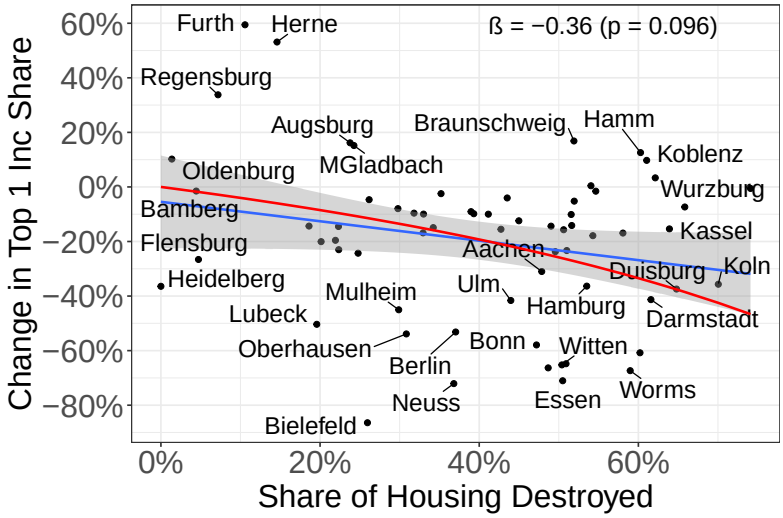
only and for a larger sample which includes wars with less than 10K casualties in the war site (see Table B.4 for the samples). Figure B.7 shows that results for inequality are close to our baseline sample. In terms of income inequality, we find a slightly larger reaction when focusing on world wars only, but a smaller reaction when considering also smaller, less destructive wars. For wealth inequality, the choice of sample matters only very little. To further test the sensitivity of results, we drop each war successively, to see if individual wars drive our results, see the bottom panels of Figure B.7. Doing so does not influence our results: the leveling we document is broad-based across countries. Next, we consider variations of the main dependent and independent variables, as well as the standard errors. Concretely, we let the 'war shock' refer not only to the war start but rather set the war dummy equal to one over the entire war period; change the interpolation of missing inequality data so that all the decline in top shares between wars is attributed to the war period only and compute Driscoll-Kraay standard errors instead of standard errors clustered by country. Results remain consistent across specifications, see Figure B.8. We also consider a specification that uses the degree of destruction in the war site to proxy for the intensity of the war, and continue to find sharp drops in income and wealth inequality, with the income inequality drop being more pronounced, see Figure B.9. Finally, we examine pre-trends in inequality during the years before the war and find no large movements (Figure B.10).

3.2 Micro-Level Analysis

We complement the time-series evidence with a micro-level analysis based on new data on inequality and destruction across German towns during World War II. This setting allows us to isolate the effect of destruction on income inequality, controlling for the macroeconomic environment (e.g., taxes and inflation).

Data. As above, we measure inequality using top-1% income shares, which we compute using newly digitized income tax tabulations from 1928-1954 for each town (data on wealth inequality at the local level are not readily available after World War II). Income is again measured before taxes and includes capital and business income, Appendix B.5 provides further details. The underlying income tax is as in the aggregate inequality series for Germany by Bartels (2019), so the aggregated town-level data track macroeconomic trends. The resulting panel is observed at irregular intervals: the pre-war period is observed in several years from 1928 to 1936, while the postwar period is observed in 1950 and 1954 and

Figure 3: Destruction and Inequality Across German Towns



Notes: The vertical axis shows the percent change in the top-1 income share from 1936 to 1950, and the horizontal axis shows the share of housing destroyed during World War II. The blue line reports the fitted relationship from an OLS regression; the coefficient and (robust) p-value are shown in the upper right corner. The red line shows the change in income inequality for a given level of destruction implied by equation (4) of the simple framework introduced below.

covers only West Germany. We measure destruction as the share of the (pre-war) housing stock destroyed during the war, since we lack data on the destruction of the capital stock. Alternatively, when we measure destruction by debris (in cubic meters per capita), we obtain similar results. Both measures of destruction were constructed by local administrators in the reconstruction after the war.

Results. Consistent with the cross-country data, we find that more destruction is associated with a greater reduction in income inequality. Figure 3 shows the correlation between the change in the top-1 income share from 1936 to 1950 (vertical axis) and the share of housing stock destroyed in the war (horizontal axis) across towns. The extent of destruction varies greatly—from zero in some towns, such as Heidelberg, to more than 70 percent in others, such as Cologne. The effect we identify is quantitatively important: a simple estimation suggests that a 1-percentage-point increase in destruction reduces the top-1% income share by about 0.35 percent, as indicated by the blue line. We also predict changes in inequality based on the simple framework introduced in Section 3.3 below, using observed destruction; these predictions are plotted in red. The relationship implied by the framework tracks the data closely, suggesting that the mechanism running through changing capital shares accounts well for the observed cross-section within Germany.

Some of the variation in destruction across towns may be due to differences in

industrial structure, which made certain towns more attractive targets. Therefore, we also conduct a more formal analysis that leverages the panel dimension of our data and an instrumental variable. Concretely, we estimate the difference-in-differences specification

$$\log(\text{top-1 share}_{i,t}) = \alpha_i + \gamma_t + \beta(\text{Share Destroyed}_i \times \text{Post 1945(t)}) + X_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where i is the town, t is the year and Post 1945 is a dummy equal to 1 after the end of the war. The coefficient of interest is β, which captures the percent change in the top-1% income share induced by a percentage point increase in destruction. We control for both town (α_i) and time (γ_t) fixed effects to account for time-invariant differences between towns and aggregate developments in the German economy. Table 2 shows the results of the regression, which are in line with the scatterplot. A one percentage point increase in war destruction is associated with 0.32% decrease in income inequality. This also holds when controlling for the pre-war industry structure (proxied by the share of employment in industrial jobs) interacted with the post dummy to account for systematic bombing of industrialized targets. Estimating specification (2) year-by-year in Figure B.11 shows that high- and low-destruction towns followed similar inequality trends before the war. This suggests that war destruction does not proxy for exposure to other pre-trends, such as the military buildup. The effects we document are not driven by migration, in fact controlling for migration strengthens our results (Column (3)). Panel (b) of the same Figure shows that results are robust to measuring destruction as debris per capita.

The Allied bombing of Germany was of course not fully random and partially reflects strategic targeting by the allies, which may be correlated with inequality trends. We therefore introduce a distance-based instrumental variable, which we argue affected inequality only through war destruction. For most of the war, the bombing of Germany was conducted by planes stationed in the U.K., which made it easier to bomb towns in the German northwest. We instrument our main regressor with the (log) distance to London interacted with the post dummy as in Vonyó (2012) and Halbmeier and Schröder (2025).[12] The instrumental variable estimates are shown in column (4) of Table 2 and confirm the effect of bombing on inequality: The coefficient becomes more negative, so that a percentage point increase in destruction causes top-1% income shares to decline by 1.7%. Because the first-stage F-statistic is relatively low, we also report

[12]Distance to London may also proxy for exposure to industrialization. We try to account for this by controlling for the pre-war industry structure interacted with the post dummy.

Table 2: The Effect of War Destruction on Inequality Across German Towns

	Log Top 1 Income Share			
	(1)	(2)	(3)	(4)
Share Destroyed × Post	-0.32*	-0.32*	-0.61**	-1.68*
	(0.18)	(0.18)	(0.24)	(0.99)
Town FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Pre-War Industry Structure		✓	✓	✓
Post-War Migration			✓	
KP F-Stat				3.67
AR-CS Set				[-7.27, -.14]
Towns	110	71	71	71
Observations	541	463	463	463

Notes: This table reports the estimated coefficient from equation (2). Share Destroyed is the share of the housing stock destroyed, Post is a dummy equal to one after World War II. Controls are the pre-war industry structure, measured by the share of employment in industrial jobs, as well as the change in town population from 1939 to 1946 interacted with the post dummy. Column (4) reports an instrumental-variable regression, using the log distance to London interacted with the post dummy as an instrument. We report the first-stage KP F-statistic as well as the weak-instrument-robust confidence interval of Andrews (2018). Standard errors are clustered by town. Significance codes: *** 0.01, ** 0.05, * 0.1.

Andrews (2018) weak-instrument robust confidence intervals. We omit the post-war migration control in the IV regression since it is determined after treatment. Taken together, the town level evidence supports the notion that destruction played a key role in leveling income inequality. Although the estimates are imprecise given the small number of towns, places with more destruction saw larger declines in top income shares. These effects are in line with a simple accounting framework that we lay out in the next section.

3.3 Capital incomes and inequality: Some simple accounting

The evidence provided above suggests that the leveling effects of war operate at least partially through their effect on capital. Also, the notion that wartime shocks to capital lower inequality by reducing capital incomes is well established.[13] The key question is whether destruction is sufficient to account for the observed decline in inequality during war. We address this question through a simple accounting exercise in the spirit of Meade (1964). For this purpose

[13]E.g., Piketty (2014, p. 275) notes that "the shocks endured by capital, especially private capital, in the period 1914–1945 diminished the share of the upper decile (and upper centile)."

we consider an exogenous decline in the capital–labor income ratio and operate under an *all-else-equal* assumption, abstracting from further effects due to, for instance, changes in labor supply or markups. This restriction will be relaxed in the HANK model below.

In what follows K denotes wealth (including capital and other assets), and I denotes income; both may arbitrarily distributed over the population. The income share of the top-p percentile is the sum of labor and capital income,

$$sh_p^I = \frac{sh_p^L \cdot w \cdot L + sh_p^K \cdot r \cdot K}{w \cdot L + r \cdot K}. \tag{3}$$

In this expression sh_p^L is the share of total labor income accruing to the top-p income percentile, $w \cdot L$ is total labor income, and sh_p^K is the share of capital income accruing to the top-p percentile. Capital income is the rental rate of capital r times the capital stock K.

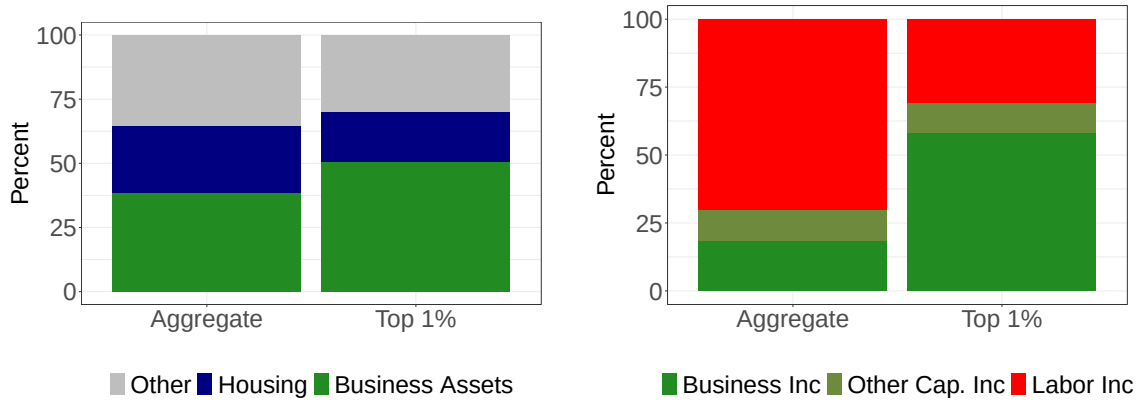
Based on equation (3), we quantify the impact of an exogenous decline in the capital–labor ratio by D%. In the accounting framework, this can be due to, for instance, physical destruction or, more broadly, by depreciation or low returns to capital (in the HANK model, we endogenize how shocks to e.g., the capital stock affect the capital-labor ratio).[14]

To simplify the analysis, we assume that the shock affects wealth uniformly—that is, it eliminates a fixed *share* of wealth K of all wealth owners. This assumption is empirically motivated, as Figure 4 illustrates based on data for France: the wealth composition of the top percentile is very similar to that of the aggregate portfolio across all households (left panel), especially when compared to the composition of income (right panel). This similarity reflects that, in historical data, much of the wealth is concentrated within the top decile, so that the average wealth-holder does not look too different from a top-1% wealth-holder. It follows directly that a D-shock that hits capital uniformly does not alter the top-1 *wealth* share. Capital is lost, but proportionally across the wealth distribution, so relative wealth inequality remains unchanged. We allow for deviations from uniform destruction in countries with richer data in Appendix C.3 and find that it only explains a very small share of the decline in wealth inequality (Table C.9).

By contrast, the shock affects *income* shares because the composition of income

[14]For example, in a study after World War II, the U.K. government noted that "industrial and other enterprises have been compelled, by shortage of material and labour, to allow arrears of normal depreciation and obsolescence to accumulate" (Chancellor of the Exchequer, 1945).

Figure 4: Wealth and Income Portfolios along the Distribution in France, 1937



(a) Wealth Composition (b) Income Composition

Notes: This figure shows the composition of wealth and income in France in 1937, both for the top 1 and the aggregate. For wealth, we distinguish three asset categories: Business assets, housing and a residual. For income, we distinguish business income, other capital income (real estate and interest incomes) and labor income. The precise definition of these categories is in Section C.3. See Figures C.14e and C.14f for an analogue for Germany.

differs substantially along the distribution, with capital income much more concentrated at the top (see again the right panel of Figure 4).[15] Formally, we can write the income share of the top-p percentile as a function of the shock:

$$sh_p^I(D) = \frac{sh_p^L + sh_p^K \cdot (1-D) \cdot \frac{r \cdot K}{w \cdot L}}{1 + (1-D) \cdot \frac{r \cdot K}{w \cdot L}}. \tag{4}$$

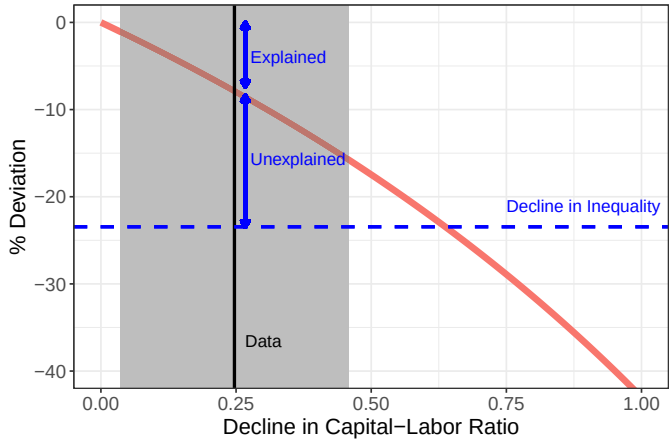
A decline in the capital-labor ratio by D percent lowers the income share for the top-p percentile, if the share of total capital income accruing to the top-p percentile sh_p^K is greater than its labor income share sh_p^L. Formally, the derivative $\partial sh_p^I(D)/\partial D$ is negative if $sh_p^L < sh_p^K$.

Importantly, D can be measured in the data such that—given data on the composition of top incomes—we can gauge its quantitative effect on the top-1 income share.[16] We first apply the accounting framework to the city-level evidence from Germany, calibrating the composition of top incomes to pre-war data shown in Table C.7. The red line in Figure 3 shows the framework's pre-

[15] Historically, top-1% households consisted mainly of landowners or industrialists living on the proceeds of their capital. In modern data, wages are important even at the top. Piketty (2014) refers to this as the transformation of the income-rich from "rentiers" to "super-managers."

[16] Meade (1964) and Moll et al. (2022) apply similar frameworks to study inequality in post-war U.K. and in the U.S. in recent years. We extend this approach to the wealth distribution and find larger effects on income inequality from shifting capital shares than they do, owing to the fact that in pre-war data the initial distribution of capital income is more unequal.

Figure 5: Top 1 Income Share as a Function of Changing Capital-Labor Ratio



Notes: The red line shows the implied decline in the top-1 income share (y-axis) as a function of a decline of the capital-labor ratio (x-axis). The Vertical line indicates response of the capital labor ratio at the 10-year horizon in Figure 2, the shaded area indicates 1-sd confidence bands. The arrows indicate the decline in income inequality that can be explained by the accounting framework, see eq. (4), and the unexplained part relative to the overall decline in top income shares in Figure 1.

diction for how the destruction of capital affects the top-1% income share, when calibrated to pre-war German data. It aligns closely with with the blue regression line of best fit. Similarly, we show that countries with larger capital losses (measured via capital shares or destruction) experience larger declines in income inequality in the data (Figure C.12), also in line with the framework. Hence, the framework successfully captures the *direct* effect of destruction on income inequality.

However, the direct effect of destruction cannot explain the *overall* effect of war on inequality in the time-series. We calibrate the simple framework using data on the composition of top incomes, which is available for France, Germany, Japan and the U.K. in the pre-war period (shown in Table C.7), and vary the decline of the capital-labor ratio D.[17] Figure 5 shows the results of this exercise. The red line shows the implied decline in the top-1% income share, measured against the vertical axis, caused by an exogenous decline in the capital-labor ratio, measured along the horizontal axis. The black vertical line indicates the empirical estimate for the decline of the capital-labor ratio, around 25% at the 10-year horizon. For the top-1% share, this generates a decrease of around

[17]The composition of top incomes does not directly give sh_p^L, which is the share of labor (or capital) income accruing to the top fractile. However, we can compute sh_p^L directly as $sh_p^L = \frac{Y}{w \cdot L} \cdot \frac{L_p}{Y_p} \cdot \frac{Y_p}{Y}$ using income composition data on top earners, where L_P/Y_p is the labor share within the fractile and Y is total income.

8%—sizable but less than half of what is observed in the data (almost 25%, see Figure 1). Matching the observed decline in top-1% income shares would require implausible declines of the capital-labor ratio by more than 50%, and the simple framework cannot account for the effects on wealth inequality.[18]
Hence, we need to move beyond the direct effect of war destruction on capital—and account for its full repercussions in general equilibrium. We do so in the next section, as we rely on a HANK model to study the distributional consequences of wars. In terms of equation (4), this means in particular that the distribution of capital and labor income (sh_p^L and sh_p^K), which we assumed to be fixed so far, and the capital-labor ratio adjust endogenously.

4 A structural interpretation with a HANK model

The HANK model provides a general equilibrium framework which allows us to quantify—through counterfactuals—the contributions of destruction, taxation, and inflation to the wartime compression of inequality. Two *defining features* make the model particularly suitable for our analysis: (i) it features heterogeneous agents (HA) due to income differences that are not insured through complete financial markets—wealth and income distributions respond endogenously to aggregate disturbances; (ii) prices and wages exhibit nominal rigidities in the New Keynesian (NK) sense, so markups—and thus the capital share—respond endogenously to shocks, too. Together, these two features allow the HANK model to capture the empirically estimated effects of war on inequality and its driving channels successfully, as we show below.
In what follows, we first provide a compact overview of the model, which builds on Bayer et al. (2024), while delegating details and the recursive definition of the equilibrium to Appendix E. We then explain how we bring the model to the data before quantifying the different channels. The section concludes with an external validation of the mechanism which drives our results.

[18] In Appendix C.3, we relax the assumption that the D-shock affects all wealth holders uniformly, taking into account that top wealth holders may have been more exposed to war-related destruction. For this purpose, we compiled data for the three hardest-hit countries: France, Germany, and Japan. Nevertheless, we find that the direct impact of war destruction explains only a small part of the observed change in wealth inequality. Destruction alone cannot—all else equal—account for the full effect of war on the top-1 income or wealth share.

4.1 Model outline

The model features heterogeneity across households and firms but nevertheless allows for a tractable characterization of aggregate dynamics. We outline the framework from a top-down perspective, beginning with the aggregate relationships. In this way, we can, first, define the "war shock" as a composite of three structural shocks—capital destruction, inflation, and taxation—all of which operate at the aggregate (rather than the idiosyncratic) level, and, second, characterize the response of the functional income distribution.

Aggregate economy. Output $Y_t \equiv \left(\int_0^1 Y_{jt}^{\frac{\varepsilon-1}{\varepsilon}} dj \right)^{\frac{\varepsilon}{\varepsilon-1}}$, with $\varepsilon > 1$, is an aggregate of varieties produced by imperfectly competitive firms, indexed by $j \in [0, 1]$. Aggregate production, in turn, depends on the economy's capital stock, K_t, and labor input, L_t:

$$Y_t = (u_t K_t)^{\alpha} L_t^{1-\alpha}, \qquad 0 < \alpha < 1, \tag{5}$$

where u_t measures the intensity with which capital is utilized.[19] All variables are in real terms unless otherwise noted.

Owing to imperfect competition, firms charge a markup over marginal cost. The resulting profits are a source of capital income for households in addition to rental income from capital services. Because prices are adjusted infrequently, the aggregate markup μ_t fluctuates, and so does the capital-to-labor income ratio, given by:

$$\frac{r_t^K u_t K_t + \Pi_t^F}{w_t^F L_t} = \frac{\alpha + (\mu_t - 1)}{1 - \alpha}, \tag{6}$$

where r_t^K is the rental rate per unit of capital services, w_t^F is the wage paid by firms, and Π_t^F denotes firm profits. Expression (6) illustrates that—unless μ_t moves—labor and capital adjust in equilibrium to keep the capital share constant; a familiar property of the Cobb-Douglas production function (5).[20]

Output is used for consumption, C_t, investment, I_t, and government spending, G_t, such that $Y_t = C_t + I_t + G_t$; and the capital stock evolves according to

$$K_t = (1 - \mathcal{D}_t \delta(u_t)) K_{t-1} + \Psi(I_t, I_{t-1}), \tag{7}$$

where $\Psi(I_t, I_{t-1})$ represents investment adjustment costs borne by perfectly

[19] Eq. (5) omits a term capturing price dispersion, which is zero to a first-order approximation.

[20] The framework in Section 3.3 above abstracts from this adjustment since it maintains an *all-else-equal*-perspective throughout.

competitive capital producers. The depreciation rate, $\delta(u_t)$, depends on utilization but is also subject to exogenous capital destruction, $\mathcal{D}_t\delta(u_t)$—intended to capture one of the key economic impacts of war, namely, physical destruction:

$$\log \mathcal{D}_t = \rho_{\mathcal{D},1} \log \mathcal{D}_{t-1} + \rho_{\mathcal{D},2} \log \mathcal{D}_{t-2} + \varepsilon_t^{\mathcal{D}}, \qquad \varepsilon_t^{\mathcal{D}} \sim \mathcal{N}(0, \sigma_{\mathcal{D}}^2). \tag{8}$$

We assume that $\mathcal{D}_t$ follows an AR(2) process with persistence parameters $\rho_{\mathcal{D},1}$ and $\rho_{\mathcal{D},2}$, allowing it to generate both an initial jump and a persistent, hump-shaped path, consistent with the historical evidence on wartime capital losses. $\varepsilon_t^{\mathcal{D}}$ represents the destruction shock.

The central bank sets the nominal bond rate, R_{t+1}^b, using current inflation and output:

$$\log \frac{R_{t+1}^b}{\bar{R}^b} = \rho_R \log \frac{R_t^b}{\bar{R}^b} + (1 - \rho_R) \left[\log \frac{\bar{\pi}_t}{\bar{\pi}} + \theta_\pi \log \frac{\pi_t}{\bar{\pi}_t} + \theta_Y \log \frac{Y_t}{\bar{Y}} \right], \tag{9}$$

where π_t is inflation, $\bar{R}^b$ and $\bar{Y}$ denote steady-state values, and $\bar{\pi}_t$ is a time-varying inflation target. The target follows $\log \bar{\pi}_t = \rho_{\bar{\pi}} \log \bar{\pi}_{t-1} + \varepsilon_t^{\pi}$, with $\varepsilon_t^{\pi} \sim \mathcal{N}(0, \sigma_\pi^2)$, capturing possible regime changes in monetary policy associated with large shifts in inflation—the second dimension of the war shock. Government debt, B_t, evolves according to

$$B_{t+1} = \frac{R_t^b}{\pi_t} B_t + G_t - T_t, \tag{10}$$

where T_t are tax revenues. Government spending adjusts to stabilize debt and output:

$$\log \frac{G_t}{\bar{G}} = \rho_G \log \frac{G_{t-1}}{\bar{G}} + (1 - \rho_G)\gamma_Y^G \log \frac{Y_t}{\bar{Y}} - (1 - \rho_G)\gamma_B^G \log \frac{B_t}{\bar{B}}, \tag{11}$$

where ρ_G determines smoothing and γ_Y^G and γ_B^G govern the responses to output and debt. For taxes, we distinguish a proportional labor-income tax, τ_t, and a high-income surcharge, τ_t^{war} (applied to both capital and labor income, as defined before). The proportional tax responds to output and to debt growth:

$$\log \frac{\tau_t}{\bar{\tau}} = \rho_\tau \log \frac{\tau_{t-1}}{\bar{\tau}} - (1 - \rho_\tau)\gamma_Y^\tau \log \frac{Y_t}{\bar{Y}} - (1 - \rho_\tau)\gamma_B^\tau \log \frac{B_t}{B_{t-1}}. \tag{12}$$

The high-income surcharge follows a shock process and captures the third di-

mension of the war shock:

$$\log \frac{\tau_t^{\text{war}}}{\bar{\tau}^{\text{war}}} = \rho_{\tau^{\text{war}},1} \log \frac{\tau_{t-1}^{\text{war}}}{\bar{\tau}^{\text{war}}} + \rho_{\tau^{\text{war}},2} \log \frac{\tau_{t-2}^{\text{war}}}{\bar{\tau}^{\text{war}}} + \varepsilon_t^{\tau^{\text{war}}}, \quad \varepsilon_t^{\tau^{\text{war}}} \sim \mathcal{N}(0, \sigma^2_{\tau^{\text{war}}}). \tag{13}$$

As before, we assume an AR(2) process with persistence parameters $\rho_{\tau^{\text{war}},1}$ and $\rho_{\tau^{\text{war}},2}$; $\varepsilon_t^{\tau^{\text{war}}}$ is the taxation shock. The war surcharge is levied fully on the labor earnings of the top 10%, on firm profits received by entrepreneurs, and to positive bond interest and net rental income held by any household.[21]

Households. There is heterogeneity among households, indexed by i, along three dimensions: liquid savings, b_{it}, capital ownership, k_{it}, and productivity, h_{it}. Asset market clearing requires that $B_t = \int_0^1 b_{it}\, di$ and $K_t = \int_0^1 k_{it}\, di$. The distinction between the two assets is particularly well suited to studying the issue at hand because it allows us to distinguish between the distributional impact of war operating through inflation (bonds) and that operating through physical destruction (capital). Formally, to solve the model, we need to keep track of the distribution of households along three dimensions, $\mu_t(b, k, h)$, as detailed in Appendix E.

Productivity drives differences in labor income across households and evolves exogenously:

$$\log h_{it} = \rho_h \log h_{it-1} + \epsilon_{it}^h, \qquad \epsilon_{it}^h \sim \mathcal{N}(0, \sigma_h^2), \tag{14}$$

where ρ_h captures persistence and ϵ_{it}^h is an idiosyncratic productivity shock.

Each period, some households work as entrepreneurs, earn firm profits and do not receive labor income ($h_{it} = 0$). Entrepreneurship is persistent, and transitions into and out of the entrepreneur state occur exogenously, with probabilities ζ and ι, respectively. This "fat-tail" mechanism generates very high income at the top, consistent with the data, and captures the importance of business income for households in the right tail of the distribution.

Preferences are of the Greenwood-Hercowitz-Huffman type:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{\left[c_{it} - n_{it}^{1+\gamma}/(1+\gamma)\right]^{1-\xi} - 1}{1-\xi}, \tag{15}$$

where ξ is relative risk aversion and γ is the inverse Frisch elasticity; c_{it} and

[21] In our empirical analysis, we focus on the top marginal tax rate, as tax rates across the income distribution are not systematically available across countries. Where data are available, the response of the top decile's average tax rate closely tracks that of the top marginal tax rate (see Figure A.3).

n_{it} denote consumption and hours worked. $\mathbb{E}_0$ is the expectation operator and β the discount factor. Households decide how much to consume and work, given wages, w_t, and adjust their portfolios in order to maximize (15). Capital is traded at price q_t, but only subject to frictions: households can adjust their holdings only when a Poisson adjustment shock of probability λ arrives; otherwise $k_{it+1} = k_{it}$. This captures the fact that capital is less liquid than bonds.

The tax treatment of asset returns is easiest to state by defining $\Delta\tau_t^{\text{war}} = \tau_t^{\text{war}} - \bar{\tau}^{\text{war}}$. The high-income surcharge is levied fully on high labor income and firm profits. Only its deviation from steady state is applied to positive bond interest and net rental income. The after-tax gross payoff on bonds is

$$\mathcal{R}_t^b(b) = \frac{R_t^b}{\pi_t} + \bar{R}\mathbf{1}_{\{b\leq 0\}} - \Delta\tau_t^{\text{war}}\left(\frac{R_t^b}{\pi_t} - 1\right)\mathbf{1}_{\{b>0\}}.$$

Let d_i^H indicate a household in the high-income labor state, and let Π_{it}^U and Π_{it}^F be its allocated union and firm profits. The period budget constraint is

$$\begin{aligned} c_{it} + b_{i,t+1} + q_t k_{i,t+1} = {} & (1 - \tau_t - d_i^H \tau_t^{\text{war}}) w_t h_{it} n_{it} + \mathcal{R}_t^b(b_{it}) b_{it} \\ & + \left[q_t + (1 - \Delta\tau_t^{\text{war}})(r_t - 1)\right] k_{it} \\ & + (1 - \tau_t)\Pi_{it}^U + (1 - \tau_t - \tau_t^{\text{war}})\Pi_{it}^F. \end{aligned}$$

Here r_t is the gross return on illiquid capital before the time-varying surcharge. Capital holdings cannot be negative, but bond holdings may be negative up to a borrowing limit, in which case borrowers pay the penalty $\bar{R}$.

Entrepreneur households receive firm profits as capital income, $\Pi_t^F = (1 - mc_t)Y_t$, while other households receive the profits earned by a union, $\Pi_t^U = (w_t^F - w_t)N_t$. The profits of the union reflect its market power in the labor market, which in turn drives a wedge between the product wage and the wage received by households. The union renegotiates wages infrequently across different segments of the labor market, giving rise to a wage Phillips curve:

$$\log\left(\frac{\pi_t^W}{\bar{\pi}_W}\right) = \beta\mathbb{E}_t\left[\log\left(\frac{\pi_{t+1}^W}{\bar{\pi}_W}\right)\frac{w_{t+1}^F N_{t+1}}{w_t^F N_t}\right] + \kappa_w\left(\frac{w_t}{w_t^F} - \frac{1}{\mu^W}\right), \tag{16}$$

where π_t^W and $\bar{\pi}_W$ denote wage inflation and its steady-state value, respectively, and $1/\mu^W$ is the desired wage mark-down. κ_w parametrizes the degree of wage rigidity.

Firms. There is heterogeneity at the firm level because firms adjust their prices infrequently. The implication is a price Phillips curve:

$$\log\left(\frac{\pi_t}{\bar{\pi}}\right) = \beta \mathbb{E}_t\left[\log\left(\frac{\pi_{t+1}}{\bar{\pi}}\right)\frac{Y_{t+1}}{Y_t}\right] + \kappa_Y\left(mc_t - \frac{1}{\mu}\right), \tag{17}$$

where mc_t are marginal costs, $\bar{\pi}$ is steady-state inflation, and μ is the desired markup. κ_Y parametrizes the degree of price rigidity.

4.2 Accounting for the evidence

We now interpret the evidence through the lens of the model. We first set its steady-state values using long-run averages in our sample and then estimate the adjustment triggered by the war shock.

Steady state. We fix the parameters that govern the steady state of the model by targeting key features of the data and by relying on estimates provided by earlier work. Table 3 shows the calibration targets in Panel A and summarizes the steady-state parameters in Panel B. One period in the model is one year. We match five rounded targets: (1) a capital-to-output ratio of 300%, (2) a public-debt-to-output ratio of 62%, (3) a top-1% wealth share of 32%, (4) a household-debt-to-output ratio of 9%, and (5) a government-spending-to-output ratio of 13%. This yields a discount factor of $\beta = 0.956$, a portfolio adjustment probability of $\lambda = 15$ percent, a borrowing penalty of $\bar{R} = 6.25$ percentage points, a transition probability from worker to entrepreneur of $\zeta = 0.07$ percent, and a labor tax rate of 13% plus a 22% surcharge for high-income households. Steady-state inflation is zero ($\bar{\pi} = 1$), and the bond rate is 1.0 percent.

For the remaining steady-state parameters, we use values established in the literature; these are reported in Panel B of Table 3. For idiosyncratic income risk, we take standard values and set $\rho_h = 0.9$ and $\sigma_h = 0.2$. Guvenen et al. (2014) estimate the probability that a household falls out of the top-1% of the income distribution in a given year as $\iota = 25$ percent, which we interpret as the transition probability from entrepreneur to worker. The relative risk aversion is set to 2, and the Frisch elasticity is set to 0.5 (Chetty et al., 2011).

Turning to firms, we set the capital share in production, α, to one third. An elasticity of substitution between differentiated goods of 11 implies a markup of 10 percent, while an elasticity of substitution between labor varieties of 41 implies a wage markup of 2.5 percent. The depreciation rate is 8.0 percent per year.

Table 3: Steady-state Targets and Parameters

Panel A: Targets for steady state				
Targets	Data	Model	Source	Parameter
Capital to GDP	300%	301%	Bergeaud et al. (2016)	Discount factor
Government debt to GDP	62%	62%	Mauro et al. (2015)	Portfolio liquidity
Top 1% wealth share	32%	32%	WID	Fraction of entrepreneurs
Household debt to GDP	9%	9%	Müller and Verner (2024)	Borrowing limit
Government spending to GDP	13%	13%	Own data	Tax rate

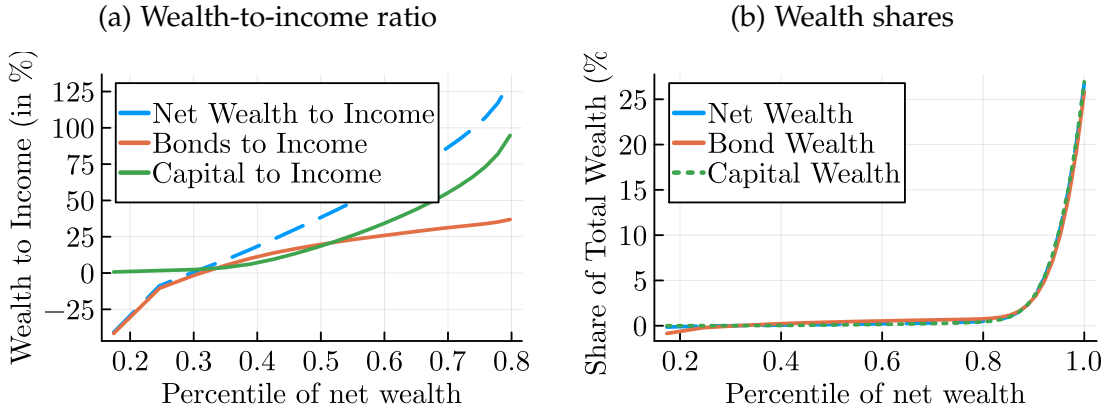
Panel B: Steady State Parameters					
	Description	Value		Description	Value
Households: Income process			**Households: Preferences**		
ρ_h	Persistence	0.90	ξ	Relative risk aversion	2.00
σ_h	Standard deviation	0.20	γ	Inverse Frisch elasticity	2.00
ι	Trans. prob. (E→W)	25.00%	β	Discount factor	0.956
ζ	Trans. prob. (W→E)	0.07%	λ	Portfolio adj. probability	15.00%
Households: Borrowing			**Government**		
$\bar{R}$	Borrowing penalty	6.25%	τ	Tax level	0.13
$\lvert\underline{b}\rvert/Y$	Borrowing limit to output	111%	τ^{war}	High-income tax	0.22
			$\bar{\pi}$	Inflation target	1.00
Firms			$\bar{R}^b$	Nominal bond rate	1.01
α	Capital share	0.33	δ_0	Depreciation rate	8.00%
$\bar{\eta}$	Goods elasticity	11	$\bar{\zeta}$	Labor elasticity	41

Notes: Panel A shows rounded calibration targets based on cross-country averages since 1870 and the corresponding model values. Household debt to GDP excludes mortgage debt; Appendix A.2 provides further details on government spending. Panel B reports parameter values set to match the steady-state targets, as well as values taken from the literature; see the main text for details.

Figure 6 illustrates how wealth and assets are distributed in the steady state. The left panel plots net wealth, along with bond and capital holdings (as a percent of income) on the vertical axis, against the wealth distribution on the horizontal axis. To preserve readability, the distribution is cut off at the 80th percentile, since the holdings of the top 20 percent amount to several times their income. Showing the assets of the very rich in the left panel would mask the patterns of interest at the lower end of the distribution, where indebtedness is concentrated. In the right panel of the same figure, we show the *share* of wealth in the population—also broken down into bonds and capital—held by different households (vertical axis) across the full wealth distribution (horizontal axis). The top percentile clearly holds the lion's share of total wealth in both bonds and capital; but the top decile also owns a sizable share.

Adjustment dynamics. In a second step, we estimate the parameters that govern the model's adjustment dynamics in response to aggregate shocks by matching the empirical impulse responses, using the Bayesian approach of Christiano et al. (2010). In the model, the "war shock" is represented as a composite of the three structural shocks introduced above: a capital destruction shock, an

Figure 6: Asset holdings across the wealth distribution



Notes: The figure shows the steady-state distribution of assets. The left panel reports net wealth, bonds, and capital as a percentage of income across the wealth distribution and is restricted to the bottom 80 percent for readability. The right panel reports the wealth shares held at each point of the full wealth distribution.

inflation (target) shock, and a taxation shock. These shocks occur simultaneously, scaled by their standard deviations: in the estimation we identify the relative importance of the components of the war shock by pinning down their persistence and standard deviations.

More formally, we treat the empirical impulse responses $\hat{\psi}$ as "data" and estimate the remaining model parameters ϑ while matching the model impulse responses $\psi(\vartheta)$ to $\hat{\psi}$. The Bayesian log posterior is then given by

$$\log f(\vartheta|\psi) \propto -\frac{1}{2}\left(\hat{\psi} - \psi(\vartheta)\right)' W \left(\hat{\psi} - \psi(\vartheta)\right) + \log p(\vartheta)\,, \tag{18}$$

where W is a weighting matrix and $p(\vartheta)$ denotes the priors on ϑ. $\hat{\psi}$ stacks the empirical impulse responses shown in Figures 1 and 2 above: the responses of the top-1% income and wealth shares, the capital stock, the capital-to-labor ratio, the top marginal tax rate, and prices. In addition, we use three variables to discipline the fiscal policy response beyond taxation: government spending, tax revenues, and output, shown in Figure E.17. Following common practice in the impulse-response-matching literature (Christiano et al., 2005; Christiano et al., 2010), we use a diagonal weighting matrix W, where the diagonals are the inverse of the squared standard error of the respective empirical impulse response.[22]

[22]We use three fixed weighting classes. Relative to the estimated standard errors, we apply multipliers of 0.20 to the top-1% income and wealth responses, 0.25 to prices, capital, and tax

Table 4: Prior and Posterior Distributions of Estimated Parameters

Parameter		Prior		Posterior			
	Distribution	Mean	Std. Dev.	Mean	Std. Dev.	5 %	95 %
			Capital Destruction Shock				
$\rho_{\mathcal{D},*}$	Beta	0.65	0.05	0.627	0.011	0.608	0.645
$\rho_{\mathcal{D},2}$	Normal	0.10	0.05	0.084	0.013	0.062	0.105
$\sigma_{\mathcal{D}}$	Inv.-Gamma	1.10	0.05	1.100	0.016	1.074	1.127
			Tax Shock				
$\rho_{\tau^{\text{war}},*}$	Beta	0.98	0.01	0.984	0.001	0.983	0.985
$\rho_{\tau^{\text{war}},2}$	Normal	-0.90	0.01	-0.897	0.004	-0.903	-0.891
$\sigma_{\tau}^{\text{war}}$	Inv.-Gamma	0.10	0.01	0.186	0.013	0.164	0.207
			Inflation (target) Shock				
$\rho_{\bar{\pi}}$	Beta	0.25	0.10	0.341	0.061	0.238	0.441
$\sigma_{\bar{\pi}}$	Inv.-Gamma	0.01	0.005	0.068	0.009	0.053	0.082
			Real and Nominal Frictions				
δ_s	Gamma	10.00	2.00	19.580	2.249	16.042	23.250
ϕ	Gamma	8.00	2.00	1.151	0.292	0.732	1.679
κ	Gamma	0.20	0.02	0.153	0.005	0.144	0.162
κ_w	Gamma	0.05	0.015	0.018	0.001	0.017	0.020
			Monetary and Fiscal Policy Rules				
ρ_R	Beta	0.67	0.08	0.542	0.019	0.510	0.571
θ_π	Normal	2.20	0.15	2.506	0.041	2.437	2.573
θ_Y	Normal	0.10	0.05	0.023	0.026	-0.020	0.066
ρ_G	Beta	0.50	0.20	0.910	0.007	0.898	0.921
γ_Y^G	Normal	-10.00	8.00	-38.173	2.698	-42.627	-33.804
γ_B^G	Gamma	0.50	0.20	0.092	0.020	0.061	0.127
ρ_τ	Beta	0.50	0.20	0.032	0.014	0.011	0.058
γ_Y^τ	Normal	0.00	1.00	-2.962	0.080	-3.088	-2.825
γ_B^τ	Gamma	0.50	0.20	4.849	0.050	4.766	4.928

Notes: To estimate the AR(2)-processes for shocks to capital depreciation and war taxation, we estimate $\rho_* = \rho_1 + \rho_2$ in addition to ρ_2.

Table 4 reports the estimation results. Where available, we use prior values (left panel) that are standard in the literature and independent of the underlying data. For the AR(2)-processes, we estimate $\rho_* = \rho_1 + \rho_2$ in addition to ρ_2. The priors for the destruction and tax processes favor persistent but hump-shaped responses, while still allowing the data to discipline the size and timing of the war shock.

Following Justiniano et al. (2011), we assume gamma priors with means of 10 and 8 and standard deviations of 2 for δ_2/δ_1, the elasticity of marginal depreciation with respect to capacity utilization, and the parameter controlling investment adjustment costs, ϕ, respectively. The slopes of the price and wage Phillips curves, κ_Y and κ_w, follow gamma priors with means of 0.20 and 0.05 and standard deviations of 0.02 and 0.015, respectively.

Regarding monetary policy, the inflation and output feedback parameters in

progressivity, and 3.00 to the remaining fiscal and aggregate responses. These multipliers are constant across horizons.

the Taylor rule, θ_π and θ_Y, follow normal distributions with prior means of 2.20 and 0.10, respectively, while the interest-rate smoothing parameter ρ_R follows a beta distribution with mean 0.67 and standard deviation 0.08. For fiscal policy, we estimate the response of government spending and taxes to deviations of government debt and output. We impose flexible priors to allow the data to speak to the cyclicality of both.

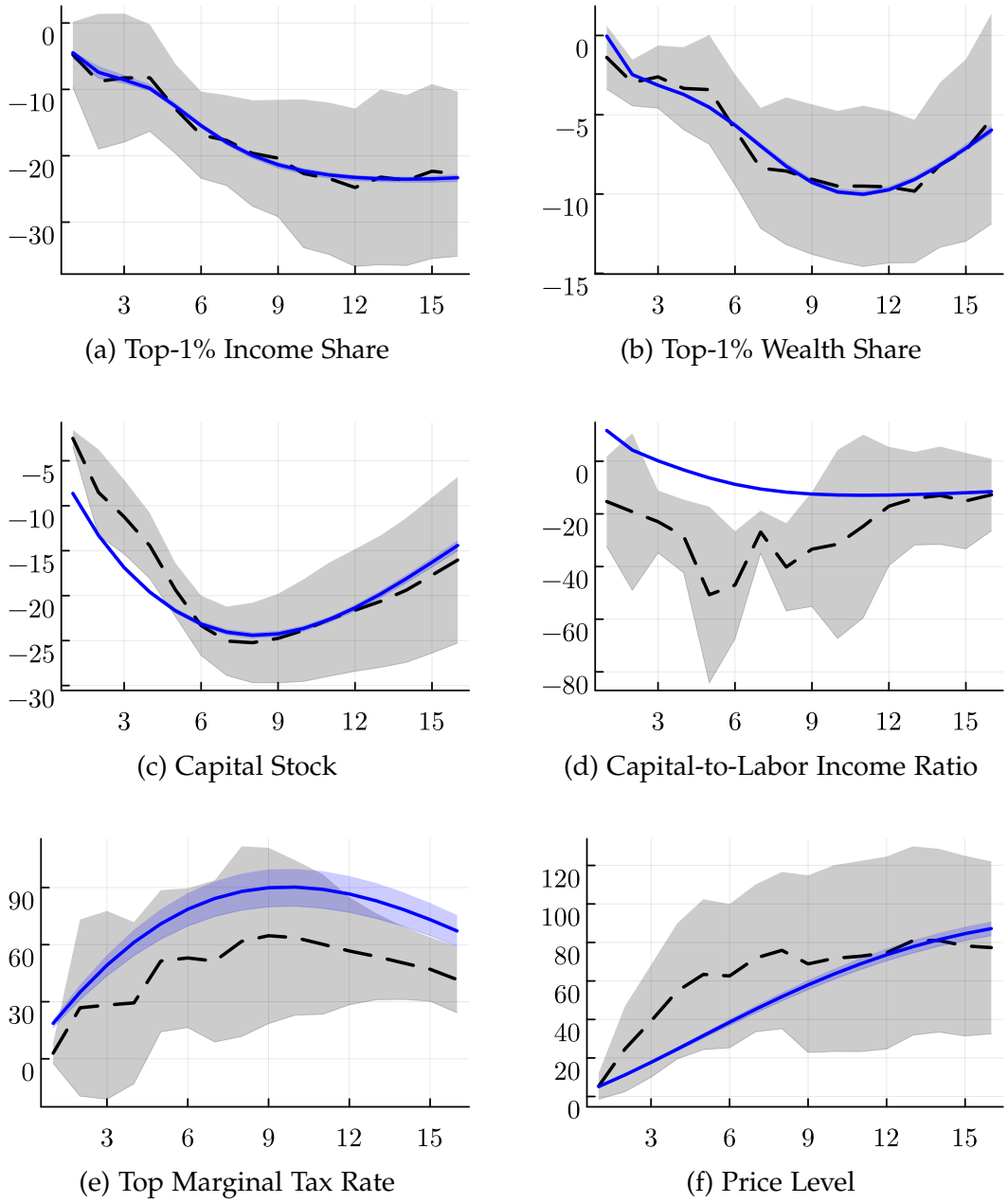
We report the posterior distribution in the right panel of Table 4. It is based on a DIME sampler of Boehl (2022), with 16 chains and 96,000 pooled draws. We discard the first 3,000 iterations of each chain, leaving 48,000 posterior draws. The trace plots indicate that the retained sample has converged; Appendix E.5 provides further details. Our estimates suggest that the war shock comprises: 1) a persistent capital destruction shock, with an overall persistence of 0.64; 2) a highly persistent and hump-shaped tax increase on wealthy households, with an overall persistence of 0.98 and a negative second-lag coefficient; and 3) an inflation-target shock. We estimate that government spending rises significantly during wars, with a strong negative response to output. For the Taylor rule, as well as for real and nominal frictions, we obtain parameter values within the range commonly used in business-cycle models.

Figure 7 compares the estimated model with the data. The panels are organized as in Figures 1 and 2. Dashed lines and gray areas show the empirical impulse responses and their confidence bands; solid blue lines show the model responses. Although these responses are estimation targets, the model has only a limited number of parameters with which to match their joint dynamics.

In particular, the estimated model replicates the decline in top-1% income and wealth shares in Panels (a) and (b). It also captures the main drivers in Panels (c) to (f). The capital stock and the capital-to-labor ratio fall markedly, while the top marginal tax rate and the price level rise. The increase in prices is especially informative. The inflation-target shock contributes to it, but capital destruction and taxation also raise prices endogenously through their supply-side effects. Figure E.17 reports the lower-priority fiscal and aggregate responses.[23]

[23]The model is less successful for these secondary moments. It misses the observed output decline and medium-run increase in tax revenue, while the government-spending response is closer on impact but too weak later. The working-paper version of Federle et al. (2026a) shows that an additional TFP shock helps account for the fall in output. Such shocks have only muted effects on income and wealth inequality in Bayer et al. (2024).

Figure 7: Adjustment to war shock—model fit



(a) Top-1% Income Share

(b) Top-1% Wealth Share

(c) Capital Stock

(d) Capital-to-Labor Income Ratio

(e) Top Marginal Tax Rate

(f) Price Level

Notes: Blue solid line: Baseline model estimated via IRF-matching. Black dashed line: Local-projection estimates. Gray shaded areas: 90 percent confidence bounds based on Newey and West (1987)-standard errors; blue shaded areas: 90 percent bands based on 10000 posterior replications. Y-axis: Percent deviation from steady state. X-axis: Years.

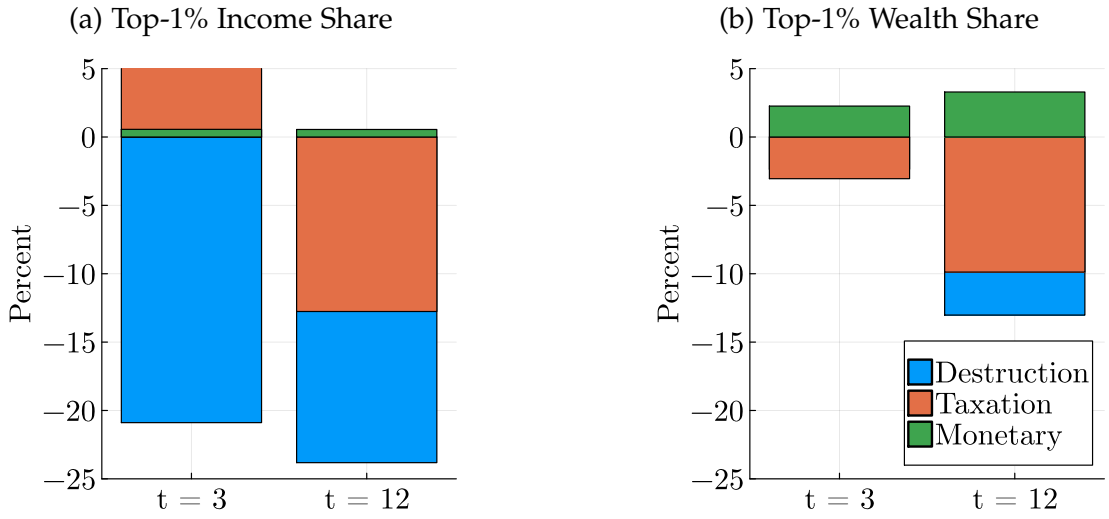
4.3 Inspecting the mechanism

The estimated model successfully captures how the economy—notably top-1% income and wealth shares—responds to war. We therefore use the model to answer three mechanism questions. First, which components of the composite war shock drive the decline in top shares? Second, how much of the full HANK response can be understood through a refined version of the Meade income accounting? Third, once this accounting points to firm profits as the central income source, why do profits move so much? We close with a portfolio-exposure check that shows where inflation matters along the wealth distribution.

Shock decomposition. The war shock is a composite of the destruction shock, the inflation shock (reflecting loose monetary policy), and the shock to tax rates at the top. The posterior estimates of the corresponding standard deviations provide an initial indication of their relative importance: 0.07 for the inflation (target) shock, 1.06 for the capital destruction shock, and 0.17 for the tax shock. Because these innovations enter different equations and have different units, their standard deviations are not directly comparable and are not sufficient to assess the contribution of each component to the decline in inequality.
Instead, we run the model with each component of the war shock in isolation and compute the resulting changes in top-1% income and wealth shares. Figure 8 presents the results 3 and 12 years after the onset of the war. The reduction in the top-1% income share is driven mainly by the destruction shock at both horizons. The wealth decomposition is different. By year 12, taxation is the largest negative contribution to the top-1% wealth share, destruction has a smaller negative effect, and the inflation-target shock partly offsets them.
In Section 3.3, we show that the mechanical effect of changing capital-labor ratios cannot account for the empirically observed decline in wealth inequality. In contrast, in general equilibrium, destruction can account for a marked decrease in the top-1% income share. We show below that having multiple types of capital income is key here. Increases in taxation have smaller effects on top income shares, which are measured pre-tax. In our model labor supply elasticities are relatively low, consistent with the data as reviewed for example in Saez et al. (2012), so pre-tax income inequality is not strongly affected by changes in tax rates.[24] Progressive taxation can explain a larger share of the effects on wealth

[24]The empirical evidence on the effects of tax progressivity on pre-tax inequality is mixed: studying a sample of tax reforms in modern data, Rubolino and Waldenström (2020) find that progressive taxation reduces pre-tax inequality; in contrast, Robinson et al. (2025) find no effects

Figure 8: Shock decomposition



Notes: The bars report the contribution of each estimated shock to the top-1% income- and wealth-share responses 3 and 12 years after the war shock. The total response is the sum of the destruction, taxation, and inflation-target contributions. Y-axis: percent deviation from steady state.

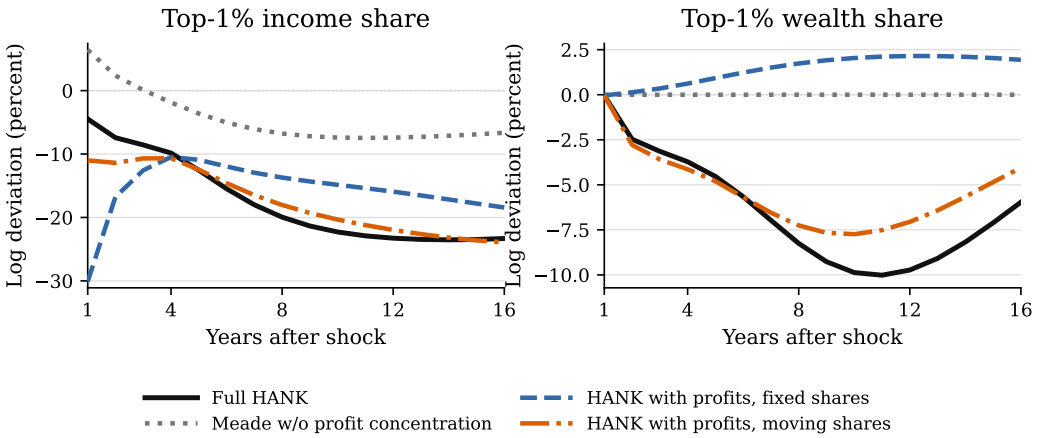
inequality because it reduces the disposable income out of which the rich accumulate wealth, formalizing the argument of Piketty (2003).

Refined HANK accounting. Figure 9 relates the full HANK model responses to the accounting logic from the Meade framework in Section 3.3. The simple accounting exercise separates labor and capital income and keeps the distribution of each source fixed. In the HANK model we can do the same calculation more finely, because the model gives us the whole household distribution at each horizon. For every household state, we compute labor compensation, broad asset income, and firm profit income. Labor compensation includes the rents earned by labor unions and paid back to workers. Broad asset income includes rental income from illiquid capital and the net payoff from liquid bond positions. We then sort households by total income and ask how much of each source accrues to the top group.

Let S_t^L, S_t^A, and S_t^Π denote aggregate labor compensation, broad asset income, and firm profit income. Let $sh_{p,t}^s$ denote the share of source s received by the top p percent after households are sorted by total income in period t. The moving-

when studying state tax reforms in the U.S.

Figure 9: Refined HANK Accounting for Top Shares



Notes: The figure compares the full HANK response of the top-1% income and wealth shares with three accounting benchmarks. The Meade benchmark evaluates the two-source formula from Section 3.3 using the HANK capital-labor path, while fixing the top capital share at the top group's steady-state share of non-profit asset income. For wealth, the Meade benchmark is zero because proportional wealth destruction leaves wealth shares unchanged. The HANK fixed-share approximation adds firm profits as a separate source and lets aggregate source totals move, but keeps the top source shares fixed. The HANK moving-share approximation also lets the top group's share of each source change as portfolios, incomes, and rankings adjust.

source-share income accounting is

$$\widehat{shsh}^{I,t}_{p,t} = \frac{sh^{L}_{p,t}S^{L}_{t} + sh^{A}_{p,t}S^{A}_{t} + sh^{\Pi}_{p,t}S^{\Pi}_{t}}{S^{L}_{t} + S^{A}_{t} + S^{\Pi}_{t}}.$$

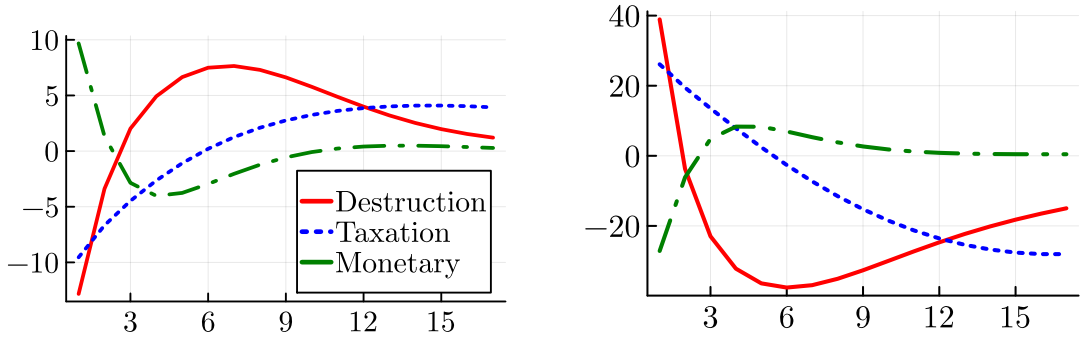
The same idea is applied to wealth, using liquid and illiquid wealth as the two sources. The time variation in $sh^{s}_{p,t}$ comes from the HANK distribution itself. After a shock, wages, returns, profits, taxes, and asset prices move; households also change portfolios and can move across the income and wealth rankings. The top group in year t is therefore not simply the steady-state top group with all incomes scaled up or down.

Figure 9 shows what each step adds. The Meade line applies the two-source formula from Section 3.3 to the capital-labor path generated by the HANK model. This path includes firm profits in aggregate capital income. To keep the simple benchmark from assigning these profits directly to the top group, we fix the top capital share at the top group's steady-state share of non-profit asset income. Section 3.3 showed that the empirical 10-year decline in the capital-labor ratio implies an 8 percent fall in the top-1% income share. This continues to hold in the HANK path, where the same calculation also only explains a small part of

the full decline in top income shares.
The HANK fixed-share line next separates firm profits from other asset income but keeps the top group's share of every income source fixed. The moving-share line also allows these source shares to change with the household distribution. This step is especially important for wealth, suggesting that portfolio adjustments differ substantially across the wealth distribution and account for much of the remaining income gap. Changes in relative asset returns induce middle-wealth households to reallocate from capital toward liquid government debt. Because the middle accumulates liquid assets and sheds capital more strongly than the wealthy, overall wealth becomes less concentrated. Thus, both the distinction between different forms of capital income and portfolio rebalancing matter. The final gap reflects the use of a first-order accounting reconstruction rather than the direct nonlinear top-share calculation, not a separate omitted income source.

Transmission channels. The accounting exercise identifies firm profits as the largest negative income channel for the top 1 percent. Figure 10 therefore compares the responses of labor income and firm profits to each estimated shock. Labor income moves moderately and begins to recover relatively quickly. Profit income, instead, responds more strongly and much more persistently. After a brief impact increase, the destruction shock lowers profits by around 30 percent, and the effect remains sizable for more than a decade. Because firm profits accrue to entrepreneur households, this fall is concentrated at the top. In contrast to the Meade framework, destruction compresses the profit component of capital income specifically, not just any form of capital income.

Figure 10: Income Sources



(a) Labor income

(b) Profit income

Notes: The panels show the responses of aggregate labor income and firm profit income to the destruction, taxation, and inflation-target shocks, each applied separately. Y-axis: percent deviation from steady state. X-axis: years.

The reason profits fall is the markup response. In the model, distributed firm profits are the residual $Y_t(1 - mc_t)$, while labor and rental capital income are proportional to $Y_t mc_t$. Profits are only about 9 percent of steady-state output. Consequently, a modest rise in real marginal cost produces a much larger percentage fall in profits. Holding output fixed, a 1 percent increase in real marginal cost lowers profits by roughly 10 percent.

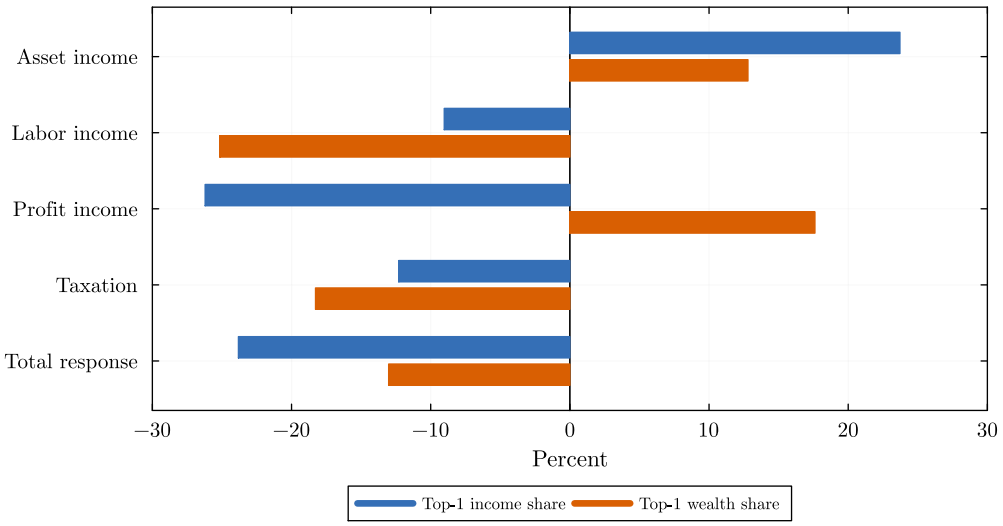
Capital destruction raises real marginal cost after the initial impact because it lowers effective capital per worker. The firm real wage also falls, but not enough to offset this effect. In the log-linear production block, $mc_t = w_t - z_t - \alpha(k_t^{serv} - n_t)$. Appendix Table E.10 shows that real marginal cost falls briefly on impact, then rises from year 3 onward as the capital-labor term dominates the wage response. The mechanism therefore does not require extremely sticky prices. The estimated price Phillips curve is reasonably steep, but the inflation response still implies a positive marginal-cost gap after the initial year. Lower markups then appear as lower firm profits.

This markup response to capital destruction is consistent with Nekarda and Ramey (2020).[25] In narrative evidence, Okazaki (1992) documents that wartime price controls in Japan explicitly sought to make producers absorb rising production costs.[26] In modern data, Auray et al. (2026) find that higher markups in

[25]They find procyclical markups after TFP shocks, as in the basic New Keynesian model. They also stress that the model's countercyclical markup response to demand shocks is inconsistent with the evidence.

[26]Similarly, the goal of the U.K.'s Prices of Goods Act was to *"freeze sellers' net pre-war income"*

Figure 11: Transmission Channel Decomposition



Notes: Decomposition of the change in top-1% income and wealth shares into the contribution of changes in asset, labor, profit income, and taxation 12 years after the war shock. The total response is the sum of the four channel contributions. X-axis: percent deviation from steady state.

France since 1980 raised top-1% pre-tax income shares.[27]

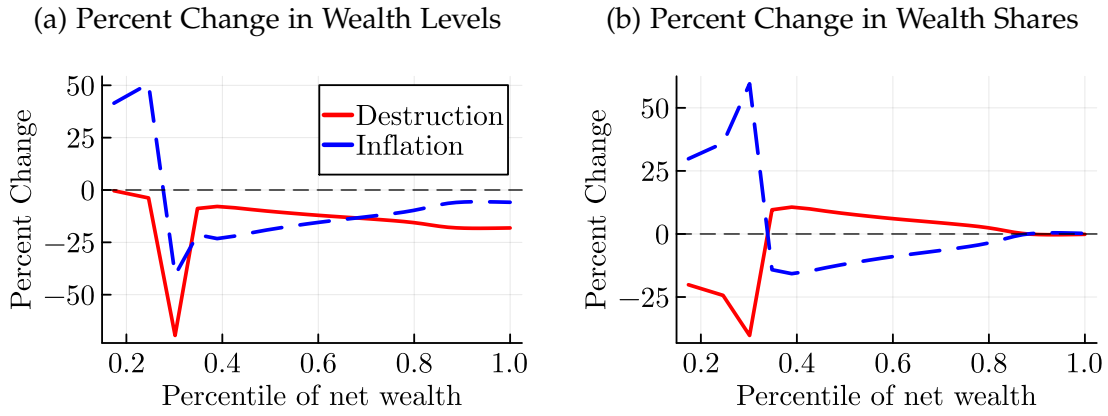
Figure 11 summarizes the channels after 12 years. For income, lower profits are the largest negative contribution. Lower labor income and taxation reinforce this decline, while asset income partly offsets it. For wealth, the positive and negative channel contributions offset each other more strongly, leaving a smaller total response.

Portfolio exposure as a distributional check. The inflation-target shock contributes less to the decline in the top-1% wealth share than the destruction and tax shocks. Still, prices rise strongly during war, partly through the endogenous response of the economy. To see where this matters along the distribution, we compute the exposure of the steady-state portfolio to surprise inflation and to capital destruction, in the spirit of Doepke and Schneider (2006). Specifically, we calculate the change in net wealth given an unexpected increase in the price

(Earley and Lacy, 1942, p. 166).

[27] We can also use the model to study the adjustment of variables for which we lack observations. We do so in Figure E.19, which contrasts the response of the top-1% income share in terms of pre- and post-tax income. Recall that our data is on pre-tax income only. We find that the top percentile experiences a far greater decline in terms of post-tax income, at least in the first few years. This reflects the increase in war taxation targeting high-income households. We also consider how the wealth share of bottom 90% and bottom 50% respond.

Figure 12: Portfolio exposure



Notes: In this partial equilibrium exercise, we assume a one-time destruction of 20% of capital and inflation of 50% in line with our empirical estimates.

level and given destruction, and report the results in Figure 12. The left panel shows the change in wealth levels; the right panel shows the change in wealth shares. The solid line reports the effect of destruction; the dashed line reports the effect of inflation.

Households in the top 1 percent of the wealth distribution lose from both capital destruction and surprise inflation. However, their wealth share is essentially unchanged because the losses at the top are not disproportionate: the bottom 99 percent also lose to a similar extent, on average. This is consistent with the analysis in Section 3.3, and provides an ex-post check on the incidence of destruction along the distribution.

The figure also reveals that the bottom 20 percent gains from inflation in absolute and relative terms, an effect that is only partly offset by capital destruction. These households hold leveraged positions in capital, so their net wealth responds disproportionately to both shocks.[28] Hence, wartime inflation generally affects the wealth distribution, but not mainly at the top; rather, it matters most at the bottom. This illustrates a benefit of our structural approach, which allows us to study parts of the distribution that are not observed in historical data.

4.4 External Validation of the Model Mechanism

In the model, falling profits are a key driver of the decline in inequality. But do profits actually fall during wartime? While many contemporaries condemned war profiteering, pointing to large gains in individual corporations, little is known about whether wars reduce profits more generally. To address this, we

[28] See Kuhn et al. (2020) for a discussion of this mechanism in the U.S. post–WW II period.

construct historical data on war profits for the countries in our sample and show that wars indeed systematically decrease firm profits.

Table 5: Index of Profits and Profits relative to GDP

WW2	1935	1938	1941	1944	1949	1952
Belgium	33.5	100.0	20.0	4.9	58.2	102.2
over GDP	*36.6*	*100.0*	*76.6*	*13.8*	*54.5*	*84.0*
Finland	67.4	100.0	94.5	64.3	56.1	51.9
over GDP	*87.3*	*100.0*	*98.0*	*53.0*	*39.0*	*26.0*
France	75.6	100.0	61.1	–8.3	115.5	124.6
over GDP	*99.8*	*100.0*	*87.3*	*–16.4*	*88.5*	*80.9*
Germany	61.2	100.0	81.3		2.1	15.8
over GDP	*82.8*	*100.0*	*58.1*		*3.2*	*16.1*
Japan	59.3	100.0	149.3	186.0	33.9	94.2
over GDP	*73.7*	*100.0*	*119.0*	*131.7*	*55.1*	*96.0*
Netherlands		100.0	138.0	16.0		
over GDP		*100.0*	*202.6*	*44.9*		
UK	68.7	100.0	95.4	71.6	96.3	110.6
over GDP	*75.6*	*100.0*	*80.7*	*58.6*	*78.8*	*89.0*
WW1	1911	1913	1915	1917	1919	1919
France	71.1	100.0	21.7	59.6	58.2	65.2
over GDP	*78.2*	*100.0*	*23.9*	*73.6*	*77.3*	*76.9*
Germany		100.0	76.0	41.0		
over GDP		*100.0*	*89.6*	*51.9*		

Notes: This table shows real profits during the wars in our sample. For each war, we construct an index of real profits that is equal to 100 in the year given in the table. Then, in the next rows, we show the respective indices when dividing by an index of real GDP, so that profits are falling relative to GDP if the figure is lower than 100. Details on the data are in section D.1. Note that in Germany we cannot construct an index of real profits in WW2, so instead we show an index for the return on equity. For WW1 in Germany, we show 'medium war-related industries' in the classification of Baten and Schulz (2005).

In most countries, we construct profits from primary sources as detailed in Appendix D.1, but add data from prior work (e.g., Baten and Schulz (2005); Spoerer (1996) for Germany) in a few cases. We aim for broad firm coverage, though sometimes only listed corporations can be covered.[29] Because the series are short and definitions differ across countries, we normalize real profits to 100 in the initial year and trace out their evolution over time. For comparability, we

[29]When possible, we use post-corporate tax profits, since only these enter top income shares.

fix the initial year across countries, but our estimation in Section 3 begins when each country becomes a war site.

In all countries, real profits fall sharply in the aftermath of wartime destruction, by more than 25 percent in most economies as we show in Table 5.[30] The largest contractions occur in France, Germany, and Japan after World War II, where profits fall by more than 50 percent and even turn negative in France. Importantly, this pattern is not explained by the general decline in economic activity during wars. Dividing each profit index by an index of real GDP shows that profits fall more than output. In several countries (such as the U.K. and France), the decline in profits is even larger when measured relative to economic activity. An alternative way of studying profits is by examining dividends of listed firms. If all firm earnings are paid out to shareholders, dividends coincide with profits. We construct the real dividend flow to shareholders across countries and show the impulse response in Figure D.16b. Real dividends also fall massively after wars, by more than 70%. Together, this evidence suggests that wars markedly reduce firm profits, validating the key mechanism in the model.

5 Conclusion

This paper provides a comprehensive analysis of the distributional impacts of war, covering both income and wealth inequality. We show that war is indeed a great leveler, and effects are strongest concerning income inequality in war sites. For wealth inequality, and non-war sites, effects on inequality are smaller. We study these facts jointly, both through a partial equilibrium framework, in which we can characterize the impact of wars on income and wealth inequality analytically as well as in general-equilibrium HANK model. Our quantitative analysis highlights the role of capital destruction, which wiped out profits—the main source of earnings at very top. Both destruction and taxation contribute to declining wealth inequality, which is less affected, as effects are more proportional along the distribution.

War is now back on the international agenda, with the Russian full-scale invasion of Ukraine dominating headlines since 2022. While the long-run impact on inequality is not yet clear, preliminary studies find that in both countries, one consequence has been a reduction in the economic standing of 'oligarchs' (Gorodnichenko et al., 2025). The mechanisms we outline continue to be at play more than 70 years after the world wars: Several Ukrainian oligarchs have seen

[30] Before the outbreak of war, profits tend to rise in the military buildup (Spoerer, 1996).

their assets destroyed, wages are rising strongly, and a governments in both countries enacting policies to curtail corporate profits.[31] Indeed, it appears that war continues to have large effects on inequality in the 21st century.

[31] For sources see here, here and here.

References

Aiyagari, S. Rao (1994). "Uninsured Idiosyncratic Risk and Aggregate Saving". In: *The Quarterly Journal of Economics* 109.3, pp. 659–684.

Albers, Thilo, Charlotte Bartels, and Moritz Schularick (2022). "Wealth and its Distribution in Germany, 1895-2018". In: *CEPR Discussion Paper* No. 17269.

Albers, Thilo NH, Felix Kersting, and Timo Stieglitz (2023). *Industrialization, returns, inequality*. Tech. rep. Discussion Paper.

Alesina, Alberto and Roberto Perotti (1996). "Income distribution, political instability, and investment". In: *European economic review* 40.6, pp. 1203–1228.

Alfani, Guido (2021). "Economic inequality in preindustrial times: Europe and beyond". In: *Journal of Economic Literature* 59.1, pp. 3–44.

Alvaredo, Facundo, Anthony B Atkinson, and Salvatore Morelli (2018). "Top wealth shares in the UK over more than a century". In: *Journal of Public Economics* 162, pp. 26–47.

Andrews, Isaiah (2018). "Valid two-step identification-robust confidence sets for GMM". In: *Review of Economics and Statistics* 100.2, pp. 337–348.

Auclert, Adrien (2019). "Monetary Policy and the Redistribution Channel". In: *American Economic Review* 109.6, pp. 2333–2367.

Auray, Stéphane and Aurélien Eyquem (Aug. 2019). "Episodes of War and Peace in an Estimated Open Economy Model". In: *Journal of Economic Dynamics and Control* 105, pp. 203–249.

Auray, Stéphane, Aurélien Eyquem, Bertrand Garbinti, and Jonathan Goupille-Lebret (Feb. 2026). "Unpacking Rising Inequality: The Roles of Markups, Taxes, and Asset Prices". In: *Journal of the European Economic Association*, jvag009.

Barro, Robert J. (2006). "Rare Disasters and Asset Markets in the Twentieth Century". In: *The Quarterly Journal of Economics* 121.3, pp. 823–866.

Bartels, Charlotte (2019). "Top incomes in Germany, 1871–2014". In: *The Journal of Economic History* 79.3, pp. 669–707.

Baten, Joerg and Christina Mumme (2013). "Does inequality lead to civil wars? A global long-term study using anthropometric indicators (1816–1999)". In: *European Journal of Political Economy* 32, pp. 56–79.

Baten, Joerg and Rainer Schulz (2005). "Making profits in wartime: corporate profits, inequality, and GDP in Germany during the First World War 1". In: *The Economic History Review* 58.1, pp. 34–56.

Bayer, Christian, Benjamin Born, and Ralph Luetticke (2023). "The Liquidity Channel of Fiscal Policy". In: *Journal of Monetary Economics* 134, pp. 86–117.

– (2024). "Shocks, frictions, and inequality in US business cycles". In: *American Economic Review* 114.5, pp. 1211–1247.

Bengtsson, Erik and Daniel Waldenström (2018). "Capital shares and income inequality: Evidence from the long run". In: *The Journal of Economic History* 78.3, pp. 712–743.

Bergeaud, Antonin, Gilbert Cette, and Rémy Lecat (2016). "Productivity trends in advanced countries between 1890 and 2012". In: *Review of Income and Wealth* 62.3, pp. 420–444.

Bilal, Adrien and Diego R Känzig (2026). "The Macroeconomic Impact of Climate Change: Global Versus Local Temperature". In: *The Quarterly Journal of Economics* 141.2, pp. 889–944.

Boehl, Gregor (2022). *DIME MCMC: A Swiss Army Knife for Bayesian Inference*. SSRN Working Paper 4250395. University of Bonn.

Bozio, Antoine, Bertrand Garbinti, Jonathan Goupille-Lebret, Malka Guillot, and Thomas Piketty (2024). "Predistribution versus Redistribution: Evidence from France and the United States". In: *American Economic Journal: Applied Economics* 16.2, pp. 31–65.

Braun, R Anton and Ellen R McGrattan (1993). "The macroeconomics of war and peace". In: *NBER macroeconomics annual* 8, pp. 197–247.

Cagetti, Marco and Mariacristina De Nardi (2006). "Entrepreneurship, frictions, and wealth". In: *Journal of political Economy* 114.5, pp. 835–870.

Castaneda, Ana, Javier Diaz-Gimenez, and Jose-Victor Rios-Rull (2003). "Accounting for the US earnings and wealth inequality". In: *Journal of political economy* 111.4, pp. 818–857.

Chancellor of the Exchequer (1945). *Statistical Material Presented During the Washington Negotiations, CMD 6707*. London, UK: British Information Services.

Chetty, Raj, Adam Guren, Day Manoli, and Andrea Weber (2011). "Are micro and macro labor supply elasticities consistent? A review of evidence on the intensive and extensive margins". In: *The American Economic Review* 101.3, pp. 471–475.

Christiano, Lawrence J, Martin Eichenbaum, and Charles L Evans (2005). "Nominal rigidities and the dynamic effects of a shock to monetary policy". In: *Journal of Political Economy* 113.1, pp. 1–45.

Christiano, Lawrence J., Mathias Trabandt, and Karl Walentin (2010). "DSGE models for monetary policy analysis". In: *Handbook of Monetary Economics*. Ed. by Benjamin M. Friedman and Michael Woodford. Vol. 3. Handbook of Monetary Economics. Elsevier. Chap. 7, pp. 285–367.

Corsetti, Giancarlo, André Meier, and Gernot J. Müller (2012). "Fiscal stimulus with spending reversals". In: *The Review of Economics and Statistics* 94.4, pp. 878–895.

Dell, Fabien (2007). "Top incomes in Germany throughout the twentieth century: 1891–1998". In: *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English Speaking Countries*, pp. 365–425.

Doepke, Matthias and Martin Schneider (2006). "Inflation and the Redistribution of Nominal Wealth". In: *Journal of Political Economy* 114.6, pp. 1069–1097.

Earley, James S and William SB Lacy (1942). "British Wartime Control of Prices". In: *Law and Contemporary Problems*, pp. 160–172.

Farhi, Emmanuel and Xavier Gabaix (2016). "Rare Disasters and Exchange Rates". In: *The Quarterly Journal of Economics* 131.1, pp. 1–52.

Federle, Jonathan, André Meier, Gernot J. Müller, Willi Mutschler, and Moritz Schularick (2026a). "The Price of War". In: *American Economic Review* 116.3, pp. 791–827.

Federle, Jonathan, André Meier, Gernot J. Müller, and Victor Sehn (2026b). "Proximity to War: The Stock Market Response to the Russian Invasion of Ukraine". In: *Journal of Money, Credit and Banking* 58.3, pp. 681–703.

Ferrière, Axelle and Gaston Navarro (2025). "The Heterogeneous Effects of Government Spending: It's All About Taxes". In: *Review of Economic Studies* 92.2, pp. 1061–1125.

Funke, Manuel, Moritz Schularick, and Christoph Trebesch (Oct. 2020). *Populist Leaders and the Economy*. ECONtribute Discussion Papers Series 036. University of Bonn and University of Cologne, Germany.

Gabaix, Xavier (2012). "Variable rare disasters: An exactly solved framework for ten puzzles in macro-finance". In: *The Quarterly journal of economics* 127.2, pp. 645–700.

Gabaix, Xavier, Jean-Michel Lasry, Pierre-Louis Lions, and Benjamin Moll (2016). "The dynamics of inequality". In: *Econometrica* 84.6, pp. 2071–2111.

Garbinti, Bertrand, Jonathan Goupille-Lebret, and Thomas Piketty (2021). "Accounting for wealth inequality dynamics: Methods, estimates and simulations for France". In: *Journal of the European Economic Association* 19.1, pp. 620–663.

Geloso, Vincent J, Phillip Magness, John Moore, and Philip Schlosser (2022). "How pronounced is the U-curve? Revisiting income inequality in the United States, 1917–60". In: *The Economic Journal* 132.647, pp. 2366–2391.

Goldin, Claudia and Robert A Margo (1992). "The great compression: The wage structure in the United States at mid-century". In: *The Quarterly Journal of Economics* 107.1, pp. 1–34.

Gorodnichenko, Yuriy, Iikka Korhonen, and Elina Ribakova (2025). "War-Induced Economic Convergence in Russian Regions". In.

Gourio, François (2012). "Disaster Risk and Business Cycles". In: *American Economic Review* 102.6, pp. 2734–2766.

Guvenen, Fatih, Greg Kaplan, and Jae Song (2014). "How risky are recessions for top earners?" In: *The American Economic Review* 104.5, pp. 148–153.

Haffert, Lukas (2019). "War mobilization or war destruction? The unequal rise of progressive taxation revisited". In: *The Review of International Organizations* 14.1, pp. 59–82.

Halbmeier, Christoph and Carsten Schröder (2025). "The long-term implications of destruction during the Second World War on private wealth in Germany". In: *Journal of Economic Growth* 30.1, pp. 161–235.

Heldring, Leander, James A Robinson, and Parker Whitfill (2022). "The second World War, inequality and the social contract in Britain". In: *Economica* 89, S137–S159.

Horn, Sebastian, Carmen M Reinhart, and Christoph Trebesch (2020). *Coping with disasters: two centuries of international official lending*. Tech. rep. National Bureau of Economic Research.

Hubmer, Joachim, Per Krusell, and Anthony A Smith Jr (2021). "Sources of US wealth inequality: Past, present, and future". In: *Nber macroeconomics annual* 35.1, pp. 391–455.

Huggett, Mark (1993). "The risk-free rate in heterogeneous-agent incomplete-insurance economies". In: *Journal of Economic Dynamics and Control* 17.5-6, pp. 953–969.
Jordà, Òscar, Moritz Schularick, and Alan M Taylor (2017). "Macrofinancial history and the new business cycle facts". In: *NBER macroeconomics annual* 31.1, pp. 213–263.
Jordà, Òscar, Sanjay R Singh, and Alan M Taylor (2020). "The long-run effects of monetary policy". In.
– (2022). "Longer-run economic consequences of pandemics". In: *Review of Economics and Statistics* 104.1, pp. 166–175.
Justiniano, Alejandro, Giorgio E. Primiceri, and Andrea Tambalotti (2011). "Investment shocks and the relative price of investment". In: *Review of Economic Dynamics* 14.1, pp. 101–121.
Kaplan, Greg, Benjamin Moll, and Giovanni L. Violante (2018). "Monetary Policy According to HANK". In: *American Economic Review* 108.3, pp. 697–743.
Kaymak, Barış and Markus Poschke (2016). "The Evolution of Wealth Inequality over Half a Century: The Role of Taxes, Transfers, and Technology". In: *Journal of Monetary Economics* 77, pp. 1–25.
Kuhn, Moritz, Moritz Schularick, and Ulrike I Steins (2020). "Income And Wealth Inequality In America, 1949–2016". In: *Journal of Political Economy* 128.9, pp. 3469–3519.
Kuznets, Simon (1955). "Economic Growth and Income Inequality". In: *American Economic Review* 45.1, pp. 1–28.
Lindert, Peter H and Jeffrey G Williamson (2016). "Unequal gains: American growth and inequality since 1700". In.
Luetticke, Ralph (2021). "Transmission of Monetary Policy with Heterogeneity in Household Portfolios". In: *American Economic Journal: Macroeconomics* 13.2, pp. 1–25.
Marzian, Johannes and Christoph Trebesch (Dec. 2025). *Guns and Butter: The Fiscal Consequences of Rearmament and War*. Kiel Working Papers 2310. Kiel Institute for the World Economy.
Mauro, Paolo, Rafael Romeu, Ariel Binder, and Asad Zaman (2015). "A modern history of fiscal prudence and profligacy". In: *Journal of Monetary Economics* 76, pp. 55–70.
Meade, James E. (1964). *Efficiency, Equality and the Ownership of Property*. George Allen & Unwin.
Moll, Benjamin, Lukasz Rachel, and Pascual Restrepo (2022). "Uneven growth: automation's impact on income and wealth inequality". In: *Econometrica* 90.6, pp. 2645–2683.
Moriguchi, Chiaki and Emmanuel Saez (2008). "The evolution of income concentration in Japan, 1886–2005: evidence from income tax statistics". In: *The Review of Economics and Statistics* 90.4, pp. 713–734.
Müller, Karsten and Emil Verner (2024). "Credit allocation and macroeconomic fluctuations". In: *Review of Economic Studies* 91.6, pp. 3645–3676.

Nakamura, Emi, Jón Steinsson, Robert Barro, and José Ursúa (2013). "Crises and Recoveries in an Empirical Model of Consumption Disasters". In: *American Economic Journal: Macroeconomics* 5.3, pp. 35–74.

Nekarda Christopher, J. and Valerie A. Ramey (2020). "The Cyclical Behavior of the Price-Cost Markup". In: *Journal of Money, Credit and Banking* 52.S2, pp. 319–353.

Newey, Whitney K. and Kenneth D. West (1987). "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix". English. In: *Econometrica* 55.3, pp. 703–708.

Okazaki, Tetsuji (1992). *The Japanese firm under the wartime planned economy*. Faculty of Economics, University of Tokyo.

Panon, Ludovic and Francesco Paolo Conteduca (2024). "Natural Disasters and Markups". In.

Piketty, Thomas (2003). "Income inequality in France, 1901–1998". In: *Journal of political economy* 111.5, pp. 1004–1042.

– (2014). *Capital in the twenty-first century*. Harvard University Press.

– (2018). *Top incomes in France in the twentieth century: Inequality and redistribution, 1901–1998*. Harvard University Press.

Piketty, Thomas and Emmanuel Saez (2014). "Inequality in the long run". In: *Science* 344.6186, pp. 838–843.

Ramey, Valerie A. and Matthew D. Shapiro (June 1998). "Costly Capital Reallocation and the Effects of Government Spending". In: *Carnegie-Rochester Conference Series on Public Policy* 48, pp. 145–194.

Robinson, Sarah, Matias Strehl Pessina, and Alisa Tazhitdinova (2025). "Do Taxes Affect Pre-Tax Income Inequality? Evidence from 100 Years of U.S. State Policies".

Roikonen, Petri (2022). "Income inequality in Finland, 1865–2019". In: *Scandinavian Economic History Review* 70.3, pp. 234–251.

Roine, Jesper and Daniel Waldenström (2015). "Long-run trends in the distribution of income and wealth". In: *Handbook of income distribution* 2, pp. 469–592.

Rubolino, Enrico and Daniel Waldenström (2020). "Tax progressivity and top incomes evidence from tax reforms". In: *The Journal of Economic Inequality* 18.3, pp. 261–289.

Saez, Emmanuel, Joel Slemrod, and Seth H Giertz (2012). "The elasticity of taxable income with respect to marginal tax rates: A critical review". In: *Journal of economic literature* 50.1, pp. 3–50.

Saez, Emmanuel and Gabriel Zucman (2016). "Wealth inequality in the United States since 1913: Evidence from capitalized income tax data". In: *The Quarterly Journal of Economics* 131.2, pp. 519–578.

– (2022). "Wealth taxation: lessons from history and recent developments". In: *AEA Papers and Proceedings*. Vol. 112. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, pp. 58–62.

Scheidel, Walter (2018). *The Great Leveler*. Princeton University Press.

Scheve, Kenneth and David Stasavage (2018). *Taxing the Rich*. Princeton University Press.

Smith, Matthew, Owen Zidar, and Eric Zwick (2023). "Top wealth in america: New estimates under heterogeneous returns". In: *The Quarterly Journal of Economics* 138.1, pp. 515–573.

Song, Ze, Gal Hochman, and Govinda Timilsina (2023). "Natural disaster, infrastructure, and income distribution". In: *Development Research*.

Spoerer, Mark (1996). *Von Scheingewinnen zum Rüstungsboom*. Franz Steiner Verlag.

Statistics Bureau of Japan (1949 – 2023). *Japan Statistical Yearbook*. Statistics Bureau of Japan.

Stock, James H. and Mark W. Watson (May 2018). "Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments". In: *The Economic Journal* 128.610, pp. 917–948.

Toussaint, Simon, Amaury de Vicq de Cumptich, Michail Moatsos, and Tim van der Valk (2022). "Household Wealth and its Distribution in the Netherlands, 1854-2019". In: *World Inequality Lab Working Paper* 19.

Ursùa, Jose F. and Robert J. Barro (2010). "Barro-Ursua Macroeconomic Data". In.

Vélez, Juliana Londoño (2014). "War and progressive income taxation in the 20th century". In: *University of California, Berkeley Working Paper*.

Vonyó, Tamás (2012). "The bombing of Germany: the economic geography of war-induced dislocation in West German industry". In: *European Review of Economic History* 16.1, pp. 97–118.

Waldenström, Daniel (2024). *Richer and more equal: a new history of wealth in the west*. John Wiley & Sons.

A Appendix: Data and Methodology

In this section, we describe in detail the data sources used in the paper.

A.1 Inequality Data

Table A.1 provides a list of instances where we use a series other than the WID baseline series. As explained in the text, this is done to make use of historical series that cover a longer time horizon in some countries.

Table A.1: Summary of Additional Inequality Data Data

Country	Source	Variable	Period	Unit	Concept
Belgium	Alvaredo et al., 2025	Top 1	1935-1994	Individual	Net Worth
Finland	Roikonen, 2022	Top 1	1865-2017	Tax Unit	Fiscal Inc
Germany	Bartels, 2019	Top 10, 1	1871-2014	Tax Unit	Fiscal Inc
Germany	Bartels, 2019	Top 10, 1	1871-2014	Tax Unit	Fiscal Inc
Japan	Moriguchi and Saez, 2008	Top 10, 1	1886-2005	Individuals	Fiscal Inc
Netherlands	Salverda and Atkinson, 2007	Top 10, 1	1914-2012	Tax Unit	Fiscal Inc
Norway	Aaberge and Atkinson, 2010	Top 1	1875-2017	Individuals	Fiscal Inc
UK	Atkinson, 2007	Top 10, 1	1918-2009	Family -1989, Individuals age 15+ post 1989	Fiscal Inc

Notes: This table presents every country in which we deviate from the baseline WID income concept, alongside with the period the series covers, the unit of observation (Individual, Tax unit etc.) and the income concept as denoted in WID. The reason for the deviation is that using a different income concept allows us to cover a longer time horizon in these countries.

Due to data availability, we can only present results on pre-tax income inequality. In the U.S. and France, for which long-run data on post-tax inequality is available, pre- and post-tax inequality has evolved similarly after large wars. In Figure A.1 we plot pre and post-tax top income shares for these countries. In France, the evolution of pre- and post-tax top income shares is similar in the aftermath of wars, while in the U.S. post-tax top shares drop considerably more

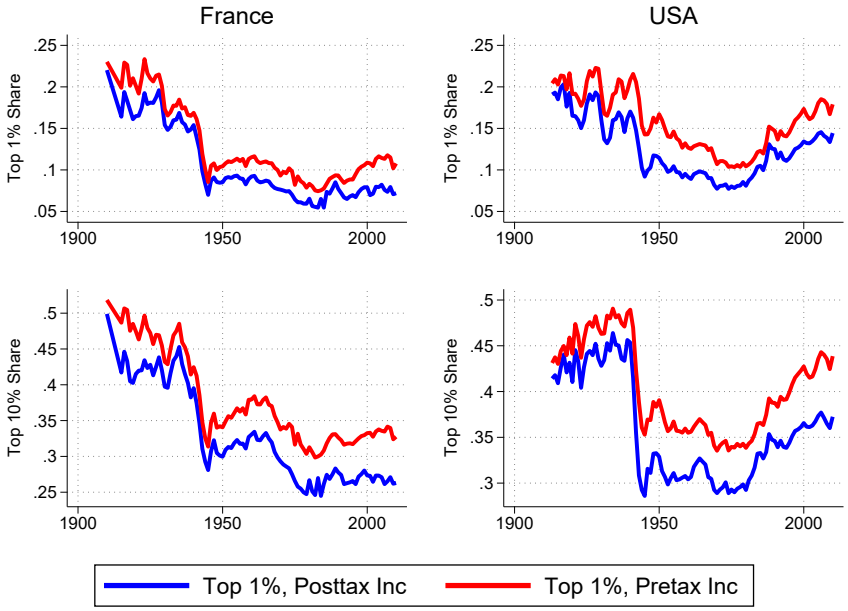


Figure A.1: Pre-and Post Tax Top income shares in France and the U.S.

Notes: This figure shows pre- and post-tax top income shares for the U.S. and France. Data is from the World Inequality Database.

than pre-tax top shares. This is likely a function of the larger increase in tax progressivity in the U.S..

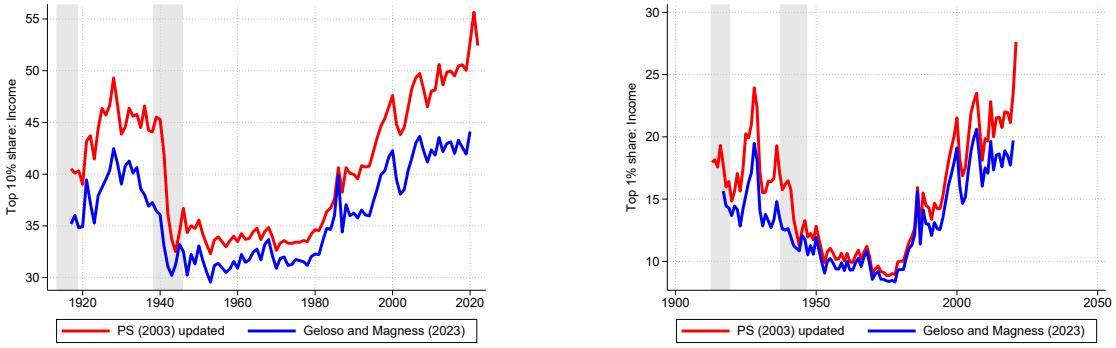
Recently, Smith et al. (2023) and Geloso et al. (2022) have raised concerns about the measurement of top income and wealth shares in the U.S.. We show below that these concerns do not affect our result that wars have an important equalizing impact on the income distribution. For the wealth distribution, Smith et al. (2023) only provide a post-war series; moreover the top wealth shares of Smith et al. (2023) and Saez and Zucman (2016) align closely up to the top-1%, with major differences only at higher percentiles.

Figure A.2 compares the data of Geloso et al. (2022) with the updated series of Piketty and Saez (2003), which are most comparable in terms of income concept. The main difference between is in the levels, with the PS series showing a consistently higher level of inequality. The trends in inequality, which are the primary concern of this paper are relatively similar. The top decile income share drops by around 10pp from 45% to 35% in the PS data and from around 37% to 32% in the GM data, a pronounced fall in both cases.

A.2 Fiscal Data

Tax Progressivity. The HANK model in Section 4 uses a tax schedule in which there is a wartime surcharge levied on the the top decile of the income distribution. Historical data is generally not detailed enough to allow us to describe the tax schedule at every percentile of the income distribution across

Figure A.2: Top Percentile Shares across Data Sources



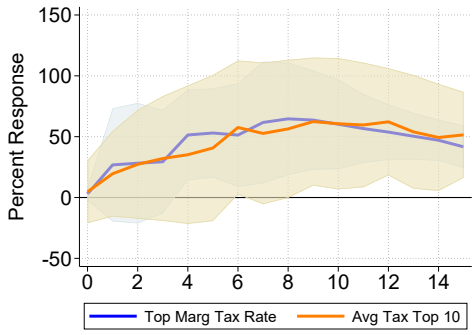
(a) Top 10 Income Shares

(b) Top 1 Income Shares

Notes: This figure compares the evolution of top income shares across data sources. The red line corresponds to the data of Piketty and Saez (2003) (updated to the present) while the blue line corresponds to the data of Geloso and Magness (2023).

countries, this is why we limit ourselves to the top marginal tax rates for our main empirical analysis. However, for three war sites, France, Germany and the Netherlands, more detailed data on the average tax rate along the income distribution exists.[32] The response of the tax rate levied on the top decile of the income distribution is similar to the response of the top marginal tax rate, as we show in Figure A.3. The two track each other closely, indicating that using the top marginal tax rate is a reasonable proxy in the absence of more detailed data.

Figure A.3: Top Marginal Tax Rate vs Top 10 Average Tax rate



Notes: This Figure shows the impulse response of the top marginal tax rate from Figure 2 in blue together with the response of the average tax rate paid by the top decile in yellow.

Government Consumption. War implies large increases in government consumption. To capture these accurately, we construct historical data on government consumption across country. This overcomes limitations with existing data

[32]We obtain data for these countries from Piketty (2003) (France), Salverda (2019) (Netherlands) and Bartels (2019) (Germany).

sources, which only cover government expenditures (Mauro et al., 2015). This includes a number of expenditures that do not directly map into our model, such as interest payments on government debt or pension payments. We construct this data from various national sources that build national accounts across specific countries, listed in table A.2.

Table A.2: Summary of Government Consumption Data

Country	**Source**	**Notes**
Finland	Hjerppe et al. (1989)	
France	Piketty and Zucman (2014)	
Japan	Ohkawa et al. (1965–88)	
Germany	Hoffmann (2013)	During WW2 Survey (1945)
Netherlands	Bochove and Huitker (1987)	
Norway	Grytten (2004)	
UK	Ryland and Dimsdale (2017)	

Notes: This table presents the sources for the data on government consumption.

B Appendix: Results

This Appendix supports the results we document in Section 3. We provide robustness checks as well as additional results supporting the main text.

B.1 Additional Outcomes

This section reports a number of additional outcomes to the war shock considered in Section 3.

Inequality. In the main text, we focus on inequality as measured using the share of income or wealth that accrues to the top percentile as in Scheidel (2018) or Piketty and Zucman (2014). For a number of other countries, we are also able to study inequality not only at the very top but also for the entire upper class.[33] In particular, Figure B.4 reports the response of the top *decile* share of income and wealth to the war shock. We find a similar picture to the top percentile: Income inequality drops following the war shock, but wealth inequality remains insulated.

Next, in panels (c) and (d), we report the response of top income and wealth shares measured in percentage points. Consistent with the findings in the main text, top income and wealth shares decline in response to wars. Measured in percentage points, top-1% income and wealth shares both decline by around three percentage points in the medium to long run. This may appear surprising, in light of the effects reported in the main text, in which income inequality

[33]Doing so shrinks our sample because for a few countries we only have top-1% shares.

Figure B.4: Additional Outcomes, Inequality



(a) Top-10% Income Share

(b) Top-10% Wealth Share

(c) Top-1% Income Share, p.p.

(d) Top-1% Wealth Share, p.p.

Notes: Panels (a) and (b) show the responses of the top-10% income and wealth share to the onset of war. Variables are log-transformed so that coefficients indicate percent responses. Panels (c) and (d) show the response of top-1% income and wealth shares measured in percentage points. Impulse responses are computed using specification 1 using the start of war as in table 1 as a shock in specification 1. Shaded areas indicate 90% confidence intervals.

declines more than wealth inequality. The reason is that in levels, top wealth shares are much higher than top income shares – historically, the top-1% wealth share is more than twice as large the top-1% income share, and often even around 3-4 times as large (Roine and Waldenström, 2015). Top percentile wealth shares range from 20 to up to 60% (historically) across countries, while top percentile income shares range from 5-15%. Therefore, a 3 p.p. decline in top income shares corresponds to a larger decline in inequality relative to initial levels than a 3 p.p. decline in the top wealth share.

Macroeconomic Aggregates and Asset Prices. We first focus on the response of asset returns, which also drop sharply during wars (Barro, 2006; Jordà et al., 2019). Both safe and risky assets perform poorly and earn negative returns during war times. Perhaps surprisingly, safe assets (bills and bonds) perform worse than risky assets (equity and housing). This is due to wartime inflation, which erodes the value of safe and nominal assets. However, for both asset

classes, wartime returns are far below their long-run average of 1-3 % (safe assets) (resp. 7-8% on risky assets). The fact that equity returns are low is consistent with our channel of falling profits during war times. The fact that equity returns are low is consistent with our channel of falling profits during war times.

Table B.3: Asset Returns in War Sites

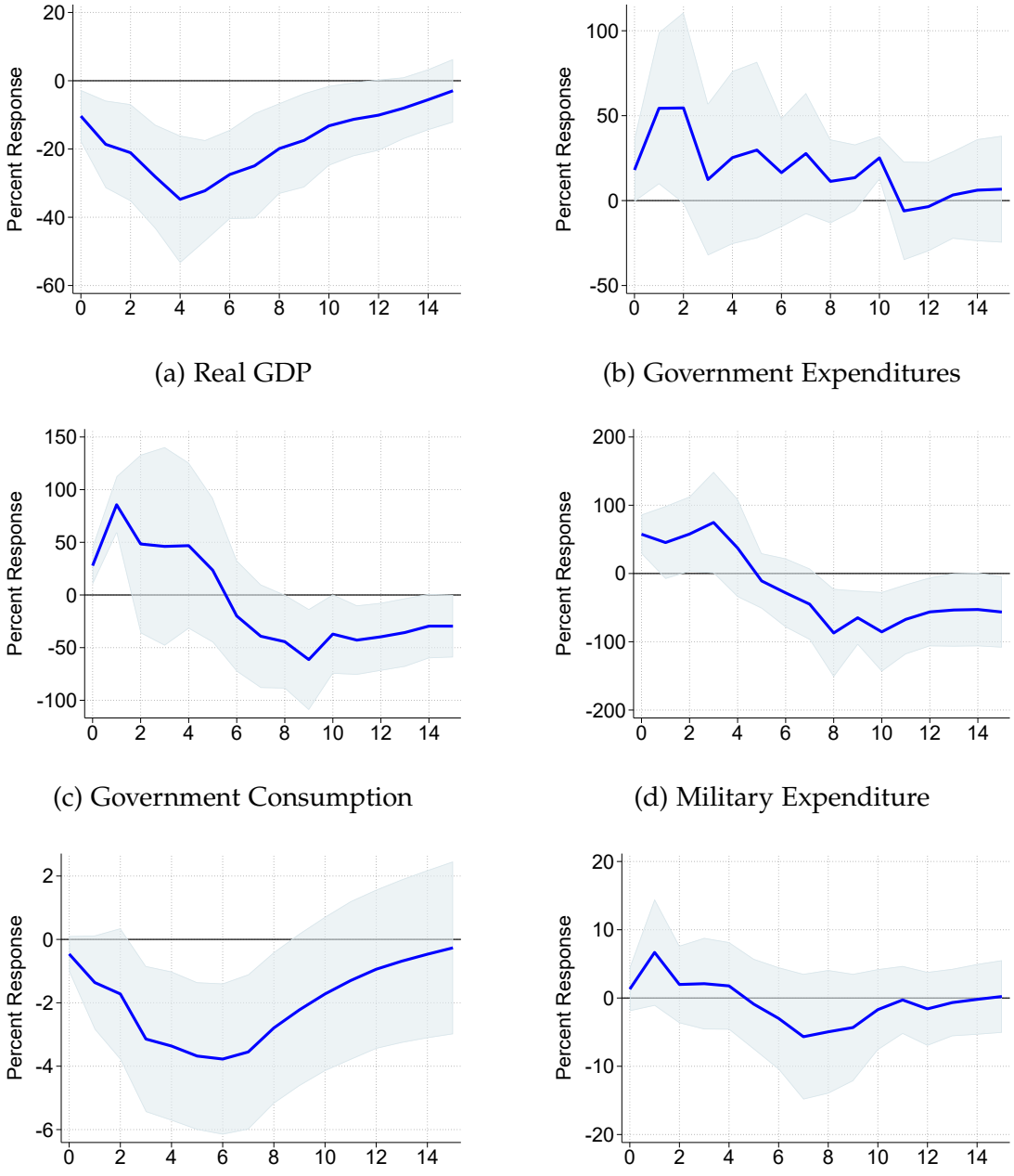
	Arithmetic Mean		Geometric Mean	
Asset	Real Returns	Nominal Returns	Real Returns	Nominal Returns
Bills	–11.75	2.82	–15.44	2.81
Bonds	–11.06	4.32	–14.54	3.90
Equity	–2.91	14.62	–8.11	11.01
Housing	0.14	13.18	–0.86	12.28

Notes: This table presents real and nominal asset returns on various assets during wars. Asset returns in the sample of war sites, we do not impute missing asset returns. Therefore implied inflation rates from the real and nominal returns differ across assets.

Finally, in Figure B.5 we consider further economic outcomes. Wars are macroeconomic disasters, and go hand-in-hand with a large drop in output (Panel (a)). However, the government also takes on an outsized role during wars as there are large increases in spending. We first show the response of all government expenditures, obtained from Mauro et al. (2015) in panel (b). However, this indicator includes a number of expenditures (such as interest payments on debt), that do not directly map into the model we consider in Section 4. Therefore, we construct additional data on government consumption, as detailed in Section A.2. Panel (c) displays the response of government consumption. This increases strongly in the initial years of the war. However, after around 4-5 years, when the wars in our sample end, government consumption reverts below trend. This is because at this point, with the large losses in output, governments cut back on the spending they were doing relative to the pre-war period. Similarly, when we look at military expenditure in Panel (d) (obtained from the Correlates of War), which is a large sub component of government consumption at this time, we find an initial increase and then a drop below the pre-war trend after the war has ended.

Finally, Panels e) and f) study the human losses of wars. There is a decline in population around the wars we study relative to the pre-war trend by around 4% in the immediate years after the war, but population reverts back to trend in the long run. On the other hand, the number of total hours worked to display a non-monotonic behavior. Initially, there appears to be a slight increase in the amount of total hours worked, perhaps due to hightened wartime patriotism Ramey and Zubairy (2018) as well as the inclusion of women in the labor force (Goldin and Margo, 1992). Afterwards, total hours worked fall by up to 10% but then recover in the long run.

Figure B.5: Additional Outcomes following War Shock



(a) Real GDP

(b) Government Expenditures

(c) Government Consumption

(d) Military Expenditure

(e) Population

(f) Total Hours Worked

Notes: This figure displays the response of additional outcomes to the onset of war. Impulse responses are computed using specification 1 using the start of war as in table 1. All quantitities are in real terms. Data on population is from Bolt et al. (2018), total hours worked are from Bergeaud et al. (2016). Shaded areas indicate 90% confidence intervals.

B.2 Alternative Country Samples

In addition to the sample in the main text, we consider alternative samples, both including smaller wars and including wars not fought on the soil of the country, but with more than 10.000 casualties. The wars included in both samples are in Table B.4, which shows all countries which are (i) classified as participants in wars on foreign soil with more than 10.000 casualties in Federle et al. (2026a) or (ii) classified as war sites with less than 10.000 casualties (those with more then 10.000 casualties compromise the base sample of wars). In both cases, we show only wars with available inequality data around the war starts.

Table B.4: Additional Country Samples

Country	Year	Country	Year
Panel A: Non-War Sites			
Japan	1904	Canada	1939
Australia	1914	Australia	1940
United Kingdom	1914	United States	1941
United States	1917	United States	1950
New Zealand	1939	United States	1965
Panel B: Small War Sites			
Denmark	1940	Peru	1995
India	1947	Ecuador	1995
India	1965	Albania	1998
Tunisia	1985	India	1999
Israel	1991	Pakistan	1999

Notes: This table shows the sample of wars with available inequality we employ in additional analyses. Panel A shows non-war sites, i.e. war participants with more than 10,000 casualties that did not experience war on their own soil. Panel B shows additional smaller war sites, with less than 10,000 casualties (in contrast to the main sample).

B.2.1 Wars in Non-Sites

The leveling effects of wars have not only been discussed for war sites, but also for non-sites, most prominently in the case of the U.S. (Scheidel, 2018). We investigate war sites and non-sites separately, as the underlying shocks are likely very different. We know that non-sites experience markedly smaller declines in GDP (Federle et al., 2026a), no capital destruction (Auray and Eyquem, 2019) and a larger increase in tax progressivity (Haffert, 2019). In this section, we study our main outcomes for non-war sites, i.e. countries with more than 10K casualties in a war on foreign soil.

Figure B.6 compares impulse responses across countries. In terms of income and wealth inequality inequality, we find that income inequality declines less in

non-sites than in war sites than in non-sites (Panel (a)), and estimates are noisier for non-sites. This suggests that destruction is key in the leveling process during wars. In terms of wealth inequality, the two look more similar, and we find a slight decline in wealth inequality both for war sites and for non-sites.

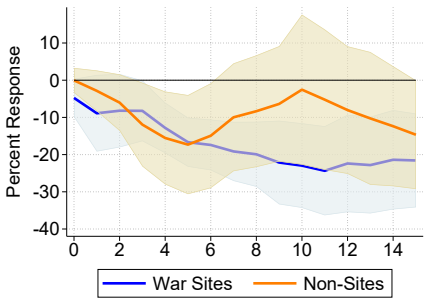
Turning to the channels, non-sites do not experience wartime destruction by definition, so the capital stock remains relatively unaffected. There is a small decline, due to reduced investment also in non-sites, but the magnitude is much smaller than in war sites. This can be also seen in the capital share, in Panel (d). On the other hand, we still see large expansions in fiscal spending and debt. In terms of inflation, non-sites also remain much more insulated than war sites, so that the increase in inflation is much smaller. Finally, we observe a somewhat stronger increase in tax progressivity in non-sites than in war sites. This is consistent with the narrative in Haffert (2019), who argues that after the second world war, the U.S. found it easier to institute highly progressive taxation than European countries, which had to rebuild their destroyed capital stock.

Taking stock, the nature of war is fundamentally different in war sites and non-sites. Wars cast a long shadow in terms of economic performance in war sites, but non-sites emerge relatively unscathed. In these countries, a more progressive tax system to finance the military effort emerges as a main legacy of war.

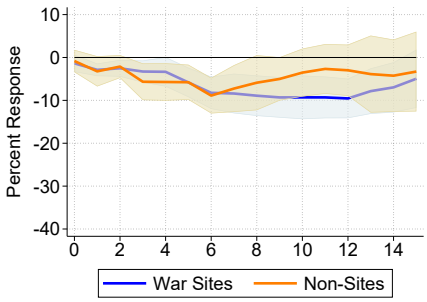
Losers and Winners. We can similarly compare how losers and winners of wars differ in terms of outcomes. Of course, classifying losers and winners is not straightforward, we thus follow the Correlates of War.[34] Figure B.6, Panels (g) and (h) compare inequality outcomes of winners and losers. We find that winners see smaller declines in inequality than losers, consistent with the fact that losers of wars tend to face larger destruction in their own country. Responses for wealth inequality are similar across winners and losers.

[34]This means that all non-war sites are classified as winners. Of the war sites, only India in 1971, the U.K. in WW2 and France in both world wars are classified as winners (we have experimented with reclassification of France in WW2, results are similar).

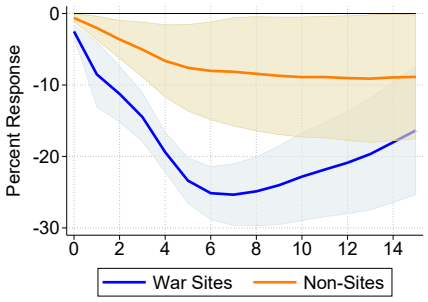
Figure B.6: War Sites vs Non-Sites



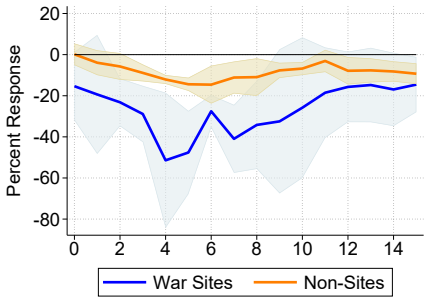
(a) Top 1 Income Share



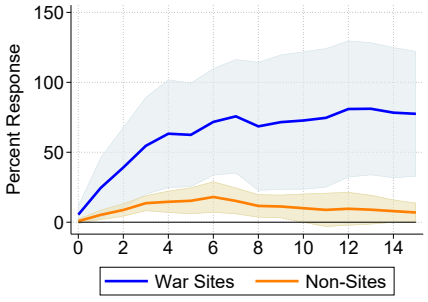
(b) Top 1 Wealth Share



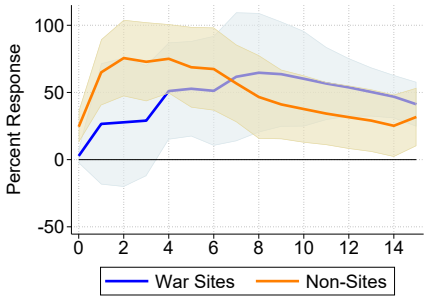
(c) Capital Stock



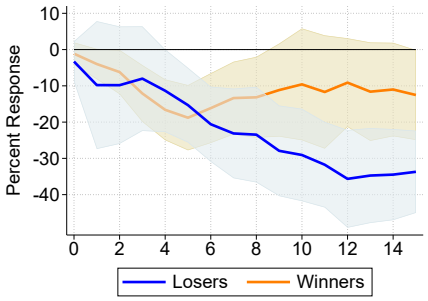
(d) Capital/Labor Share



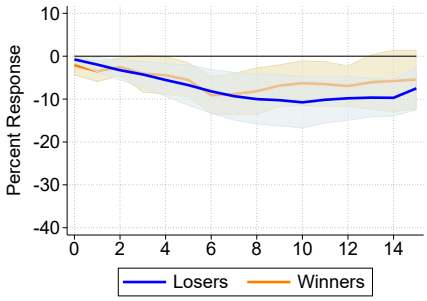
(e) Price Level



(f) Top Marginal Tax Rate



(g) Top-1 Inc Share: Losers vs Winners



(h) Top-1 Wealth Share: Losers vs Winners

Notes: This figure displays the response of various outcomes to the onset of war for non war sites, defined as countries with more than 10K casualties in a war that does not occur on their soil. Shaded areas indicate 90% confidence intervals.

B.2.2 Different Samples

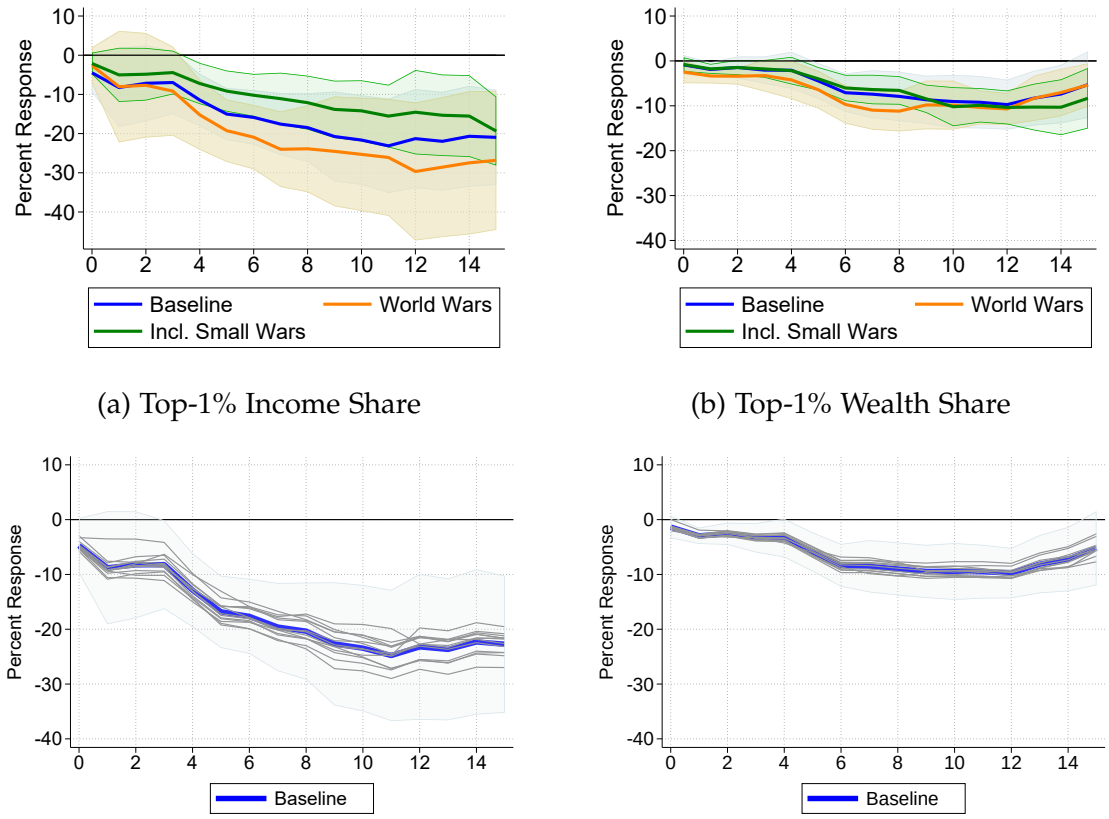
Figure B.7 shows results when using a sample of different war sites. We consider two main variations of the samples: first, a sample including just the war sites from world wars, and second, a sample that includes all countries that are classified as war sites in Federle et al. (2026a) with available inequality data (see Table B.4), not just those with more than 10K casualties.
Income inequality declines substantially across samples. For the sample including just world wars, the decline in income inequality is around 5 percentage points larger (-20 vs -25% at the 10 year horizon). In contrast, the impact on income inequality decreases if we include smaller wars, but remains quite negative. In contrast, the impact on wealth inequality is virtually unchanged across samples. The fact that results on income inequality vary more with the composition of the sample is consistent with destruction being a key force in bringing down income inequality.
We check for the impact of individual wars on our results. Panels (c) and (d) of figure B.8 reports the impact individual wars have on our results by showing impulse response functions computed by dropping each war successively from our sample. Doing so results in a decline in inequality that is very similar across samples, because the fall in inequality was a common experience across the countries in our sample. Our results are not driven by individual wars and their leveling effects.

B.3 Robustness

In this section we provide a number of checks to assess the robustness of the results in Section 3. We first focus on the results on income and wealth inequality.

Alternative Specifications. We consider alterations to our baseline specification (1). In particular, we vary both the construction of the dependent and independent variable. The results are in Figure B.8.
First, the figure shows the baseline regression, now also using Driscoll and Kraay (1998)-robust standard errors (rather than robust standard errors clustered at the country level). Next, we vary the independent variable to be a dummy variable equal to one during the entire duration of the war (and not only on the war onset). Finally, we change the interpolation of inequality so that the entire change in inequality between missing years is attributed war years. These changes do not affect the results in the main text – this is because the wars represent large and important shifts in inequality that are clearly visibly in the time series in most countries.
Quantitative War Shock. Finally, we use a quantitative measure of the size of the war shock. Concretely, we normalize the war shock we consider in the main text by the share of the capital stock that is destroyed in the war. The sources for our estimates of destruction are given in C.3, together with a small narrative for each country. We then normalize the war shock so that it corresponds to a destruction of 10% of the capital stock in the war site economy. Figure B.9 plots

Figure B.7: Inequality in War Sites, Alternative Samples



(a) Top-1% Income Share

(b) Top-1% Wealth Share

(c) Top-1% Income Share, Leave-out

(d) Top-1% Wealth Share, Leave-out

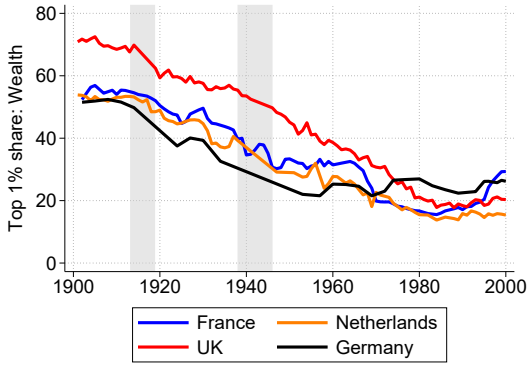
Notes: This figure displays the response of various outcomes to the onset of war for war sites. Shaded areas indicate 90% confidence intervals. The blue line indicates our baseline results from section 3. The yellow line adjusts the sample to include world wars only, the green line adds smaller wars (see table B.4). Panels c) and d) show the impulse responses when dropping wars one-by-one, both for income and wealth inequality.

the impulse responses obtained this way. We find results consistent with the main text: Income inequality drops sharply, but wealth inequality is relatively insulated. Intuitively, this is because the most destructive wars also saw the largest declines in inequality, which we show explicitly in Figure C.12.

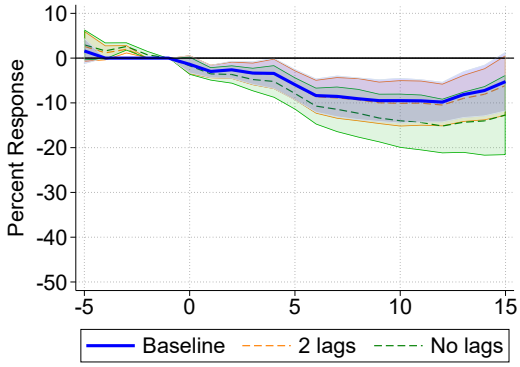
The reaction of wealth inequality. We now offer additional details on the response of wealth inequality. In our baseline findings, reported in Figure 1, we find that wealth inequality reacts less to war than income inequality. Figure B.10 provides further insights on this. We show that controlling for lags of the dependent variable, as is standard in the macroeconometric literature and recommended e.g., in Montiel Olea and Plagborg-Møller (2021) generates the muted response of wealth inequality. Intuitively, adding lags means that we are controlling for trends in wealth inequality prior to the war. If we add no lags at all, we would find a larger equalizing effects in terms of wealth inequality, as

indeed wealth inequality is falling in all economies already prior to the world wars, with the wars having relatively small effects in visual terms. Consistent with the lack of visual evidence, our macroeconometric method finds a small reaction of wealth inequality.
Moreover, in this figure we also show the evolution inequality prior to the wars, both for income and wealth. In our baseline specification, we control for 4 lags of the outcome, so that there are no pre-trends in the 4 years before by construction. Figure B.10 shows that the there are no important pre-trends in prior years, even when controlling for less lags. The fact that there are no large movements in inequality prior to wars strengthens the interpretation of war as the ultimate cause of movements in inequality.

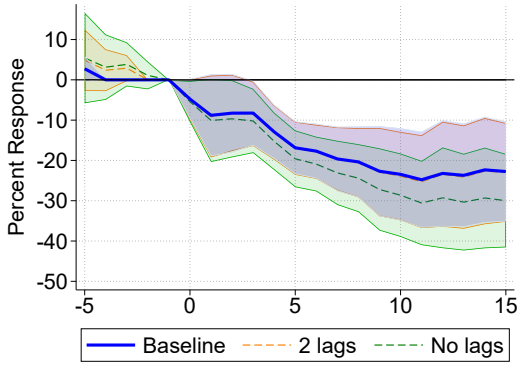
Figure B.10: Additional Results



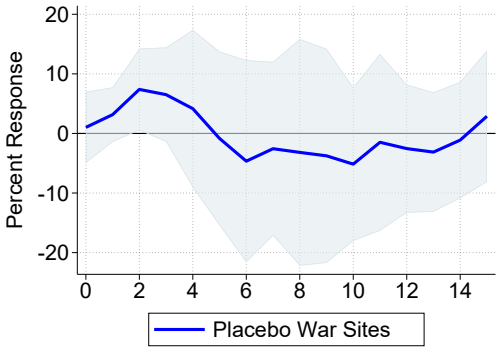
(a) Top Wealth Share in select countries



(b) Top 1 Wealth Share; Different Lags



(c) Top 1 Income Share; Different Lags



(d) Top 1 Income Share, Placebo

Notes: This figure shows additional empirical results. Panel (a) shows the raw data on the top wealth share for four prototypical economies. Panel (b) displays the response of the top 1 wealth share to the onset of war, Panel (c) shows the top 1 income share estimated based on specification (1). We include a different number of lags of the outcome across specifications, the baseline specification includes 4 lags. The start of war as specified in table 1. Panel d) estimates specification 1 using the placebo war sample of countries that were not fighting in the World Wars in Table B.5. Shaded areas indicate 90% confidence intervals.

Placebo Check. We conduct a Placebo exercise to test the robustness of our findings. In particular, our methodology might mechanically find important

leveling effects of wars because it is hard to separate the effects of war shocks from the underlying trends in inequality. We use countries which have long series of inequality available around the world wars, but were not part of the war themselves (either directly or indirectly via colonial linkages) as a control group to see if we are able to find effects from placebo war shocks in 1914 and 1939. The countries included are listed in Table B.5.

Table B.5: Countries and Years for Placebo War Assignment

Country	**Year**	**Country**	**Year**
Argentina	1939	Norway	1914
Switzerland	1939	Sweden	1914, 1939

Notes: This table shows the country and war years considered in the placebo sample.

Of course, this is an imperfect check given the international spillovers of war, but it gives an idea whether the leveling we document happened also absent the war itseltf. Due to data limitations, we only study the top-1% income share. We then estimate specification (1) using the placebo wars, the resulting impulse response is given in Figure B.10d. Unlike for war sites, or even war participants, we are unable to effect large leveling effects, if anything there appears to be a slight increase in inequality in the early war years.

B.4 Effects due to Changes in Population and Borders

War may mechanically affect income and wealth inequality due to changes in the size of the population and borders. This section shows that these effects are too small to account for the observed responses of income and wealth inequality (and could potentially go in the opposite direction, increasing inequality). To do so, we develop bounds on the effects that deaths due to war have on top income and wealth shares. Throughout, we assume that war deaths are concentrated at the bottom of the distribution.

Income Inequality. Consider a shock that reduces the population by x%. We show that this would tend to *increase* top income shares. We write the top-1% income share as $sh_1^Y = \frac{Y_1}{Y_1+Y_{99}}$, that is the total income of the top 1 over total income. The mechanical effect of war deaths among the bottom 99 is to decrease the income of the bottom 99, so that Y_{99} goes down and the top-1% income share goes up. Assuming that the income of the deceased is equal to the average income among the bottom 99 and using a shock that kills x% of the bottom 99 yields a top-1% income share $sh_1^{Y,\text{post}}$ after the war shock equal to

$sh_1^{Y,\text{post}} = \frac{sh_1^{Y,\text{pre}}}{1-(1-sh_1^{Y,\text{pre}})x}$. The percent change in top income shares is then

$$\frac{sh_1^{Y,\text{post}}}{sh_1^{Y,\text{pre}}} \approx 1 + (1 - sh_1^{Y,\text{pre}})x.$$

This means that war would increase income inequality, as measured by top shares, the increase is bounded by the share x of the population dieing in wars. Assuming that the deceased have lower income would mean that income inequality increases less; if the deceased have higher income (but are still in the bottom 99), income inequality would rise more.

Note that this analysis holds the income of the top-1% fixed. In a mechanical sense, the income of the top-1% also decreases slightly; because the overall size of households is lowered some households that were previously in the top-1% move to the bottom 99. However, these effects are likely to be smaller than the deaths in the bottom 99, because only the re-ranking of households affects only a small percentage of the top-1%.

Wealth Inequality. For wealth inequality, deaths at the bottom of the distribution have the potential to decrease top wealth shares. The big difference is that wealth does not disappear at death, but is passed on to the inheritors. We assume that all inheritors remain in the bottom 99 and consider a shock that reduces the population by x%. This means that only the threshold at which households enter the top-1% changes.

Therefore changes in wealth inequality ocurr due to re-ranking – because the size of the population decreases, some wealth owners in the top-1% now enter the bottom 99. If wealth holders in the top-1% all have equal wealth holdings, the mechanical effect of the re-ranking is to decrease the wealth of the top-1% by x%, because those wealth owners now enter the bottom 99. Because aggregate wealth remains is unchanged, the top wealth share decreases by x%. This is an upper bound for the decrease, because generally the 'poorer' members of the top-1% are affected by the re-ranking. In any case, we find population declines of at most 4%, lower than the effects we document on wealth inequality.

Border Changes. Wars sometimes entail large changes in borders. To the extent that the affected territories have the same distribution of income or wealth as the overall country, this will not affect inequality statistics. For the wars in our main sample, this only affects the case of Germany, where inequality statistics reflect historical borders that change over time. Albers et al. (2022) decompose the mechanical effects of territorial changes on the top 1 wealth share in Germany and find them to be small, around a 0.3pp decrease in the top 1 wealth share for WW1 and no effects for WW2. For income inequality, territories in Eastern Europe generally had lower incomes than the rest of the historical German state, so that removing then would tend to increase income inequality by similar arguments as above.[36]

[36]Even around the reunification of Germany, top income and wealth shares appear stable.

B.5 Town-Level Analysis

We provide additional information on the town-level data that we construct for Germany. The data is sourced from the *Statistisches Jahrbuch Deutscher Gemeinden* (Statistisches Reichsamt, 1929–1958), an annual statistical compendium on German towns. The covered towns vary slightly by year, so we work with an unbalanced panel of around 70 towns every year. The post-war data only covers West-Germany, so we are restricted to a sample of West German towns. The data was collected by local administrations and then reported to the compendium.

For each year in which data on the income tax is available (these are 1928, 1929, 1932, 1934, 1934, 1950 and 1954), we construct the pre-tax distribution of income across towns. Income tax data is reported in brackets, we construct the full distribution using generalized pareto interpolation (Blanchet et al., 2022). The income tax that underlies the data is the national income tax, which also underlies the aggregate German income inequality series by Bartels (2019). In particular, it covers business and capital incomes and is measured before taxes.[37] We further measure destruction at the town level. During the postwar reconstruction, administrators gathered detailed data on the extent of destruction in their respective towns. Our preferred measure of destruction is the share of the pre-war (1939) housing stock destroyed in the war. Alternatively, we can also measure debris (in cubic meters) per capita. We also collect data on the industry structure, measured as the share of the labor force employed in manufacturing.

Table B.6: Summary Statistics for Key Variables

Variable	N Obs	N Towns	Mean	SD	Median	Min	Max
Share Destroyed	541	110	0.36	0.21	0.38	0.00	0.89
Debris per Capita	426	63	16.43	10.71	14.79	0.42	39.67
Industry Employment Share	463	71	0.53	0.13	0.53	0.17	0.76
Top 1% Income Share	541	110	0.15	0.05	0.14	0.08	0.33

Notes: This table shows summary statistics for the analysis of German towns. For details see text.

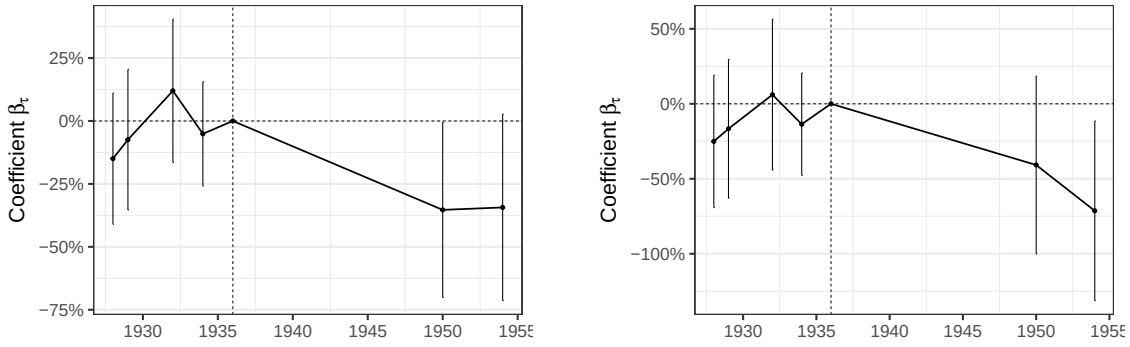
Table B.6 reports summary statistics for the main variables used in our analysis (the panel is unbalanced and there are fewer towns post-war). Next, in Figure B.11 we show the difference-in-differences plots underlying specification (2). Panel (a) shows the difference-in-differences plot, while Panel (b) shows results measuring destruction instead as debris (in cubic meters) per capita.

C Appendix: Stylized Framework

We provide additional details and results on the framework in Section 3.3.

[37] We winsorize top income shares at the 1 and 99% level.

Figure B.11: Destruction and Inequality in a Panel of German Towns



(a) DiD Plot

(b) DiD, different destruction measure

Notes: Panel (a) plots the estimated coefficients estimating specification (2) year-by-year together with 90% confidence intervals. Panel b) plots the estimated coefficients from (2) when measuring destruction as debris in cubic meters per capita. Standard errors are clustered by town.

Table C.7: Summary Statistics: Simple Framework

Country	Top 1 Income Share	sh_1^L	sh_1^K	Capital Share	Labor Share	Capital / Labor Share
France	0.17	7.83	40.88	29.73	70.27	0.42
Germany	0.13	8.87	19.73	37.57	62.43	0.60
Japan	0.28	16.79	57.30	26.76	73.24	0.37
U.K.	0.17	10.25	30.13	31.39	68.61	0.46
Average	0.19	10.93	37.01	31.36	68.64	0.46

Notes: This table displays the initial calibration for the stylized framework presented in Section 3.3. 'Average' corresponds to an unweighted average of France, Germany, Japan and the U.K., which we use to produce the simulations in Section 3.3.

C.1 Calibration and Further Results

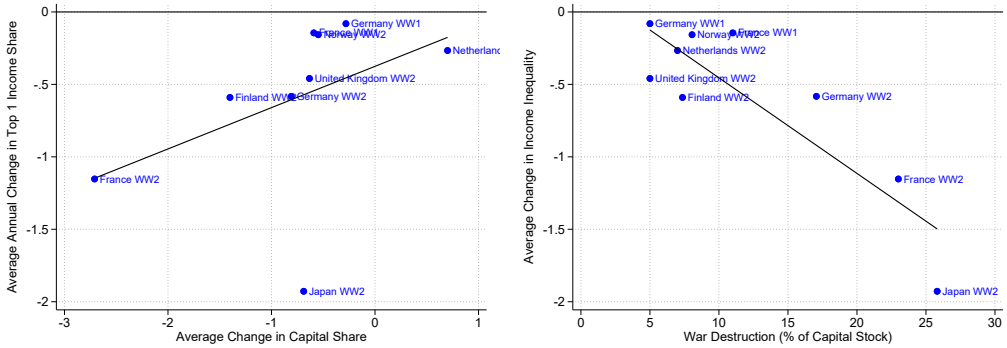
Calibration. We calibrate the framework to those economies for which we have data on the composition of top incomes before wars. Data limitations restrict our sample to four economies before World War II. We summarize the calibration, which averages over the period 1930-1938 in Table C.7.

Destruction and the Fall in Inequality. The framework offers a simple empirical prediction: In wars that see larger declines in capital shares, income inequality should fall more. We test this prediction empirically in Figure C.12, which compares the evolution of overall income inequality and the capital share. Concretely, we compute the average annual decline in inequality during the wars and correlate it the the average annual decline in capital shares, as well as the share of the capital stock that is physically destroyed in each war.[38] Figure C.12 plots this correlation. Although there is consistent decline in income inequality during war years, income inequality declines more for countries with larger declines in the capital share. The correlation with the destruction of the capital stock similarly shows that countries which experienced larger capital destruc-

[38]We define the periods as 1914-1920 for WW1 and 1939-1950 for WW2, to allow for the effects of wars to level out. The choice of periods does not affect our results.

tion due to wars indeed experienced larger declines in inequality.

Figure C.12: Correlation: Change in Inequality, Capital Shares and Destruction



(a) Inequality and Capital Shares (b) Inequality and Destruction

Notes: This figure shows the correlation between the change in inequality and both the decline in capital shares and wartime destruction. In both plots, the y-axis shows the average annual change in inequality. Panel (a) shows the average annual change in the capital share on the x-axis, Panel (b) provides instead uses the estimates of capital destruction from Table 1. Due to data availability, we restrict to countries in the World War sample.

Income Inequality with Differential Destruction. Finally, we can calibrate the framework to a higher loss of capital for the top-1% than for the whole economy. This generates a larger decline in top income shares for a given loss in wealth, because the rich are hit more by the shock. Concretely, we consider that the rate of destruction D_1 for the top-1% can be computed from the decline in the top percentile wealth share as follows

$$sh_{1,K}^{post} = \frac{(1-D_1)K_1^{pre}}{(1-D)K^{pre}} \quad \text{so that} \quad \frac{sh_{1,K}^{post}}{sh_{1,K}^{pre}} = \frac{1-D_1}{1-D} \approx 1 + D - D_1$$

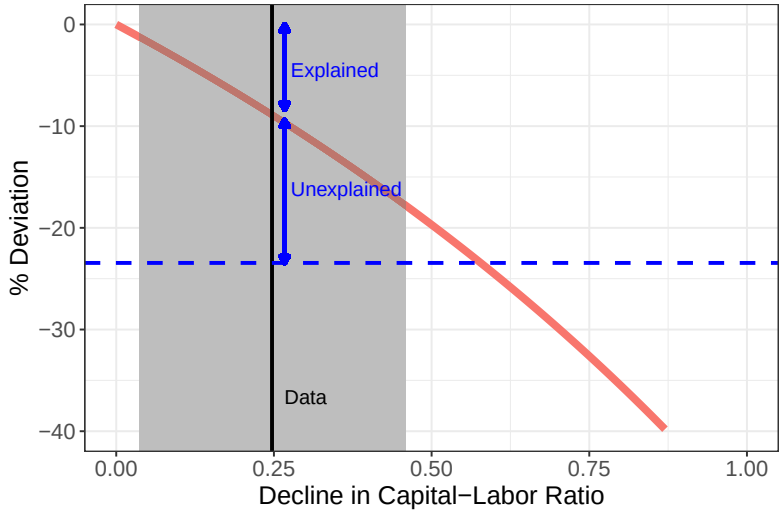
where $sh_{1,K}^{post}$ is the top-1% wealth share after the war, K_1^{pre} is the wealth of the top-1% and K^{pre} is total wealth (measured before the war). We can compute the differential loss in wealth directly from the decline in top wealth shares as $D_1 = D - \Delta \log sh_{1,K}$.
To calibrate the framework with differential destruction, we then compute

$$sh_p^I(D) = \frac{sh_p^L + sh_p^K \cdot (1-D_1) \cdot \frac{r \cdot K}{w \cdot L}}{1 + (1-D) \cdot \frac{r \cdot K}{w \cdot L}}, \tag{19}$$

with D_1 computed as above. Figure C.13 shows the implied decline in the top-1% income share when taking into account differential destruction of capital. It plots the aggregate rate of destruction D against the explained decline in the top-1%share, when fixing D_1 to the decline in the top wealth share at the 10-year horizon (about 10%). While potentially, larger losses of wealth at the top of the

distribution could account for the fall in income inequality with a lower decline of the capital-labor ratio, quantitatively the decline in the top-1% wealth share is relatively small, such that the resulting simulation is close to the benchmark with proportional losses.

Figure C.13: Framework Simulation Accounting for Differential Wealth Losses



Notes: This figure shows simulations of the top 1 income share for a given decline in the capital-labor ratio using equation (19). The red line indicates the decline in the top income share as a function of the decline in the capital-labor ratio. The vertical line indicates the average decline in the data at the 10-year horizon. The blue line indicates the observed decline in the top 1 income share.

C.2 War Destruction Across Countries

We now provide the sources for our estimates of destruction for the other countries in our sample, in addition to the more granular data on France, Germany and Japan discussed in Section C.3. Of course, the fog of war means that these estimates are surrounded with some uncertainty, which we discuss for each country. Table C.8 summarizes our estimates.

Finland. Finland suffered repeated war destructions during a series of battles and bombings in the second world war, first during the 'Winter War' in 1939-40 and then through German destruction at the end of the war. We base our analysis on the work of Finnish economic historian Nummela (1993)'s analysis of the Economics of the world war in Finland. It is hard to exactly quantify the extent of destruction in Finland in general. In terms of dwellings, 13.27% of the total housing stock was destroyed in Finland during the Winter War (Nummela, 1993, page 123). The exact value of the destroyed housing stock is not known, however we know the extent to which different kinds of buildings were destroyed (fully destroyed, more than half, less than half) (Nummela, 1993, Table 24). Factoring this in leads to an estimate on the lower bound of 7.36% of

Table C.8: War Destruction Across Countries

Country	Year	Destruction	Country	Year	Destruction
Finland	1939	7.4%	Japan	1944	25.8%
France	1914	11.0%	Netherlands	1940	7.0%
France	1940	23.0%	Norway	1940	8.1%
Germany	1914	5.0%	U.K.	1940	5.0%
Germany	1939	17.1%			

Notes: Table shows wars for which we construct additional data on capital destruction, measured here as a percentage of the pre-war capital stock.

the total dwelling stock.[39] This yields a lower rate of destruction of 7.36% of the total dwelling stock. We assume the same for industrial assets and use this figure in our calculations. In calculating the capital stock, we assume even destruction across the years 1939, 1940 and 1945. This does not factor in the loss of territories in Karelia or war reparations paid to the Soviet Union in terms of Machinery.

Netherlands. The Netherlands experienced war destruction as well as German plunder in the second world war, especially towards the end of the war in 1943-45. Our baseline estimate accounts for only destruction and is 7% of the initial capital stock, taken from Groote et al. (1996, page 8). As noted there, this estimate is on the low end compared to immediate post-war reactions, which were on the order of 28%. However, given the limited fighting on dutch soil, we find the estimate of Groote et al. (1996), who carefully survey the post-war data more plausible. We apply the destruction evenly to the 1943-45 period when computing the capital stock.

Norway. During the German occupation of Norway, there were repeated allied raids on Norwegian territory to sabotage the military and industrial capacity of the German military. Moreover, at the end of the war, Norway experienced destruction through the scorched earth policy in the area of Finnmark. The Norwegian administration quantified the capital losses during the war in a statistical publication in 1946 (Sentralbyrå, 1949). The data provides an estimate of the losses due to the war as well as the pre-war capital stock. We take those numbers directly from the publication and thus arrive at an estimate of destruction around 8.05 % of the capital stock.[40] Because war destruction is not broken out separately, this figure should be considered an upper bound for the total destruction of the Norwegian capital stock. In computing the capital stock, we apply this evenly from 1940 and 1944-45, when allied raids as well as destruc-

[39] Concretely, we weigh houses fully destroyed by 1, those destroyed 'more than half' by 0.75, and those destroyed by 'less than half' by 0.25.

[40] We include capital destruction in land, buildings, and machinery (and exclude destruction in boats and durable goods).

tion by German forces was concentrated.

United Kindom. Harrison (2000) surveys the war damages in the United Kingdom during the second world war. Although war damages in the U.K. were more limited, the U.K. was subject to aerial attacks on its territory through German bombings, which killed more than 40,000 people and injured many more. Harrison (2000) puts the figure of destruction for the U.K. economy at 5% of the capital stock. This does not account for the large wartime 'disinvestments' (foregone investment due to the war), which are argued to have lowered the capital stock even more. To compute the capital stock, we assume that this happens evenly throughout the period 1941-42 as well as 1944-45, when allied raids were concentrated.

C.3 Empirical Evidence on Differential Destruction

We provide additional evidence on the incidence of destruction along the distribution. To do so, we construct estimates of destruction at the asset class level for a number of economies. We then use a version of the simple framework with multiple assets to understand the impact that differential destruction may have on top wealth shares. Although there is inherent uncertainty around the wealth lost in wars, we find little evidence for wealth losses that are very disproportional along the the distribution.

The Impact of Destruction in the Simple Framework. To fix ideas, consider an economy with two types of assets, housing H and the rest of the wealth stock R. Then the top-1% wealth share is the composite of both assets,

$$sh_1^W = \frac{W_1}{W} = \frac{H_1 + R_1}{H + R},$$

where H_1 and R_1 are the wealth holdings of housing and the other asset of the top-1% of the wealth distribution. Then we consider a shock D that destroys parts of the housing stock. After the shock, we have that the top-1% share comes out to

$$sh_1^W(D) = \frac{(1-D)H_1 + R_1}{(1-D)H + R}. \tag{20}$$

The top wealth share falls in the degree of wealth destruction if and only if

$$sh_1^{W'}(D) = \frac{HR_1 - H_1R}{((1-D)H + R)^2} < 0 \Leftrightarrow \frac{H_1}{R_1} > \frac{H}{R}$$

i.e. if the portfolio of the top wealth holders is more tilted towards housing, the asset destroyed in this case, than the aggregate portfolio.

The decomposition is straightforward to extend to multiple assets, for which we each know the rate of destruction. The coverage of asset classes varies by country, and is explained below. Generally, we are able to consider three types of asset holdings; Housing, Business (and equity claims) and a residual asset

Table C.9: Simulation of Destruction Effects on Top 1 Wealth Share

		Data			Simulation		
Country	Pre-War (Data)	Post-War	Δ	Percent Change	Post-War	Δ	Percent Change
France WW1	54.9	50.6	-4.3	-7.8	54.9	0	-0.1
France WW2	42.8	32	-10.8	-25.2	42.2	-0.6	-1.5
Germany WW1	50.7	37.5	-13.2	-26	50.4	-0.3	-0.6
Germany WW2	32.6	22	-10.6	-32.5	30.4	-2.2	-6.7
Japan WW2	*45*				*43.6*	*-1.4*	*-3.1*

Notes: This table reports realized and simulated changes in wealth inequality induced by war destruction. The 'Pre-War (Data)' column reports the observed top 1 wealth share before the war. Under 'Data', 'Post-War' is the observed top 1 wealth share after the war, 'Δ' is the observed post-war value minus the pre-war value, and 'Percent Change' is this change relative to the pre-war value. The final three columns report the results in the scenario which simulates destruction that varies across asset classes. For Japan, we do not have data on the pre-war top wealth share, so we set it to 45% (the average of the other countries); entries that depend on this assumption are italicized.

category, which is in practice made up mostly of safe asset holdings. For each asset category, we compute a rate of destruction and apply it to wealth holdings to calculate the impact of destruction on the wealth distribution in a more granular way. The results of this exercise are shown in table C.9, we give precise details on the calculations below.

The direct effects of destruction on wealth inequality in these simulations is limited. Concretely, we find that destruction directly lowers wealth inequality by around 7% (2.2 p.p.) in Germany in World War 2, and by less in the other wars. For France we find barely any potential reduction of wealth inequality in World War 1, and around 1.5% in World War 2.

The muted effect of destruction is a result of portfolio composition: Differences in the wealth portfolio of the top-1% and the aggregate portfolio are small historically. Figure C.14 illustrates this by comparing the wealth portfolio of the top-1% to the aggregate portfolio in these country. In the historical sample, wealth is more concentrated than in modern data, so that there is not as much space for the aggregate wealth portfolio to deviate from the top-1% wealth portfolio. The pre-World War 1 portfolio in France is a case in point: The top-1% portfolio looks very similar to the aggregate portfolio and top-1% wealth shares stand at 55% (top decile shares at 80%).

France. For France, we use portfolio data from Piketty (2011), who provides data both on the top portfolio as well as the aggregate wealth portfolio based on data from the (universal) Parisian estate tax. We use the portfolios of the top-1% of decedents as well as for all decedents in the years 1912 and 1937. In particular, we distinguish three asset categories that are consistently available; real estate, business assets (including equity) and a residual category. We show the portfolios in figures C.14a and C.14b. Notably, before the wars, the aggregate portfolio of decedents looks very similar to the top-1% portfolio.[41] For the composition of income in figure 4, we use data from (Piketty, 2018) and classify 'investment

[41] Further examining the data of Piketty (2011) shows that this is a function of the fact that the portfolio of the "next nine" looks very similar to the top-1% portfolio. Only for the middle 40 do portfolios start to look meaningfully different.

income', 'agricultural income', 'industrial and commercial profits' and noncommercial profits' as business income, 'payments, wages, retirement pensions and annuities' as labor income and the residual as other capital income.
Then, we compute top percentile shares when applying destruction rates to both the stock of real estate as well as business assets. For World War 1, we use a destruction rate of around 11% for business assets as well as real estate following Piketty and Zucman (2014).[42] For World War 2, we use the same sources to estimate a rate of destruction of real assets of 23% and zero fore the remainder. Unfortunately, no consistent breakdown of war destruction across businesses and housing is available. However, given the limited difference of the top 1 portfolio from the aggregate wealth portfolio (Figure C.14), having destruction differ by asset class would not generate meaningful shifts in the wealth distribution. To compute the capital stock, we assume evenly spaced destruction during the years of the wars.

Japan. For Japan, we take information on the portfolio of top estates in 1935 from Moriguchi and Saez (2008). Information on the aggregate wealth portfolio is from the Japan historical statistical yearbook (Statistics Bureau of Japan, 1949 – 2023, Table 591, Statistical Yearbook 1949), which contains the composition of aggregate wealth as well as an estimate for direct destruction for each component of aggregate wealth. In both sources, we classify components into business assets, housing and other.[43] Figure C.14c shows the portfolio of the top estates as well as the aggregate wealth portfolio. While the rich are slightly tilted more towards business assets, they are not too different than the aggregate wealth portfolio. We then apply the destruction rates from the Statistical Yearbook of Japan, i.e. 22% of housing, 31% of business assets and 22% of other (including inventories etc). For the total wealth stock, this yields a rate of destruction of 25.61%, consistent with Wolff (1991) and Harrison (2000) who find similar values. To compute the capital stock, we assume that the full destruction happens in 1945.
Note that for Japan, we do not have data on the top wealth share (or even the top estate share). However, we can carry out simulations for differential destruction using data on just the portfolios of the bottom and the top of the wealth distribution, and assuming a value for the top wealth share. We assume a value of 40%, in line with the evidence for France and Germany pre-WW2 and higher than the top income share of 35%; changing this assumption leaves the resulting decline in top wealth shares unchanged in percent terms.[44] Doing this results

[42] Piketty and Zucman (2014) often mention a rate of destruction of 22%, but explain that half of this are losses on foreign bond holdings in France.

[43] Concretely, in Moriguchi and Saez (2008) we classify stocks, Agricultural land and businesses as business assets; residential land and houses and structures as housing and the residual as other. In Statistics Bureau of Japan (1949 – 2023, Table 591, Statistical Yearbook 1949), we classify "Building" as Housing, "Machinery and Equipment for Industry", "Industrial Facilities" (Electricity, Waterworks,...) and "Products" as Business Assets and all other assets as Other. We have experimented with other classifications, which yield similar results in terms of differential destruction.

[44] To see this, note that we can rewrite (19) as $sh_1^W(D) = \frac{(1-D)H_1+R_1}{(1-D)H+R} = \frac{W_1}{W}\frac{(1-D)H_1/W_1+R_1/W_1}{(1-D)H/W+R/W}$, i.e.

in a decrease of 3.1 % (1.3 percentage points).

Germany. Data on the portfolios and the destruction simulations is taken from Albers et al. (2022). In particular, the authors simulate the effects of destruction historically for both wars, taking into account the asset classes destroyed in both wars. Moreover, they make an adjustment for differential destruction along the distribution, to take into account that destruction affects the rich disproportionally more.[45] In numbers, the authors estimate a 5% loss of wealth due to territorial losses after the first world war (this is taken into account, because pre-war data refers to pre-1914 borders), and destruction of 17.5% of the capital stock in WW2. For the calculation of the capital stock, we apply the losses at the end of WW1 and evenly spaced in WW2.
Figures C.14d and C.14e compare the top-1% portfolio and the rest of the distribution. In Germany, we are able to break out agriculture and industry separately. However, one drawback is that equity claims are not broken out separately, so that a fraction of "other" likely represents claims on business assets as well. Before both wars, the top-1% portfolio is relatively well aligned with the aggregate wealth portfolio.[46]
For Germany before WW2, we can also compare both the income and the wealth portfolio of the top 1 and the aggregate, as we do for France in figure 4. Figure C.14f shows the resulting income portfolio in Germany in 1938.[47] Note that we cannot break out business income and other capital income for the 'total income' portfolio. The resulting picture is similar to France: The top and the aggregate differ very strongly in their income composition, with the top much more tilted towards business income.
Overall, both wars contribute to a reduction in wealth inequality through destruction, but only mildly. For World War 1, the estimated reduction in the top-1% wealth share is only around -0.6%, for World War 2 it is higher at 6.7%.

D Appendix: HANK Model

D.1 Evidence on Profits

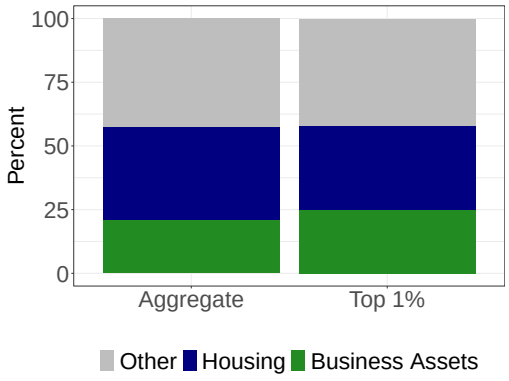
A key channel for the leveling in our estimated HANK is a decline in firm profits. We provide evidence on declining profits during war in Section 4.4. Here, we describe the data used to construct firm profits. When constructing profits, we aim to maximize our coverage of companies. Therefore, when possible, we take profits from national accounts. However, this is not possible in many cases,

separating the top wealth shares and the top wealth portfolio.

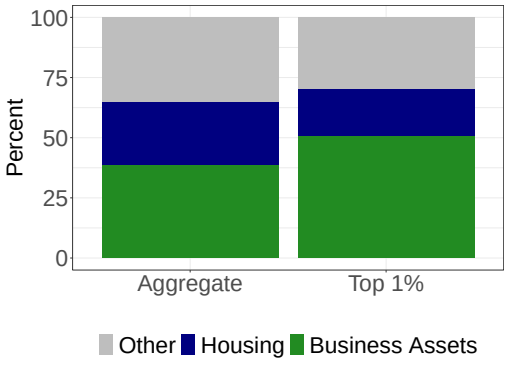
[45] We do not have sufficient data to make this adjustment for other countries.

[46] The share of "Industry" in the portfolio may appear low, especially before the second world war. This is because the portfolios for the second world war come from the year 1934, which is still heavily affected by the great depression.

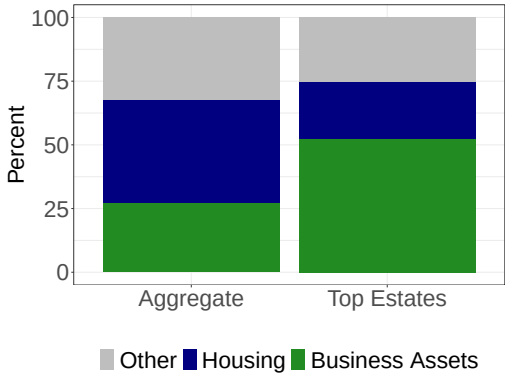
[47] In Germany, we use the data of Dell (2007) and classify Agricultural income, Industrial income and 2/3 of self-employment income as 'business income'.



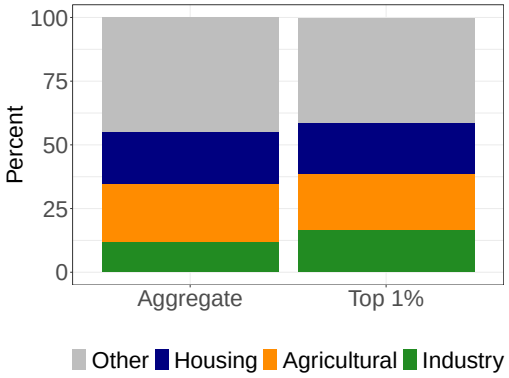
(a) Asset Composition France WW1



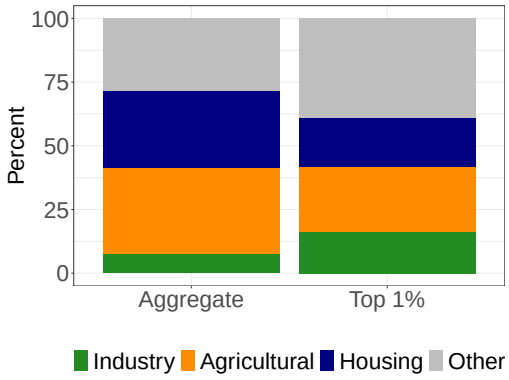
(b) Asset Composition France WW2



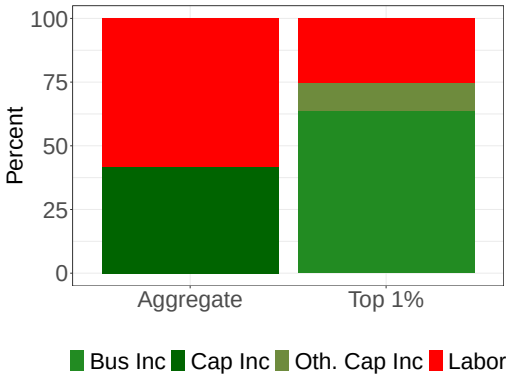
(c) Asset Composition Japan WW2



(d) Asset Comp. Germany WW1



(e) Asset Comp. Germany WW2



(f) Income Comp. Germany WW2

Figure C.14: Historical Wealth and Income Composition

Notes: This figure shows the composition of top incomes and wealth as well as the aggregate wealth or income composition prior to the wars. Panel C.14f shows the income composition for Germany, both for the top 1% and the aggregate. For details see the text.

in which we are can only cover a subset of companies (for example, listed firms). When possible, we subtract profit taxes levied during the wars.[48]
There are numerous complications in the measurement of economic profits (see e.g., Barkai (2020) and Gutierrez (2017)). We make no attempt to correct for these. Instead, we directly use profits as reported in the source material, with no further computations or corrections. The concept of profits we use is consistent within countries around each war, but inconsistent across countries.

Belgium We collect data on profits from the Belgian Statistical Yearbooks (Banque Nationale de Belgique, 1929–1960), Tables on "Rendement des Societes par Actions". Data refer to corporations and report the total profits and losses of all corporations, we subtract the two to compute net profits.[49] Figure D.15a reports the resulting series of profits, deflated using the CPI.

Finland We collect data for profits of cooperatives in Finland from the Finnish statistical yearbook (Statistics Finland, 1900 –, Table 139). Profits are available for Cooperatives, a form of privately held businesses owned by multiple partners. We use the net surplus of cooperatives without further adjustment. Figure D.15b reports profits as a percentage of sales, available in the same table.

France. Data for profits in France come from Piketty and Zucman (2014), who source data from Villa (1994). We define profits as the sum of net of depreciation corporate profits and self-employment capital income and subtract the corporate tax. Figure D.15c shows each component of the calculation. In the first World war, there is a initial rise and then small decline in profits in France. Note that we do not have data on the corporate profit tax imposed in World War 1. However, the fact that profits do not decline much in World War 1 is consistent with a relatively flat top income share. In World War 2, corporate profits in France fall sharply at the start of the war and even turn negative. They then continue to remain low into the 1950's.

Germany. In Germany, we start from two comprehensive works on 'war profiteering' during world wars by economic historians; Baten and Schulz (2005) for World War 1 and Spoerer (1996) for the World War 2 . We extend these to the post-war period periods using the balance sheet of listed corporations.
Specifically, for WW1 we use the profit indices from Baten and Schulz (2005, Table 4), who track rates of real profits for a sample of large firms. They classify firms by their relatedness to wars (e.g. heavy industry is classified as very war related). The indices are normalized to 100 in 1913, as a comparison, we also report GDP. For World War 2, we use the return on equity from Spoerer (1996, Page 147, Table 34) up to 1942.[50] After World War 2, we use data on the prof-

[48] Although the data on income inequality is pre-tax, income taxes are levied on the payouts to firm owners after they pay corporate taxes.

[49] Data includes the Belgian Congo, which we are unable to strip out but likely only accounts for a minor share.

[50] Spoerer (1996) reports the return on equity from the balance sheet both for the entire econ-

its of non-financial firms from Statistisches Bundesamt (1949-55). This annual publication reports the consolidated balance sheet of German listed firms and is the post-war continuation of the pre-war data. We take profits directly from the tables 'Gewinne und Verluste der Aktiengesellschaften nach Gewerbegruppen'. We divide profits by shareholder equity, which is reported in the same tables. We cannot compute an index of real profits, but only of the return on equity because only the second is available in the pre-war period.
The data leave us with a gap from 1943–48 without information on profits. It is likely that profits were extremely low during this time period, both because of very high profit taxes of up to 80% by the Nazi regime at the end of the war (Banken, 2018), and the general economic depression in the post-war period.
Figures D.15d and D.15e reports profit rates for both wars. In both wars profits decline sharply. In World War 1, profits drop by more than 40% for the industries not directly related to wars. In the second world war, there is an initial boom in corporate profits during the military buildup. However, after the destruction of the war has set in, profits after the second world war are extremely low abd do not catch up to their pre-war levels for a while.

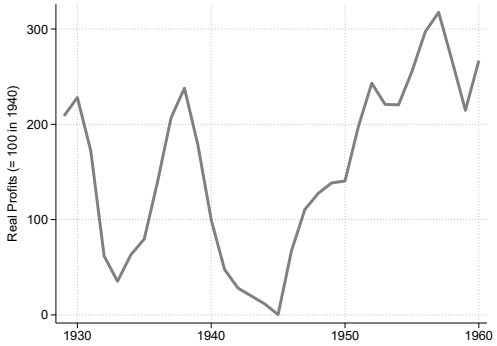
Japan. For Japan, we collect data on the national accounts from the Japanese Statistical Yearbook (Statistics Bureau of Japan, 1949 – 2023, Table: National Income by Distributive Shares). We use the series on corporate profits and subtract the series on the corporation tax. Figure D.15f plots profits in Japan, expressed as a share of GDP, before and after taxes. While initially corporate profits are high during the war (similar to Germany), profits decline steeply at the end of the war years and almost turn negative post-tax.

Netherlands. Data on profits during World War 2 come from the work of dutch economic historian Klemann (2002). He constructs profits for a large sample of dutch listed firms from corporate balance sheets and provides an index of aggregate profits from 1938 to 1948. Figure D.15g plots the index of profits together with an index of real GDP that is normalized to 100 in 1938 as well.

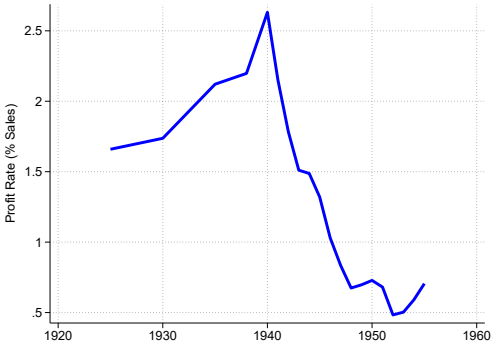
United Kingdom. We take data on Profits from Piketty and Zucman (2014) ('Gross operating surplus of private non-financial companies'), who in turn rely on data from Mitchell (1988). For profit taxes, we take data from Ryland and Dimsdale (2017, Sheet A.27) ('Profit Taxes'). This allows us to calculate profits of U.K. nonfinancial firms as a percentage of GDP. We show profits before and after the profit tax in figure D.15h. After the wartime profit tax, corporate profits decline significantly during the war and the immediate aftermath.

omy, and for a sample of companies for which he also collects profits as reported in corporate income tax statistics. We use balance sheet profits, consistent with what is available post-war. In 1940-41, we use the balance sheet profits for the firms in the smaller sample, as there is no balance sheet covering the entire corporate sector. As explained in Spoerer (1996), balance sheet profits are similar in his sample and the full corporate sector before 1940.

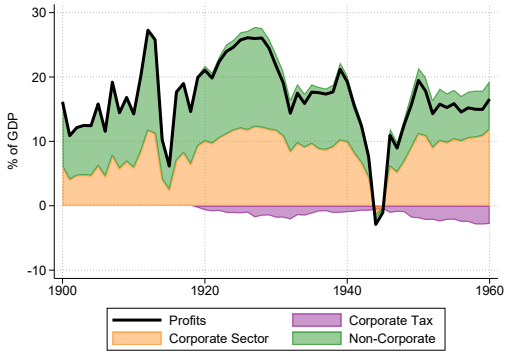
Figure D.15: Comparison of Corporate Profits during Wars



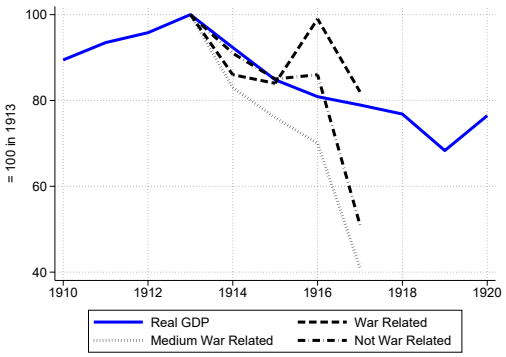
(a) Belgium World War 2



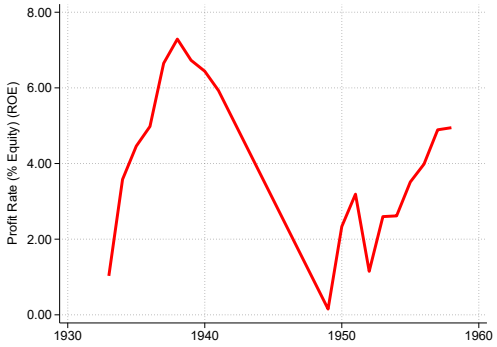
(b) Finland World War 2



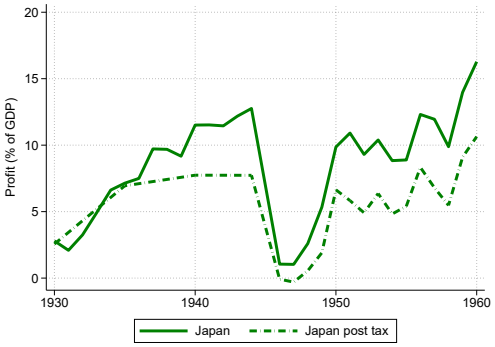
(c) France World War 2



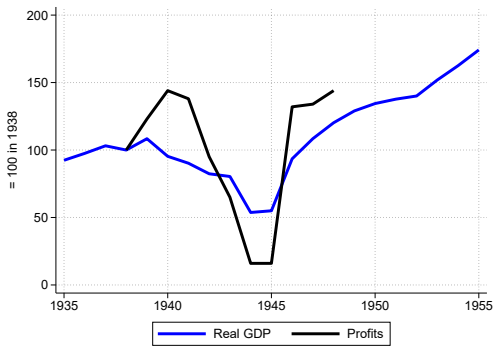
(d) Germany World War 1



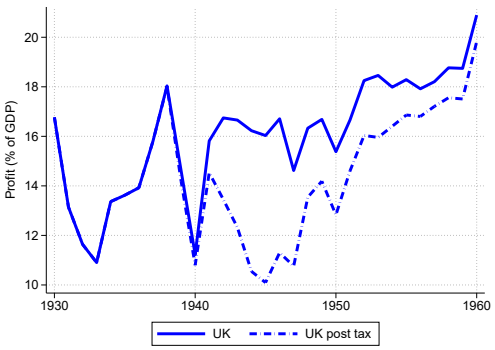
(e) Germany World War 2



(f) Japan World War 2



(g) Netherlands World War 2



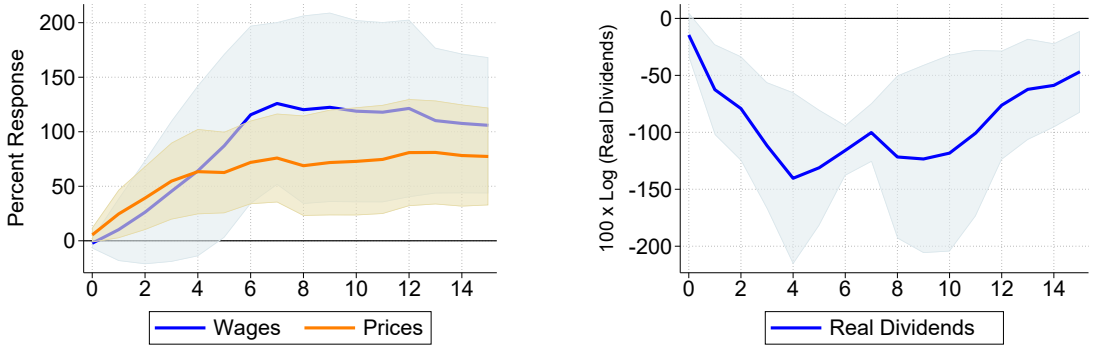
(h) United Kingdom World War 2

Notes: This figure shows profits during war for the countries in our sample. For details see text.

D.2 Additional Validation: Prices, Wages and Dividends

In the model, a key mechanism for the decline in income inequality is that firm costs rise faster than output prices, therefore squeezing profits. Figure D.16a shows impulse responses of the price and wage level (from Jordà et al. (2017)) using specification 1. Indeed, we find that wages rise faster than prices.
Second, in addition to the profit data, we also construct data on real dividends across countries. We compute real dividends by multiplying stock market capitalization from Kuvshinov and Zimmermann (2022) with the price-dividend ratio from Jordà et al. (2019). Figure D.16b shows the estimated response of real dividends (log-transformed) to the wars using specification (1) in our sample. We find that war decreases dividend payouts sharply, by up to 150%. The decline in dividends far exceeds the decline in output (see Figure B.5), so that dividends decline by more than overall income.

Figure D.16: Response of Prices, Wages and Dividends



(a) Response of Wages and Prices

(b) Response of Real Dividends

Notes: Panel a) the response of wages and prices in the data of Jordà et al. (2017) to the war shock computed using specification 1, the sample is restricted to the 18 countries in Jordà et al. (2017), for which data on wages is available. Panel b) shows the response of real dividends to the war shock. For the data on dividends, see Section D.2. Real dividends are in Logs, so that a drop by -150 log points correspond to a 78% decline in real dividends.

E Full Model Equations and Recursive Equilibrium

This appendix collects the structural equations used in the baseline specification and then states the recursive equilibrium. Throughout, time is discrete, all variables are real unless noted otherwise, and expectations $\mathbb{E}_t$ are conditional on information at t.

E.1 Households

Worker–entrepreneur switching. Each household carries a discrete employment status $e_{it} \in \{0, 1\}$ (0 = worker, 1 = entrepreneur/rentier) with transition matrix

$$\Pr(e_{it} = 1 \mid e_{it-1} = 0) = \zeta, \qquad \text{(become entrepreneur)} \tag{21}$$

$$\Pr(e_{it} = 0 \mid e_{it-1} = 1) = \iota, \qquad \text{(return to work)} \tag{22}$$

and complementary probabilities of staying put. Entrepreneurs set $h_{it} = 0$ and receive firm profits Π_t^F for one period; workers draw labor efficiency h_{it} from the process below.

Idiosyncratic labor productivity.

$$\log h_{it} = \rho_h \log h_{it-1} + \epsilon_{it}^h, \qquad \epsilon_{it}^h \sim \mathcal{N}(0, \sigma_{h,t}^2). \tag{23}$$

Preferences.

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{\left[c_{it} - n_{it}^{1+\gamma}/(1+\gamma)\right]^{1-\xi} - 1}{1-\xi}. \tag{24}$$

Let d_i^H indicate a household in the high-income labor state, define $\tau_{i,t}^{\text{war}} = d_i^H \tau_t^{\text{war}}$, and let $\Delta\tau_t^{\text{war}} = \tau_t^{\text{war}} - \bar{\tau}^{\text{war}}$.

Labor-supply condition.

$$n_{it}^{\gamma} = (1 - \tau_t - \tau_{i,t}^{\text{war}})\, w_t h_{it}. \tag{25}$$

After-tax bond payoff.

$$\mathcal{R}_t^b(b) = \frac{R_t^b}{\pi_t} + \overline{R}\mathbf{1}_{\{b \le 0\}} - \Delta\tau_t^{\text{war}} \left(\frac{R_t^b}{\pi_t} - 1\right) \mathbf{1}_{\{b > 0\}}, \tag{26}$$

where $\overline{R} > 0$ is the penalty rate for unsecured borrowing. The high-income surcharge is applied to positive bond interest only through its deviation from the steady-state surcharge.

Budget constraints. (i) Capital adjusters

$$c_{it} + b'_{it} + q_t k'_{it} = (1 - \tau_t - \tau^{\text{war}}_{i,t}) w_t h_{it} n_{it} + \mathcal{R}^b_t(b_{it}) b_{it} + [q_t + (1 - \Delta\tau^{\text{war}}_t)(r_t - 1)]\, k_{it} + (1 - \tau_t)\Pi^U_{it} + (1 - \tau_t - \tau^{\text{war}}_t)\Pi^F_{it}, \tag{27}$$

with controls (b'_{it}, k'_{it}).
(ii) Non-adjusters

$$c_{it} + b'_{it} = (1 - \tau_t - \tau^{\text{war}}_{i,t}) w_t h_{it} n_{it} + \mathcal{R}^b_t(b_{it}) b_{it} + (1 - \Delta\tau^{\text{war}}_t)(r_t - 1) k_{it} + (1 - \tau_t)\Pi^U_{it} + (1 - \tau_t - \tau^{\text{war}}_t)\Pi^F_{it}, \tag{28}$$

with control b'_{it} and $k'_{it} = k_{it}$. Constraints: $b'_{it} \geq \underline{B}$ and $k_{it} \geq 0$.

Bellman system.

$$V^a_t(b, k, h, e) = \max_{b', k'} \Big\{ u(\cdot) + \beta\, \mathbb{E}_t W_{t+1}(b', k', h', e') \Big\}, \tag{29}$$

$$V^n_t(b, k, h, e) = \max_{b'} \Big\{ u(\cdot) + \beta\, \mathbb{E}_t W_{t+1}(b', k, h', e') \Big\}, \tag{30}$$

$$W_{t+1}(b, k, h, e) = \lambda V^a_{t+1}(b, k, h, e) + (1 - \lambda) V^n_{t+1}(b, k, h, e).$$

Distribution dynamics. If $s = (b, k, h, e)$ and $s' = (b', k', h', e')$ and the adjustment indicator $J_{it} \sim \text{Bernoulli}(\lambda)$,

$$\mu_{t+1}(s') = \int \Big[\lambda\, \mathbf{1}_{\{b' = b^a(s),\, k' = k^a(s)\}} + (1 - \lambda) \mathbf{1}_{\{b' = b^n(s),\, k' = k\}} \Big] f_H(h'|h) f_E(e'|e)\, \mu_t(ds), \tag{31}$$

with f_H from (23) and f_E from (21)–(22).

E.2 Firms

Wage-setting unions. Objective:

$$\max_{W_{jt}} \mathbb{E}_t \sum_{s=0}^{\infty} (\beta \lambda_w)^s \frac{W^F_{t+s}}{P_{t+s}} N_{t+s} \Big[\Big(\frac{W_{jt} \bar{\pi}^s_W}{W^F_{t+s}} - \frac{W_{t+s}}{W^F_{t+s}} \Big) \Big(\frac{W_{jt} \bar{\pi}^s_W}{W^F_{t+s}} \Big)^{-\zeta} \Big]. \tag{32}$$

Wage Phillips curve:

$$\log \frac{\pi^W_t}{\bar{\pi}_W} = \beta\, \mathbb{E}_t \left[\log \frac{\pi^W_{t+1}}{\bar{\pi}_W} \frac{w^F_{t+1} N_{t+1}}{w^F_t N_t} \right] + \kappa_w (mc^W_t - \mu^{W,-1}_t). \tag{33}$$

Price-setting intermediates. Objective:

$$\max_{p_{jt}} \mathbb{E}_t \sum_{s=0}^{\infty} (\beta\theta)^s Y_{t+s} \Big[\Big(\frac{p_{jt} \bar{\pi}^s}{P_{t+s}} - MC_{t+s} \Big) \Big(\frac{p_{jt} \bar{\pi}^s}{P_{t+s}} \Big)^{-\eta} \Big]. \tag{34}$$

Price Phillips curve:

$$\log \frac{\pi_t}{\bar{\pi}} = \beta \, \mathbb{E}_t \left[\log \frac{\pi_{t+1}}{\bar{\pi}} \frac{Y_{t+1}}{Y_t} \right] + \kappa_Y (mc_t - \mu_t^{-1}). \tag{35}$$

Production and factor prices. Define effective capital as $K_t^{serv} = u_t K_t$ and the effective depreciation rate as

$$d_t^K = \mathcal{D}_t \delta_0 + \delta_1 (u_t - 1) + \frac{\delta_2}{2} (u_t - 1)^2.$$

$$Y_t = Z_t (K_t^{serv})^{\alpha} N_t^{1-\alpha}, \tag{36}$$

$$w_t^F = (1-\alpha) mc_t Z_t \left(\frac{K_t^{serv}}{N_t} \right)^{\alpha}, \tag{37}$$

$$MPK_t = \alpha mc_t Z_t \left(\frac{K_t^{serv}}{N_t} \right)^{\alpha - 1}, \tag{38}$$

$$r_t = 1 + u_t MPK_t - q_t d_t^K, \tag{39}$$

$$MPK_t = q_t \left[\delta_1 + \delta_2 (u_t - 1) \right]. \tag{40}$$

Capital-goods producers. Let $g_t^I = I_t / I_{t-1}$. With investment-specific productivity fixed at its baseline value, optimal investment and capital accumulation satisfy

$$1 = q_t \left[1 - \frac{\phi}{2} (g_t^I - 1)^2 - \phi (g_t^I - 1) g_t^I \right] + \beta \mathbb{E}_t \left[q_{t+1} \phi (g_{t+1}^I - 1) (g_{t+1}^I)^2 \right], \tag{41}$$

$$K_{t+1} = (1 - d_t^K) K_t + \left[1 - \frac{\phi}{2} (g_t^I - 1)^2 \right] I_t. \tag{42}$$

Profits distributed to households.

$$\Pi_t^U = (w_t^F - w_t) N_t, \qquad \Pi_t^F = (1 - mc_t) Y_t. \tag{43}$$

E.3 Policy Rules

Monetary policy.

$$\log \frac{R_{t+1}^b}{\bar{R}^b} = \rho_R \log \frac{R_t^b}{\bar{R}^b} + (1 - \rho_R) \left[\log \frac{\bar{\pi}_t}{\bar{\pi}} + \theta_\pi \log \frac{\pi_t}{\bar{\pi}_t} + \theta_Y \log \frac{Y_t}{\bar{Y}} \right]. \tag{44}$$

Inflation-target dynamics.

$$\log \frac{\bar{\pi}_t}{\bar{\pi}} = \rho_{\bar{\pi}} \log \frac{\bar{\pi}_{t-1}}{\bar{\pi}} + \varepsilon_t^{\pi}, \quad \varepsilon_t^{\pi} \sim \mathcal{N}(0, \sigma_{\pi}^2). \tag{45}$$

Government purchases.

$$\log \frac{G_t}{\bar{G}} = \rho_G \log \frac{G_{t-1}}{\bar{G}} + (1-\rho_G)\gamma_Y^G \log \frac{Y_t}{\bar{Y}} - (1-\rho_G)\gamma_B^G \log \frac{B_t}{\bar{B}}. \tag{46}$$

Payroll tax rule.

$$\log \frac{\tau_t}{\bar{\tau}} = \rho_\tau \log \frac{\tau_{t-1}}{\bar{\tau}} - (1-\rho_\tau)\gamma_Y^\tau \log \frac{Y_t}{\bar{Y}} - (1-\rho_\tau)\gamma_B^\tau \log \frac{B_t}{B_{t-1}}. \tag{47}$$

War-surcharge shock.

$$\log \frac{\tau_t^{\text{war}}}{\bar{\tau}^{\text{war}}} = \rho_{\tau^{\text{war}},1} \log \frac{\tau_{t-1}^{\text{war}}}{\bar{\tau}^{\text{war}}} + \rho_{\tau^{\text{war}},2} \log \frac{\tau_{t-2}^{\text{war}}}{\bar{\tau}^{\text{war}}} + \varepsilon_t^\tau, \quad \varepsilon_t^\tau \sim \mathcal{N}(0, \sigma_\tau^2). \tag{48}$$

E.4 Market Clearing and Government Budget

$$B_{t+1} = \mathbb{E}_t[\lambda b_t^a + (1-\lambda) b_t^n], \tag{49}$$

$$K_{t+1} = \mathbb{E}_t[\lambda k_t^a + (1-\lambda) k_t^n], \tag{50}$$

$$Y_t = C_t + I_t + G_t, \tag{51}$$

$$B_{t+1} = \frac{R_t^b}{\pi_t} B_t + G_t - T_t. \tag{52}$$

E.4.1 Recursive Competitive Equilibrium

A **recursive competitive equilibrium** is a set of

1. Household policy functions b^a, k^a, b^n, c, n and value functions V_t^a, V_t^n solving (29);
2. Firm policies and prices satisfying (32)–(43);
3. Policy instruments $\{R_t^b, G_t, \tau_t, \tau_t^{\text{war}}, \bar{\pi}_t\}$ obeying (44)–(48);
4. A distribution $\mu_t(b, k, h, e)$ evolving via (31);
5. Aggregate allocations and prices such that the market-clearing conditions (49)–(51) and the government budget (52) hold for every t.

E.5 Estimation Details and Convergence

We first locate the posterior mode and use the local curvature around it to initialize the Differential-Independence Mixture Ensemble (DIME) sampler of Boehl (2022). DIME updates an ensemble of chains using differential-evolution proposals, supplemented by occasional independent proposals. We run 16 chains for 6,000 iterations each, giving 96,000 pooled draws. Burn-in is removed separately from every chain: we discard the first 3,000 iterations of each chain and

retain 48,000 draws for posterior summaries. The posterior means and quantiles in Table 4 use this full retained sample. Point estimates in the figures are evaluated at the posterior mean. The blue 90 percent bands in the model-fit figures are based on 10,000 distinct draws sampled from the retained posterior.
We assess convergence using the parameter traces, the log-posterior trace, acceptance rates, and comparisons across the retained sample. After burn-in, the traces fluctuate around stable levels and the log posterior shows no persistent drift. The overall acceptance rate is 21.4 percent, close to the sampler's 25 percent target. These diagnostics indicate that the retained chains have converged.

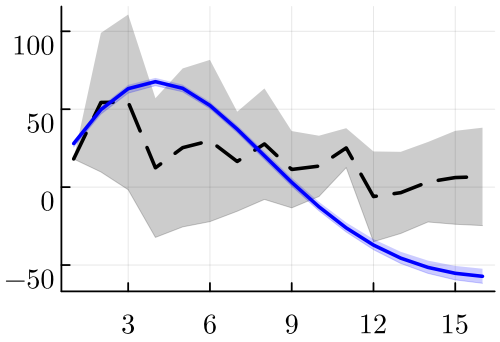
E.6 Additional Model Results

Additional fitted observables. Figure E.17 compares the model and empirical responses of government spending, tax revenues, and output. These lower-weight outcomes provide additional information on fiscal and aggregate adjustment. They complement the paper's main evidence on inequality and the principal war channels.

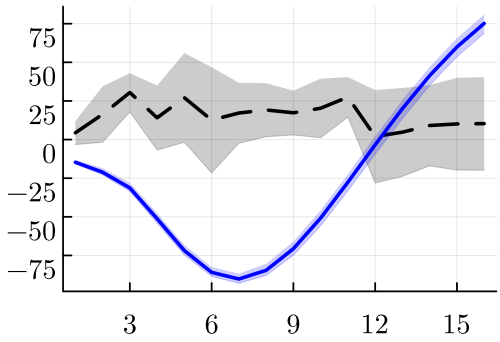
Aggregate transmission by shock. Figure E.18 reports the responses of output, consumption, investment, and inflation when the destruction, taxation, and inflation-target shocks are applied separately. This complements the main-text decomposition of top shares by showing the aggregate transmission generated by each component of the composite war shock.

Further distributional responses. Figure E.19 compares the top-1% pre-tax and post-tax income-share responses and reports wealth-share responses for the top 1%, bottom 90%, and bottom 50%. It extends the paper's focus on pre-tax top shares by showing a larger post-tax decline and corresponding gains in wealth shares lower in the distribution.

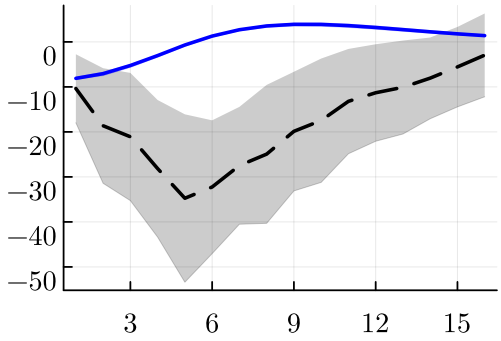
Figure E.17: Model Fit for Additional Observables



(a) Government Spending



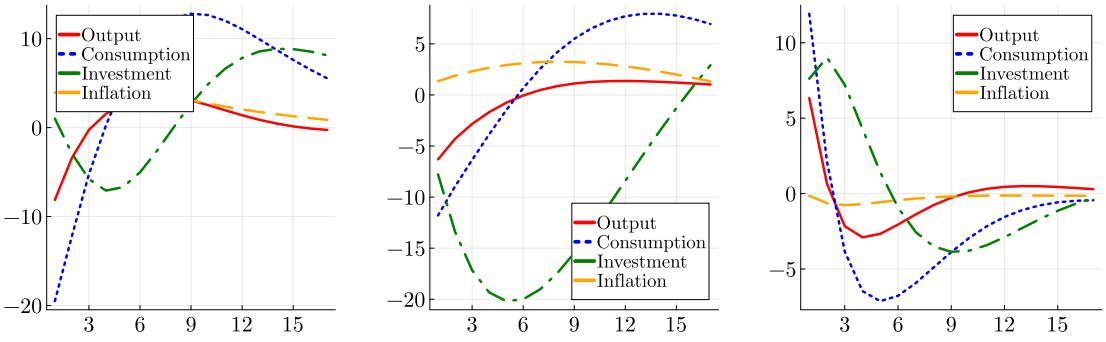
(b) Tax Revenues



(c) Output

Notes: These variables receive lower weight in the estimation than top-1% income and wealth, prices, capital, and tax progressivity. Blue solid line: baseline model estimated by IRF matching. Black dashed line: local-projection estimate. Gray area: 90 percent confidence band based on Newey and West (1987) standard errors. Blue area: 90 percent band based on 300 posterior replications. Y-axis: percent deviation from steady state. X-axis: years.

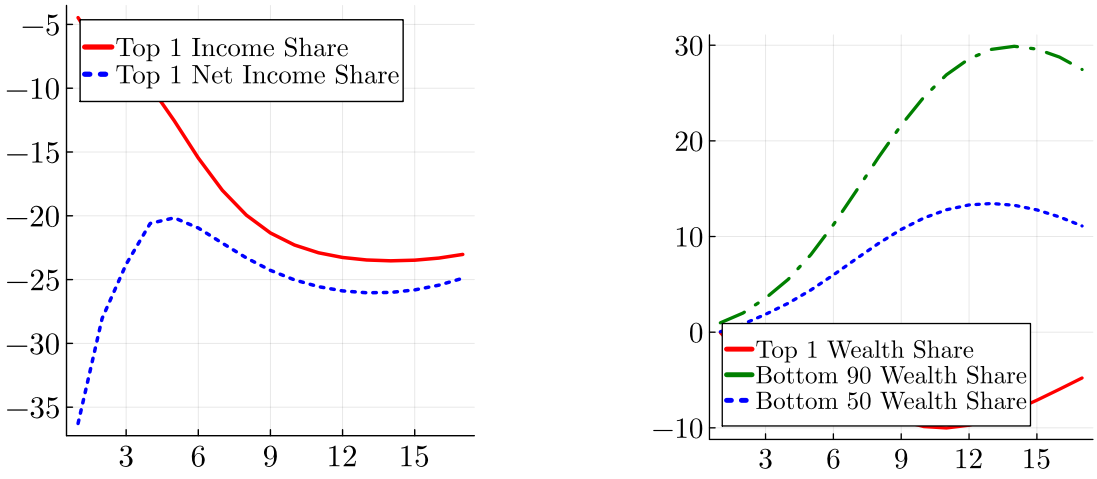
Figure E.18: Shock-Specific Impulse Responses



(a) Destruction shock (b) Taxation shock (c) Inflation-target shock

Notes: The panels show the responses of output, consumption, investment, and inflation to each estimated shock applied separately. Y-axis: percent log deviation from steady state; inflation is measured in percentage points. X-axis: years.

Figure E.19: Total Inequality Responses to the War Shock

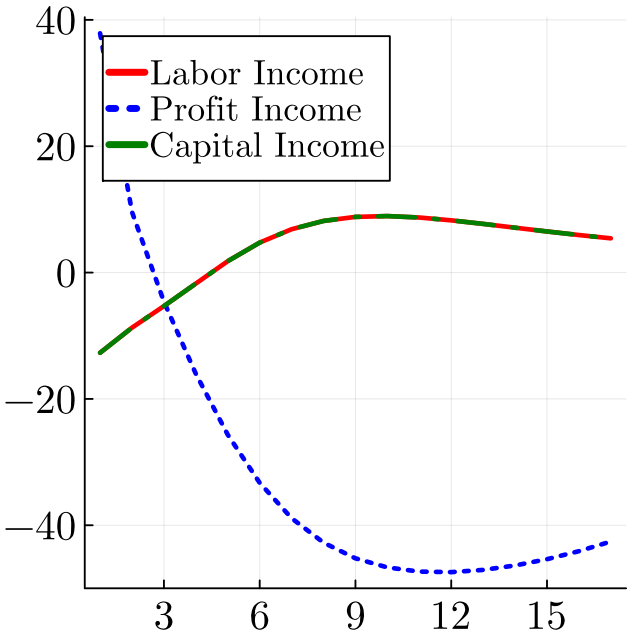


(a) Income shares (b) Wealth shares

Notes: Panel (a) shows the responses of the top-1% pre-tax income share in red and the top-1% post-tax income share in blue. Panel (b) shows the top-1% wealth-share response in red, the bottom-90% response in green, and the bottom-50% response in blue. Y-axis: percent deviation from steady state. X-axis: years.

Income-source mechanism. Figure E.20 shows the responses of aggregate labor, capital, and profit income to the combined war shock. Labor and capital income move moderately, whereas profit income falls sharply and persistently. Because profits are concentrated among entrepreneur households, the figure supports the paper's central mechanism for the decline in the top-1% income share.

Figure E.20: Income Sources after the War Shock



Notes: The figure shows the response of aggregate labor income, capital income, and profit income to the combined war shock. Y-axis: percent deviation from steady state. X-axis: years.

Table E.10: Production-Side Decomposition of Real Marginal Cost

Year	Real marginal cost	Firm wage	Capital-labor term	TFP term	Profits
0	-4.56	-1.11	-3.44	0.00	37.83
3	3.06	-4.83	7.89	0.00	-29.54
6	4.00	-6.46	10.46	0.00	-36.68
12	2.62	-3.84	6.46	0.00	-24.99
16	1.80	-1.45	3.25	0.00	-17.93

Notes: The table reports the response to the destruction shock alone, evaluated at the posterior mean. All entries are percent log deviations from steady state. The decomposition uses $\widehat{mcmc}_t = w\widehat{w}_t^F - z\widehat{z}_t - \alpha(\widehat{kk}_t^{serv} - n\widehat{n}_t)$. The firm-wage, capital-labor, and TFP columns are the three additive terms on the right-hand side. The final column reports distributed firm profits, $\Pi_t^F = Y_t(1 - mc_t)$.

Computation of the refined HANK accounting. Figure 9 compares the full HANK response of top shares to the simple Meade benchmark and two HANK

accounting decompositions. Let $Z \in \{I, W\}$ denote income or wealth, and let $\mathcal{S}^Z$ denote the corresponding set of sources. For income, $\mathcal{S}^I = \{L, A, \Pi\}$. The labor source L includes the wage income received by workers and the labor-union rents distributed back to them, so in the aggregate $S^I_{L,t} = mcw_t w_t N_t + \Pi^U_t = w_t N_t$, with $\Pi^U_t = (1 - mcw_t) w_t N_t$. The asset-income source A includes rental income from illiquid capital and the net payoff on liquid bond positions. The profit source Π is firm profit income, $S^I_{\Pi,t} = \Pi^F_t$, which is paid to entrepreneur households. Thus neither labor-union income nor bond income is left outside the accounting; they are included in L and A, respectively. For wealth, $\mathcal{S}^W = \{M, K\}$, with liquid and illiquid wealth components computed from the model portfolio positions and prices. For each source s, define

$$sh^Z_{p,s,t} = \frac{\sum_i \omega_{i,t} \mathbf{1}\{i \in \mathcal{T}^Z_{p,t}\} z^Z_{i,s,t}}{\sum_i \omega_{i,t} z^Z_{i,s,t}}, \qquad S^Z_{s,t} = \sum_i \omega_{i,t} z^Z_{i,s,t},$$

where $\omega_{i,t}$ are distribution weights, $z^Z_{i,s,t}$ is household i's source-s income or wealth component, and $\mathcal{T}^Z_{p,t}$ is the top group after sorting households by total Z. The full HANK line in Figure 9 is the model-implied response

$$100 \log \left(\frac{sh^{Z,\text{HANK}}_{p,t}}{sh^{Z,\text{SS}}_{p}} \right).$$

The Meade benchmark is the two-source formula from Section 3.3,

$$sh^{I,M}_p(\chi_t) = \frac{sh^L_{p,\text{SS}} + sh^A_{p,\text{SS}} \chi_t}{1 + \chi_t}, \qquad \chi_t = \frac{\text{capital income}_t}{\text{labor income}_t}.$$

Here $sh^L_{p,\text{SS}}$ is the HANK steady-state share of labor income received by the top group, and $sh^A_{p,\text{SS}}$ is the HANK steady-state share of non-profit asset income received by the top group. Firm profits are deliberately excluded from this top capital share. In Section 3.3, evaluating the analogous empirical formula at the empirical 10-year decline in the capital-labor ratio implies

$$100 \log \left(\frac{sh^I_p(\chi^{\text{data}}_{10})}{sh^I_p(\chi_{\text{data}})} \right) \simeq -8.$$

In Figure 9, we instead use the full HANK capital-labor path. The model's estimated `captolab` object, which is the model counterpart of the empirical capital-to-labor income series used in the estimation, is

$$\chi^{\text{HANK}}_t = \frac{r^K_t u_t K_t + \Pi^F_t}{w^F_t N_t} = \frac{\alpha mc_t Y_t + (1 - mc_t) Y_t}{(1 - \alpha) mc_t Y_t} = \frac{\alpha + (\mu_t - 1)}{1 - \alpha},$$

where r^K_t is the rental rate per unit of capital services and $mc_t = 1/\mu_t$ is real marginal cost. Gross labor income in the denominator is also the amount

received by households: worker earnings, $mcw_t w_t^F N_t$, plus labor-union rents, $(1 - mcw_t)w_t^F N_t$, sum to $w_t^F N_t$. The plotted Meade income line is therefore

$$100 \log \left(\frac{sh_p^{I,M}(\chi_t^{\text{HANK}})}{sh_p^{I,M}(\chi_{\text{SS}}^{\text{HANK}})} \right).$$

This means that firm profits are included in the aggregate HANK capital-labor path, but not in the fixed top capital share used by the Meade benchmark. For wealth, the Meade benchmark is zero because proportional destruction of wealth leaves the wealth share unchanged. The HANK fixed-share decomposition instead evaluates

$$\widehat{shsh}_{p,t}^{Z,\text{SS}} = \frac{\sum_{s \in \mathcal{S}^Z} sh_{p,s,\text{SS}}^Z S_{s,t}^Z}{\sum_{s \in \mathcal{S}^Z} S_{s,t}^Z},$$

so the aggregate HANK source totals move while the top source shares remain fixed at their steady-state values. The HANK moving-share decomposition also lets the source shares move,

$$\widehat{shsh}_{p,t}^{Z,t} = \frac{\sum_{s \in \mathcal{S}^Z} sh_{p,s,t}^Z S_{s,t}^Z}{\sum_{s \in \mathcal{S}^Z} S_{s,t}^Z}.$$

Numerically, these two accounting decompositions are implemented as local linear approximations around the steady state. For each horizon t, the combined war-shock path is scaled by $\varepsilon = 0.01$. We compute

$$\dot{S}_{s,t}^Z = \frac{S_s^Z(\varepsilon X_t) - S_{s,\text{SS}}^Z}{\varepsilon}, \qquad \dot{sh}_{p,s,t}^Z = \frac{sh_{p,s}^Z(\varepsilon X_t) - sh_{p,s,\text{SS}}^Z}{\varepsilon},$$

where X_t is the full model state implied by the combined destruction, taxation, and inflation-target shocks. The plotted fixed-share series is therefore

$$100 \log \left(\frac{\sum_s sh_{p,s,\text{SS}}^Z \left(S_{s,\text{SS}}^Z + \dot{S}_{s,t}^Z \right)}{sh_p^{Z,\text{SS}} \sum_s \left(S_{s,\text{SS}}^Z + \dot{S}_{s,t}^Z \right)} \right),$$

and the plotted moving-share series is

$$100 \log \left(\frac{\sum_s \left[S_{p,s,\text{SS}}^Z + sh_{p,s,\text{SS}}^Z \dot{S}_{s,t}^Z + S_{s,\text{SS}}^Z \dot{sh}_{p,s,t}^Z \right]}{sh_p^{Z,\text{SS}} \sum_s \left(S_{s,\text{SS}}^Z + \dot{S}_{s,t}^Z \right)} \right),$$

where $S_{p,s,\text{SS}}^Z = sh_{p,s,\text{SS}}^Z S_{s,\text{SS}}^Z$. Thus the fixed-share line isolates movements in aggregate source totals, while the moving-share line adds the first-order effect of portfolio and rank movements within the HANK distribution. If the moving-source-share formula were evaluated exactly on the same nonlinear distribution

objects as the full model share, it would be an accounting identity. The small remaining difference in Figure 9 is therefore the residual from using this local-linear accounting reconstruction and comparing it to the direct HANK top-share IRF, rather than a separate omitted income source.

References for Appendix

Aaberge, Rolf and Anthony B Atkinson (2010). "Top incomes in Norway". In: *Top incomes: A global perspective* 2, pp. 448–480.

Alvaredo, Facundo, Yonatan Berman, and Salvatore Morelli (2025). "Evidence from the dead: new estimates of wealth inequality based on the distribution of estates". In.

Atkinson, Anthony B. (2007). "The Distribution of Top Incomes in the United Kingdom 1908-2000". In: *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*. Ed. by A. B. Atkinson and T. Piketty. Oxford University Press. Chap. 4.

Banken, Ralf (2018). *Hitlers Steuerstaat: Die Steuerpolitik im Dritten Reich*. Walter de Gruyter GmbH & Co KG.

Banque Nationale de Belgique (1929–1960). *Statistiques économiques belges, 1919–1960*. Bulletin d'information et de documentation, numéros spéciaux. Volumes consulted: 1919–1928; 1929–1940; 1941–1950, tomes I–II; 1950–1960, tomes I–II. Bruxelles.

Barkai, Simcha (2020). "Declining labor and capital shares". In: *The Journal of Finance* 75.5, pp. 2421–2463.

Blanchet, Thomas, Juliette Fournier, and Thomas Piketty (2022). "Generalized Pareto curves: theory and applications". In: *Review of Income and Wealth* 68.1, pp. 263–288.

Bochove, Cornelis A. van and Theo A. Huitker (1987). *Main National Accounting Series, 1900–1986*. Tech. rep. NA-017. The Netherlands: Central Bureau of Statistics, National Accounts Research Division.

Bolt, Jutta, Robert Inklaar, Herman De Jong, and Jan Luiten Van Zanden (2018). "Rebasing 'Maddison': new income comparisons and the shape of long-run economic development". In: *GGDC Research Memorandum* 174, pp. 1–67.

Driscoll, John C and Aart C Kraay (1998). "Consistent covariance matrix estimation with spatially dependent panel data". In: *Review of Economics and Statistics* 80.4, pp. 549–560.

Geloso, Vincent and Phillip Magness (2023). "A Methodologically Consistent Measure of Income Inequality in the United States, 1917 to 2020". In: *Available at SSRN 4532761*.

Groote, Peter, Ronald Albers, and Herman De Jong (1996). "A standardised time series of the stock of fixed capital in the Netherlands, 1900-1995". In.

Grytten, Ola H (2004). "The gross domestic product for Norway, 1830'2003". In: *Norges Bank: Occasional Papers* 1, p. 241.

Gutierrez, German (2017). "Investigating global labor and profit shares". In: *Unpublished Working Paper, SSRN*.

Harrison, Mark (2000). *The economics of World War II: six great powers in international comparison*. Cambridge University Press.

Hjerppe, Riitta et al. (1989). *The Finnish economy 1860-1985: Growth and structural change*.

Hoffmann, Walther G (2013). *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts*. Springer-Verlag.

Jordà, Òscar, Katharina Knoll, Dmitry Kuvshinov, Moritz Schularick, and Alan M Taylor (2019). "The Rate Of Return On Everything, 1870–2015". In: *The Quarterly Journal of Economics* 134.3, pp. 1225–1298.

Klemann, Hein AM (2002). *Nederland 1938-1948: economie en samenleving in jaren van oorlog en bezetting*. Boom Koninklijke Uitgevers.

Kuvshinov, Dmitry and Kaspar Zimmermann (2022). "The big bang: Stock market capitalization in the long run". In: *Journal of Financial Economics* 145.2, Part B, pp. 527–552.

Mitchell, Brian R (1988). *British Historical Statistics*. Cambridge University Press.

Montiel Olea, José Luis and Mikkel Plagborg-Møller (2021). "Local projection inference is simpler and more robust than you think". In: *Econometrica* 89.4, pp. 1789–1823.

Nummela, Ilkka (1993). *Inter arma silent revisores rationum: toisen maailmansodan aiheuttama taloudellinen rasitus Suomessa vuosina 1939-1952*. 46. Jyväskylän yliopisto.

Ohkawa, K., M. Shinohara, and M. Umemura, eds. (1965–88). *Chōki Keizai Tōkei (Estimates of Long-Term Economic Statistics of Japan)*. Tokyo: Tōyō Keizai Shimpōsha.

Piketty, Thomas (2011). "On the long-run evolution of inheritance: France 1820–2050". In: *The quarterly journal of economics* 126.3, pp. 1071–1131.

Piketty, Thomas and Emmanuel Saez (2003). "Income inequality in the United States, 1913–1998". In: *The Quarterly journal of economics* 118.1, pp. 1–41.

Piketty, Thomas and Gabriel Zucman (2014). "Capital is back: Wealth-income ratios in rich countries 1700–2010". In: *The Quarterly journal of economics* 129.3, pp. 1255–1310.

Ramey, Valerie and Sarah Zubairy (2018). "Government spending multipliers in good times and in bad: evidence from US historical data". In: *Journal of political economy* 126.2, pp. 850–901.

Ryland, Thomas and Nicholas Dimsdale (2017). *A millennium of macroeconomic data. Bank of England research dataset*.

Salverda, Wiemer (2019). "Top Incomes, Income and Wealth Inequality in the Netherlands: The first 100 Years 1914-2014-what's next?" In.

Salverda, Wiemer and Anthony B. Atkinson (2007). "Top Incomes in the Netherlands over the Twentieth Century". In: *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*. Ed. by A. B. Atkinson and T. Piketty. Oxford University Press. Chap. 10.

Sentralbyrå, Statistisk (1949). *Statistiske oversikter 1948: Statistical Survey 1948*. Oslo: Statistics Norway.

Statistics Finland (1900 –). *Statistical Yearbook of Finland*. Statistics Finland.

Statistisches Bundesamt (1949-55). *Die Abschlüsse der Aktiengesellschaften*. Stuttgart: Kohlhammer.

Statistisches Reichsamt, ed. (1929–1958). *Statistisches Jahrbuch Deutscher Gemeinden*. Annual publication. Cited volumes span the years 1929 to 1958. Berlin: Verlag für Sozialpolitik, Wirtschaft und Statistik.

Survey, United States Strategic Bombing (1945). *The United States Strategic Bombing Survey: Summary Report (European War) September 30, 1945*. Vol. 1. US Government Printing Office.

Villa, Pierre (1994). *Un siècle de données macroéconomiques*. Vol. 303-304. Insee Résultats. Insee, p. 266.
Wolff, Edward N (1991). "Capital formation and productivity convergence over the long term". In: *The American Economic Review*, pp. 565–579.