THE EFFECT OF LABOUR'S BARGAINING POWER ON WEALTH INEQUALITY IN THE UK, USA, AND FRANCE

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This paper analyses the determinants of wealth inequality, measured as the share of wealth owned by the top 1% wealthiest individuals. We find that labour's bargaining power is a significant and important determinant of top wealth shares. Using a semi-structural vector autoregression (SVAR) model for the period 1970-2019, we estimate that shocks to labour's bargaining power explain 32%, 8% and 32% of the variation around the long-term trend in wealth inequality in the UK, USA and France, respectively.

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1. INTRODUCTION

This paper analyses the determinants of wealth inequality, measured as the share of the top 1% wealthiest individuals in total wealth, with a particular focus on the causal role played by labour's bargaining power. In the UK, the USA and France, changes in the top 1% share of wealth have followed a similar trajectory, albeit at different rates. As can be seen in Figure 1, wealth became more equally distributed throughout the 1970s. However, since the 1980s inequality has been rising, with the USA seeing the sharpest uptick.

<Figure 1>

In parallel to these trends, there have been significant institutional and structural changes impacting the bargaining power of labour. Figure 2 and 3 presents the union density rate and collective bargaining coverage rate for the three countries respectively. Union density increased or remained stable throughout the 1970s, with the UK having a higher rate. In all countries, however, unionisation has decreased substantially starting from the 1980s. Collective bargaining coverage similarly dropped in the UK and US since the 1980s, although not in France, where increasingly more workers have been covered by agreements.

<Figure 2>

<Figure 3>

The idea that inequality is caused by changes in bargaining power, and not just by technological change or globalisation, is familiar to economics. There is a substantial literature analysing how labour's bargaining power determines personal income inequality via its impact

on both wage inequality and the labour share of income (Ahlquist, 2017; Bengtsson, 2014; Bivens and Mishel, 2013; Fichtenbaum, 2009; Freeman and Medoff, 1985; Guschanski and Onaran, 2021; Hancké, 2013; Kristal, 2013, 2010; Levy and Temin, 2007; Rosenfeld, 2014; Stockhammer, 2017; Stockhammer et al., 2009). When it comes to the determinants of wealth inequality, however, there are two gaps in the literature that we aim to address in this paper.

Firstly, the econometric literature analysing the determinants of wealth inequality is underdeveloped. Rather than analysing the deep determinants of wealth inequality, the existing literature has tended to focus on understanding the composition of wealth inequality, that is the accounting factors that make up wealth shares (Blanchet and Martinez-Toledano, 2022). These components include differential capital gains (Kuhn et al., 2020), top 1% income shares, differential saving rates (Lieberknecht and Vermeulen, 2018; Saez and Zucman, 2016) and inheritance flows (Boserup et al., 2016; De Nardi and Yang, 2016). The determinants of these components, however, are often left out of the analysis. One exception is Piketty (2014) who discusses why wealth inequality changes over time, although largely based on descriptive rather than econometric methods. Furthermore, while a related literature introduces wealth inequality into a general equilibrium framework, such models tend to be static and focus on reproducing the top 1% wealth share for a given year in the USA (see De Nardi and Fella (2017) for review). The need for econometric analysis on the determinants of wealth inequality is particularly apparent when compared to the well-developed econometric research on the determinants of income inequality, which has highlighted the role of several causal factors including technological change (Autor, 2015; Bassanini and Manfredi, 2014; Goos et al., 2014), globalisation (Heimberger, 2020; Jaumotte et al., 2013), taxation (Piketty et al., 2014) and labour's bargaining power (as mentioned above).

Secondly, the specific link between labour's bargaining and wealth inequality has not been properly explored. While some papers have analysed the link between labour's bargaining power and aggregate wealth as a ratio to income (Naidu, 2018), or included wealth distribution in macroeconomic models (Ederer and Rehm, 2020; Onaran et al., 2019; Palley, 2012; Taylor et al., 2015), a detailed theoretical and econometric analysis of how labour's bargaining power impacts wealth inequality is absent. Incorporating the effects of bargaining power into the analysis to wealth inequality is non-trivial, as labour's bargaining may impact the components of wealth inequality, i.e. differential capital gains and savings rates, in different ways - amplifying or diminishing the effect on income inequality.

This paper aims to address both these gaps. We first present a theoretical analysis of the channels through which labour's bargaining power is likely to impact wealth inequality via its effects on the components of wealth inequality. We then empirically estimate these channels using a semi-structural vector autoregression analysis using data from the UK, the USA and France for the period of 1970-2019.[1] To the best of our knowledge this is the first paper to empirically estimate the effects of shocks to labour's bargaining on the top 1% share of wealth across the three countries.

We estimate the model using a semi-structural VAR, as we are primarily concerned with analysing a particular shock to bargaining power. To identify this shock, we use short run restrictions and assume that the indicators capturing bargaining power[2] are contemporaneously

[1] The sample period is determined by data availability. Our baseline estimation is estimated on data from 1970-2015, although we estimate robustness tests for the period 1970-2019.

[2] Labour's bargaining power is captured using trade union density in the UK and USA and collective bargaining coverage in France due to the different bargaining regimes in each country, which we discuss in more detail in section three.

exogenous to wealth inequality. This assumption is justified by the fact that the top 1% is likely to only impact these labour institutions via a political channel that takes time to materialise. For example, if the top 1% aims to politically leverage its wealth to influence trade union legislation, such lobbying will take time to come into effect and this reverse causality will only occur with a lag.

Our estimations indicate that a positive shock to the bargaining power of labour significantly reduces top 1% wealth shares across all three countries. Quantitatively, shocks to labour's bargaining power explain 32%, 8% and 32% of the variation in top wealth shares in the UK, the USA and France, respectively. We show that these results are robust to alternative specifications and control variables. The reason why bargaining explains a significantly smaller proportion of the variation in top wealth shares in the USA compared to the UK and France is not because bargaining shocks have a smaller impact in the USA. Using impulse response functions, we demonstrate that a 1%-point positive shock to labour's bargaining power reduces top 1% wealth shares by similar magnitudes across all three countries. We therefore interpret these two findings - that bargaining explains a smaller proportion of top 1% share variation but has a comparable absolute effect size in the USA - as the result of higher volatility of wealth inequality (a stronger decline in top wealth shares since 1980) in the USA compared to the UK and France.

The rest of the paper is organised as follows: Section two provides a theoretical overview of the components of wealth inequality and how they are impacted by labour's bargaining power. Sections three and four present the data and estimation methodology. Section five discusses the estimation results and section six concludes.

2. THEORETICAL FRAMEWORK

2.1 The components of wealth inequality

We first derive the components of the top 1% wealth share from an accounting framework. We then outline how labour bargaining power impacts the top 1% share of wealth via these components. Building on the accounting framework used by several papers (Hubmer et al., 2020; Kuhn et al., 2020; Lieberknecht and Vermeulen, 2018; Mian et al., 2020; Saez and Zucman, 2016) wealth W_t^f of fractile f (e.g. the top 1% wealthiest households) in period t is given by

$$W_t^f = W_{t-1}^f(1 + q_t^f) + s_t^f Y_t^f + h_t^f \quad (1)$$

where q_t^f denotes the return on wealth due to capital gains, Y_t^f is pre-tax personal income (from both capital and labour but excluding capital gains), s_t^f is the saving rate and h_t^f is the net inheritances, gifts and inter vivos transfers from the rest of society to fractile f. These

refer to synthetic rather than actual values, as it does not account for the fact that over time the top 1% is made up of different individuals entering and leaving the group.[3]

The capital gains component (q_t^f) is a weighted change in the price of assets in a portfolio. Consider a portfolio of assets $\{A_{j,t}^f\}$, where asset j is held by fractile f in period t and liabilities are shown as negative values. For each fractile f we can measure the capital gain q_t^f as the change in the asset prices, weighted by the assets they hold as a fraction of their wealth:

$$q_t^f = \sum_{j=1}^{J} \left(\frac{P_{j,t} - P_{j,t-1}}{P_{j,t-1}}\right) \frac{A_{j,t-1}^f}{W_{t-1}^f} \tag{2}$$

Given that we do not have data on the composition of portfolios or asset price changes for all assets in the countries in our estimation, we simplify the analysis by making three assumptions. Firstly, we assume that there are only two assets in the economy - equities and housing – as these are the two assets for which we have long run data. Secondly, we assume that over time the composition of assets held by fractile f changes in line with the population as a whole.[4] Lastly, we assume that the top 1% capital gains can be approximated by the capital gains of stocks, while the aggregate capital gains can be approximated by the capital gains on housing. From these simplifying assumptions, it follows that

$$q_t^f \approx \left(\frac{P_{stocks,t} - P_{stocks,t-1}}{P_{stocks,t-1}}\right) \tag{3}$$

and the rate of return on wealth for the population on aggregate q_t is given by the following equation.

$$q_t \approx \left(\frac{P_{housing,t} - P_{housing,t-1}}{P_{housing,t-1}}\right) \tag{4}$$

Lastly, we integrate both inheritance and income taxes into the model. We first decompose the saving rate into the saving rate out of post-tax income $s_{post,t}^f$ and average income tax rate across all income sources T_y^f for fractile f.

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[3] The approach of Saez and Zucman (2016) is therefore to think of the saving and capital gains for fractile f as synthetic rates, which will approximate the actual average rates of the top 1% so long as the households entering and exiting are relatively similar to each other.

[4] In other words, $\frac{A_{j,t}^f}{W_t^f} - \frac{A_{j,t+i}^f}{W_{t+i}^f} = \frac{A_{j,t}}{W_t} - \frac{A_{j,t+i}}{W_{t+i}}$. Taking data from the UK, this assumption is relatively justified. Between 2015 and 1971, the aggregate share of housing assets as a percentage of total net personal wealth has gone up from 42% to 70%. For the wealthiest 1%, housing share has gone from making up 10% of wealth to 30% of wealth over the same period.

$$s_t^f = s_{post,t}^f - T_y^f \tag{5}$$

We then decompose net inheritance, gifts and inter vivos transfers into the post-tax net transfers ${h_{post}}_t^f$ and average inheritance tax rate across all transfers T_h^f for fractile f.

$$h_t^f = h_{post,t}^f\left(1 - T_h^f\right) \tag{6}$$

Rearranging, we can write the law of motion for top wealth shares i.e. the ratio of wealth held by the top 1% of the wealth distribution to the rest of the population as

$$\frac{W_t^f}{W_t} = \frac{\left(1 + q_t^f\right)\frac{W_{t-1}^f}{W_{t-1}} + s_t^f \frac{Y_t^f}{Y_t}\frac{Y_t}{W_{t-1}} + \frac{h_t^f}{W_{t-1}}}{1 + q_t + \frac{s_t Y_t}{W_{t-1}} + \frac{h_t}{W_{t-1}}} \tag{7}$$

Equation 7 shows that top wealth shares in period t is a positive function of q_t^f, $\frac{{Y_t}^f}{Y_t}$, s_t^f, $\frac{Y_t}{W_{t-1}}$, $\frac{h_t^f}{W_{t-1}}$, $\frac{W_{t-1}^f}{W_t - 1}$ and is a negative function of q_t, and s_t. We focus on the four main factors.

A positive shock to differential capital gains $(q_t^f - q_t)$, all else being equal, leads to an increase in top wealth shares. This means that an increase in the capital gains of stocks relative to housing will lead to an increase in top 1% wealth shares.

A positive shock to the share of personal income going to the top 1% $(\frac{Y_t^f}{Y_t})$ all else being equal, leads to an increase in top wealth shares as the wealthiest households earn more income which is saved over time into new wealth.

A positive shock to differential saving rates $(s_t^f - s_t)$, all else being equal, increases the top 1% share of wealth. As shown in equation 7, differential saving rates are a positive function of differential saving rates out of post-tax income and a negative function of progressive income taxes.[5]

Lastly, a positive shock to top 1% net inheritance, transfer and inter vivos flows as a ratio to aggregate wealth $(\frac{h_t^f}{W_{t-1}})$ leads to an increase in the top 1% wealth share. As shown in equation 6, net inheritance, transfer and inter vivos flows are a positive function of post-tax flows and a negative function of progressive inheritance taxes.

2.2 The theoretical impact of the bargaining power of labour on the components of wealth inequality

[5] From equation 7, $s_t^f - s_t = (s_{post,t}^f - s_{post,t}) - (T_y^f - T)$ where $T_y^f - T$ is the difference in average tax rate of fractile f and the average tax rate of the whole economy. The greater $(T_y^{1\%} - T)$ the more progressive the income tax system.

How does a positive shock to labour's bargaining power (e.g. an exogenous increase in union density or collective bargaining coverage) impact these components of wealth inequality? The consequent causal effects of changes in labour's bargaining power are summarised in Figure 4.

A positive labour bargaining shock impacts the top 1% share of income via two channels. The first channel works via wage inequality and top managerial pay.[6] Jensen and Murphy (1990) argue that labour bargaining shocks, in the form of higher trade union density, reduce top managerial pay, as unions set fairness concerns and threaten to take industrial action if executive compensation becomes excessive. DiNardo et al. (1997) find that a 10% increase in trade union density reduces the pay of CEOs by 2.5% or more using US firm level data. Gomez and Tzioumis (2006) find similar results, while Sjöberg (2009) in a 15 country panel regression between 1979-2000 find that union density significantly reduces top wage shares. These studies build on the wider literature establishing that top managerial pay is not set competitively and is subject to bargaining effects between managers, shareholders, and workers (Bebchuk and Fried, 2003; Kuhnen and Zwiebel, 2008).

The second channel works by decreasing the capital share of income. In an economy with imperfect competition, a positive bargaining shock pushes up wages and redistributes income from capital to labour. In such an imperfectly competitive framework, increasing wages does not simply lead to higher prices or increased unemployment (Bivens and Mishel, 2013; Blanchard and Katz, 1997; Furceri et al., 2018). As capital income is more concentrated than labour income, a decline in the capital income share decreases the top 1% share of income. Several empirical papers establish such a negative relationship between trade union density and the capital income share (Bivens and Mishel, 2013; Fichtenbaum, 2009; Guschanski and Onaran, 2021; Hancké, 2013; Kristal, 2013, 2010; Stockhammer, 2017; Stockhammer et al., 2009).

A positive labour bargaining shock impacts differential capital gains via three channels. The first is via a negative impact on stock prices. At the level of the firm, a significant number of US studies have documented the negative relationship between unionisation and stock prices (Abowd and Tracy, 1989; DiNardo and Lee, 2004; Lalonde et al., 1996; Ruback and Zimmerman, 1984). Lee and Mas (2012) estimate that a union election victory in a firm leads to a 10% decline in the market value of the company. In particular, trade unions that push for industrial action in the form of strikes are shown to significantly reduce stock prices (Davidson et al., 1988; Dinardo and Hallock, 2002; Kramer and Vasconcellos, 1996; Nelson et al., 1994; Ruback and Zimmerman, 1984). Becker and Olson (1986) estimate that a single strike reduces a firm's stock price by 4.1%. In addition to the extent that stock prices reflect the perceived future profitability of a company, stronger unions are likely to reduce a company's profitability in favour of higher wages and benefits for its employees and thus reduce stock prices.

Labour bargaining shocks could also increase house prices. Arundel and Doling (2017) argue that a positive labour bargaining shock could lead to higher homeownership and house price growth, as labour market insecurity, associated with a low bargaining power of labour, could impact homeownership (with a lag) by reducing the prevalence of secure, stable incomes needed for a mortgage.

[6] See Frydman and Jenter (2010) section four for a literature review and McCall and Percheski (2010) for a summary of the debate. There is also a large literature on how unions impact the dispersion of wages within the 99% which is less important for our analysis (Farber et al., 2021).

However, a positive bargaining shock may also reduce house prices. Stronger labour bargaining institutions tend to push for more redistributive policies and public spending in social housing rather than private homeownership, as shown by Camilli (2020) who finds that union density is negatively correlated with homeownership rates in a panel regression on 19 OECD countries from 1965-2014. As an outcome of these opposing effects on house prices, the overall effect of labour's bargaining power on differential capital gains is ambiguous.

The impact of a positive labour bargaining shock on differential saving rates is also ambiguous due to two opposing effects. An increase in labour's bargaining power increases differential saving rates via a change in the relative precautionary saving motives between the top 1% and the bottom 99%. As the motivation to save for precautionary reasons is driven by one's sense of security, a shift in power to the bottom 99% should in theory lead to a decrease in their saving rate relative to the top 1% (Fessler and Schürz, 2015). For example, if unions push for more public state pensions, workers will be less incentivised to save for a private pension. On the other hand, a positive labour bargaining shock could reduce differential saving rates due to the change in the distribution of income between the two groups. It is well established that saving rates increase the more income a household receives (Dynan et al., 2004). Therefore, a positive labour bargaining shock which redistributes income from the top 1% to the bottom 99%, should also reduce the differential saving rate of the top 1% relative to the rest.

Lastly, a positive labour bargaining shock should reduce inheritance flows to the top 1% via a political channel. Unions and collective bargaining agreements set fairness norms throughout not just in an industry but also the economy (Western and Rosenfeld, 2011). Often these fairness norms are directed towards the supposed unjust earnings of the wealthiest groups, including those with inherited wealth (Anderson, 1992). A positive bargaining shock may therefore push for more redistributive policies, such as changes to inheritance laws and taxation policies (Acemoglu et al., 2015; Ahlquist, 2017; Scruggs and Lange, 2002; Volscho and Kelly, 2012).

In addition to labour bargaining shocks, other factors are also significant in determining these components of wealth inequality. Firstly, technological change leads to an increase in top 1% income shares through either labour-saving automation which increases the capital share of income or skill biased automation which increases wage inequality (Acemoglu and Autor, 2011; Autor et al., 2008; Autor, 2015; Bassanini and Manfredi, 2014; Berman et al., 1994; Goldin and Katz, 2007; Goos et al., 2014). Financial and trade globalisation also push up income inequality through similar channels, with the additional effect of offshoring on labour's bargaining power. An increase in top marginal inheritance tax rates on the other hand reduces wealth inequality by decreasing the net inheritance and inter vivos transfers to the top 1% as a ratio of aggregate wealth.

<Figure 4 here>

3. DATA

Table A1 and Table A2 present the variable definitions, data sources and summary statistics for the components and determinants of wealth inequality respectively. Both the share of net personal wealth held by the top wealthiest 1% of individuals and the share of pre-tax national income of the top 1% of the income distribution are based on data provided by the

World Inequality Database (WID).[7] The top 1% income share includes both capital and labour income but does not include capital gains. The data on differential capital gains (the real rate of return for stocks minus that for housing) is based on the Macro History Database (Jordà et al., 2019). The capital gain for each asset is measured as the change in its nominal price, deflated by the consumer price index. We do not have data for differential saving rates or inheritance flows to the top 1% - these components are captured by the direct shocks to wealth inequality as discussed below.

Regarding the direct measures of labour's bargaining power, we use different variables for decentralised bargaining systems in the UK and USA versus the coordinated bargaining system in France based on the industrial relations literature (Jensen, 2006). In a decentralised system, wages are negotiated at the firm or company level. In a coordinated or centralised system, bargaining over wages is coordinated at the sectoral or national level (Ferreiro, 2004). In the UK and USA, the bargaining power of labour depends on the power they have at the firm or company level and is therefore directly tied to whether they are unionised at the firm level. In a coordinated or centralised system, the state takes a more active role in regulating labour market conditions and industrial relations and so collective bargaining coverage may be substantially higher than union density (Ebbinghaus and Visser, 2001:238). Therefore, the bargaining power of labour depends on the extent to which they are covered by the negotiations and regulations coordinated at the state level, for which collective bargaining coverage is a better measure. France, despite having one of the lowest union density rates in the OECD has a very high collective bargaining coverage and is widely considered to have more favourable industrial relations for labour. Therefore, union density in France does not capture the extent of labour's bargaining power (Guschanski and Onaran, 2021).

Regarding the other determinants of wealth inequality, technological change is measured as the aggregate real ICT capital stock as a ratio to real value added based on data provided by the EU KLEMS for the period of 1970-2015. This variable has been used to capture both labour saving and skills biased technological change in the literature on the determinants of capital income shares (Bassanini and Manfredi, 2014; Guschanski and Onaran, 2021; Stockhammer, 2017).

Globalisation is captured using both the KOF de jure measures of financial and trade globalisation (Gygli et al., 2019). We focus primarily on financial globalisation as this is expected to have a more direct impact on financial assets, returns and wealth than trade globalisation. This is a composite index incorporating laws on investment restrictions, capital account openness, international investment agreements and international voice traffic. We prefer de jure measures as these, being policy variables, tend to be the most exogenous. We test the robustness of our results using other KOF indices of globalization.

Progressive taxation is measured by both the top marginal inheritance tax rate and the top marginal income tax rate, both of which are provided by WID.

4. ESTIMATION METHODOLOGY

[7] This is the share of income going to the top 1% of the income distribution, rather than the top of the wealth distribution, as we do not have long run data on the latter variable. As Kuhn et al (2018:53) shows the two distributions follow the same trend over time for the USA; we therefore follow the literature (Saez and Zucman, 2016; Lieberknecht and Vermeulen, 2018) and use the top 1% share of the income distribution as a proxy.

Our empirical methodology estimates the impact of a labour bargaining shock on wealth inequality using a semi-structural or partially identified VAR model for each country. We use VARs for three reasons. Firstly, unlike autoregressive distributed lag models (ARDL), the SVAR approach models the feedback effects of wealth inequality on unionisation and collective bargaining. Secondly, we do not have enough countries to estimate a panel data model, as long-term time series data for wealth distribution exists only for the UK, the USA and France. Lastly, rather than finding average effects across the three countries in a panel SVAR, the country specific estimations make it possible to explicitly compare cross country differences in the estimated parameters.

In order to identify the labour bargaining shock, we impose short-run restrictions via a Cholesky Decomposition. We use a semi-structural model as we are primarily interested in identifying and analysing one structural shock – the bargaining power shock (Kilian and Lütkepohl, 2017:227). We can write the data generating process according to the following structural equation:

$$B_0 \boldsymbol{y_t} = B_1 + B_2 \boldsymbol{y_{t-1}} + B_3 \boldsymbol{y_{t-2}} + \boldsymbol{u_t} \tag{8}$$

where $\boldsymbol{y_t}$ is a K x 1 vector of a set of determinants; B_i are the model coefficients , $i = 0, \dots, p$ which are interpreted in the same way as any normal OLS regression coefficient;[8] and $\boldsymbol{u_t}$ is a K x 1 vector of structural shocks. Below we present $\boldsymbol{e_t} = B_0^{-1} \boldsymbol{u_t}$ for each model, where $\boldsymbol{e_t}$ are the reduced-form errors for the underlying VAR and B_0 denotes the contemporaneous relationships between the variables.

Theoretically, a Cholesky Decomposition imposes both a lower triangular matrix on B_0 and leaves the diagonal of C unrestricted in addition to restrict its off-diagonal elements to zero. Intuitively, this assumes that if a variable is ordered above another in the system, the variable above has a contemporaneous impact on all variables below without any contemporaneous feedback effects, i.e. the variables ordered above are contemporaneously exogenous to those below. The orderings of the variables for the baseline model are shown via the identification matrix in Figure 5.

<Figure 5 here>

As outlined by Kilian and Lütkepohl (2017:227), the benefit of the semi-structural approach is that by not identifying the remaining shocks, less identification restrictions are needed. In other words, we do not analyse the impact of globalisation, technological change, or any other variable in our analysis on wealth inequality. As such we do not attempt to construct a structural aggregate model as there is only one identified shock, compared to the seven variables in our system derived from the theoretical framework (Forni et al., 2018; Forni and Lippi, 1997).

To identify the labour bargaining shock, we assume that trade union density and collective bargaining coverage are contemporaneously exogenous to wealth inequality and its components.[9] While wealth inequality may impact labour market institutions, this reverse

[8] B_2 gives the partial effect of a one-unit shock of a lagged variable in vector y_{t-1} on a dependent variable in vector y_t.

[9] Hence, trade union density or collective bargaining coverage are ordered above wealth inequality and its components.

causality will likely occur only with lag. An increase in wealth inequality, or its components, may lead to changes to trade union legislation, union density or collective bargaining coverage, if the newly acquired wealth at the top is used to make legislative or institutional changes. Such political capture and the role of monied interests in legislative and political institutional change is well documented (Jacobs, 2018). However, economic wealth does not instantly create political power, as campaigns to influence public opinion or lobbying to change laws take time to materialise. Given this delay, we therefore assume that trade union density and collective bargaining coverage are contemporaneously exogenous to wealth inequality and its components.

Furthermore, we order trade union density or collective bargaining coverage after the control variables (technology, globalisation and inheritance taxes) given the fact that union density or collective bargaining coverage may be impacted by these structural and institutional changes. For example, Acemoglu et al. (2001) argue that skill biased technological change causes de-unionisation as it increases the outside option of skilled workers, undermining the coalition among skilled and unskilled workers in support of unions. Furthermore, globalisation increases the likelihood of shifting investment and production abroad which in turn may lead to de-unionisation and the breakup of collective bargaining agreements (Ebbinghaus and Visser, 2001; Rodrik, 1998; Visser, 2012). As a robustness check we also report all possible orderings of the bargaining variables with respect to the control variables, following the methodology adopted in the literature (Diebold and Yilmaz, 2009; Henly and Wolman, 2005; Klößner and Wagner, 2014).

In addition, we test whether the model suffers from non-fundamentalness, i.e. when the variables in the VAR do not convey enough information to recover the structural shocks (Forni et al., 2019). In this case non-fundamentalness may be an issue, given that trade union legislation and collective bargaining agreement take time to come into effect (Leeper et al., 2013). Given the likelihood of non-fundamentalness in our model, we follow Forni et al. (2019) who argue that so long as the key shocks of interest in a VAR are informationally sufficient, non-fundamentalness is not a concern.[10] A VAR is sufficient for a shock if such a shock is a linear combination of the current and past values of the variables included in the VAR (Forni et al., 2019).[11] Hence, we follow the procedure outlined by Forni and Gambetti (2014) for testing whether the labour bargaining shock is informationally sufficient.[12] The basic intuition is that structural shocks are informationally sufficient, if they are orthogonal to the lags of a set of state variables that capture all relevant information about the economy (assuming the identification scheme is correct). The procedure has four steps. Firstly, we construct a large macroeconomic database of 50 variables to capture the relevant information about the economy. We use all variables from both the Penn World Table and the Macroeconomic History Database, deleting all duplicate or irrelevant variables. We also transform the relevant variables in line with the transformations made by Forni and Gambetti (2014). Secondly, we run a principal component analysis to reduce these macroeconomic variables down to a smaller number of principal components. Following Forni and Gambetti (2014), we construct 4

[10] Beaudry et al. (2019) take a different approach and propose a simple diagnostic test for the quantitative importance of non-fundamentalness in structural VARs.

[11] Fundamentalness holds if and only if the VAR is informationally sufficient for all of the structural shocks.

[12] We use the procedure set out in Forni and Gambetti (2014) as it is designed for VARs which are not derived from a well-defined theoretical model of reference.

principal components. Thirdly, we estimate the labour bargaining shock as a function of the lags of these principal components. We run two estimates with both 2 lags and 4 lags for each country. Lastly, an F-test is performed on this regression. If the labour bargaining shock is informationally sufficient, the lags of these components should have no explanatory power, which can be tested via an F-test. Table A3 in the online appendix presents the data used for the principal component analysis. Table A4 presents the F-test results. As can be seen in Table A4, the F-test fails to reject the null hypothesis of insignificant coefficients on the principal component lags. Given correct identification, we can therefore conclude that the labour bargaining shock is informationally sufficient and therefore can be used in our analysis.

In section 5 below on the estimation results, we present both structural impulse response functions (IRF) and forecast error variance decompositions (FEVD). The IRF plots the response of top wealth shares over time to a 1%-point increase in labour's bargaining power. The FEVD shows how much of the unconditional variance in top wealth shares is explained by labour bargaining shocks.

We estimate the SVAR models in levels with an intercept. Even if some of the variables are integrated of order one or potentially cointegrated, estimating an SVAR in levels with an intercept remains consistent, while imposing unit roots and/or cointegration restrictions when they do not actually hold leads to inconsistent estimates (Kilian and Lütkepohl, 2017:373).

We present 95% confidence interval bands, using conventional residual-based bootstrap confidence intervals, which are more accurate in small samples than the standard asymptotic confidence intervals (Kilian and Lütkepohl, 2017:340). We include two lags in both models based on information criteria and autocorrelation tests, which are presented in Table A5 in the online appendix. The models satisfy the eigenvalue stability condition and normality tests at the 1% significance level.

Finally, we only analyse the results up to 11 years after the shock for both the IRF and FEVD to keep the bootstrap inference valid (Kilian and Lütkepohl, 2017:377).

5. ESTIMATION RESULTS

We first present the estimation results for the impact of the labour bargaining shock on the top 1% wealth share for all countries using the semi-structural VAR outlined above. This model is estimated for the period of 1970-2015.[13] We then undertake five robustness tests to show that our main results are robust to alternative orderings, system sizes and control variables.

Table 1 presents the FEVD, which shows how much of the variation in top wealth shares around its long-term trend is explained by labour bargaining shocks over the given time horizons. Labour bargaining shocks are significant across all three countries after 11 years. The magnitude of the effects in the UK and France are almost identical. In the UK, labour bargaining shocks explain 28% and 32% of the variation in top wealth shares after 7 and 11 years respectively. In France, labour bargaining shocks explain 32% of the variation after 7 and 11 years. In the USA on the other hand, labour bargaining shocks explain only 8% of the variation in top wealth shares after 11 years.

[13] 1970 is the first year of data available for the ICT capital intensity series and the KOF index. 2015 is the last year of data available for the ICT capital intensity series. Below we estimate a robustness test for the period of 1970-2019 excluding the ICT capital intensity series.

<Table 1 here>

The results from the impulse response functions are consistent across all three countries. Figure 6 presents the IRF analysing the effect of a positive 1 %-point shock to bargaining power on the top 1% wealth share. We find that across all three countries, a shock to labour's bargaining power significantly reduces top 1% wealth shares of roughly similar magnitudes. In the UK and the USA, a 1%-point increase in union density leads to a 0.29 %-point and 0.32%-point decline in top wealth shares after 8 years, respectively. In the USA the effect becomes significant later than in the UK. In France, a 1%-point increase in collective bargaining coverage also leads to a 0.38% decline by the 8th year, although there is a much bigger drop in the short run (1.8 %-points after 3 years) which dies out beyond the 8th year.

<Figure 6 here>

What accounts for these cross-country differences in the FEVDs but not the IRFs? The interesting starting point is that based on the IRFs, the absolute effect size of a 1%-point increase in bargaining power is very much the same in the USA and the UK at about 0.3%. Given that we use trade union membership as the bargaining measure in both countries and we have very similar levels and trends in this measure the underlying shocks are also closely comparable. The finding that these similar shocks account for 8% and 32% of the total variation in top wealth shares in the USA and UK implies that there is a larger amount of variation in top 1% wealth shares in the USA. This latter point is consistent with the observation that wealth inequality increased to much higher levels in the USA compared to the UK. In this sense, the seemingly contradictory results between the FEVDs and IRFs are very much in line with the trends in our data.

How does this relate to the overall aggregate trends in wealth inequality that we see in Figure 1? Since the 1980s, wealth inequality has increased the most in the USA, followed by France and the UK. We find that unionisation declined in the USA, driving up income and wealth inequality. In France on the other hand, the increase in wealth inequality has been less dramatic because collective bargaining coverage has *increased* since 1985 (see Figure 2) - preventing income inequality from rising as much. Wealth, however, still became more concentrated in France because of other factors. In other words, without the rise in collective bargaining coverage, wealth inequality (and income inequality) in France would have been much higher than it currently is. In the USA, if unionisation had not fallen, wealth inequality may have still risen but not by as much. Using a novel dataset, Blanchet and Martinez-Toledano (2022) analyse drivers of wealth inequality in France and the USA and provide results which are highly consistent with our analysis. They focus on three components of wealth inequality (differential rates of return, differential saving rates and income inequality) [14] and analyse which of those have driven wealth inequality since 1985 in each country. Blanchet and Martinez-Toledano (2022) conclude that in the USA, wealth inequality has risen since 1985 because all three components have risen - i.e. savings, returns and income have all become more unequal. In France on the other hand, income inequality has not increased as much, but wealth inequality still rose because differential saving rates increased substantially. The authors do not present results for the UK.

[14] They do not include inheritance flows in their analysis .

At the heart of both of these stories is the effect of labour's bargaining power on income inequality. The FEVD in Table 2 summarises how much of the variation in top 1% *income* shares is driven by labour bargaining power shocks. As can be seen, bargaining shocks explain the same amount of variation in income inequality across all three countries - namely 18% of the variation in top 1% income shares after 11 years.

<Table 2 here>

We estimate five alternative specifications to check the robustness of these results. Firstly, we reorder union density/collective bargaining coverage with respect to the control variables, estimating three separate SVARs with the bargaining variable ordered in the first, second, third and fourth places. As can be seen in Figure 7, the impact of a labour bargaining shock on wealth inequality is robust to these alternative orderings and remains significant at the 5% significance level.

<Figure 7 here>

Secondly, we reduce the size of the system, dropping the least significant variable first. This aims to test whether our results are biased due to the large number of variables in our system with respect to the relatively small number of annual observations. We estimate three alternative specifications, dropping first differential capital gains, top rate inheritance taxes and ICT capital intensity. As can be seen in Figure 8, the impulse response functions do not significantly change. In all specifications, labour bargaining shocks have a significant negative impact on top wealth shares.

<Figure 8 here>

Thirdly, we replace our de jure measure of financial globalisation with a de jure measure of trade globalisation. As can be seen in the impulse response functions in Figure 9, the impact of a labour bargaining shock on top wealth shares remains significant at the 5% level.

<Figure 9>

Fourthly, we replace top inheritance tax rates with top income tax rates, to test whether a different measure of progressive taxation changes the results. As can be seen in the impulse response functions in Figure 10, the impact of a labour bargaining shock on top wealth shares remains significant at the 5% level.

<Figure 10>

Lastly, we extend the dataset to estimate the model for the period of 1970-2019 rather than 1970 to 2015. As we do not have data for ICT capital intensity beyond 2015, we exclude this variable from the estimations. Figure 11 presents the impulse response functions for this specification. Labour bargaining shocks are still significant and with the same order of magnitude as before.

<Figure 11>

6. CONCLUSION

This paper analyses the determinants of the top 1% wealth share in the UK, the USA and France using a semi-structural vector autoregression (SVAR) estimation for the period 1970-2019 with a focus on the effects of labour's bargaining power. Such an analysis is particularly crucial, given the extensive literature showing that labour's bargaining power significantly impacts income inequality, and yet there is little theoretical and empirical research analysing its role in determining wealth inequality.

The results indicate that the bargaining power of labour is a significant and robust determinant of the top 1% wealth share across all the countries in all the specifications. Quantitively, a positive bargaining shock associated with a 1%-point increase in union density in the UK and USA leads to a 0.25 %-point and 0.36%-point decline in top wealth shares after 10 years. A positive shock associated with a 1 %-point increase in collective bargaining coverage in France leads to a much bigger drop in top wealth shares in the short run (1.8 %-points after 3 years), although the impact is less persistent and dies out by the 10^{th} year. After 11 years, labour's bargaining power explains 32%, 8% and 32% of the variation in top wealth shares in the UK, the USA and France respectively.

The reason why bargaining shocks explain less of the variation in top wealth shares in the USA compared to the UK and France is not because bargaining shocks have a smaller impact in the USA. Using impulse response functions, we demonstrate that a positive shock to labour's bargaining power reduces top 1% wealth shares by similar magnitudes across all three countries. The reason why less of the variation is explained by bargaining in the USA is because of a more pronounced variation in the wealth inequality in the USA, as represented by the much steeper increase in the top wealth shares.

How does this relate to the overall aggregate trends in wealth inequality that we see in Figure 1? We argue that the cross-country differences can be explained by the impact of bargaining power on wealth inequality via its impact on income inequality. In the USA, the decline in unionisation pushed up income inequality (and therefore wealth inequality), but other factors beyond bargaining power have also contributed to an increase in wealth inequality. In France, on the other hand, workers have become more powerful since the 1980s, as collective bargaining coverage has increased. Despite a rise in differential saving rates, which have been driven by factors other than bargaining power since 1985 – the rise in bargaining shocks has prevented income inequality from rising. In other words, without the rise in collective bargaining coverage, France would have seen much higher increases in wealth inequality (and income inequality) than it did. If unionisation had not fallen in the USA, wealth inequality may have still risen, but not by as much.

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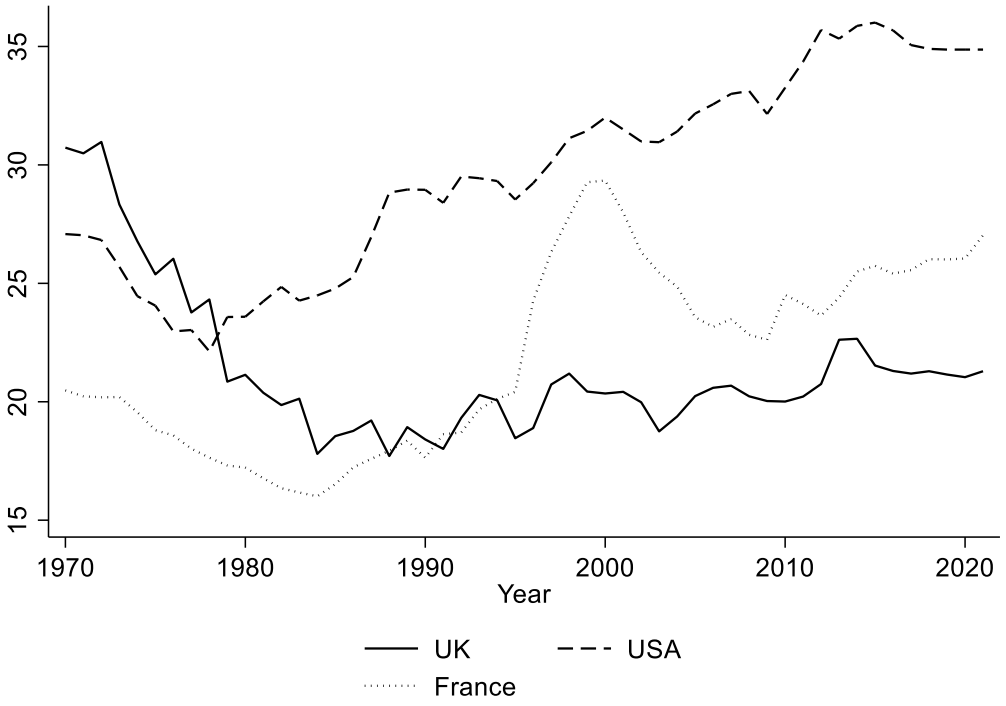
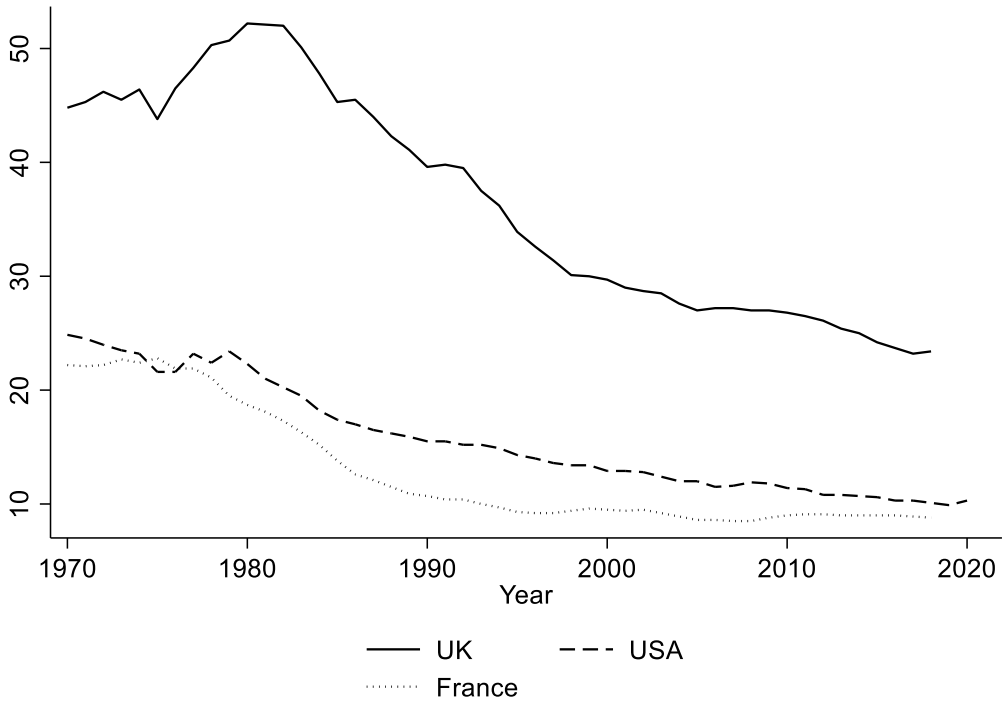
FIGURES

Figure 1. The share of wealth owned by the top 1% wealthiest households in the UK, the USA and France (%)



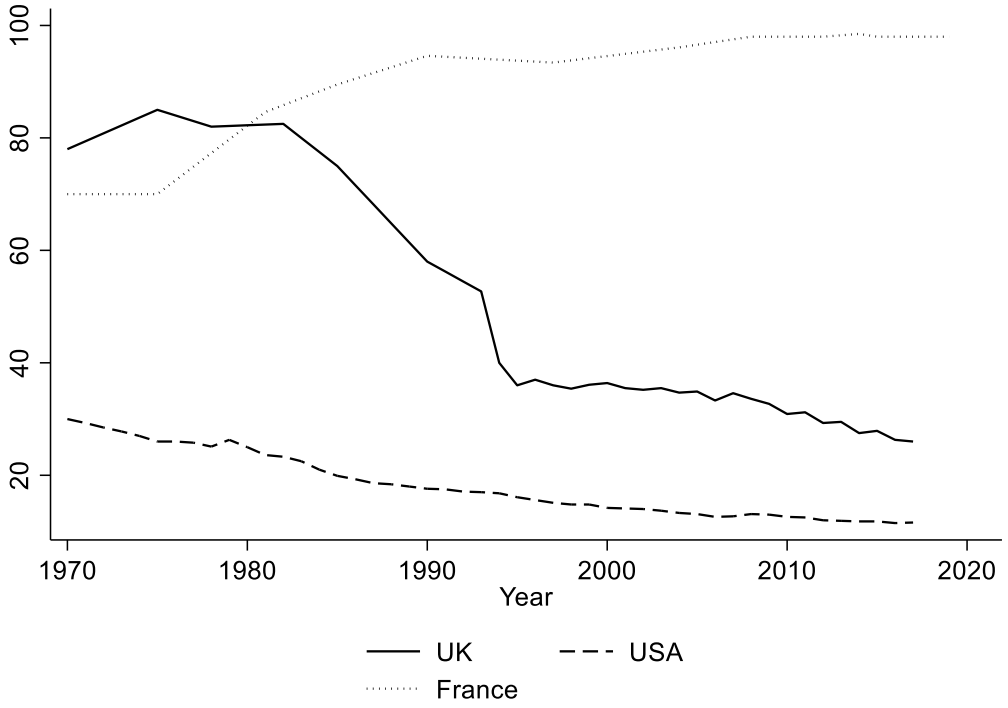
Notes: Data from World Inequality Database

Figure 2. The proportion of workers who are part of a trade union in the UK, the USA and France (%)



Notes: Data from OECD

Figure 3. The proportion of workers covered by collective bargaining coverage agreements in the UK, the USA and France (%)



Notes: Data from OECD

Figure 4. The theoretical impact of a positive labour bargaining shock on the top 1% share of wealth

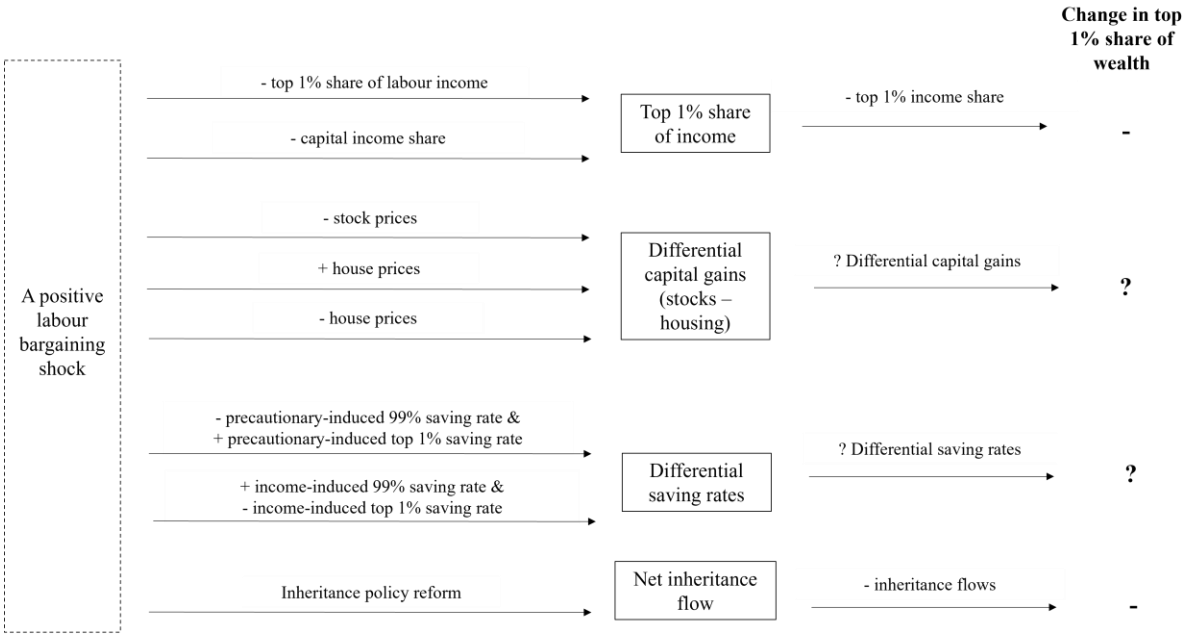


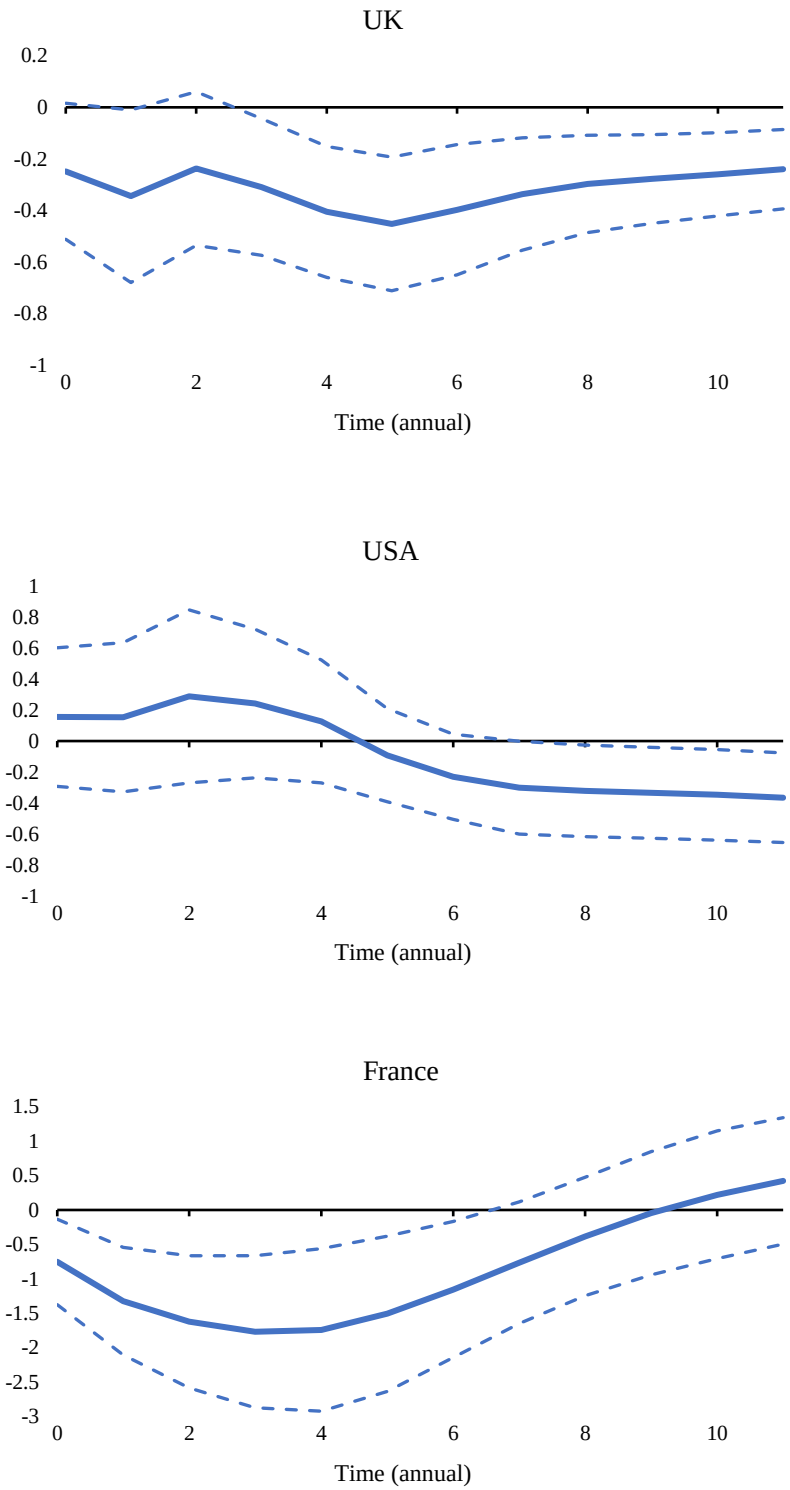
Figure 5. Model Identification Matrix

$$\begin{pmatrix} e_{0t}^{\text{top inheritance tax rate}} \\ e_{1t}^{\text{financial globalisation (KOF)}} \\ e_{2t}^{\text{real ICT capital intensity}} \\ e_{3t}^{\text{union density or collective bargaining coverage}} \\ e_{5t}^{\text{differential capital gains}} \\ e_{5t}^{\text{top 1\% income share}} \\ e_{6t}^{\text{top 1\% wealth share}} \end{pmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_1 & 1 & 0 & 0 & 0 & 0 & 0 \\ b_2 & b_3 & 1 & 0 & 0 & 0 & 0 \\ b_4 & b_5 & b_6 & 1 & 0 & 0 & 0 \\ b_7 & b_8 & b_9 & b_{10} & 1 & 0 & 0 \\ b_{11} & b_{12} & b_{13} & b_{14} & b_{15} & 1 & 0 \\ b_{16} & b_{17} & b_{18} & b_{19} & b_{20} & b_{21} & 1 \end{bmatrix} \begin{pmatrix} u_{0t} \\ u_{1t} \\ u_{2t} \\ u_{3t}^{\text{bargaining shock}} \\ u_{4t} \\ u_{5t} \\ u_{6t} \end{pmatrix}$$

Notes, given the semi-structural VAR approach, the only shock that is identified is the labour bargaining shock $u_{3t}^{\text{bargaining shock}}$. The labour bargaining shock is defined as the residual change in union density/collective bargaining coverage after accounting for all endogenous variation in union density/collective bargaining coverage due to taxation, globalisation and technological change.

Figure 6. Structural impulse response function:

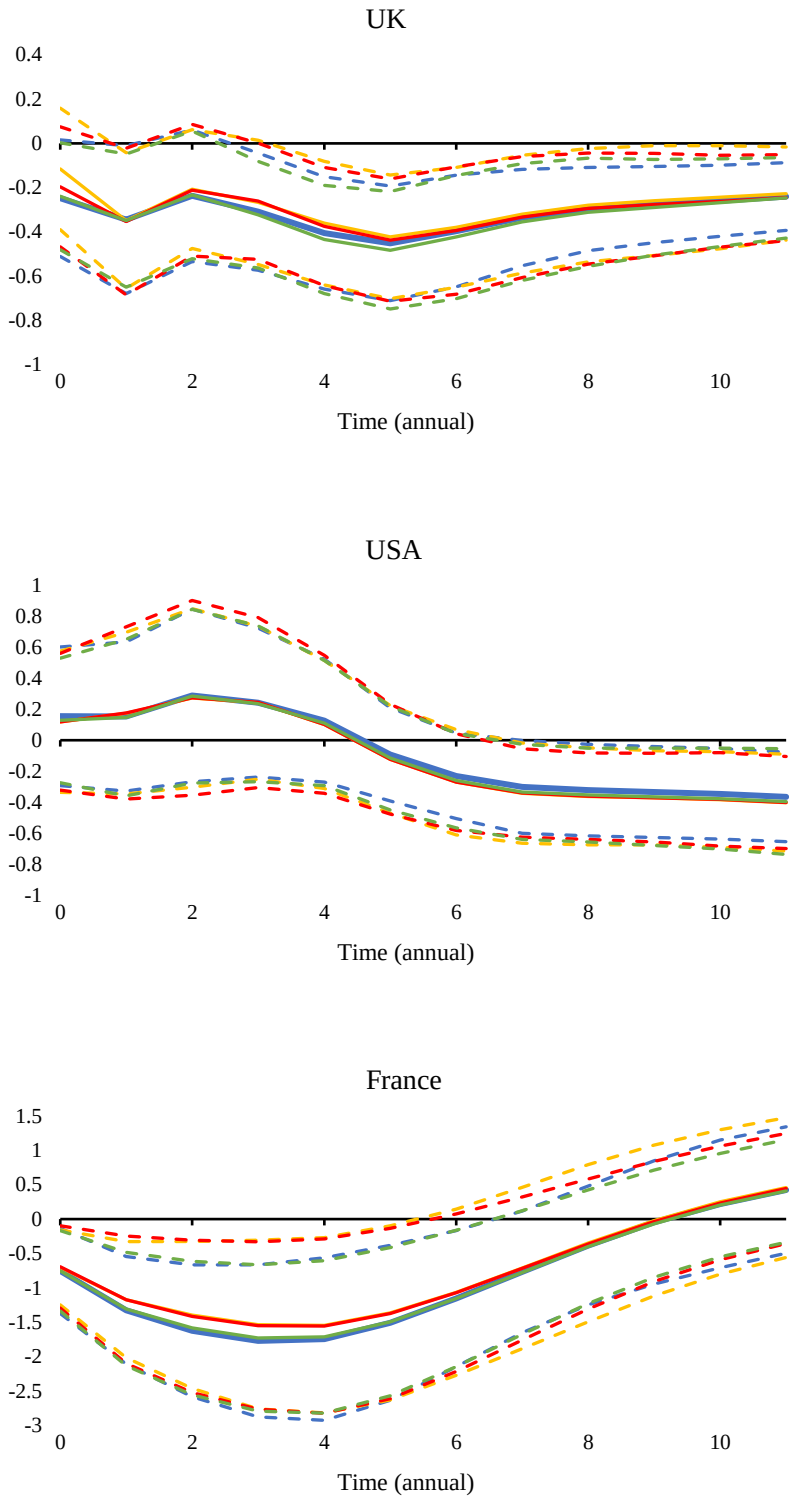
Effects of a 1-% point increase in union density or collective bargaining coverage on top wealth shares in the UK, USA and France



Notes: Sample period: 1970-2015. Solid blue line: structural impulse response function. Blue dotted line: the residual-based 95% level bootstrapped confidence intervals. Legend: x axis: years. y axis: %-point change in the top 1% wealth share.

Figure 7. Structural impulse response function:

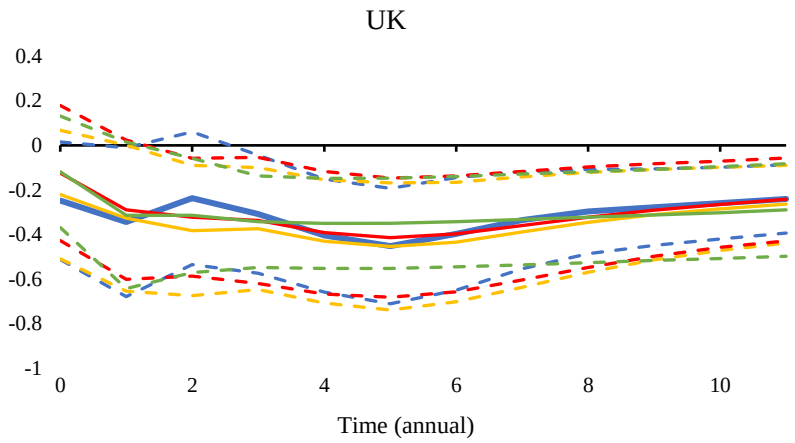
Effects of a 1-% point increase in union density or collective bargaining coverage on top wealth shares in the UK, USA and France with alternative orderings

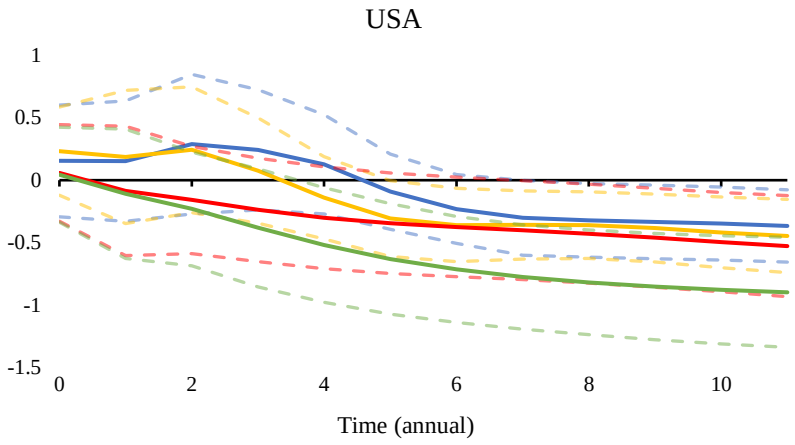


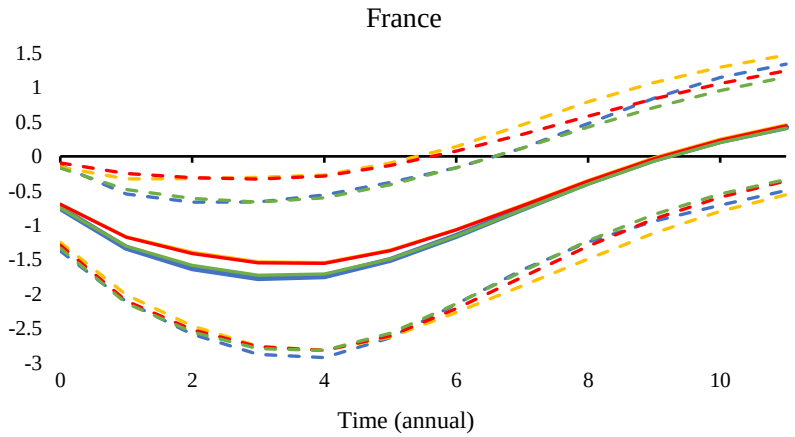
Notes: Sample period: 1970-2015. Solid blue line: structural impulse response function. Blue dotted line: the residual-based 95% level bootstrapped confidence intervals. Legend: x axis: years. y axis: %-point change in the top 1% wealth share.
Orange: Union density/collective bargaining coverage is ordered first
Red: Union density/collective bargaining coverage is ordered second
Green: Union density/collective bargaining coverage is ordered third
Blue: Union density/collective bargaining coverage is ordered fourth

Figure 8. Structural impulse response function:

Effects of a 1-% point increase in union density or collective bargaining coverage on top wealth shares in the UK, USA and France with smaller systems



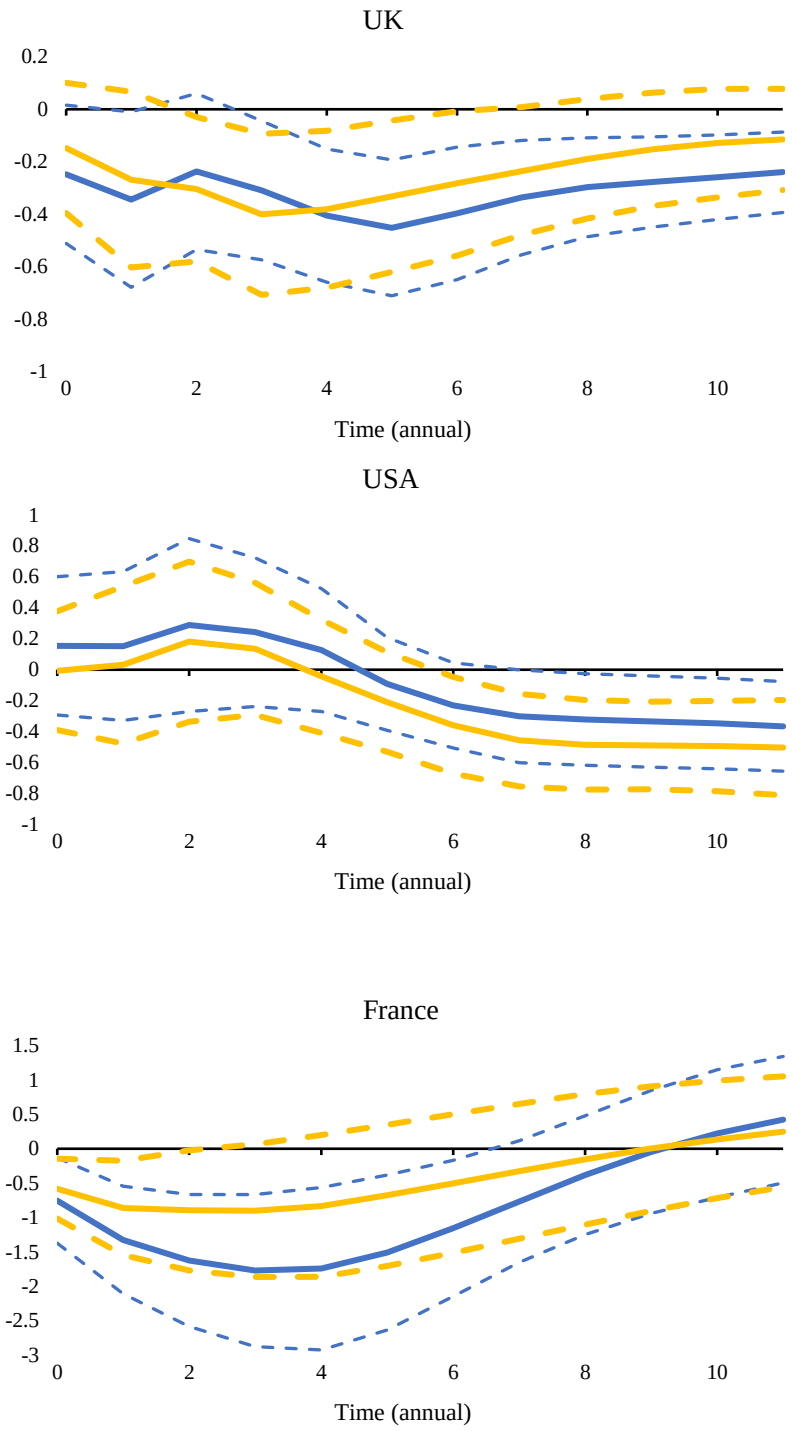




Notes: Sample period: 1970-2015. Solid blue line: structural impulse response function. Blue dotted line: the residual-based 95% level bootstrapped confidence intervals. Legend: x axis: years. y axis: %-point change in the top 1% wealth share.
Orange: Top rate inheritance tax, financial globalisation, technological change, Union density/collective bargaining, top income share, top wealth share
Red: Financial globalisation, technological change, Union density/collective bargaining, top income share, top wealth share
Green: Financial globalisation, Union density/collective bargaining, top income share, top wealth share
Blue: All variables

Figure 9. Structural impulse response function:

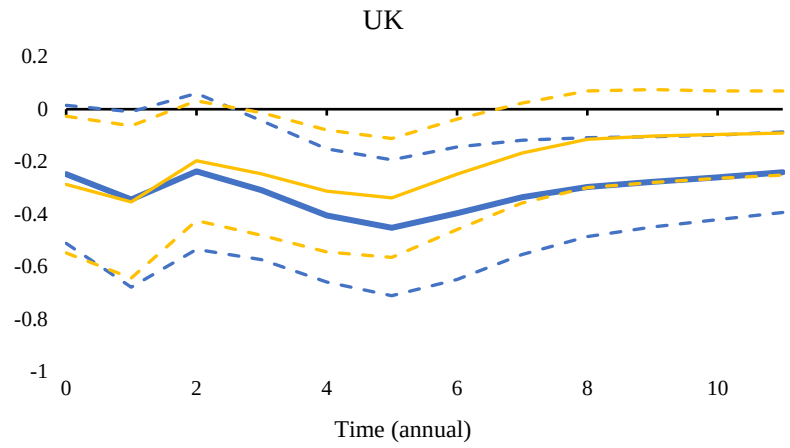
Effects of a 1-% point increase in union density or collective bargaining coverage on top wealth shares in the UK, USA and France with trade globalisation

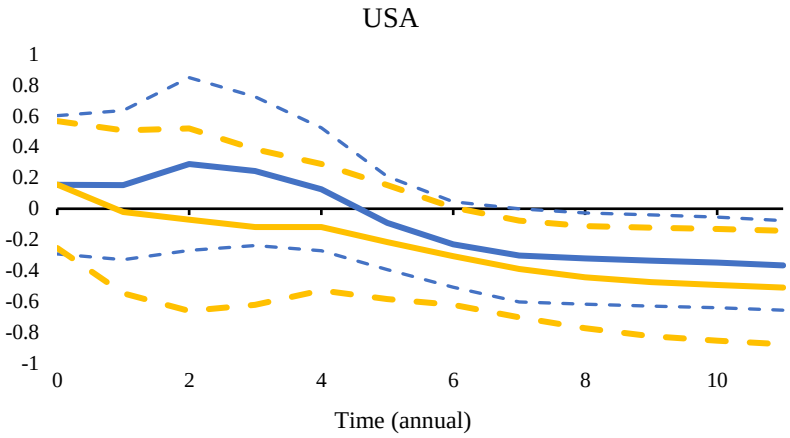


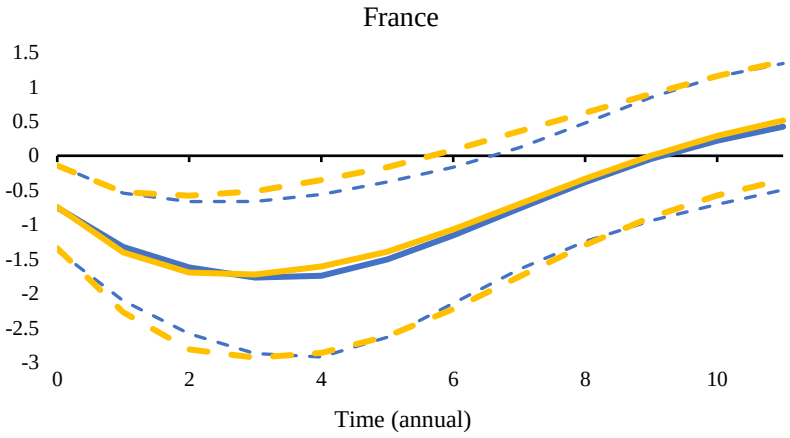
Notes: Sample period: 1970-2015.
Solid yellow line: structural impulse response function for model with trade globalisation index. Yellow dotted line: the residual-based 95% level bootstrapped confidence intervals for model with trade globalisation.
Solid blue line: structural impulse response function for baseline model. Blue dotted line: the residual-based 95% level bootstrapped confidence intervals for baseline model.
Legend: x axis: years. y axis: %-point change in the top 1% wealth share.

Figure 10. Structural impulse response function:

Effects of a 1-% point increase in union density or collective bargaining coverage on top wealth shares in the UK, USA and France with top income tax rate



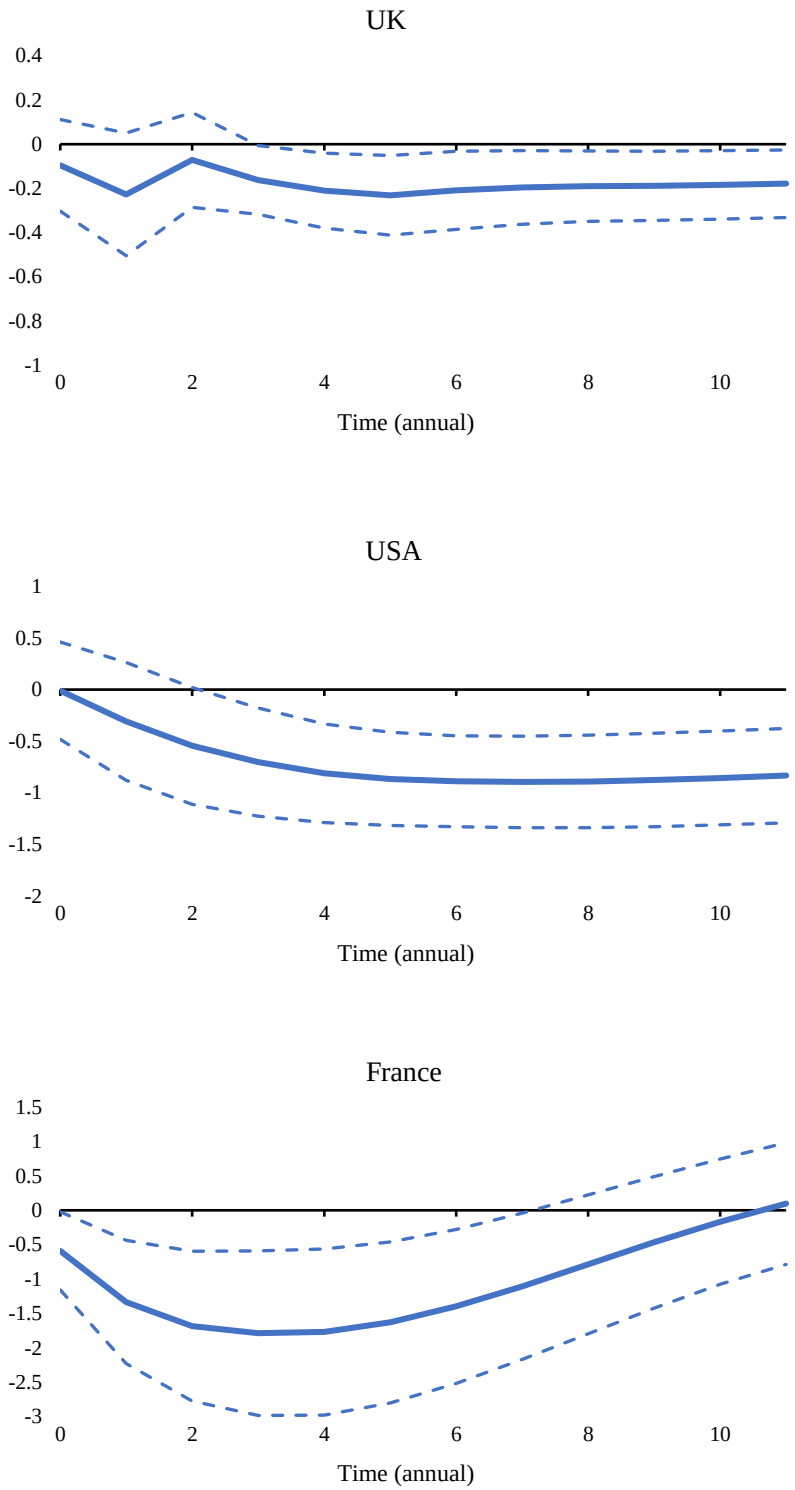




Notes: Sample period: 1970-2015.
Solid yellow line: structural impulse response function for model with top income tax rate. Yellow dotted line: the residual-based 95% level bootstrapped confidence intervals for model with top income tax rate.
Solid blue line: structural impulse response function for baseline model. Blue dotted line: the residual-based 95% level bootstrapped confidence intervals for baseline model.
Legend: x axis: years. y axis: %-point change in the top 1% wealth share.

Figure 11. Structural impulse response function:

Effects of a 1-% point increase in union density or collective bargaining coverage on top wealth shares in the UK, USA and France 1970-2019



Notes: Sample period: 1970-2019. Solid blue line: structural impulse response function. Blue dotted line: the residual-based 95% level bootstrapped confidence intervals. Legend: x axis: years. y axis: %-point change in the top 1% wealth share.

TABLES

TABLE 1

FEVD results - variation of top wealth shares explained by a one percentage shock to labour bargaining power (%)

Time since shock (Years)	UK	USA	France
1	6%	1%	13%
7	27%**	4%	32%**
11	32%**	8%*	32%**

Note: * is significant at 90% level | ** is significant at 95% level.

TABLE 2

FEVD results - variation of top income shares explained by a one percentage shock to labour bargaining power (%)

Time since shock (Years)	UK	USA	France
1	4%	3%	13%
7	18%*	10%	18%*
11	18%*	18%* *	18%*

Note: * is significant at 90% level | ** is significant at 95% level.

Online Appendix: SUPPORTING INFORMATION

TABLE A1

Data: The components of the top 1% wealth share

Variable Name	Description	Source		Period	Mean	Std Dev	Min	Max
Top 1% share of net personal wealth (%)	Net personal wealth (housing, land, deposits, bonds, equities, etc.) held by top 1% wealthiest individuals.	WID	UK	1970-2019	21	3	18	31
			USA	1970-2019	30	4	22	36
			France	1970-2019	22	4	16	29
Top 1% share of personal income (%)	Pre-tax national income share held by top 1% individuals.	WID	UK	1970-2019	11	3	7	15
			USA	1970-2019	15	3	10	19
			France	1970-2019	10	1	8	12
Differential capital gains (ratio)	The capital gains on equities minus the capital gains on housing. Capital gain is the change in the price of asset divided by the CPI (i.e. the yearly change in the general price level).	JSTdatasetR4 (Release 4, May 2019)	UK	1970-2019	0.007	0.283	-0.680	1.310
			USA	1970-2019	0.034	0.160	-0.368	0.320
			France	1970-2019	0.009	0.248	-0.467	0.468

TABLE A2

Data: The determinants of the top 1% wealth share

Variable Name	Description	Source		Period	Mean	Std Dev	Min	Max
Trade union density (%)	The proportion of total employees who are members of a trade union across the whole economy.	OECD, Bain and Price (1980), Freeman (1998), Ebbinghaus and Visser (2000)	UK	1970-2019	37	10	23	52
			USA	1970-2019	16	5	10	25
			France	1970-2019	13	5	9	23
Collective bargaining coverage (%)	Percentage of employees with the right to bargain.	OECD	UK	1970-2019	54	22	26	85
			USA	1970-2019	18	6	12	30
			France	1970-2019	90	10	70	99
Real ICT Capital Intensity (ratio)	National real ICT capital stock divided by real gross value added.	EU KLEMS	UK	1970-2015	.0362	.0260	.0043	.0719
			USA	1970-2015	.0429	.0325	.0083	.1053
			France	1970-2015	.0496	.0241	.0055	.0922
Financial globalisation de jure (KOF) (Index 0-100)	De jure index of financial globalisation from KOF. The index is constructed from four variables: investment restrictions; capital account openness; international investment agreements; and international voice traffic.	Gygli et al (2019)	UK	1970-2019	80	14	33	92
			USA	1970-2019	73	11	57	90
			France	1970-2019	77	10	46	91
Trade globalisation de jure (KOF) (Index 0-100)	De jure index of trade globalisation from KOF. The index is constructed from four variables: trade regulations; trade taxes; tariffs; and trade agreements.	Gygli et al (2019)	UK	1970-2019	87	5.74	75.06	97.11
			USA	1970-2019	75.61	8.84	62.63	88.17
			France	1970-2019	86.36	5.36	77.12	95.78
Top marginal income tax rate (%)	The maximum amount of tax paid on an additional unit of income for highest income earners.	WID	UK	1970-2019	57	22	40	98
			USA	1970-2019	47	15	28	72
			France	1970-2019	58	5	48	70
Top marginal inheritance tax rate (%)	The maximum amount of tax paid on an additional unit of inheritance for the highest inheritances.	WID	UK	1970-2019	53	17	40	85
			USA	1970-2019	57	12	35	77
			France	1970-2019	34	10	20	45

TABLE A3

Data for sufficient information tests

Transformations: 1=levels, 2=growth rate, 3=first difference of the logs of the original series

No. series	Transformation	Long label
1	2	Real consumption per capita (index, 2006=100)
2	1	Investment-to-GDP ratio
3	3	Imports (nominal, local currency)
4	3	Exports (nominal, local currency)
5	3	Narrow money (nominal, local currency)
6	3	Broad money (nominal, local currency)
7	1	Short-term interest rate (nominal, percent per year)
8	1	Long-term interest rate (nominal, percent per year)
9	1	Public debt-to-GDP ratio
10	3	Government revenues (nominal, local currency)
11	3	Government expenditure (nominal, local currency)
12	3	Total loans to non-financial private sector (nominal, local currency)
13	3	Total loans to business (nominal, local currency)
14	3	House prices (nominal index, 1990=100)
15	1	Equity total return, nominal. r[t] = [[p[t] + d[t]] / p[t-1]] - 1
16	1	Housing total return, nominal. r[t] = [[p[t] + d[t]] / p[t-1]] - 1
17	1	Government bond total return, nominal. r[t] = [[p[t] + coupon[t]] / p[t-1]] - 1
18	1	Bill rate, nominal. r[t] = coupon[t] / p[t-1]
19	1	Housing rental return. dp_rtn[t] = rent[t]/p[t-1]
20	1	Housing rental yield. dp[t] = rent[t]/p[t]
21	1	Equity dividend yield. dp[t] = dividend[t]/p[t]
22	1	Tot. rtn. on risky assets, nominal. Wtd. avg. of housing and equity
23	1	Tot. rtn. on safe assets, nominal. Equally wtd. avg. of bonds and bills
24	3	Output-side real GDP at chained PPPs (in mil. 2017US$)
25	1	Population (in millions)
26	2	Human capital index, based on years of schooling and returns to education; see Human capital in PWT9.
27	3	Real consumption of households and government, at current PPPs (in mil. 2017US$)
28	3	Real domestic absorption, (real consumption plus investment), at current PPPs (in mil. 2017US$)
29	3	Capital stock at current PPPs (in mil. 2017US$)
30	3	Capital services levels at current PPPs (USA=1)
31	3	TFP level at current PPPs (USA=1)
32	3	Welfare-relevant TFP levels at current PPPs (USA=1)
33	1	Share of labour compensation in GDP at current national prices
34	1	Real internal rate of return
35	1	Average depreciation rate of the capital stock
36	1	Exchange rate, national currency/USD (market+estimated)
37	1	Price level of CCON (PPP/XR), price level of USA GDPo in 2017=1
38	1	Share of household consumption at current PPPs
39	1	Share of gross capital formation at current PPPs
40	1	Share of government consumption at current PPPs
41	1	Share of merchandise exports at current PPPs
42	1	Share of merchandise imports at current PPPs
43	1	Share of residual trade and GDP statistical discrepancy at current PPPs
44	1	Price level of household consumption, price level of USA GDPo in 2017=1
45	1	Price level of capital formation, price level of USA GDPo in 2017=1
46	1	Price level of government consumption, price level of USA GDPo in 2017=1
47	1	Price level of exports, price level of USA GDPo in 2017=1
48	1	Price level of imports, price level of USA GDPo in 2017=1
49	1	Price level of the capital stock, price level of USA in 2017=1
50	1	Price level of the capital services, price level of USA=1

TABLE A4

Sufficient information test of labour bargaining shock: F-test p values

Lags	UK	USA	France
2	0.7793	0.9537	0.8541
4	0.6573	0.8637	0.6893

Note: The F-test is performed on a regression where the dependent variable is the labour bargaining shock and the covariates are the lags of the principal components. Results are presented for 2 and 4 lags and for 4 principal components. The null is that the lag of the principal components are orthogonal to the labour bargaining shock.

TABLE A5

Postestimation tests

Residual Autocorrelation Test

Country	lag	chi2	df	Prob>chi2
UK	1	42.15	36	0.22
	2	38.98	36	0.33
USA	1	41.67	36	0.23
	2	40.41	36	0.28
France	1	28.75	36	0.79
	2	31.78	36	0.66

Normality Tests

Country	Skewness test	Skewness	chi2	df	Prob > chi2
UK	globalisation	0.46	1.58	1	0.20
	public wealth	-0.81	4.88	1	0.02
	ICT capital intensity	-0.10	0.08	1	0.77
	Union density	0.11	0.09	1	0.75
	top 1% income share	0.27	0.56	1	0.45
	top 1% wealth share	0.13	0.14	1	0.70
	all		7.35	6	0.28
USA	globalisation	0.24	0.44	1	0.50
	public wealth	-0.16	0.20	1	0.65
	ICT capital intensity	0.01	0.00	1	0.98
	Union density	1.295	12.35	1	0.00
	top 1% income share	-0.01	0.00	1	0.97
	top 1% wealth share	0.10	0.08	1	0.77
	all		13.08	6	0.04
France	globalisation	-1.03	7.62	1	0.00
	public wealth	0.01	0.00	1	0.97
	ICT capital intensity	-0.26	0.50	1	0.473
	collective bargaining	0.91	6.04	1	0.01
	top 1% income share	-0.36	0.94	1	0.33
	top 1% wealth share	0.63	2.86	1	0.09
	all		17.98	6	0.01

Information Criteria

Country	lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
UK	0	367.42				2.95E-15	-16.42	-16.33	-16.18
	1	685.79	636.74	36	5.7E-111	8E-21	-29.26	-28.63	-27.56*
	2	742.50*	113.41*	36	6.07E-10	3.43E-21*	-30.20*	-29.03*	-27.04
USA	0	401.66				6.23E-16	-17.98	-17.89	-17.74
	1	749.70	696.06	36	3.4E-123	4.38E-22	-32.16	-31.53*	-30.46*
	2	789.52*	79.65*	36	3.84E-05	4.04E-22*	-32.34*	-31.16	-29.19
France	0	171.60				1.82E-11	-7.70	-7.61	-7.45
	1	529.91	716.61	36	1.9E-127	5.72E-18	-22.69	-22.05	-20.97*
	2	582.72*	105.6*	36	9.15E-09	2.89E-18*	-23.47*	-22.29*	-20.28

Continued Table A3

Stability Test – Modulus of Eigenvalues						
UK	0.963	0.963	0.846	0.846	0.838	0.838
USA	0.963	0.894	0.894	0.827	0.827	0.796
France	0.993	0.893	0.893	0.880	0.880	0.809