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Stockhammer, E, Rabinovich, J orcid.org/0000-0002-9175-0848 and Reddy, N (2021) Distribution, wealth and demand regimes in historical perspective: the USA, the UK, France and Germany, 1855–2010. Review of Keynesian Economics, 9 (3). pp. 337-367. ISSN 2049-5323

https://doi.org/10.4337/roke.2021.03.03

Distribution, wealth and demand regimes in historical perspective. USA, UK, France and Germany, 1855-2010

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Forthcoming in: *Review of Keynesian Economics*

Abstract

Most empirical macroeconomic research is limited to the period since World War II. This paper analyses the effects of changes in income distribution and in private wealth on consumption and investment covering a period from as early as 1855 until 2010 for the UK, France, Germany and USA, based on the dataset of Piketty and Zucman (2014). We contribute to the study of wealth effects, of financialisation and of the nature of demand regimes. We find that overall domestic demand has been wage-led in the USA, UK and Germany. Total investment responds positively to higher wage shares, which is driven by residential investment. For corporate investment alone, we find a negative relation. Wealth effects are found to be positive and significant for consumption in the USA and UK, but weaker in France and Germany. Investment is negatively affected by private wealth in the USA and the UK, but positively in France and Germany.

Keywords: financialisation, wealth, income distribution, economic growth.

JEL codes: B50, E11, E12, E20, E21, N10.

Funding: This paper is part of the research project 'Income Distribution, Asset Prices and Aggregate Demand Formation, 1850-2010: A post-Keynesian Approach to Historical Macroeconomic Data' (INO16-00008) with financial support by the Institute for New Economic Thinking.

Acknowledgements: The authors are grateful to Paul Auerbach, Erik Bengtsson, Giorgos Gouzoulis, Rob Jump, Karsten Kohler, Ozlem Onaran, Rafael Wildauer and eight anonymous referees for helpful comments. All remaining errors are ours.

1. Introduction

Empirical research in macroeconomics overwhelmingly analyses recent experience and utilises data from the past three or four decades. However, the growing availability of long-range longitudinal datasets, many stretching back to the 19th century, has provided an opportunity for research with far greater historical scope, such as Reinhart and Rogoff's (2010) broad historical coverage of financial crises, Piketty's (2014) analysis of wealth inequality and Jordà, Schularick and Taylor's (2016) econometric analysis of debt and recessions. All of these are informed by a mainstream economics approach. The aim of this paper is to offer similar historical breadth to a key issue of heterodox macroeconomics: the study of the demand effects of changes in functional income distribution and private wealth. We present macroeconomic behavioural equations for the UK (1855-2010), USA (1929-2010), France (1896-2010) and Germany (1870-2010), using the data compiled by Piketty and Zucman (2014).

The paper contributes to two debates. The first is on the nature of demand regimes and the effects of changes in functional income distribution. The empirical literature on this debate has focused on estimations of the Bhaduri-Marglin model, which has the virtue of being able to depict wage-led as well as profit-led demand regimes depending on the relative size of the saving differential between capital and labour and the profit sensitivity of investment. The model provides a framework for the controversy between the Kaleckian and Marxist-inspired Goodwinians and has sparked a substantial research effort with impressive geographical scope (Bowles and Boyer, 1995; Stockhammer and Onaran 2004; Naastepad and Storm, 2006; Hein and Vogel, 2008; Stockhammer, Onaran, and Ederer, 2009; Onaran and Galanis, 2014; Hartwig 2014; Kiefer and Rada, 2015; Stockhammer and Wildauer, 2016; Onaran and

Obst 2016). The demand regime approach has recently also been taken up by comparative political economists (Baccaro and Pontusson 2016). However, all existing studies have so far been limited to the postwar era.

The second debate to which we contribute concerns the effect of wealth on consumption and investment. The study of consumption has been dominated by mainstream frameworks based on life time utility-maximizing individuals who may be credit-constrained and consume part of their wealth (Slacalek 2009, Ludwig and Slok 2004). There is currently no strong consensus on the size of wealth effects and on whether they differ for financial and housing wealth (Case, Quigle and Shiller 2005). Research on the impact of wealth on (business) investment has largely taken place outside the mainstream under the heading of financialisation, where several authors have highlighted the negative impact of financial activity on real investment (Stockhammer 2004, Krippner 2005, Tori and Onaran 2017, 2018). Both of these research programs have been confined to the post-1970 period.

This paper builds on Stockhammer and Wildauer (2016), who synthesise these effects in a post-Keynesian macro model. The contribution of this paper is to apply this framework to historical macroeconomic data. Methodologically, our approach follows the existing literature. We estimate error correction models (ECM) for each country. This approach has limitations in that it is open to the criticism of endogeneity problems. Blecker et al (2020) offer a GMM approach that addresses this, but it presupposes adequate instruments for the endogenous variables. These are not readily available for our period and countries. Thus instead we focus on the long-run effects of (lagged) level variables and we report specifications with predetermined variables only as a robustness check.

For consumption we find a positive long-run effect of wages for the USA, the UK, and Germany. Our investment results are potentially surprising – they indicate positive or no effect of the wage share on total investment, which comprises business and residential accumulation. For France and the USA we also perform estimations for corporate investment alone and find a negative association with the wage share. This suggests that the residential component is driving the outcome in total investment estimations. Since total investment responds positively to an increase in the wage share, overall domestic private demand is wage-led in the USA, UK and Germany. Regarding wealth effects, we find that effects on consumption are large in the USA and UK but smaller and less significant in France and Germany, which is consistent with the distinction between market-based and bank-based financial systems (Jackson and Deeg 2006). For the investment equation we find a negative effect in the USA and UK, but positive effects in Germany and France. While these effects are not always statistically significant, they suggest that financialisation-type effects on investment have been operating for longer than previously recognized.

The paper is structured as follows. Section 2 motivates our consumption and investment functions and analyses demand regimes with respect to changes in distribution and wealth. Section 3 reviews the existing empirical literature. Section 4 presents our data and econometric methodology. Section 5 presents results, section 6 analyses demand regimes and results for subperiods and section 7 concludes.

2. Distribution, wealth and demand regimes

We will use general consumption (*C*) and investment (*I*) functions that depend on income (*Y*), the functional distribution of income measured by the wage share (*WS*) and private wealth (*PW*):

$$C = C(Y, WS, PW) \tag{1}$$

with $\partial C/\partial Y,\ \partial C/\partial WS,\ \partial C/\partial PW > 0$

Consumption responds positively to increases in income ($\partial C/\partial Y>0$). Following a long tradition in Classical, Marxist and post-Keynesian theory we assume that the marginal propensity to consume is higher for workers (or recipients of wage incomes) than for capitalists (or recipients of capital incomes), therefore a higher wage share will positively affect consumption ($\partial C/\partial WS>0$). Neoclassical economics usually does not consider the distribution of income to have any causal effect on consumption. Wealth is generally expected to have a positive effect on consumption ($\partial C/\partial PW>0$), although there are varying theoretical explanations for this.[1] In mainstream economics this result is generally derived from the utility maximization of rational households (e.g. Aron et al 2012), whereas the financialisation literature emphasises the active role of lenders and non-rational consumption norms (Cynamon and Fazzari, 2008). For New Keynesians, households (and businesses) are generally assumed to confront credit constraints, which higher asset values help to relax, meaning that wealth increases feed through to consumption (Muellbauer 2007). Recent heterodox research also highlights the importance of rising house prices as a supply of collateral, with

[1] Theoretically, mainstream economics has for a long time shown less interest in financial variables. This is due in part to the frequent assumption of efficient capital markets, in part to the assumption about life time utility maximization which leads to consumption smoothing. Net wealth matters, but it will be consumed slowly. Some mainstream economists question wealth effects for housing wealth, like Buiter (2008) who contends that aggregate impacts of housing price increases are likely to be neutral as the gains to owners are offset by higher costs for renters.

important effects on consumption as households with risky mortgages refinance to free up disposable income (Cynamon and Fazzari, 2008).

Ideally we would use distinct measures of household and corporate wealth but this is not available in the Piketty-Zucman data for the required time frame. We are thus restricted to a net national aggregate measure of real and financial wealth across the private sector.

The investment function has a similar form to the consumption function:

$$I = I(Y, WS, PW, i) \tag{2}$$

with $\partial I/\partial Y > 0$, $\partial I/\partial WS$, $\partial I/\partial PW = ?$, $\partial I/\partial i < 0$

Investment depends on income, the wage share, net private wealth and the (real) rate of interest (i). There is little disagreement about the fact that income will have positive effects on investment although different mechanisms are posited for this result. In Keynesian theory it follows from the fact that firms are demand constrained. The accelerator hypothesis claims that the *change* in demand will affect (the level of) investment. While this is not in the centerpiece of our analysis, it appears in our model as the short run income effect.

Profitability affects investment in Classical, Marxist and post-Keynesian theories as well as in versions of New Keynesian theory, where firms are credit constrained (Stiglitz and Weiss 1981). Total investment consists of business investment (*IB*) and residential investment (*IR*), although most of the literature (including that on the Bhaduri-Marglin model and the controversy between Kaleckians and Marxists) neglects this crucial distinction. Only business investment is dealt with theoretically, whilst empirical estimates generally use total investment.

For our purposes the distinction is important because higher wage shares are expected to reduce business investment as lower profit margins impact on profit expectations and retained earnings. In contrast, residential investment decisions are made by households or by construction firms whose demand will be strongly determined by the volume of mortgage loans. For most households, wages are the most important income source; if housing demand is predominantly from wage earners, then higher wages will enable workers to obtain larger mortgages. A substantial part of profits is retained earnings, which will have limited impact on housing investment. Thus residential investment will be affected not only by income but also by changes in distribution. To the extent that the working classes are homeowners we expect a positive effect of the wage share on residential investment ($\partial IR/\partial WS>0$). The overall effect of a change in the wage share on total investment is therefore ambiguous ($\partial I/\partial WS =?$).

In New Keynesian theory, financial wealth is usually held to be positively related to investment due to a relaxation of credit constraints (Stiglitz and Weiss 1981). Private wealth includes the physical stock of capital along with private ownership of land and natural resources (see Section 4). Hence, we can also expect a positive effect of private wealth on investment due to, say, the discovery of new oil fields or public investment in the reconstruction of private assets done in the inter-war or after-war periods ($\partial I/\partial PW>0$).

Our data does not allow us to disaggregate household from corporate wealth. In so far as the measure of private household wealth we use includes business liabilities,[2] private wealth could have a negative effect on investment ($\partial I/\partial PW<0$). Similarly, if

[2] Only in 1950 (Germany), 1961 (US), 1970 (France) and 1988 (UK) we are able to identify an approximate percentage of bonds in net wealth. In all cases except the US, bonds are included into the category "other assets" which averages 28% for Germany, 6% for US, 23% for France and 15% for UK.

higher net worth entails a larger overall balance sheet and firms react more strongly to changes in the value of liabilities than to changes in the value of assets, this could generate a negative effect on investment. The financialisation literature (Lazonick and O'Sullivan, 2000) posits a negative effect of financial wealth on investment. More broadly, financialisation is associated with shifts in corporate governance that orient managers towards profitability over growth. Lastly, some changes in private wealth arising purely from stock-price dynamics may have no effect on investment (Stockhammer and Wildauer, 2016). Therefore, as in the case of changes in distribution, private wealth has an ambiguous effect that will depend on both country and historical specificities ($\partial I/\partial PW = ?$).

Finally, we include the interest rate, which reflects the cost of credit and allows us to control for possible redistributions of profit from the nonfinancial to the financial sector. We expect a negative effect.

Aggregate expenditure equals the sum of consumption, investment, net exports (NX) and government consumption (G):

$$Y = C + I + G + NX \tag{3}$$

We can calculate demand regimes following Bhaduri and Marglin (1990), who proposed a general macroeconomic framework that allows for wage-led as well as for profit-led regimes. The paper has become an important reference point for heterodox macroeconomics because it synthesizes Kaleckian arguments, which emphasize the consumption demand coming from workers' income and the central role of profitability for investment in Marxian and Classical economics. The framework suggests that demand regimes can differ across countries and over time and has given rise to a substantial literature dedicated to identifying demand regimes empirically.

This paper focuses on the domestic private economy so both net exports and government expenditures are excluded from the analysis. Differentiating equilibrium income, *Y**, with respect to the wage share gives:

$$\frac{dY^*}{dWS} = \frac{h_2}{1 - h_1} \tag{4}$$

where $h_2 = \frac{\partial C}{\partial WS} + \frac{\partial I}{\partial WS}$ and $h_1 = \frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} + \frac{\partial NX}{\partial Y}$

The numerator of this equation, h_2, is the partial effect of a change in distribution on the domestic demand components, which is also called private *excess* demand: the increase in demand due to a distributive change *for a given level of income*. The denominator $\frac{1}{1-h_1}$ is similar to a standard multiplier but includes investment effects. It measures the second-round effects of changes in distribution. Assuming that the multiplier is positive, the sign of the total effect of a change in income distribution will depend on the sign of the effect on excess demand, i.e. h_2. The overall distributive dynamics of the economy will be determined by the relative strength of consumption and investment responses to higher wage shares. If higher consumption more than outweighs the reduction of investment due to lower profit margins, the economy as a whole will be wage-led ($\frac{dY^*}{dWS} > 0$). In the reverse case it will be profit-led ($\frac{dY^*}{dWS} < 0$).

We can calculate the effects of a change in private wealth in a similar way. Total wealth effects will depend on the combination of consumption and investment effects:

$$\frac{dY^*}{dPW} = \frac{h_3}{1 - h_1} \tag{5}$$

where $h_3 = \frac{\partial C}{\partial PW} + \frac{\partial I}{\partial PW}$

If h_3 is positive we call the economy wealth-led, if it is negative is it wealth-burdened. (this terminology is based on Dutt (2006) and Hein (2012)). The expression summarizes the effect of financialisation, here narrowly defined as an increase in private wealth, on aggregate demand. This is particularly interesting in the context of the financialisation literature which posits a positive effect of wealth on consumption, but a negative one on investment. The overall effect is thus a priori indeterminate.

The *demand regime* of an economy, defined by the combination of the coefficients of the behavioural equations, is distinct from the *growth model*, based on the actual contribution of different demand components to GDP. A demand regime is wage led if a redistribution towards wages *would* induce higher growth, regardless of *whether* such a redistribution has actually taken place, or whether consumption has actually been the main contributor to GDP. In contrast, the growth model is, in our context, determined by the actual patterns of distribution and asset valuation.

It should be clear that the demand regime analysis is partial equilibrium analysis. It is appropriate if one believes that changes in demand factors (as opposed to changes in the supply side) are the main drivers of actual growth processes. It is worth clearly stipulating what has been left out, if only as a guide to how such analyses can be enriched. First, supply side factors are assumed to be given; this is due to the post-Keynesian theory that demand is the active variable and the supply conditions will, to a substantial degree, adjust. Simply put, there is no natural (supply-side determined) rate of growth and no natural rate of unemployment. This does not mean that technology has to be static - Storm and Naastepad (2013) model productivity growth as a function of wage and demand growth.

Second, we are privileging changes in income distribution and financialisation as explanatory factors. This is a matter of emphasis – there are other factors such as the relation between national economies or the role of the state that could be analyzed within this framework. Third, we treat distribution and private wealth as exogenous in the sense that demand does not affect the wage share and private wealth contemporaneously.[3] This is in the interest of keeping the model tractable. A fuller approach would allow feedback between demand and distribution and between demand and financialisation (specifically asset prices) which is attempted in Minsky models (see Nikolaidi and Stockhammer 2017 for a survey).

What cross-country differences in demand regimes do we expect? Comparative Political Economy has highlighted differences between liberal market economies (in our case USA and UK) and coordinated market economies (in our case Germany, with France as an intermediate case) but dominant thinking in the field has concentrated on the supply side to the exclusion of demand regimes (Hall and Soskice 2001). Critics of the dominant paradigm, such as Baccaro and Pontussen (2016), have recently called for integrating Kaleckian insights into Comparative Political Economy but this work is still in its infancy. As regards wealth effects, it has been argued that market-based financial systems of the liberal economies should lead to larger wealth effects (as financial assets are more frequently revalued) than the bank-based financial systems of the organized market economies (Slacalek, 2009).

3. Related empirical literature

The empirical studies inspired by the Bhaduri Marglin model show a range of

[3] Econometrically, this can lead to endogeneity bias in our estimates. However, we expect this bias to be minor in our case as we focus our analysis on the long-run effects. We also report specifications which only include lagged, i.e. predetermined, variables, which are not subject to endogeneity bias.

methodological approaches and a variety of findings, with recent interest in the role of personal income inequality and financial cycles. Broadly, estimations of demand regimes can be divided into two main strands. First, the behavioural equation approach (Stockhammer 2017b), also referred to as structural approach (Blecker 2016), is based on estimating separate behavioral equations for the components of aggregate demand, in our case consumption and investment.[4] These effects are then totaled to obtain the overall effect of income distribution shifts on output. In contrast, the reduced-form approach directly regresses aggregate income on the wage share and various lags thereof, along with a set of control variables. Individual component effects are then retrieved from the overall results. Reduced-form VAR models are the most commonly employed in this strand of the literature (Barbosa-Filho and Taylor, 2006; Carvalho and Rezai, 2016; Kiefer and Rada, 2015; Stockhammer and Onaran, 2004). The advantage of the behavioural equations approach is that the estimated equations have a direct interpretation and the investment and consumption effects are easily identified. However, it is open to endogeneity problems if contemporaneous explanatory variables are included. The reduced-form approach addresses endogeneity problems but does not allow the identification the behavioural parameters and it cannot disentangle consumption and investment effects without additional assumptions.

Table 1 summarises the existing studies for the UK, France, Germany and the USA. We note, first, that all existing studies are restricted to the postwar era. Second, only a few studies control for financial variables. Third, the majority of studies find wage-led (domestic) demand regimes. Previously, a pattern between estimation strategy and

[4] Stockhammer (2017) uses the terms 'behavioural equations approach' versus 'reduced form approach'. Blecker (2016) distinguishes between 'structural approach' and 'aggregative approach'. Blecker argues that the reduced form approach is more likely to detect short-run effects, whereas the behavioural equations are focusing on the long-run effects.

findings had been noted, with behavioural equations more likely to find wage-led and reduced form equations more likely to report profit-led demand regimes. However, Jump and Mendieta-Muñoz (2017) and Blecker et al (2020) estimate systems estimators that report wage-led demand regimes for the UK and USA respectively. Blecker at al offer a systematic comparison of different estimators and use a GMM estimator and instrumental variables to address endogeneity issues.

[INSERT Table 1]

Among the multi-country time series studies Bowles and Boyer (1995), Hein and Vogel (2008) and Onaran and Galanis (2014) find all four countries covered in this study to be domestically wage-led while Nastepad and Storm (2007) found the USA to be profit-led. Kiefer and Rada (2015) for a panel of 13 OECD countries and Barbosa-Filho and Taylor (2006) for the USA employ the reduced-form method and also find profit-led demand regimes. However, as Stockhammer and Stehrer (2011, p. 510) report, the Barbosa-Filho and Taylor's findings are highly sensitive to lag length – extending from two to four period lags changes the demand regime from profit to wage led (for the USA). Systematic distinctions between so-called liberal (Anglo-Saxon) and coordinated (Germany, France) economies are not a strong finding of this literature.

In post-Keynesian economics the analyses of the effects of changes in income distribution and of changes in wealth have largely proceeded separately, which mirrors the Kaleckian and Minskyan streams. Only two studies within the demand regime literature control for wealth effects. Onaran, Stockhammer and Grafl (2011), employ variables for net financial and gross housing wealth in the US economy; and Stockhammer and Wildauer (2016) use data on house prices, equity prices and

household and business debt for a panel of 13 OECD countries for the period 1980-2011. Both follow the behavioural equations approach, find wage-led demand regimes and report sizable wealth effects, both in consumption and investment.

In the Minsky-inspired literature, Kim, Setterfield and Mei (2015) estimate an aggregate consumption function for the USA (1952–2011) controlling for wealth and borrowing and find that borrowing has positive effects. Zezza (2009) finds that net worth (which is similar to our measure of private wealth) has a positive impact on private expenditures (consumption plus investment) in the USA. Neither of these studies control for income distribution. Overall it is fair to say that wealth considerations did not play a major role in post-Keynesian analyses of consumption until the early 2000s. Since then, wealth and debt have begun to feature prominently, particularly in increasingly popular stock-flow consistent models, on which there is yet limited empirical research.

Mainstream empirical research on how wealth affects consumption is more substantial (Table 2). For example, Ludwig and Sløk (2004) and Slacalek (2009) include housing wealth and financial wealth in standard consumption functions and find a higher marginal propensity to consume out of housing relative to financial wealth in the USA and UK. For European countries the marginal propensity to consume out of housing wealth is often small. In a variation emphasising the importance of credit availability, Muellbauer (2007) and Aron et al. (2012) argue that rising housing wealth feeds in positively to consumption through a relaxation of credit constraints. Linder (2013) argues that changes in both demographics and mortgage institutions precipitated a shift in the consumption effect of housing wealth, which became positive only after the mid 1980s. Slacalek (2009) and Goodhart and Hofmann (2008) also find stronger

effects from the late 1980s. Jordà et al. (2016, p. 115) present historical data on aggregated bank balance sheets and show that the phenomenal increase in bank lending to GDP ratios since the 1970s, a marker of the financialisation of advanced economies, has been almost entirely driven by mortgage lending.

[INSERT Table 2]

The recent literature on financialisation builds on Marxist, post-Keynesian and political economy theories of finance (van der Zwan 2014). One of its main contributions has been an analysis of how changes in corporate governance regimes have affected investment behavior, specifically the way that shareholder oriented management principles have led non-financial firms to deepen involvement in financial activities, while dampening real accumulation (Table 3). Krippner (2005) documents the growing share of financial incomes in the total profit statement of US firms. Stockhammer (2004) showed econometrically, using national accounts data, that these increased financial incomes in the USA, UK and France have been associated with lower rates of capital formation. The same finding was reached using firm-level data for the USA by Orhangazi (2008) and for the UK and European countries by Tori and Onaran (2017, 2018). Hecht (2014) also studied firm-level data in a range of large economies and found negative effects of financial profit in China, France, Germany, India and the USA. In Clévenot et al. (2010) financialisation is measured by firms' financial asset accumulation and is found to be negatively related to investment. Similarly, Tomaskovic-Devey, Lin and Meyers (2015) measure financialisation as the proportion of financial assets over total assets and find negative impact for value added.

[INSERT Table 3]

All of the literatures just reviewed cover a fairly recent time frame. While consumption and investment have been extensively studied in historical research, we are not aware of any attempts to model their macroeconomic dynamics in the way we do here. Eichengreen (1982) models fluctuations in investment in Victorian England using an asset market approach in which the shadow price of capital is proxied by Tobin's q. One fairly long-range study is Collins and Williams (2001), who use a dataset of 13 developed economies between 1870 and 1950 to show that relative prices of capital goods are significant in explaining cross-country variation in investment. They find an elasticity of the price of capital goods with the investment share of GDP of -0.68.

From a historical perspective consumption has mostly been studied as social practice, focusing on cultures and real quantities, rather than as a demand component or macroeconomic phenomenon (McCracken 1987 chronicles the rise of consumption histories). Gazeley and Newell (2015), for example, study caloric and vitamin intakes of different income strata cultures of distribution within British working class families in 1904. One study of consumption determinants is Greasley, Madson and Oxley (2001) who use stock market variation to proxy income uncertainty in a simple model that includes lags of consumption and wealth effects. They find that most categories of consumption in the USA, especially durables, were strongly affected by uncertainty around the Great Depression which may help to account for the slow recovery.

4. Data and econometric methodology

The dataset used in this article is was developed by Piketty and Zucman's (2014), and provides internationally standardised long-term information on national income,

labour share, consumption, investment and national wealth for all relevant countries up to 2010, but with different starting dates. All relevant variables begin in 1855 for the UK and 1870 for Germany. For France and the USA we are constrained by wage share information, which only begins in 1896, and in 1929 respectively. Our estimations thus cover different time ranges for different countries. Corporate (non-residential) investment is available for France and the USA. National account information in the Piketty-Zucman dataset is drawn from economic history scholarship and official statistics where available. Long-term interest rates were obtained from Jordà, et al. (2016).

The Piketty-Zucman dataset offers a single measure for private net wealth (assets minus liabilities). We should be clear that our interpretation of this variable differs from Piketty (2014). Piketty treats wealth, i.e. ownership of financial and non-financial assets, and capital, i.e. the productive capacity of an economy, as synonymous. Piketty (2014, chapters 5 and 6) proposes an explanation of income distribution based on neoclassical marginal productivity theory, involving the marginal products of capital and rates of substitution between capital and labour. This has been criticized for conflating financial assets and productive capacity, in particular Piketty and Zucman's wealth measure seems to a substantial degree be driven by real estate prices (Rognlie 2015). In contrast, we do not use private wealth as factor of production, but rather consider its impact on demand.

Private wealth is defined as the net wealth (non-financial assets plus financial assets minus liabilities) of households and non-profit institutions serving households (NPISH). In addition to individuals, the household sector includes most unincorporated enterprises. Corporations are part of this private wealth through the

equity and corporate bond holdings of households. Enterprise capital is calculated based on market capitalization. Figure 1 plots the development of private wealth relative to GDP. Wealth shares were high relative to income in the 19th century but were eroded during World War I in the aftermath of World War II. They remained low during the post-War era and then began rising from the 1970s.

[INSERT Figure 1]

The wage share is defined as the sum of all labor income identifiable in national accounts: wage and salaries, imputed labor income in the non-corporate business sector, and net foreign labor income, as a percentage of GDP at current prices. Piketty and Zucman (2014) deal with the issue of self-employment by assuming the same income shares in the non-corporate and corporate business sectors. Figure 2 plots the wage share for the four countries. Wage shares trended downwards from the late 19th century until World War I, thereafter entering a period of high volatility until World War II. They were generally increasing in the post-War era but have, since the late 1970s, once again assumed a downward trend. Online Appendix 1 provides the descriptive statistics of our main variables of interest.

[INSERT Figure 2]

Augmented Dickey-Fuller (ADF) tests for unit roots were performed with 2 lags, including either intercept or trend and intercept. ADF results are reported in Online Appendix 2 - almost all our variables have a unit root. The null hypothesis is rejected at the 10% level. Only the wage share does not have a stochastic trend. When we perform the test on the first difference of all variables, none are found to have unit root (also reported in Online Appendix 2). We will use an error-correction model (ECM) to identify long-run relationship and use the critical values for cointegration

tests from Banerjee, Dolado, and Mestre (1998), which are 3.47, 3.82 and 4.49 at the 10%, 5% and 1% for three explanatory variables and 3.67, 4.03 and 4.71 respectively for four explanatory variables (for a sample size of 100, which is approximately our sample).

5. Econometric results

Our consumption baseline model (specification 1) is

$$\Delta c_t = \alpha_0 + \alpha_1 c_{t-1} + \alpha_2 y_{t-1} + \alpha_3 pw_{t-1} + \alpha_4 ws_{t-1} + \sum_{j=0}^{2} \beta_{1j} \Delta y_{t-j} + \sum_{j=0}^{2} \beta_{2j} \Delta pw_{t-j} + \sum_{j=0}^{2} \beta_{3j} \Delta ws_{t-j} + \sum_{j=1}^{2} \beta_{4j} \Delta c_{t-j} + \varepsilon_t \quad (6)$$

Where consumption, *c*, national income, *y*, wealth, *pw*, and the wage share, *ws*, are all in log form. Our main interest is the cointegration equation, where we expect positive signs for all the variables. Specification 1 includes contemporaneous short-run effects and lagged effects. We will also report two variations on this specification as robustness checks. Specification 2 offers a more parsimonious specification by dropping the second lag of the differences. If multicollinearity is an issue, this should improve the precision of the estimates. Specification 3 excludes contemporaneous effects: this follows the Goodwin-inspired models (e.g. Kiefer and Rada 2015) and has the advantage of not being subject to endogeneity problems. Dummy variables were included for years with residuals higher than 1.5 standard deviations of the first stage regression without dummies. These years are indicated for each country in the tables below. We follow convention and report Durbin-Watson (DW) statistics, but its standard critical values are not applicable because a lagged dependent variable is

included. Thus we also report Breusch-Godfrey (BG) Serial Correlation LM Test with the null hypothesis that there is no serial correlation in the residuals up to 3 lags.

Table 4 reports our results for consumption for the USA and UK. Specifications including contemporaneous effects present higher t-ratios for the error correction term with specifications 1 and 2 for the USA and for the UK passing the critical ratio for cointegration (at the 10% level). All estimations (except specification 2 in the USA) report large and statistically significant long-term wage share and wealth effects. Excluding contemporaneous effects (specification 3) results in autocorrelation problems (the BG test rejects the null of no autocorrelation at the 5% level for both the USA and the UK) and the t-value of the error correction term falls clearly short of the critical value for cointegration. We thus regard specification 3 as less reliable.

In specification 1 the wage share elasticity in the USA is 0.94 and statistically significant at the 1% level. Wealth effects are also statistically significant at the 1% level with an elasticity of 0.43. However, this specification suffers from autocorrelation. Therefore, we prefer specification 2, which gives a similar elasticity of wealth effect, 0.41 (statistically significant at the 1% level), but a lower wage share elasticity of 0.52 (not statistically significant). For the UK, specification 1 passes the cointegration critical value and has no signs of autocorrelation. The wage share elasticity is 0.69 and statistically significant at the 1% level. Wealth effects are smaller than the USA, at 0.24, also significant. Specification 2 gives similar results.

[INSERT Table 4]

Table 5 reports the consumption equations for France and Germany. For France t-ratios for the error correction term pass the critical values in specification 1. However, that specification returns a perverse (and statistically significant) long-run wage share

effect. Specification 3 is the only one that presents a positive wage share, but it is small and not statistically significant. However, this sign is not robust when we repeat the estimation for subperiods (reported in section 6). Wealth effects are not statistically significant in any specification and are consistently low (relative to the USA and UK). For Germany cointegration tests are passed in all specifications. Wage share effects are small and statistically insignificant for all specifications. Similarly to France, wealth effects are never statistically significant. Specification 1 reports a valid ECM and no autocorrelation so is also preferred. The wage share and wealth elasticities of consumption are 0.30 and 0.06 respectively. Overall *WS* and *PW* do not seem to play a major role in the consumption equations for France and Germany.

[INSERT Table 5]

The income elasticity of consumption presents large and statistically significant values across models for almost all countries (the only exception is specification 3 in the UK). Moreover, results are stable across different specifications for each country. The effect is lower in Anglo-Saxon countries, with values averaging 0.55 for the USA and 0.63 for the UK. In the case of France, values average 0.85 and 0.91 in Germany.[5]

Our baseline model for investment is:

[5] As a robustness check we also estimated the consumption equation along the lines of Onaran et al. (2011) where the share of consumption over income is regressed on the wage share and private wealth over income. A referee suggested that this specification may be more reliable if the consumption differential between wages and profits changes with the level of income. We present results for specifications in differences in Online Appendix 3. Results are somewhat sensitive to the specification, but qualitatively consistent with our results. Consumption effects are statistically significant and larger in these specifications and the effect for France is positive. Wealth effects are also statistically significant, sensitive to the lag structure, but overall substantially larger than our baseline.

$$\Delta i_t = \alpha_0 + \alpha_1 i_{t-1} + \alpha_2 y_{t-1} + \alpha_3 pw_{t-1} + \alpha_4 ws_{t-1} + \alpha_5 LTR_{t-1} + \sum_{j=0}^{2} \beta_{1j} \Delta y_{t-j}$$
$$+ \sum_{j=0}^{2} \beta_{2j} \Delta pw_{t-j} + \sum_{j=0}^{2} \beta_{3j} \Delta ws_{t-j} + \sum_{j=0}^{2} \beta_{4j} \Delta LTR_{t-j} + \sum_{j=1}^{2} \beta_{5j} \Delta i_{t-j}$$
$$+ \varepsilon_t \quad (7)$$

All variables are in log form, with the exception of the long-term real interest rate (LTR). The different specifications follow the same logic as above. For France and the USA we also report results with corporate investment (instead of total investment) as dependent variable.

Table 6 reports the results for USA and UK while Table 7, for France and Germany. For all countries the results suggest cointegration; for the USA, UK and France specification 1 clearly passes the cointegration critical value of Banerjee et al. (1998), for Germany specification 2 presents the highest t-ratio. For the USA, specification 1 returns a negative statistically significant value at the 10% level of private wealth and a positive value, although not significant, for the wage share. In specification 2, private wealth and wage share have the same signs but the former is no longer significant. In the UK, all specifications show robust, negative and statistically significant (at the 1% level) relations with private wealth. The wage share is not significant but presents positive values for specifications 1 and 3, the only ones without autocorrelation problems.

[INSERT Table 6]

[INSERT Table 7]

In France wage share effects are positive in all specifications and statistically significant in specification 3, which suffers from autocorrelation problems. Specifications 1 and 2, on the other hand, present wage share elasticities ranging between 0.45 and 0.29. Wealth effects display positive values ranging between 0.03 and 0.02, although statistically insignificant. For Germany only specification 2 is close to the critical value for cointegration. Wage share elasticities are positive and large: a 1 percent increase in wage share is associated with an *increase* in investment of 1.62 percent. Wealth effects are statistically significant in specifications 1 and 2, ranging between 0.66 and 0.49.

Notably, almost all specifications report a *positive* long-term effect of the wage share on investment. This is the reverse of what is usually assumed in the Bhaduri-Marglin framework. These findings change considerably when only corporate investment is considered: higher wage shares seem to have a substantial and significant *negative* impact on *corporate* investment. In the case of France wage share elasticities are reasonably robust to the inclusion of one or two lags when contemporaneous effects are present, and they are statistically significant in both cases. In specification 2 the wage share effect is largest, with a coefficient of -0.93. This specification does not suffer from autocorrelation and all signs are as expected. The US wage share elasticity is comparable for specification 2, at -0.62. Wealth effects on French corporate investment are positive (and statistically significant) and larger than for total investment. They are largely invariant to the inclusion of lags – a 1 percent increase in wealth is associated with around a 0.13 percent increase in non-residential investment. In the USA wealth effects are negative and larger (and statistically significant) for corporate investment.

The income elasticity of investment in the long-term is found to be large and statistically significant across models and countries. The effect is largest in the USA, especially for corporate investment alone, where all models report an elasticity above 3. Differently to this, the elasticity is smaller for French corporate than total investment, although it is still substantial – at around 0.84. The effect is smallest in Germany, in our preferred estimation (specification 1), the elasticity is only 0.66. In the UK, investment is again highly responsive to income – our preferred specification reports an elasticity of 1.71. Interest rates have the expected negative effect in most specifications.

6. Domestic demand regimes

As our model is defined in logarithms, the results we have presented so far are the elasticities of consumption and investment to the wage share, GDP and private wealth (in the case of long term interest rate, since it is defined in levels, we have a semi-elasticity). Clearly, the marginal effect will depend on the date on which the relation is measured.[6] Table 8 presents total domestic demand effects calculated at the mean of each sample and also reports the statistical significance of the total effect, a Wald test whose null hypothesis is that the combined effects, which are a non-linear parameter restriction, is equal to 0.[7] Both equations were estimated as a system, which allows for factoring in estimates uncertainty and therefore testing restrictions across equations. For the UK and France (with total investment), we find statistically significant effects both for distribution and wealth. For Germany, distribution effects are statistically significant while wealth effects are close to the 10% threshold while

[6] In the case of the marginal effect of changes in consumption due to income distribution, we have: $\frac{\partial C}{\partial WS} = e_{C,WS} \cdot \frac{C_t}{\mathrm{WS}_t}$

[7] Estimations were performed with EViews.

for the USA as a whole, wealth effects have a p-value of 0.0015 and distribution, 0.1537.

[INSERT Table 8]

For the whole economy, all countries except France display a positive private excess demand when we consider the marginal effects of a redistribution toward labour on consumption and investment together. Regarding investment, none of our countries conform to the standard post-Keynesian (or Marxist) hypothesis that higher wage shares have a direct negative effect on investment. It is this positive effect of the wage share on investment which ensures positive private excess demand in USA, UK and Germany (since effects on consumption are positive as expected). In Germany, the elasticity of consumption with respect to the wage share was found to be in line with what is found in most of literature (Hein and Vogel, 2008, p. 491; Onaran and Galanis, 2014, p. 12; Stockhammer and Stehrer, 2011, p. 515). In contrast, in the USA and the UK, consumption elasticities are found to be substantially above those reported by other researchers, around double what is found in Onaran and Galanis (2014, p. 35) for example – adding to the positive excess demand from investment. For France the perverse negative effect on consumption overpowers the positive investment effect.

The unexpected sign that we find on the long-term investment coefficient reverses when we consider only corporate non-residential investment in France and the USA, where the data is available. The difference between corporate investment and total investment is primarily residential investment. We thus conclude that changes in income distribution have opposite effects on corporate and residential investment. Higher wages seem to encourage higher spending on residential construction by the

recipients of labour income. We find these effects to be large enough to more than offset the negative impact on business investment that results from lower profit margins. Non-corporate investment typically makes up a substantial amount of the total – at the mean of our samples for the USA and France it comprised just over 50 percent. Most of the empirical literature on demand regimes does not make the distinction – our results add empirical support to theoretical reasons for treating the two separately. If our findings are accurate, the positive effect on residential investment has dominated the negative in corporate investment – advanced economies are likely to have been even more strongly wage-led than previously supposed.

Another important finding is that wealth effects on consumption largely follow what is predicted by the literature that contrasts market-based (Anglo-Saxon) from bank-based financial systems (see Jackson and Deeg, 2006 pp.13-15 for a review). The former is characterized by market-based financial systems with larger and more dominant capital markets and lower state involvement in housing and social provision. Households therefore tend to have greater access to and be more dependent on financial and residential wealth – consistent with the finding above that increases in wealth indexes have strong effects on the level of consumption. So-called coordinated market economies, of which Germany is emblematic, are defined by stronger state control over housing and social provision and a more prominent place for banks relative to equity markets in investment financing. Our findings show that consumption in these economies is less correlated with national wealth.

This pattern is reversed when it comes to investment – net wealth effects are positive in France and Germany and negative in the UK and especially the USA, where effects were unusually high. This may be partly explained by the fact that corporate bonds

are part of net wealth. Significantly, the results are consistent with the financialisation literature discussed above. Greater financial accumulation by non-financial corporations will show up ultimately on household balance sheets in our data. The negative correlation of investment and private wealth is therefore likely to reflect the same orientation of managers towards financial outcomes that was found in Stockhammer (2004), Orhangazi (2008) and Tori and Onaran (2017). These forces do not seem to operate in Germany and France or, at least, are countervailed by the positive effects of private wealth on investment. While we prefer an interpretation in terms of financialisation, we acknowledge that it is possible that these positive effects could also be due to other factors, for example the rapid growth of the capital stock in the post-World War II reconstruction period, which was more dynamic in Germany and France than in the USA and the UK.

Overall effects of a wealth increases on domestic spending are positive in all countries, i.e. the consumption effects outweigh the investment effects. Total effects are statistically significant (at the 5% level) for USA, UK and France. Thus economies seem to have been wealth-led.

Results in Table 8 are based on our preferred specification, which may suffer from endogeneity problems. To check whether our main findings are robust to choosing specifications that only rely on predetermined explanatory variables, in Online Appendix 4 we report results based on specification 3, i.e. without contemporaneous effects, for all equations. The results are qualitatively similar (but statistical significance deteriorates). Regarding wage share effects, seven out of ten equations report the same sign. A switch in sign occurs in the following cases: consumption in France, which turns positive (but very small); consumption in Germany, which turns

negative (but very slightly); and (total) investment in the USA, which turns negative. As regards wealth effects, signs switch in four equations, but coefficients are very small in all cases. Overall domestic demand regimes do not change.

7. Do demand regimes change over time?

Our estimation period covers more than a hundred years, a period that witnessed momentous economic and social changes. These include the rise of welfare states, two waves of globalization and a change in the global hegemon from Great Britain to the USA. There is no universally agreed periodization of capitalism over this length of time but one common framework recognizes four broad phases: a liberal pre-WWI period, a disarticulated interwar period, a Fordist post-WWII period and a final period of neoliberalism (from around 1980). The question naturally arises as to whether institutional changes of this kind would have resulted in parameter changes and hence whether demand regimes can be meaningfully estimated.

The establishment of welfare states, which began in the 19th century with health care, social security and old-age pension, seems especially pertinent for the demand behaviour of the economy. Some well-known differences among welfare regimes notwithstanding (Esping-Andersen, 1990), in all four of countries welfare states expanded in the post-War era to include unemployment insurance systems, a recognition of the role of labour unions and a commitment to full employment as a policy goal. The post-1980 period has seen a broad trend towards welfare state retrenchment, although its extent is debated (Pierson 1994, Clayton and Pontusson 1998). The broad contours seem clear: welfare states have been weakened, but are still stronger than in the 19th century. For our purposes these developments are important due particularly to two effects associated with welfare states. First, welfare

states tend to have a mitigating effect on inequality, which in our context means a lowering of wage shares (e.g. Kristal 2010, Stockhammer 2017a). Second, due to the partial decommodification of labour, the link between wage incomes and working class consumption may be weakened, which may be reflected in the coefficient of the wage share on consumption.

Note that only the second of these implies a change in model parameters. In other words, it is possible that institutional change is reflected in a shift in key variables and thus is consistent with stable parameters provided these variables are controlled for. In our case, if the growth of welfare states and changes in labour legislation are reflected in changes in the wage share (see Figure 2) and, similarly, if waves of financial deregulation result in movements in private wealth (see Figure 1), then institutional change will register without a change corresponding change in the *demand regime* (parameters).

Econometrically we address the question of parameter stability in two ways, firstly through recursive estimates. These estimate the equations using the first 15 observations and then continue in a rolling estimation by adding successive years. They indicate some changes in parameter values before 1950, but mostly stable parameters thereafter (see Online Appendix 5). Second, we test for the presence of structural breaks using the Quandt-Andrews method, which performs a series of Chow breakpoint tests and identifies the most important breakpoint. In all cases the most this is found to occur in the 1930s or 1940s (the only exception is consumption for France with a break in 1918).[8]

[8] We find the following breaks: USA 1944 (consumption) and 1946 (investment), UK: 1940 and 1946; France: 1918 and 1945; Germany: 1931 and 1935.

Based on these breakpoints, we re-estimate consumption and investment equations for the periods before and after 1945 for the UK, France and Germany (for the USA the pre-WWII period is too short; full results are presented in Online Appendix 6). Table 9 summarises total private domestic demand effects for France and the UK. Note that if there were indeed structural breaks, one would expect the results for the subsample to improve. This was not found to be the case, however. Germany fails to pass the cointegration critical value for all specifications.[9]

[INSERT Table 9]

We note that for France wage share effects on consumption are *positive* for both sub-periods. Table 9 sheds some light on the results obtained for the whole period. Wage share effects on consumption and investment change between the pre- and post-WW2 period in similar ways for both countries. The marginal effect of the wage share on consumption decreases from 0.46 in the pre-War period to 0.25 in France and from 0.90 in to 0.82 in the UK. A number of factors could explain the decreasing sensitivity of consumption to higher labour shares over time. Firstly, at lower levels of development, marginal propensities to consume have likely been higher, as a greater proportion of workers live close to or at subsistence, with little option of saving. Secondly, labour income in the earlier period made up a greater proportion of the total income for a greater share of the total workforce, whilst capital ownership for was highly concentrated amongst the wealthy. Less developed financial systems may also have meant that ambitions to save and smooth consumption could not be realized, leading to higher current consumption out of income.

[9] For the UK we find statistically significant cointegration relations for consumption in the first period and close to the 10% threshold in the second; for investment we find statistical significance in the second period only. For France, we find statistically significant ECMs for consumption and investment in the first period and investment in the second, without autocorrelation in all cases.

Interestingly, the positive association of higher wage shares with investment that was found for the whole period changes when the sample is split – for the pre-war period in both France and the UK, higher wages have a negative effect on investment: -0.005 for France and -0.45 for the UK. For the later period effects change to 0.21 and 0.29 respectively. Long-run positive investment-wage share relationships that were described above are thus driven by the post-War period. This is also consistent with our earlier attempt to understand this putatively perverse relationship, which hinges on the importance of residential expenditure in total investment. With the general increase of income and population, a greater proportion of the population was able to afford their own residence.[10]

Results for wealth effects confirm the findings for estimations covering the whole period. Effects on consumption are positive and larger in the UK in both periods. Wealth effects on consumption in France have declined since World War II, but increased in the UK. Effects on investment are positive for France and negative for the UK for both periods. Investment effects have been stable in France, but have declined for the UK. Despite the negative effects of financialisation on investment, the UK has become more finance-led since World War II, owing to the relatively stronger impact of consumption effects. While there is change within countries, cross-national differences in the financial systems seem to be persistent over time.

We also experimented with splitting the post-war period into two periods (1945-1980 and 1981-2010) to allow for potential differences between a Fordist and a neoliberal period. Although Chow tests are consistent with a structural break in the 1980, results

[10] Available data suggest a secular increase in homeownership in the 20th century. For Britain, Holman (2005, p. 166) reports homeownership rates of 31% for 1953/54, whereas today they are around 68%. For the USA homeowner ship rates have been estimated below 50% in 1900, but have varied between 63% and 69% since 1965 (see also Blackwell and Kohl 2018).

for these sub-periods failed cointegration tests and results lack robustness (Online Appendix 7). This suggests that either these samples are too short for ECM specifications or there is insufficient evidence for parameter change between these periods.

8. Conclusion

This paper has extended the analysis of growth regimes and of wealth effects to a much longer historical range, using a sample that covers more than a century for the UK, France and Germany and more than 80 years for the USA, based on a dataset compiled by Piketty and Zucman (2014). This is relatively uncharted territory in historical macroeconomics and we should be clear that historical data may not have the same degree of reliability as recent data. Results should thus be interpreted with a measure of caution and future research will need to corroborate our findings with other data sources. Keeping these qualifications in mind, we have some interesting findings. For the USA and UK we find economically large effects of distribution on consumption. For France we find a negative consumption differential, but that is not robust to dropping the contemporaneous short-run effects and it does not hold for subperiods. Perhaps surprisingly we find that wage shares are positively related to total investment in all countries. We explain this seemingly perverse result as caused by residential investment, which can react positively to an increasing wage share. In contrast, wage share effects on corporate investment (available only for the USA and France) show the expected negative effects. Overall our main finding is that USA, UK and Germany have exhibited a wage-led domestic private demand regime.

In the case of financialisation, defined here as the effect of an increase in private wealth on aggregate demand, we find evidence for the full sample but effects differ by country. For the USA and the UK we find positive wealth effects in consumption and negative wealth effects on investment. For France and Germany we fail to find wealth effects on consumption, but we find some evidence for positive wealth effects on investment. A possible explanation for this is that some of the financialisation patterns recently highlighted by the financialisation literature, i.e. rising consumption but dampened business investment, have been features of Anglo-Saxon capitalism for a long time. In contrast, results for France and Germany seem to be consistent with a story of consumption not being tied to wealth and investment benefiting from increased wealth. This could reflect wealth accumulation by firms, which loosens their liquidity constraints.

When we split our whole sample into the pre-WW2 and post-WW2 period for France and UK, we find higher consumption elasticities for the first period. This suggests higher marginal propensities to consume of the working classes at earlier stages of capitalist development (or rising consumption propensities of the upper classes in mature capitalism). We also find that the perverse sign in investment functions only holds for the post-WW2 period, but not before. This is consistent with the increasing importance of residential investment driven by the working class.

Our findings have several implications for future research. First, it is notable how small the historic macroeconometric literature is. We think this promising area of research can raise interesting questions about continuity and change in economic regimes. Second, future research should explore structural breaks and structural change more systematically; these are interesting both in relation to distribution

effects and for the role of wealth and debt. Third, independent of time period, our findings highlight the need to distinguish between business investment and residential investment. Forth, this paper has investigated the determinants of private expenditures leaving aside government expenditures. Capitalist market economies, however, are shaped by government activities, both in terms of regulation and in terms of expenditure and income stream. Future research should investigate the impact of the changing role of the state.

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Table 1: Domestic Demand Regimes Empirical Literature

Paper	Period	Data	Domestic demand regime					Wealth effects	Estimation strategy
			Gr	Fr	UK	US	Panel		
Bowles & Boyer (1995)	1961-1987	TS	W	W	W	W			BE
Barbosa-Filho & Taylor (2006)	1948-2002	TS	-	-	-	P			RF
Ederer & Stockhammer (2007)	1960-2004	TS	-	W	-	-			BE
Naastepad & Storm (2007)	1960-2000	TS	W	W	W	P			BE
Hein & Vogel (2008)	1960-2010	TS	W	W	W	W			BE
Stockhammer & Stehrer (2011)	1970-2007	TS	W	W	P	W			BE
Onaran, Stockhammer & Grafl (2011)	1962-2007	TS	-	W	-	-		Y	BE
Stockhammer, Hein & Grafl (2011)	1970-2010	TS	W	-	-	-			BE
Onaran & Galanis (2014)	1960-2007	TS	W	W	W	W			BE
Hartwig (2014)	1970-2011	Panel					W		BE
Rada & Kiefer (2015)	1971-2012	Panel					P		RF
Onaran & Obst (2016)	1960-2013	TS	W	W	W				BE
Stockhammer & Wildauer (2016)	1980-2013	Panel					W	Y	BE
Jump & Mendieta-Muñoz (2017)	1971-2007	TS				W			RF
Blecker, Cauvel & Kim (2020)	1963-2016	TS				W			BE

Notes BE = Behavioural Equations, RF=Reduced Form, TS=time series, W = wage-led; P= Profit-led, Y = wealth effects included.

Table 2: Wealth Effects Literature

Paper	Period *	Sample		Method	Main finding
Ludwig and Slok (2004)	1980 - 2000	16 OECD Countries	Panel (w sub-groups)	BE	Positive effect of housing and stock market wealth on consump.; much stronger in market-based economies (US, UK).
Muellbauer (2007)	1975-2001	UK; US; South Africa; Japan	Separate	BE	Large positive effect of wealth on consump.; esp. liquid assets; Little effect of housing wealth before 1980, large thereafter in market-based economies.
Goodhart & Hofmann (2008)	1970 - 2006	17 Industrialized Countries	Panel	VAR	Multidirectional relationships between housing wealth, consumption and other macroeconomic variables; much stronger effects after 1985.
Slacalek (2009)	1970 - 2003	17 OECD Countries	Separate	BE	Positive effect of housing and stock market wealth on consump.; much stronger in market-based economies (US, UK); housing effect grows after 1988.
Aron et al. (2012)	1979 - 2009	US; UK; Japan	Separate	BE	Liberalization and improved credit access has shifted up consumption curve in market-based economies (US, UK) since 1980s; indebtedness and lower wealth likely to negatively effect consumption.
Linder (2013)	1959 - 2010	US	-	VAR	Little to no effect of housing wealth on consumption prior ti 1980s; substantial thereafter
Kim et al (2015)	1952 - 2011	US	-	BE	Little effect of wealth on short run consumption for either whole period or post-1980 sub sample (except during crises).

*Periods often differ between countries in sample.

Table 3: Financialisation Empirical Literature

Paper	Period	Data	Variables	Effect on Investment
Stockhammer (2004)	1963 - 1997	National Accounts	Financial income	Negative, except Germany
Orhangazi (2008)	1973-2003	Panel of US nonfinancial firms	Financial profit; financial payout	Negative
Clévenot (2010)	1978 - 2003	Panel of French nonfinancial firms	Equity demand and accumulation	Negative
Hecht (2014)	1998 - 2008	Panel of 7 countries nonfinancial firms	Financial profit; financial payout	Negative in a few cases
Tomaskovic-Devey et al. (2015)	1970-2008	Panel of US nonfinancial industries	Financial Assets	Negative
Tori & Onaran (2017)	1995 - 2015	Panel of European nonfinancial firms	Financial income; financial payout	Negative
Tori & Onaran (2018)	1983 - 2013	Panel of UK nonfinancial firms	Financial income; financial payout	Negative

Table 4: Regression results for consumption equations, USA and UK

	USA[1]			UK[2]		
	1	2	3	1	2	3
c(-1)	-0.254††	-0.214	-0.220	-0.176†††	-0.178†††	-0.096
t-stat	-4.308	-3.576	-2.565	-4.777	-4.846	-1.584
ws(-1)	0.239***	0.110	0.355***	0.123***	0.126***	0.147**
t-stat	2.858	1.364	3.084	3.179	3.529	2.465
pw(-1)	0.110***	0.088***	0.104**	0.043***	0.043***	0.039**
t-stat	3.372	2.679	2.229	3.667	3.900	2.113
y(-1)	0.144***	0.124***	0.114**	0.122***	0.122***	0.049
t-stat	4.464	3.752	2.413	4.287	4.326	1.048
Δws	-0.221*	-0.140		0.056	0.030	
t-stat	-1.756	-1.045		0.755	0.417	
Δpw	0.140***	0.156***		0.175***	0.171***	
t-stat	3.095	3.305		4.078	4.429	
Δy	0.292***	0.340***		0.628***	0.628***	
t-stat	4.547	4.910		11.757	11.857	
Δc(-1)	0.303***	0.221**	0.119	0.069	0.103**	-0.201**
t-stat	2.748	2.051	0.798	1.191	1.862	-2.219
Δws(-1)	-0.117	0.031	-0.754***	-0.077	-0.106	-0.302***
t-stat	-0.855	0.233	-4.466	-1.090	-1.649	-2.672
Δpw(-1)	0.041	0.010	0.252***	0.010	-0.005	0.362***
t-stat	0.693	0.166	3.802	0.200	-0.112	6.227
Δy(-1)	-0.126	-0.064	-0.165	-0.063	-0.081	0.126
t-stat	-1.570	-0.822	-1.580	-0.969	-1.385	1.186
Δc(-2)	-0.057		0.077	0.110		0.109
t-stat	-0.555		0.519	1.578		0.956
Δws(-2)	-0.080		0.021	-0.062		-0.131
t-stat	-0.647		0.116	-0.972		-1.217
Δpw(-2)	-0.107*		-0.266***	-0.022		-0.204***
t-stat	-1.896		-3.428	-0.495		-3.053
Δy(-2)	0.165**		0.288***	-0.110		-0.108
t-stat	2.289		2.764	-1.565		-0.936
obs	79	80	79	153	154	153
r2	0.833	0.790	0.611	0.896	0.893	0.696
DW	1.721	1.912	1.519	2.174	2.195	1.724
BG Serial Correl.	0.0247	0.8031	0.0005	0.4586	0.2993	0.0350
Long run effects						
ws	0.940	0.515	1.614	0.696	0.710	1.528
pw	0.432	0.414	0.472	0.244	0.244	0.403
y	0.565	0.580	0.517	0.690	0.689	0.513

[1]Estimation period 1929-2010. Dummies for 1942, 1943, 1944 and 1945.
[2]Estimation period 1855-2010. Dummies for 1914, 1915, 1916, 1917, 1918, 1919, 1921, 1939, 1940, 1941, 1942, 1943, 1944 and 1945
*, ** and *** denote statistical significance at the 10%, 5% and 1% level based on standard t values. †, †† and ††† denote statistical significance at the 10%, 5% and 1% level based Banerjee, Dolado, & Mestre (1998) ECM test

Table 5: Regression results for consumption equations, France and Germany

	France[1]			Germany[2]		
	1	2	3	1	2	3
c(-1)	-0.220††	-0.162	-0.361	-0.157††	-0.122††	-0.182†
t-stat	-4.070	-3.254	-3.638	-4.574	-4.037	-3.786
ws(-1)	-0.113**	-0.049	0.022	0.048	0.052	-0.003
t-stat	-2.081	-0.914	0.215	1.314	1.479	-0.062
pw(-1)	0.009	0.010	-0.002	0.009	0.007	-0.007
t-stat	1.086	1.233	-0.128	1.541	1.358	-0.893
y(-1)	0.187***	0.135***	0.312***	0.139***	0.107***	0.175***
t-stat	3.930	3.131	3.639	4.459	3.962	4.058
Δws	0.032	0.007		0.263***	0.351	
t-stat	0.408	0.087		2.766	4.032	
Δpw	0.019	0.050		0.099	0.081	
t-stat	0.189	0.506		1.318	1.097	
Δy	1.058***	1.140***		0.465***	0.508***	
t-stat	12.223	14.255		8.511	10.096	
Δc(-1)	-0.229**	-0.172*	-0.537***	0.185*	0.123	0.320**
t-stat	-2.472	-1.827	-3.009	1.894	1.292	2.293
Δws(-1)	-0.018	-0.058	-0.056	-0.040	-0.082	-0.244*
t-stat	-0.241	-0.748	-0.382	-0.412	-0.864	-1.801
Δpw(-1)	-0.029	-0.148	0.634***	-0.103	0.005	0.017
t-stat	-0.204	-1.485	3.423	-1.275	0.082	0.162
Δy(-1)	-0.136	-0.209	0.134	-0.032	-0.072	0.056
t-stat	-0.973	-1.426	0.487	-0.445	-1.037	0.540
Δc(-2)	0.081		-0.268	-0.193		-0.220
t-stat	0.911		-1.592	-1.993		-1.579
Δws(-2)	0.172**		0.315**	0.117		0.209
t-stat	2.301		2.160	1.207		1.480
Δpw(-2)	-0.128		-0.739***	0.061		-0.110
t-stat	-1.208		-3.952	0.943		-1.222
Δy(-2)	-0.199		-0.076	0.063		0.074
t-stat	-1.495		-0.288	0.895		0.731
obs	100	102	100	111	114	111
r2	0.897	0.874	0.572	0.789	0.780	0.532
DW	1.800	2.172	1.714	1.786	1.715	2.004
BG Serial Correl.	0.1592	0.4350	0.1703	0.2932	0.0675	0.4427
Long run effects						
ws	-0.514	-0.303	0.060	0.304	0.424	-0.017
pw	0.039	0.059	-0.005	0.057	0.061	-0.040
y	0.852	0.832	0.865	0.888	0.881	0.962

[1] Estimation period 1896-2010. Dummies for 1903, 1910, 1917 and 1932. Data for 1940-1948 is missing
[2] Estimation period 1869-2010. Dummy for 1990. Data for 1914-1924 and 1939-1949 is missing.
*, ** and *** denote statistical significance at the 10%, 5% and 1% level based on standard t values. †, †† and ††† denote statistical significance at the 10%, 5% and 1% level based Banerjee, Dolado, & Mestre (1998) ECM test.

Table 6: Regression results for investment equations, USA and UK

	USA[1]			USA. Corporate Investment[2]			UK[3]		
	1	2	3	1	2	3	1	2	3
i(-1)	-0.258†††	-0.248†††	-0.222	-0.390	-0.241	-0.587	-0.373†††	-0.316†††	-0.373†††
t-stat	-4.788	-4.877	-1.479	-3.570	-2.421	-2.883	-6.853	-6.027	-6.387
y(-1)	0.383***	0.338***	0.206	1.277***	0.904***	1.309**	0.640***	0.567***	0.657***
t-stat	3.447	3.103	0.668	3.667	2.729	1.903	5.652	5.239	5.504
pw(-1)	-0.114*	-0.080	-0.036	-0.729***	-0.553**	-0.616	-0.216***	-0.194***	-0.236***
t-stat	-1.876	-1.327	-0.216	-2.881	-2.306	-1.260	-2.851	-2.647	-3.073
ws(-1)	0.181	0.349	-0.696	-0.626	-0.148	-0.375	0.070	-0.050	0.038
t-stat	0.584	1.358	-0.889	-0.675	-0.187	-0.246	0.250	-0.184	0.135
LTR(-1)	-0.636***	-0.621***	1.174**	-0.815	-1.317**	1.365	-1.098**	-0.296	-0.471
t-stat	-3.000	-3.509	2.202	-1.447	-2.517	1.268	-2.316	-0.724	-1.113
Δy	2.854***	2.878***		5.099***	5.238***		1.705***	1.417***	
t-stat	14.688	15.796		8.853	9.184		3.328	2.701	
Δpw	-0.085	-0.130		-1.118***	-1.171***		-0.267	-0.389	
t-stat	-0.651	-0.983		-3.323	-3.565		-0.979	-1.473	
Δws	-0.257	0.159		0.346	-0.024		0.327	0.255	
t-stat	-0.599	0.386		0.306	-0.022		0.467	0.386	
ΔLTR	-0.868***	-0.648***		-2.471***	-2.505***		-0.556	-0.762*	
t-stat	-4.282	-3.148		-3.538	-3.659		-1.329	-1.978	
Δi(-1)	-0.208**	-0.096	-0.002	-0.009	-0.125	-0.325	0.078	0.030	0.083
t-stat	-2.153	-1.140	-0.009	-0.057	-0.909	-1.125	1.335	0.549	1.401
Δy(-1)	0.282	-0.526**	-0.878	-1.359	-1.708*	0.572	-0.848	-0.382	-0.784
t-stat	0.842	-2.045	-0.913	-1.421	-1.788	0.317	-1.610	-0.742	-1.483
Δpw(-1)	0.385**	0.455***	1.155***	1.495***	1.465***	1.981***	0.381	0.817**	0.533*
t-stat	2.617	3.280	3.654	3.335	3.609	3.219	0.861	2.348	1.893
Δws(-1)	0.168	-1.110***	-1.922	-0.260	-1.968**	-1.597	-1.006	-0.569	-1.576**
t-stat	0.390	-3.126	-1.657	-0.226	-2.138	-0.779	-1.537	-0.967	-2.555
ΔLTR(-1)	-0.052	0.149	-0.845	0.385	0.018	-0.634	-0.298	-0.420	-0.738**
t-stat	-0.254	0.800	-1.433	0.551	0.029	-0.491	-0.912	-1.330	-2.276
Δi(-2)	0.266***		0.239	0.263*		0.214	-0.094*		-0.099*
t-stat	3.294		1.081	1.870		0.801	-1.676		-1.766
Δy(-2)	-1.373***		-0.585	-1.495		-1.413	0.890*		1.022*
t-stat	-4.592		-0.684	-1.417		-0.742	1.778		1.917
dpw(-2)	0.138		-1.089***	0.057		0.236	0.736*		0.553
t-stat	0.873		-2.800	0.117		0.266	1.813		1.502
Δws(-2)	0.013		0.636	0.870		1.011	0.049		0.151
t-stat	0.037		0.611	0.922		0.544	0.086		0.246
dLTR(-2)	0.123		-0.688	1.034*		1.075	-0.070		-0.014
t-stat	0.669		-1.352	1.713		0.888	-0.234		-0.045
obs	77	78	78	60	61	61	130	132	131
r2	0.979	0.972	0.795	0.903	0.876	0.567	0.828	0.797	0.791
DW	1.973	2.423	2.107	1.712	1.928	1.549	2.149	2.174	2.202
BG Serial Correl.	0.3999	0.1175	0.3674	0.3609	0.8411	0.0195	0.2959	0.0505	0.1179
Long run effects									
ws	0.703	1.404	-3.136	-1.608	-0.615	-0.640	0.188	-0.159	0.101
pw	-0.441	-0.321	-0.161	-1.871	-2.299	-1.049	-0.579	-0.613	-0.632
y	1.488	1.359	0.929	3.279	3.755	2.231	1.717	1.796	1.763

[1] Estimation period 1929-2010. Dummies for 1932, 1933, 1942, 1943 and 1945.
[2] Estimation period 1946-2010. No dummies.
[3] Estimation period 1855-2010. Dummies for 1876, 1880, 1908, 1940, 1941, 1942, 1943, 1944, 1945 and 1946.
*, ** and *** denote statistical significance at the 10%, 5% and 1% level based on standard t values. †, †† and ††† denote statistical significance at the 10%, 5% and 1% level based Banerjee, Dolado, & Mestre (1998) ECM test

Table 7: Regression results for investment equations, France and Germany

	France[1]			France. Corporate Investment[1]			Germany[2]		
	1	2	3	1	2	3	1	2	3
i(-1)	-0.429†††	-0.389†††	-0.280†	-0.698†††	-0.650†††	-0.528††	-0.084	-0.137	-0.063
t-stat	-7.425	-8.065	-3.866	-6.379	-7.890	-4.323	-1.753	-3.317	-0.572
y(-1)	0.417***	0.386***	0.277***	0.596***	0.563***	0.437***	0.044	0.091*	0.081
t-stat	6.249	6.560	3.237	5.635	6.629	3.664	0.743	1.695	0.586
pw(-1)	0.013	0.007	-0.001	0.091**	0.079**	0.073*	0.055*	0.068**	-0.033
t-stat	0.433	0.248	-0.040	2.284	2.274	1.721	1.820	2.567	-0.482
ws(-1)	0.193	0.112	0.304*	-0.595***	-0.602***	-0.149	0.294*	0.222	0.147
t-stat	1.377	0.844	1.716	-2.644	-3.171	-0.614	1.968	1.596	0.429
LTR(-1)	0.194*	0.110	-0.061	-0.328**	-0.338**	-0.357**	-1.648***	-1.319***	-0.665
t-stat	1.774	1.186	-0.492	-2.026	-2.586	-2.181	-3.716	-3.704	-0.744
Δy	1.595***	1.467***		1.456***	1.386$_{***}$		3.192***	3.319***	
t-stat	6.509	6.295		4.733	4.902		17.134	17.557	
Δpw	-0.281	-0.319		-0.802*	-0.844**		0.495	0.681**	
t-stat	-0.896	-1.042		-1.955	-2.154		1.594	2.316	
Δws	0.524**	0.555**		0.182	0.191		0.435	0.702**	
t-stat	2.094	2.283		0.570	0.629		1.222	2.070	
ΔLTR	0.326***	0.296***		0.071	0.056		-1.923***	-1.924***	
t-stat	2.712	2.682		0.458	0.397		-5.747	-6.036	
Δi(-1)	0.066	0.049	0.129	0.177*	0.151	0.201*	-0.005	-0.030	-0.116
t-stat	0.841	0.659	1.443	1.686	1.632	1.756	-0.053	-0.362	-0.503
Δy(-1)	0.612**	0.677***	0.642**	0.762***	0.851***	0.796*	-0.472	-0.581*	0.709
t-stat	2.618	3.105	2.087	2.638	3.158	2.388	-1.197	-1.698	0.739
Δpw(-1)	0.760**	1.071***	1.283***	1.248**	1.341***	1.428***	-0.239	0.031	1.213
t-stat	1.766	3.724	3.174	2.168	3.683	2.951	-0.620	0.109	1.532
Δws(-1)	0.218	0.332	0.351	0.782**	0.815**	0.777*	0.158	0.120	-0.505
t-stat	0.904	1.397	1.110	2.303	2.530	1.966	0.441	0.357	-0.615
ΔLTR(-1)	-0.149	-0.157*	-0.158	0.064	0.003	0.103	-0.077	-0.121	-1.519**
t-stat	-1.257	-1.687	-1.046	0.400	0.028	0.562	-0.237	-0.522	-2.079
Δi(-2)	0.055		-0.021	0.080		0.082	0.112*		0.084
t-stat	0.714		-0.216	0.826		0.730	1.725		0.522
Δy(-2)	0.140		-0.206	0.077		-0.287	-0.400		-0.085
t-stat	0.614		-0.700	0.269		-0.890	-1.259		-0.108
Δpw(-2)	0.247		-0.256	0.026		-0.493	0.079		-1.171*
t-stat	0.726		-0.617	0.059		-1.039	0.264		-1.669
Δws(-2)	-0.235		-0.314	-0.016		-0.082	-0.343		-0.821
t-stat	-0.922		-0.944	-0.044		-0.192	-1.042		-1.026
dLTR(-2)	0.002		0.071	0.054		0.068	0.172		0.231
t-stat	0.024		0.560	0.440		0.467	0.757		0.414
obs	110	111	111	110	111	111	105	108	106
r2	0.872	0.860	0.761	0.732	0.723	0.615	0.947	0.939	0.649
DW	1.975	1.926	2.366	2.066	2.036	2.287	1.759	1.932	2.000
BG Serial Correl.	0.2397	0.2300	0.0002	0.5867	0.7919	0.0022	0.1511	0.3216	0.0424
Long run effects									
ws	0.451	0.287	1.083	-0.853	-0.926	-0.282	3.516	1.623	2.349
pw	0.029	0.017	-0.005	0.130	0.122	0.138	0.659	0.494	-0.523
y	0.972	0.992	0.988	0.855	0.866	0.828	0.523	0.664	1.290

[1] Estimation period 1896-2010. Dummies for 1919, 1925, 1930, 1936, 1938, 1939, 1940, 1941, 1942, 1943 and 1945.
[2] Estimation period 1869-2010. Dummies for 1930, 1931, 1932, 1933 and 1990. Data for 1914-1919 and 1939-1945 is missing. Depreciation information starts in 1925, we computed a constant rate of depreciation before.
*, ** and *** denote statistical significance at the 10%, 5% and 1% level based on standard t values. †, †† and ††† denote statistical significance at the 10%, 5% and 1% level based Banerjee, Dolado, & Mestre (1998) ECM test.

Table 8: Private excess demand* and wealth effects (in percentage points of GDP) caused by a 1%-point increase of the wage share and private wealth respectively**

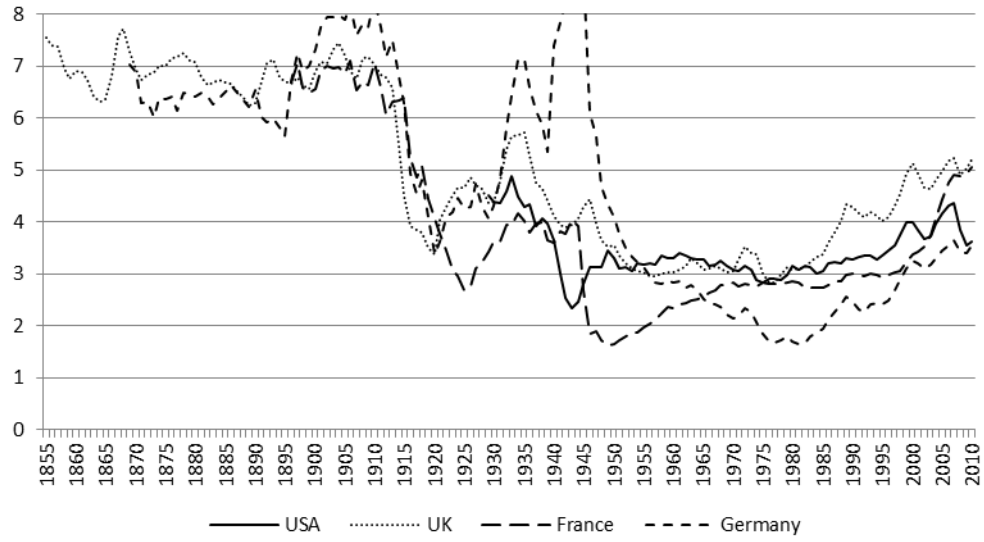
	C'_{WS}	I'_{WS}	$C'_{WS}+I'_{WS}$	*p-value*	*Demand regime*	C'_{PW}	I'_{PW}	$C'_{PW}+I'_{PW}$	*p-value*	*Demand regime*
USA	0.503	0.204	0.707	*0.154*	*Wage-led*	0.089	-0.028	0.061	*0.002*	*Wealth-led*
UK	0.716	0.033	0.750	*0.003*	*Wage-led*	0.052	-0.021	0.031	*0.017*	*Wealth-led*
France)	-0.440	0.124	-0.316	*0.065*	*Profit-led*	0.013	0.003	0.016	*0.027*	*Wealth-led*
Germany	0.262	0.543	0.805	*0.002*	*Wage-led*	0.022	0.075	0.097	*0.118*	*Wealth-led*

* column $C'_{WS}+I'_{WS}$ is private domestic demand with respect to changes in functional income distribution; Column $C'_{PW}+I'_{PW}$ gives the private domestic demand with respect to changes private wealth.
** All calculations refer to specification 1 except for Consumption in the USA (specification 3) and Investment in Germany (specification 3).

Table 9: Private excess demand and wealth effects (in percentage points of GDP) caused by a 1%-point increase of the wage share and private wealth respectively. Before and after WW2, France and the UK

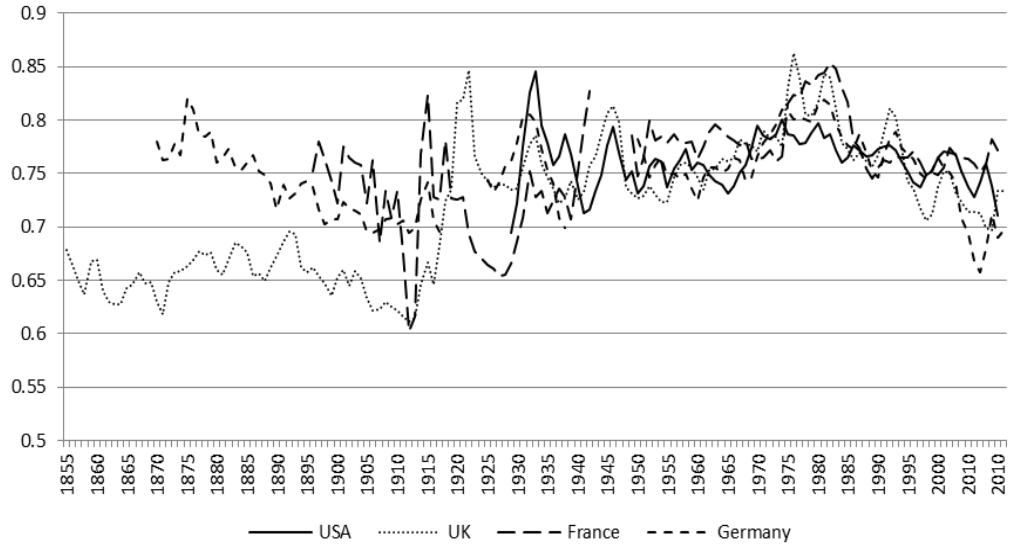
	C'_{WS}	I'_{WS}	$C'_{WS}+I'_{WS}$	C'_{PW}	I'_{PW}	$C'_{PW}+I'_{PW}$
France, before WW2	0.459	-0.005	0.454	0.019	0.017	0.035
France, after WW2	0.254	0.210	0.464	0.006	0.015	0.020
UK, before WW2	0.902	-0.454	0.448	0.023	-0.083	-0.061
UK, after WW2	0.823	0.286	1.109	0.079	-0.021	0.059

Figure 1. Private Wealth as a share of GDP



Source: Piketty and Zucman (2014). Author's calculations

Figure 2. The Wage Share



Source: Piketty and Zucman (2014). Author's calculations