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Income from Capital, Inequality Indicators and Social Policy

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Abstract: Income from Capital, Inequality Indicators and Social Policy

Capital incomes have traditionally been an understudied topic in inequality research but have begun to receive significant attention in recent years. The main puzzle emerging is why marked increases in capital shares observed in many advanced economies appear to have little impact on standard indicators of income inequality. The implication is that different narratives are opening up across different areas of scholarship. As a consequence, both academics and policy makers are not talking the same language. If there is no accurate picture of the effect of capital incomes on overall inequality, capital incomes will continue to be under-studied, their impact will not be properly captured and understood, and policy responses will be inadequate and poorly designed.

This thesis (1) puts forward a blueprint which puts into context recent advances in the field which helps to explain why different narratives open up and (2) provides an exploratory pathway to help bridge diverging UK narratives. First, improving the capture of capital incomes in headline inequality indicators, drawing upon state-of-the-art methods. Second, recalculating headline statistics using the capital adjusted series and showing how the narrative changes from little to moderate (and increasing) effect on inequality. Third, identifying complementary information not captured by the recalculated headline indicators, which add substantial information to the capital income narrative. Finally, combining all the policy implications that have opened up in the process and highlight that there is much potential to expand the discussion of capital (income) redistribution in social policy debates. It is argued that one of the conditions for this to work is that capital income adjustments should be made to the headline inequality statistics, proposed in this thesis.

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I started working on inequality studies as a research assistant in 2011, before the boom in inequality studies took place. I would like to thank my mentors back in the Netherlands who have guided me on this topic when it was not fashionable. In particular I would like to thank Dr. Marloes de Graaf-Zijl, Professor Wiemer Salverda, Professor Bas ter Weel, Professor Chris Elbers and Professor Henri de Groot. Each of them has encouraged, academically stimulated and guided me in different ways. Their efforts combined have given me the confidence to keep on pursuing my interest in inequality studies and have helped me acquire the skills needed to embark on this journey.

At first, exposure to the multi-disciplinary approaches, adopted at the Department of Social Policy and at the Institute for New Economic Thinking at the Oxford Martin School, was overwhelming. Being trained as an economist it was a challenge to adapt to these different ways of thinking. For a while I lost my identity navigating the space in between disciplines, methodologies and perspectives. I decided to take on the challenge as coordinator of a global inequality working group, at the INET Young Scholars Initiative.

This has given me the opportunity to interact with leading figures within inequality studies such as institute directors, senior scholars, PhD students etc. The insights that I gained from this exposure has strongly influenced the shaping and framing of the thesis. I would like to thank the key people that have crossed my path during this time, in particular Dr. Gonçalo Fonseca. The incentives in the academic system are still very much within disciplinary boundaries (e.g. publishing). My exposure to the above has made me realise the value of building bridges. In retrospect the Department of Social Policy and INET have allowed for the flexibility and network building allowing for such an approach, for which I am grateful.

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List of Abbreviations

BHSP	British Household Panel Survey
DINA	Distributional National Accounts
DWP	Department for Work and Pensions
ESCoE	Economic Statistics Centre of Excellence
ETB	Effect of Taxes and Benefits on Household Income
EU-SILC	European Union Statistics on Income and Living Conditions
FES	Family Expenditure Survey
FRS	Family Resources Survey
HBAI	Household Below Average Income
HBAI-BHC	Household Below Average Income – Before Housing Costs
HMRC	Her Majesty Revenue and Customs
IFS	Institute for Fiscal Studies
ISA	Individuals Savings Accounts
LCFS	Living Cost and Food Survey
LIS	Luxembourg Income Survey
NPISH	Non-Profit Institutions Serving Households
NS&I	National Savings and Investments
OBR	Office for Budget Responsibility
OECD	Organisation for Economic Co-Operation and Development
ONS	Office of National Statistics
PIT	Personal Income Tax
SPI	Survey of Personal Incomes
WID	World Inequality Database

1. Thesis introduction and overview

Research Puzzle

The OECD (2008, 2011, 2015) has long advanced the narrative that capital incomes make a relatively low contribution to inequality. Meanwhile, other areas of scholarship have been preoccupied with observed surges in capital shares over the past decades (Karabarbounis & Neiman 2014; Piketty & Zucman 2014; Rodriguez & Jayadev 2013). The puzzle that emerges is why the importance of capital incomes as measured at the macro level is not picked up by mainstream socio-economic inequality indicators used by organisations such as the OECD to inform socio-economic policies. One possible explanation is that surges in the capital share have been equally distributed across the population but given the stylized fact that capital incomes are heavily concentrated towards the top of the distribution there is no reason to believe that this has been the case.

Capital income defined

The main capital income components discussed in this thesis are dividends, interest, rents and smaller capital income flows. Capital incomes are generated though the ownership of assets such as company shares, savings and property. Capital income, or unearned income, is paid out on a less regular basis than earnings and flows are often virtual rather than real (Atkinson & Bourguignon, 2000). They are volatile and easily affected by fluctuations in the business cycle such as shocks and real interest rates (Fräßdorf, Grabka, & Schwarze, 2011; Piketty & Saez, 2007a).

Often assumptions are imposed to produce capital income variables e.g. attributing 30% of self-employment income to capital income because traditionally a fraction of self-

employment income is considered a return on the ownership of assets. In this thesis the trade-off has been made to use as few assumptions as possible. This allows the research to stay as close to the secondary data source as possible and draw the most detailed conclusion about how to improve both measurement and understanding of the relationship between capital incomes and inequality. Strong assumptions will only be used when considered relevant for illustrative purposes. The terms 'capital income' and 'investment income' will be used interchangeably throughout the thesis.

Capital incomes as understudied subject.

Capital incomes have long been an understudied area of research, especially empirically. One can think of various reasons why this has been the case. First, the most straightforward explanation is poor data quality. Second, the importance of capital incomes in overall inequality is traditionally thought to be relatively low. This might have affected the decision of researchers to primarily move towards other areas.

Inequality scholars and international organisations have traditionally studied the distribution of total income carrying out factor decomposition where possible (Jenkins 1995; OECD 2008). Traditionally these studies were carried out using household surveys carrying out factor decomposition where possible (Nolan et al. 2014; Salverda et al. 2014). Pioneering efforts by leading inequality scholars have led to a more widespread adoption of tax administrative data in inequality analysis for broad set of countries worldwide, allowing researchers to understand more about inequality at the very top of the income distribution (Atkinson & Piketty 2007, 2010). This area of research begun to receive more widespread attention after the books on top income shares, a project led and edited by Atkinson and Piketty. The measurement of capital incomes started to get more attention in these books, in

particular for countries allowing for this breakdown. More recently there have been methodological advances in the inequality literature to harmonise survey and tax administrative sources (Anand & Segal 2015; Atkinson & Jenkins 2019; Bourguignon 2018; Lustig 2018). The main focus of these studies has been on correcting total income, not income components, leaving capital incomes relatively understudied in the broader economic inequality literature with a focus on empirics.

Within economics the main economic inequality narrative has been centred around surges in wage inequality and their drivers (Acemoglu & Autor 2011; Goldin & Katz 2008; Goos et al. 2009). Studies looking at the drivers of wage inequality are still mainly carried out by labour market economists. A natural consequence of this is that capital incomes are not given enough consideration in frameworks developed by labour economists.

Given the magnitude of capital incomes, traditionally accounting for 30% of the total income in the economy, it is questionable why researchers know so little about the determinants of capital incomes and its role in shaping inequality. This thesis puts forward both the argumentation (why) and a preliminary framework (how) to start reshaping the capital income and inequality narrative taking the household survey as starting point.

Motivation

The motivation for the thesis is to bring together capital income and inequality debates in a way that is currently not available. There is no clear incentive within the research community to bring together the information in the way proposed by this thesis. Leading researchers working in the field will argue that surveys underestimate capital incomes and will continue to work on their own approach using other data sources. Young scholars may not use household surveys to study capital incomes and researchers using household surveys will

continue to write in their paper that any conclusions on capital income have to be interpreted with caution. This produces a bias within the research community towards not considering the implications on end users such as policy makers informed by headline statistics such as Gini coefficients from household surveys.

Because in most countries mainstream indicators are still calculated using household surveys, the household survey is taken as starting point of the analysis. Given recent advances in the academic community arguing for the use of fiscal data the approach adopted may appear outdated, however, from a practical point of view, in many countries' household surveys are still used as principle source to calculate mainstream inequality indicators. This will be illustrated by providing an in-depth analysis of the UK.

New research questions related to capital incomes that were posed by Atkinson and Piketty in their volumes on top incomes (Atkinson & Piketty 2007, 2010). Piketty took this narrative forward in *Capital in the 21st Century* after which there has been an observable increase in research studying the link between capital incomes and inequality. These advances have led to novel theoretical and empirical approaches and the development of new indicators, all relating capital incomes and inequality from different angles. These initiatives have been generally carried out independently form each other. Therefore, in most cases scholars behind these initiatives draw from different frameworks. By nature, this suggests that the scholars often do not speak the same language. This makes it hard to properly evaluate and merit alternative approaches that have been emerging. Which is a pity because all of their research is driven by the same underlying principle: understanding the link between capital incomes and inequality.

It is argued that the need for a blueprint is opening up allowing to systematically combine the knowledge on this topic and on that basis discuss policy options in a more

comprehensive way. This thesis wants to introduce the idea that precisely because windows (or databases) give a restricted view, and each country is operating under different restrictions, it is important to keep on encouraging research efforts in all these different directions. Researchers will have to keep patching together all available information and new insights in the best way possible to create one consistent narrative and evaluate all pieces of evidence in the right context. This will help to provide initial answers to the puzzle set at the outset and work towards streamlining the capital income narrative.

In order to systematically compare the heterogeneous results, a blueprint has to be created where the lion's share of the existing research can be classified. The blueprint gives an indication of the structure of the building (overarching capital income narrative) but it also provides details about all the different building materials used (databases, indicators, mechanisms etc). This blueprint will have to be sketched in a way that all actors in the building process (academics, policy makers, statisticians, general public etc.) can relate both to the shape of the building and have a sense all their preferred materials have been included. In other words, there is need to search for terminology that is neutral enough so that all parties are able to relate to the bigger picture but at the same time ensure that sub-specific interests and concerns within other areas of expertise are acknowledged.

The idea that the survey-based literature has consistently made wrong conclusions about the effect of capital incomes on inequality is not new. Underestimation of capital incomes within the household survey literature has long been acknowledged by the research community, but with little efforts to correct for this limitation. With surges in the capital share the underestimation problem has likely become worse over the past decades. It is time to identify how to start correcting the socio-economic indicators and the capital income narrative drawing upon on insights produced by other frameworks.

Furthermore, this thesis seeks to bring out the implications of not bringing information generated through other approaches, back into headline indicators used to inform social policy. Headline indicators, such as Gini coefficients, are traditionally calculated by statistical offices and the Governments using household surveys. These indicators play a large role in shaping policy, political and public debates. Anything that is not adequately captured in these indicators is expected to not receive sufficient attention by end users of the statistics. It is expected that, at present, socio-economic policy makers will not give sufficient importance to redistribution related to capital (incomes) and inequality.

Main objective

The objective of this thesis is to shed light on the following question: *Why are capital incomes not adequately picked up by headline inequality indicators used to inform social policy, how can to correct for this and what are the implications?*

Chapter 2 surveys the wider inequality literature with the purpose of extracting the key information that different approaches give on capital income. It is possible to distinguish two main types of approaches. After the release of Piketty's *Capital in the 21st Century* there has been more empirical research linking capital incomes and inequality. Inequality research before the release of this important work had some coverage of capital incomes but it has rarely been the main focus of analysis. After the release of *Capital* alternative approaches have started to emerge. The chapter combines these two strands of literature using this information to create a blueprint that maps out the general narrative and allows to systematically compare new information as it is released. As mentioned, the challenge that arises is that there is no single database which provides an accurate picture of entire

distribution of capital incomes among persons and households which is why there is a need to patch together the windows available to expand the view. A substantial proportion of this literature has appeared since the start of the thesis. Best efforts have been made to provide the most up to date picture at the time of writing.

Chapter 3 familiarises the reader with the UK headline inequality indicators, methodological debates and how capital incomes feature in these debates. The reader is familiarised with the inequality indicators, and data sources, used to inform social policy. The UK has a pioneering position in applying top income corrections to the household statistics using tax administrative records since 1992. More recently academics have challenged this correction directly (Burkhauser et al. 2017a) and the wider academic community has started to pay more attention to top income corrections. These methodological debates are placed in a wider context and discuss how capital incomes figure in these debates. Drawing upon all the materials collected the thesis gives a picture of the UK capital income and inequality narrative in its current form, identify gaps that open up and explain how this thesis is going to contribute to the narrative.

Chapter 4. The UK capital income narrative has long been that of a low (and stable) contribution to inequality (Belefield et al. 2017; Brewer & Wren-Lewis 2016; OECD 2011) while fiscal sources have observed increases in investment income (Atkinson 2007a). In other words, different windows have produced divergent narratives. First, I examine how discrepancies between the household survey and fiscal sources might arise. Second, I look at how well the top income adjustments proposed in the UK correct for capital income. Third, I propose an extension to existing top income methodology used in the UK context

which allows to account for the diverging windows. Finally, I discuss implications and pathways for future research.

Chapter 5. Using the adjusted series, I re-calculate the headline inequality indicators. Drawing upon the materials collected I bring into the debate novel indicators that add substantially to the narrative. The remainder of the chapter identifies complementary information not captured by the indicators, but which also adds substantially to the capital income narrative, drawing upon the materials collected. These include characteristics of the groups driving capital income dynamics, unmeasured income and capital shares as measured in different sources. Overall, I provide initial evidence that the capital income narrative for the UK needs to change from a low (and stable) contribution to inequality to a moderate (and increasing) one.

Chapter 6 gives an overview of the policy implications of the research. The first set of implications relates to measurement. The second set of implications combs through the entire thesis and streamlines the policy implications that have opened up in the process. I highlight that there is much potential to expand the discussion of capital (income) redistribution in social policy debates. One of the conditions for this to come about is that capital income adjustments should be made to the headline statistics, along the lines proposed in the thesis.

Chapter 7 provides a general conclusion, discusses limitations of the research and puts forward an agenda for future research.

2. Creating a blueprint: mapping the effect of capital incomes on inequality

The study of capital incomes has long been largely concentrated in macroeconomics, where for much of the period since the Second World War capital shares were believed to be constant over time. In recent years, the study of capital incomes has moved into the economic inequality literature. This has been driven by recent empirical research observing surges in capital shares across advanced economies (Karabarbounis & Neiman 2014; Piketty & Zucman 2014; Rodriguez & Jayadev 2013). After the release of Piketty's *Capital in the 21st Century* there has been more empirical research linking capital incomes and inequality. The earlier literature does provide information on capital incomes, but it has rarely been the main empirical focus.[1]

This chapter surveys the wider economic inequality literature with the purpose of extracting key empirical information that each approach provides on capital incomes. The challenge that arises is that there is no single database which provides an accurate picture of the entire distribution of capital incomes among persons and households, which is why the research community will need to patch together that picture from various sources to expand our view on the topic. Generals findings are presented that emerge from different databases (surveys, fiscal sources, unique databases etc.) from studies focussing on advanced economies, published in English.

This information is used to create a blueprint, a first building block, which helps come to grips with the puzzle as to why marked increases in capital shares have little impact on standard indicators of income inequality. The blueprint represents a typology into which

[1] This is a generalisation applicable to the mainstream literature. Heterodox macro-economic has examined the links between the capital shares and inequality for longer falling outside the scope of this thesis.

the confusing and complex, distinct but related, streams of the existing literature and future contributions can be set and seen. This blueprint represents a significant contribution in itself in that it will helps to improve (re-shape and re-formulate) the capital income and inequality narrative to better inform social policies, the topic of subsequent chapters.

2.1. Comparing windows

This section provides an overview the available cross-country comparative research.[2] Ideally this Section only include papers published in high ranked journals to ensure quality, however, because the topic is understudied, most of the available materials also includes working papers etc. The literature is very much in movement, the best efforts have been made to include all the relevant papers at the time of writing.

2.1.1. Household Survey Literature

The inequality literature, using household surveys, traditionally provides little information on the relationship between capital incomes and inequality. There are many known problems surrounding the measurement of capital incomes in household surveys e.g. under reporting and data preparation such as imputations, top coding and anonymisation (Blanchet et al. 2018; Jenkins 2017; Ruiz & Woloszko 2016). Table 1 provides an overview of the few papers that have made the attempt.

The main capital income components observed in this literature are interest, dividend and rents, which are often grouped together. Capital incomes are known to be heavily concentrated towards the top of the distribution. If a broader definition is used this will be mentioned in Table 1 in the column other

[2] Later Chapters will focus specifically on the UK.

Table 1: Household literature approaches traditional in the literature (factor decomposition) and alternative approaches that have started to emerge after the release of Capital 21st.

Paper	Key Finding	Data	Other
Traditional Approaches (Factor Decompositions)			
Fräßdorf et al. (2011)	Find that capital incomes make a disproportionate and high contribution to overall inequality given their share in total income in the USA, Germany and Britain.	Three country specific household surveys are used for their cross-country comparative estimates for the period 1992-2004.	Authors use the half square coefficient of variation (HSCV), the relative contribution of capital incomes to inequality is on average 32 and 22 in the USA and Germany. In Britain the values are relatively low at 11 using the BHPS. Their estimates include capital income flows from trust funds.
García-Peñalosa & Orgiazzi (2013); Green, García-Peñalosa, & Orgiazzi (2008)	Different findings in cross country comparative perspective. Surges in inequality in Scandinavian countries can mainly be attributed to fiscal reform and changes in the interest rate.	Use of household surveys for eight advanced economies over the period 1969-2004. Includes private pensions and royalties.	Authors use the half square coefficient of variation (HSCV). Stronger link between capital incomes and inequality in Sweden and Norway, driven by fiscal reform. Increases also observed for other countries but hard to interpret because of data quality.

Paper	Key Finding	Data	Other
OECD (2008)	Increased of capital incomes mid 1990s to mid 2000s have contributed to increased income disparities across OECD countries. Capital income is more concentrated than earnings.	OECD inequality database. Include private pensions, occupational pensions.	The OECD uses the Gini coefficient as unit of analysis. Nordic countries, Italy and Hungary. Table 11.4 in this report concludes that capital incomes have reduced inequality over this period in both the UK and the US.
OECD (2011)	Capital incomes saw a greater increase in inequality than earnings from mid 1980s to late 2000s.	OECD inequality database. Include private pensions, occupational pensions.	The OECD uses the Gini coefficient as unit of analysis. Contribution of capital incomes to inequality has declined in English speaking countries. Capital shares remained at the OECD average of 7%, and surges in overall capital income are mainly observed at the top of the income distribution.
OECD (2015)	Do not provide empirical evidence but suggest that widening wealth concentration, and the expected capital income flows, are likely to increase inequality levels in the future.		This thesis provides a framework arguing why capital incomes should be on the policy agenda and point out why it is problematic from a policy perspective that capital incomes are not adequately discussed by institutions such as the OECD.

Paper	Key Finding	Data	Other
Alternative Approaches (proposed after C21 largely linking capital shares and overall inequality)			
Adler & Schmid (2012)	Positive relationship rising capital shares and inequality.	Use the German Socio-Economic Panel (GSOEP) data for the period 2002-2008.	Are among the first to look at the differences between capital income in household surveys and as measured in the national accounts and point towards the potential importance of undistributed profits in the German case with a relatively high concentration of company stock holdings. Includes income from rental and leasing.
Schlenker & Schmid (2015)	Find a positive relationship between capital shares and inequality in gross household income. Driven by an increased high concentration of capital incomes and higher capital shares over the period observed for the entire period.	Use EU-SILC data for 16 countries over the period 2005-2011.	They find that a 1 percentage point increase in the capital share raises the Gini coefficient by 0,8 percentage points, the main driver is a larger concentration of capital incomes. Surprisingly the authors find that the average capital share did not fall after the crisis. Includes profits from unincorporated business.

Paper	Key Finding	Data	Other
Francese & Mulas-Granados (2015)	Find no significant relationship between the capital share and Gini coefficient for disposable income.	Use LIS and AMECO for 34 countries.	This is the only study using disposable income to calculate their inequality measure. A possible explanation for their findings to differ from the remainder of the literature is that the effect they want to capture is washed away using post-tax income.
Iacono & Ranaldi (2018)	The Italian population is increasingly receiving income from multiple sources moving away from the traditional class society.	Italian survey of Household and Wealth (SHIW). Includes imputed rent and net-self-employment income.	The authors provide estimates for a new indicator the income factor concentration index (IFC) for the Italian case.
Milanovic (2017)	Examines the transmission from a higher capital share onto overall inequality. Rising capital shares have an upward effect on the Gini and this relationship has become stronger.	LIS data for seventeen advanced economies over the period 1969-2013.	The elasticity of transmission, developed by the author, gives an indication of how surges in observed capital shares affect measures of overall inequality Italy, US and Finland have the highest elasticities of around 0,6 compared to the relatively elasticity in the UK of around 0,38 which is below the average of 0,45.

Paper	Key Finding	Data	Other
Cirillo, Corsi, & D'Ippoliti (2017)	Households relying mainly on labour earnings had the highest probability of moving down the income distribution after the crisis, receiving income from capital did not increase the probability of moving upwards.	Use EU-SILC data for 2008, 2013 and 2015	Over half of European households earn some form of capital incomes but these households mainly rely on wage earnings. Includes investment in unincorporated business, private pension and imputed rent.
Aitken & Weale (2017, 2018)	Correct statistics for missing investment income and pensions raise the overall Gini coefficient by 2-3 Gini points.	UK Living Cost and Food Survey (LCFS) for the period 2005-2014.	The imputation for investment income has a larger impact on the Gini than the imputations made for pensions. Authors do not present factor decompositions.
Atkinson (2012a); Fesseau & Mattonetti (2013); Fesseau et al. (2013); Zwijnenburg (2017)	The OECD Expert Group on Disparities in National Accounts (EG-DNA) scale up household sector income as measured in surveys to household sector income measured in the National Accounts. The micro-macro gaps, or, scale up factors are largest for capital incomes.	OECD inequality database and national accounts.	Does not discuss the link between capital incomes and inequality. Rather provides a discussion of how the national accounts statistics can be best brought into inequality analysis.

Table 1 allows us to draw some general conclusions linking capital incomes and inequality based on the household inequality literature. First, some stylised facts can be identified: (1) there appears to be a relationship between capital incomes and inequality, the strength of this relationship varies per country and has been linked to institutions such as fiscal reform (2) the distribution of capital incomes has become more concentrated over time and has pushed up capital shares in most cases; (3) this concentration has a disproportionate effect on inequality; and (4) capital incomes contribute less to inequality than other income components such as wages.

Second, fads and fashions in the studies linking capital incomes and inequality in the household tradition are observed. Until 2011 researchers have attempted to carry out factor-decompositions in a cross-country comparative setting. This type of study usually draws from harmonized databases such as the Luxembourg Income Study (LIS), EU-SILC and the OECD. There has been one attempt to study the relationship between capital incomes and inequality to directly compare country-specific surveys which have not been harmonised (Fräßdorf et al. 2011), providing the best cross-country comparative analysis based on surveys to date. From 2012 researchers have started to use household surveys to shed an alternative light on the relationship between capital incomes and inequality. This includes the relationship between capital shares and inequality (Adler & Schmid 2012; Milanovic 2017), the phenomenon that people are increasingly earning both wage and capital income (Cirillo et al. 2017; Iacono & Ranaldi 2018; Schlenker & Schmid 2015) and making corrections to household surreys to correct for underestimation (Aitken & Weale 2018; Zwijnenburg 2017).

Third, there are not many studies looking at capital incomes and inequality using surveys, given the known problems with underestimation, and the result is largely ambiguous because of substantial heterogeneity between papers. The literature is often not

very specific about the components included in investment income and covers different time periods, which makes it hard to systematically interpret findings across the different papers. Studies adopt different definitions of total income (market, gross, disposable) or units of measurement (individuals or households). It is often not clear how capital income variables have been harmonised and how this might affect the conclusions drawn from cross-country comparative analysis. In addition, the purpose of data collection significantly affects the quality of the variables. A household survey will provide more accurate estimates for earned income variables, rather than unearned variables such as capital incomes.

Overall, the alternative approaches provide an indication that the study of capital incomes and inequality is beginning to receive more research attention. The different approaches taken suggests that researchers are starting to sense the importance of this topic, in part influenced by the bigger picture questions posed by Piketty (2014), and are exploring the topic in new ways. There is no overarching framework for the study of capital incomes which allows the studies to go in different directions. Since there is only little evidence research in all directions is encouraged. However, there is need for a framework that is able to link all of these individual findings together to start constructing a broader narrative. The objective of this chapter.[3] Now the research continues by looking at the relationship between capital incomes and inequality taken in other frameworks, which do not use the household survey as basis.

[3] Our approach differs from other initiatives in the literature by taking the household survey as basis and ask the question how to improve this window which is still predominantly used for policy purposes. This point will come back throughout the thesis.

2.1.2. Fiscal Income Literature

Fiscal, or tax administrative, sources are known to provide a better coverage of top incomes. The advantage of this database is that is captures the top of the distribution more accurately than household surveys and may provide a better *window* into the distribution of capital incomes among people or households. There are some methodological issues that one needs to take into consideration when working with fiscal data (Atkinson, 2007; Morelli, Smeeding, & Thompson, 2015). Not everybody is required to submit tax returns, there are 'non-filers'. This may only have a limited effect on the coverage of capital incomes, since non-filers tend to be located towards the lower end of the distribution of total income where capital incomes do not play a prominent role. Tax legislation determines what is observed in fiscal sources creating a gap between what is ideally observed and what is actually observed (Atkinson, 2007; Jenkins, 2017). The tax base can expand or be reduced over time, creating discontinuities, or the tax unit can change from e.g. households to individuals, which has been the case in the UK. This in turn differs per income component and can very per country and across time, complicating cross-country comparability. Table 2 gives an overview of the results produced by the top income literature. Countries are listed in alphabetical order and the database used is the available fiscal data in the country.[4] The gives an indication of discontinuities in the capital income variable over the period and conclusions that are drawn on the composition of top incomes.

[4] Countries which do not have insightful information for the capital income narrative have been excluded.

Table 2: Fiscal income literature traditional approaches (measurement of top shares) and alternative approaches that have started to emerge after the release of Capital 21st.

Country & Paper	Capital Income Trends	Definitional Changes	Other
Traditional Approaches (Top Share Measurement)			
Australia Atkinson & Leigh, (2007); Burkhauser et al., (2015a)	During the 1980s and 1990s both earned and unearned income contributed to the rise in the top 1%, with earned income carrying more of the weight.	In 1985 Australia introduced a capital gains tax and reduced marginal rates on dividends.	Before the reform there was an incentive for companies to pay shareholders in capital gains not observed in PIT, the reform this increased the amount of company profits observed in fiscal sources
Denmark Atkinson & Søgaard (2013)	Authors work with tabulations and are not able to look at the effect of capital incomes on top shares	In 1987 introduction of dual income taxation in which capital income got taxed at lower rates. In 1991 and 2000, dividends and imputed rents were taxed under a separate scheme, respectively.	Change in 1987 made it easier for self-employed to retain profits. The 1991 and 2000 reforms removed both income sources from the PIT.

Country & Paper	Capital Income Trends	Definitional Changes	Other
Finland Jäntti, Riihelä, Sullström, & Tuomala (2010)	Increased importance of capital incomes at the top of the distribution.	In 1993 changes were made to property income tax, in which capital gains were taxed at the same rate as other property income (before they were only partly taxable) and imputed rents became tax exempt. In 1996 property income tax got raised from 25% to 28%.	
France Piketty (2003, 2007)	Increased importance of capital incomes at the top of the distribution, primarily dividend income	No definition changes reported after 1980s	The income of the top 0.01% consists 60% capital income, dividend income in particular, indicating this group predominantly exists of shareholders.
Germany Bartels (2017)	The authors find evidence that unincorporated profits and higher capital shares have contributed to increase in top shares.	From 2009 capital income is no longer part of the PIT.	Dividends, interest and capital gains from stock shares are taxed at a 25% flat rate. (Bartels & Jenderny 2015).

Country & Paper	Capital Income Trends	Definitional Changes	Other
Ireland Nolan (2007)	Of the top taxpayers (+ €150.000) 4% of total income was in the form of unearned income. Most of the unearned income is found among the top 10% taxpayers, and account for in 18% of total income for this group.	After 2004 only 40% of dividends had to be reported against a flat tax rate of 12.5%. Before 2003 people were allowed to report dividends against either the income tax or the 12.5% flat tax rate.	Tax reform created clear break in series, author has applied ad hoc adjustment of 1/0.40 to capital incomes in 2004.
Italy Alvaredo & Pisano (2010)		Capital gains included in the tax base from 1998 onwards, but with different treatments for different types of gains which have changed over time From 2003 onwards only 40% of certain types of dividends have to be reported.	Capital gains are not included in the tax tabulations available to the researchers, but a fraction is imputed to smaller investment income items.
New Zealand Atkinson & Leigh, (2005, 2008)		In 1989 possibility to withdraw dividends without dual taxation In 1990 top marginal rate reduced to company tax rate	1990 reform created the incentive to the incentive to delay company payments until 1990. Capital gains gradually entered the tax base over time.

Country & Paper	Capital Income Trends	Definitional Changes	Other
Norway Aaberge & Atkinson (2010); (Aaberge et al. 2013b); Alstadsæter et al. (2016)	The importance of capital income has increased at the top of the distribution. Fiscal reform has played a role in this observed increase.	The marginal tax rate on capital incomes has reduced over the period 1986-1992. Introduction of dividend taxation in 2005 has provided incentives to retain earnings in the corporate sector (Alstadsæter et al. 2016). The 2005 tax reform has led to capital income leaving the top 0.1% and is now observed in the corporate sector	Reduction marginal rates led to more capital income reporting at the top of the distribution. Evidence of tax shifting between PIT and corporate sector.
Portugal Alvaredo (2010)		Capital gains taxation gradually introduced from 1989 onwards	Relatively easy to legally avoid reporting capital gains
Sweden Roine & Waldenström (2010)	Large increases in asset prices (shares) which has gone disproportionately to the top of the distribution, in particular capital gains accruing to high wage earners.	Dividend tax change was reduced from 30% to 20% in 2006	Abolished wealth taxation in 2007 affected data collection for wealth (Lundberg & Waldenström 2018).

Country & Paper	Capital Income Trends	Definitional Changes	Other
UK Atkinson (2007); Pope & Waters, (2016); Vassilev, Walker, & Darke, (2017); Atkinson (2012); Atkinson & Ooms, (2015); Miller & Pope (2015)	Moderate surges capital income at the top of the distribution observed since 1979. Earnings remain the dominant source at the top.	Corporate tax reform in 2000-2002 Reduction top marginal rates from 50% to 45% in April 2013 Since 2009 foreign dividends are tax exempt form UK corporation tax, allowing individuals to remit offshore income to the UK without being taxed.	Corporate reform has incentivised the self-employed to incorporate and pay themselves out largely in dividends. Changes in marginal tax rate brought £16-18 billion has been brought forward, of which £6 billion in dividends (35%) among those with taxable incomes above £500,000.
USA Piketty & Saez (2007a) Saez (2015, 2017)	Changes to top rates triggered a fall in top incomes in 2013.	Tax Reform Act 1986 cut the top marginal income tax rates. 2003 tax cut dividend income. In 2013 top tax rates increased (6.5% for labour and 9.5% for capital income).	The top 1% of earners shifted 10% of their income to 2012, particularly strong effect found for capital gains and dividends at the very top of the distribution. Retiming strategies are easiest for capital gains.

Paper	Objective	Other
Alternative Approaches (proposed after C21 largely linking capital shares and overall inequality)		
Piketty (2014)	Study the empirical relationship between income inequality, factor shares and economic growth. Provides evidence for the empirical consistency $r>g$ observed.	Empirical consistency found using fiscal sources and national accounts.
Bartels & Jenderny (2015)	Correct for erosion capital income from the German tax base. In 2009 the imputation increases the top 10% share by 8% and 28% for the top 0.01%.	The authors test a set of proxy baseline figures, including national accounts totals, to see which variable a similar trend to the capital income variable reported in fiscal sources.
Bengtsson & Waldenström (2018)	Study the relationship between income inequality and capital shares. A 1 percentage point increase in the capital share raises the top incomes by 0.89 on a log scale.	Use WID top income figures as inequality measure.
Atkinson & Lakner (2017)	Study the joint distribution of wage and capital incomes. A rising association between wage and capital income observed in the US over the period 1985-2006.	80% of the top 1% earners are also in the top quintile of the capital income distribution. 2/3 of the top 1% capital income earners are in the top earnings quintile.
Aaberge et al. (2013a, 2018)	Study the joint distribution of wage and capital incomes. Over the period 1995-2005 the association between top labour and capital income grew stronger in Norway.	90% of top 1% wage earners were located in the top half of the capital income distribution. 80% within the top 1% of the capital income distribution were also in the top half of the wage distribution

Paper	Objective	Other
Aaberge et al., (2013)	Study the effect of mobility at the top of the distribution. Using Norwegian fiscal data, there is evidence that the 2005 tax reform had permanent impact on the top income composition at the very top.	In 2005, 81% of the people in top 0.1% derived the majority of their income from investment, down to 50% in 2006. The authors attribute this to an exit of capital incomes rather than upward mobility of earners from within the top 10%.
Atkinson et al. (2018); Boschini et al. (2017)	Study the relationship between top incomes and gender. Females at the top of the distribution have more capital income than earnings income for a set of advanced economies. In the UK and Sweden there are clear compositional effects where females receive more interest and other investment income, as opposed to males who receive more dividend income at the top over the period 2004-2014.	Objective: At the top of the UK distribution females have more investment income than earned income over the period 1995-2010. In 2007 females located at the top received ¼ of their income in the form of investments, for males this figure is 15% respectively (Atkinson et al., 2015).

General conclusions typically drawn from the top income literature are that in many advanced economies wage earners have replaced capitalists at the top of the distribution (Atkinson, 2007; Piketty & Saez, 2007a; Salverda & Atkinson, 2007b) except for Nordic countries where capital income has been making a comeback (Aaberge & Atkinson, 2010; Roine & Waldenström, 2010). Even though wage earners have replaced capitalists at the top in many countries, capital incomes still made an observable impact on the increases in top shares such as in Australia, Germany, France and the UK. Overall, drawing cross-country comparative conclusions is not an easy task because of pre-existing differences and subsequent changes to the tax base over time. An analysis of cross-country comparability of capital incomes and their role in top shares falls, drawing upon the information collected here, falls outside the scope of this thesis but is an interesting avenue for future research.

The main income components observed in fiscal sources are dividend, interest and rent. In some top shares are based on tabulations not allowing this income source to be distinguished in their analysis. In a few countries other income definitions can be studied such a realised capital gains, trust incomes, partnerships, owner occupied imputed rent, copyrights, royalties and business income (Alvaredo & Pisano 2010; Atkinson & Leigh 2007; Atkinson & Søgaard 2013; Burkhauser et al. 2015a; Jäntti et al. 2010; Piketty & Saez 2007a; Roine & Waldenström 2010).

At the global level there has been a decline in capital income taxation, this has led to less capital income to be included in the tax base over time or taxed under separate schemes separate from the Personal Income Tax, which is the case in many countries in particular for capital gains (Alstadsæter et al. forthcoming; Atkinson & Søgaard 2013; Bartels 2017; Bartels & Jenderny 2015; Förster et al. 2014). In the countries where capital gains are observed, they increase top income trends and levels significantly (Roine & Waldenström 2010). The UK has experienced a series of tax reforms which suggests that it is joining the

race (Miller & Pope 2015). This erosion takes place through lowering of capital income taxes, profit shifting and the classification of capital income taxation under separate schemes removed from the Personal Income Tax (Atkinson & Søgaard, 2013; Bartels, 2017; Bartels & Jenderny, 2015; Förster, Llena-Nozal, & Nafilyan, 2014). This suggests that the level of capital incomes observed in fiscal sources is expected to have decreased over time, but the magnitude remains unknown.

Furthermore, it is clear that tax reforms are able to trigger behavioural responses large enough to affect top shares, mainly through dividends (Aaberge et al. 2013b; Bartels & Jenderny 2015). This effect is known to be largest for capital gains, where income retiming strategies are easiest to apply, but unfortunately these are not observed for most countries (Roine & Waldenström 2012; Saez 2017).

There are two main channels through which this effect operates. The first channel runs through tax incentives to report (capital) income in either the household or corporate sector are found to have an effect on both top shares and levels of impact on capital incomes observed in fiscal sources, also known as tax shifting. Tax reforms linked to business taxation has an impact on what is reported in the PIT, affecting top shares and their composition by producing discontinuities in the amount of capital income observed (Alstadsæter et al. 2016; Atkinson & Leigh 2005, 2008; Atkinson & Søgaard 2013; Bartels & Jenderny 2015; Burkhauser et al. 2015b). Overall it is known that specific groups, e.g. business owners, benefit from taking advantage of differences between PIT and corporate tax rates in order to minimize their tax burden (Förster et al. 2014). The second channel runs through changes in top marginal rates producing observable shifts in capital incomes among high income individuals. For example, through income forestalling reduce tax burdens, this has large enough effects to impact the amount of capital income observed in fiscal sources. The 2013 decrease in top marginal rates among those with taxable income over £500,000

have brought forward £6 billion in dividends (Atkinson & Ooms 2015). The same has been observed for the USA where increases in the top marginal in 2013 rate have led to high income individuals to bring forwards large sums of dividends and capital gains, this leads to an observable reduction in top income shares (Saez 2012, 2015b).

The alternative approaches have given some new insights into the link between capital income and inequality. Novel indicators that are calculated, using fiscal sources to capture the joint distribution of wage and capital income, require a high level of detail from the tax administrative source. In countries relying on tabulations such as Portugal it is not possible to calculate such indicators. There are particular groups that are known to have strong responsiveness to the tax system such as closely held business owners and the self-employed. There is little to no information on smaller payments such as IP rights, partnerships, lump-sum payments etc. There is initial evidence that mobility in and out of top shares and capital income reporting behaviour between spouses will have something to add to the capital income narrative (Aaberge et al., 2013; Atkinson et al., 2018; Atkinson & Lakner, 2017; Ranaldi, 2018). Females at the top of the distribution tend to have larger shares of investment income than earnings (Atkinson et al. 2015, 2018; Boschini et al. 2017). Where relevant insights from these alternative approaches will be integrated in the current analysis, and the mechanisms they help to uncover, to help strengthen the overall capital income narrative and build bridges between the different areas of research.

2.1.3. Capital Augmenting Literature

Two approaches can be identified in this area. The first draws on unique datasets allowing one to make unique connections between Personal Income Tax (PIT) data and corporate ownership data. Usually such links are exploited to study responsiveness of the tax system by closely held business owners or the self-employed. The second approach combines existing sources (surveys, fiscal, national accounts) to expand the income definition to find links with corporate capital income such as retained earnings and business income. It depends on the nature of the research question whether it is appropriate to make such augmentations, at the outset it is might not always be clear why one would want to allocate e.g. corporate sector income to households. Because of the novelty of the subject not all extended definitions are widely known or adopted by inequality scholars at the time of writing.

Table 3 gives an overview of the insights that can be gained from these studies. The key takeaway from this Table is to provide the reader an understanding of the various capital income components that can further be integrated into inequality analysis. Because these studies take different approaches it is hard to make classifications, at the time of writing, therefore a general description and the potential use of this type of analysis for inequality studies is given. Any *augmentation* of the capital income definition to include non-household sector investment income has a noticeable upward effect on inequality indicators (Alstadsæter et al. 2016; Bartels & Jenderny 2015). Approaches vary from no distributional assumptions (unique databases) to heavy distributional assumptions (Alvaredo et al. 2017). It is not likely that all retained earnings are held in the corporate sector for tax minimisation at the individual level. Results from the former can be used to refine assumptions in this second approach. There is some evidence pointing towards new mechanisms running from the corporate sector onto wages (Short 2017).

Table 3: Capital income augmenting literature

Paper	Country	General description and potential use for inequality studies
Alstadsæter et al. (2016)	Norway	Use a unique database that is able to link individual capital income flows to corporate ownership using a shareowner register. Augmenting the capital income definition to include retained earnings in the corporate sectors leads to more than doubling of the top 0.1% income share.
Alstadsæter & Jacob (2016)	Sweden	Use Swedish tax administrative data linking individuals and corporations and find that after 2006 dividend tax cut there are noticeable differences in income shifting across tax bases. In particular owner managers of closely held companies have an incentive to report their income as dividend which is taxed at a lower rate than earnings.
Martin Jacob, Michaely, & Alstadsæter (Forthcoming)	Sweden	Unique data on private corporations and their owners. Sample of firms accounts for more than half of the taxable business income of the entire Swedish private sector. Ownership structure has a direct and economically large effect on tax elasticity of dividends. As ownership becomes more dispersed, dividend policies are less sensitive to taxation, in other words firms held by fewer owners are more sensitive to change in dividend taxation. Gives no information on how the tax reform affected top shares.
Smith (2018)	UK	UK tax system places largest burden on employees. The self-employed and owner managers systematically pay less tax. Closely held business owners are very responsive to the tax system, less is known about how individual incentives to the tax system are shaped. Retained profits are of particular importance to higher income owner managers.

Paper	Country	Augmentation capital income definition
Pope & Waters (2016); Vassilev et al. (2017)	UK	A 2000-2002 tax reform made it more attractive for self-employed to incorporate and pay themselves out in dividends. Observed increases in aggregate level of dividends from this period onwards.
Short (2017)	USA	Two separate sources on merges and acquisitions involving US companies and WID data. Rising levels of merger and acquisitions appear to increase pay among top wage earners, rather than capital gains and dividend payment among top capital income earners.
Marcus Jacob & Jacob (2013)	cross-country	Compile database with annual corporate tax, income tax and capital gains, firms with missing stock price, firms with dividends exceed sales etc. Dividend and capital gains taxation are large determinants of corporate pay-out internationally. Dividend volumes of firms with higher inside ownership show greater response to taxes.
Alvaredo et al., (2017) Thomas Piketty, Saez, & Zucman (2019)	cross-country	The Distributional National Accounts (DINA) creates synthetic micro files that are consistent with macro-economic aggregates. This approach makes imputations of all sorts. Such as allocating imputed rents and retained earnings back to households. But it also imputes corporate and government sector income back to individuals, relying on heavy assumptions. At present detailed DINA calculations exist for the USA and France. The UK calculations are in progress at the time of writing. More recently simplified DINA has been released which allows researchers to carry out DINA imputations in countries with limited information at the individual level.

2.1.4. Capital Shares Literature

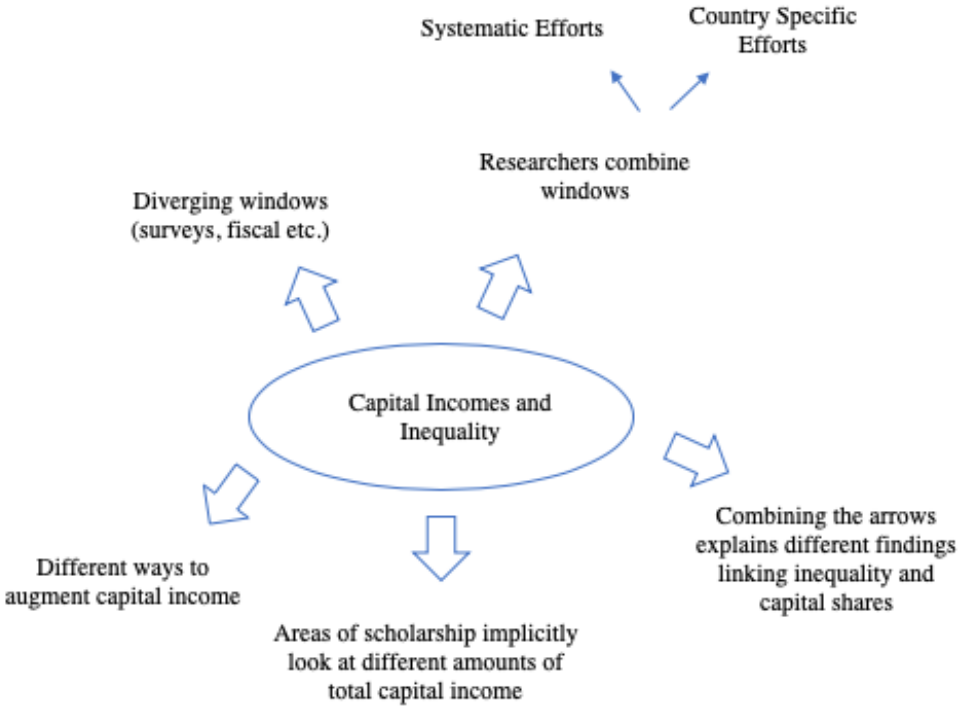
The stability of capital shares, at approximately 30 percent of GDP, has long been considered to be a stylised fact in macroeconomics (Kaldor 1961). In recent years more research attention has gone out to falling capital shares (Berg et al. 2018; Elsby et al. 2013; Giovannoni 2014a,b; Karabarbounis & Neiman 2014; Rodriguez & Jayadev 2013). This has been largely linked to the elasticity of substitution between capital and labour, skill-biased technological change and the role of automatization. These debates have macroeconomic foundations. A new set of stylized fats has been proposed by Stiglitz (2015) factoring in the more recent empirical observations.

This thesis takes as basis the household survey, used to calculate headline inequality indicators, and works towards a broader understanding of how other frameworks connect to the household survey literature. A detailed analysis of macroeconomic debates falls outside the scope of this thesis. Nevertheless, in line with the objectives of the thesis, later chapters will include an overview of capital share indicators used in the macroeconomic literature (national accounts) and revisit the policy implications of these macroeconomic debates with focus on capital shares. The reader is referred to Section 3.2.3.

2.2. Introducing the blueprint

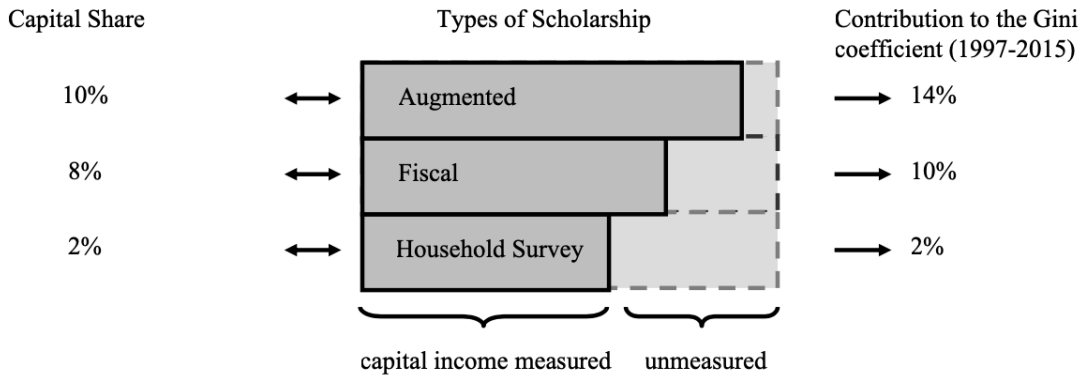
I argue that given the rapid movements in this area, a gap for a blueprint is opening up. The research community will have to keep patching together all available information and new insights in the best way possible to create one consistent narrative. All advances in all different directions are greatly encouraged, especially since there is no one self-contained window (database) or framework (area of scholarship). To be able to draw relevant conclusions there is need to develop a way in which findings can be systemised and compared, across countries and across time. Figure 1 gives an overview of the challenges that have been identified so far.

Figure 1: Challenges when researching the relationship between capital incomes and inequality



Because measurement differences open up along different lines it is not surprising that the link between capital incomes and inequality has been studied taking a myriad of approaches. Each study has a different objective and draws from different databases leading to the results not being directly comparable across studies. The studies looking at the relationship between capital incomes and inequality broadly fit into the blueprint in Figure 2. There is a correlation between the amount of capital income observed in each framework and its contribution to inequality.[5] Even patching together all these windows will not give a full picture of capital incomes in the economy. There will still be a fraction of capital incomes that remains unmeasured because of e.g. tax avoidance and evasion etc.

Figure 2: Blueprint capital incomes and inequality



Source: Author's estimates from SPI data (HMRC 2017)

The remainder of the thesis takes the survey-based literature as starting point and draws upon all the information collected from the other areas of research, to re-write the capital income narrative in the UK in a way that can be of practical use for policy making.

[5] The numbers are calculated using UK household and fiscal sources averaging the period 1997-2015. A detailed description of these sources will be given in later chapters. For illustrative purposes, the augmented variable scales up the fiscal sources to equal capital incomes as capture in the National Accounts Household Sector. This is a lower bound, if one were to scale up incomes the total amount of capital income observed in the economy this amount would increase substantially.

2.3. Summary and Discussion

The blueprint developed and presented here helps to identify several layers related to measurement that stand between as capital income captured by socio-economic indicators and for the total economy. Because there is no single database that captures all of the capital income in the economy, systematically going through all these layers broadens the view of the topic. This broader view will allow to go about constructing a broader capital income narrative and identify ways forward in terms of both measurement and policy design.

The **household survey** literature suffers from underestimation of capital income. This can be corrected for using fiscal sources (Aitken & Weale 2018). Another possibility is to make imputations to account for a broader household income concept such as the inclusion of imputed rents and pension accruals (Aitken & Weale 2018; Iacono & Ranaldi 2018). Atkinson (2012a), Fesseau & Mattonetti (2013) and Zwijnenburg (2017) discuss how national account household sector income can be aligned to correspond to living standards, and shows how survey estimates can be scaled up to national accounts totals. Another approach would be to include institutional capital income flows held by insurance and pension companies would raise the level of capital income observed at the household level.

In sum, under-estimation, the definition of capital income and accounting for institutional capital flows belonging to households but held by institutions all contribute to differences between conventional socio-economic indicators and those employed for the total economy. This gap is bridged in different ways using other micro sources or national accounts data.

The **fiscal** literature, at times, corrects for underestimation in fiscal sources. Incentives in the tax system affect how much capital income is observed in fiscal sources. Individuals are able to play around with differences in the PIT and corporate taxation to minimize their tax burden. Changes in top marginal rate triggers behavioural responses affecting timing and composition of income. One strategy to correct for such underestimation is through making imputations for such changes in the tax base triggering artificial reductions in observed capital income (Bartels & Jenderny 2015). Overall, there is not much research that corrects for such discontinuities.

In other words, the tax systems add to measurement discrepancies between the inequality indicators and those for the total economy. The amount of capital incomes observed is further affected by tax exempt capital income (e.g. income falling below personal allowances), lowering of capital income tax rates, removing of capital income from the Personal Income Tax, and behavioural responses that incentivise individuals to report their income in the corporate sector.

The **augmented** literature is more recent in nature but broadly speaking accounts for capital income that is reported in the corporate sector and allocates this back to individuals observed in the household sector. Where the fiscal literature corrects for discontinuities in their series this literature goes one step further, directly linking to corporate sector ownership and allowing one to more precisely account for business income in inequality measures (Alstadsæter, Jacob, Kopczuk, & Telle, 2016; Jacob, Michaely, & Alstadsæter, forthcoming). There is some evidence that a part of retained earnings in the corporate sector is held there by individuals for tax minimising purposes. The Distributional National Accounts takes a wider approach and allocates all of the corporate (and government) sector income back to individuals. Corporate sector income is another gap between the socio-

economic indicators and capital income in the total economy. At the time of writing it is not clear to what extent researchers would want to account for corporate sector income in the inequality statistics. It remains an open question where to draw the line.

The **capital share** literature origins from macro-economics. This is an important part of the broader literature but, at present, its role is downplayed in the blueprint. The thesis works its way up from micro sources towards capital shares, which allows to delve more into micro dynamics (and measurement) rather than macro dynamics. Taking a this *bottom up* approach, relying on the least number of assumptions, it is possible to shed light on issues that are not capture taking a *top down* approach, which take the national accounts as basis and work back to inequality measures imposing larger assumptions.

Table 4 provides a summary of the different results produced by the three windows and comments on their strengths and weaknesses.

Table 4: Summary table of the key differences between the household survey, fiscal and augmented approach

Literature	Household Survey	Fiscal	Augmented
Income Definition	Dividends, rents, property income Extensions: imputed rent, self-employment pensions etc.	Dividends, rents, property income. Other investment income (securities, partnerships, business income, IP rights etc.)	Discontinuities: changes in tax rates Extensions: retained earnings, business income, capital gains
Main Source	Household Surveys	Fiscal sources	Patches together all different sources: surveys, fiscal data, national accounts, country specific linkages, stock market statistics etc.
Strengths	Cross-country comparison and harmonization Disposable income and other socio-economic indicators Household level analysis	Captures the top of the distribution where capital incomes are disproportionally located Captures groups with high responsiveness to the tax system not adequately sampled in household surveys	Unique databases allow to link ownership in the corporate sector to individuals Distributional effects of macroeconomic developments Broader perspective link capital incomes and inequality

Literature	Household Survey	Fiscal	Augmented
Weaknesses	Underestimation capital incomes Does not adequality pick up responses to the tax system because groups with high responsiveness tend to be under-sampled Not able to adequately separate capital income sub-components	Tax legislation determines what is observe, is not the same as what is ideally observed (e.g. individuals vs households) Lower end of the income distribution not well captured Lower bound estimates: discontinuities in tax base, erosion income components from tax base, income shifting, tax avoidance and evasion Income definition linked to legal system differs from living standards definition	High level of distributional assumptions Lack of unique datasets with links to corporate sector ownership

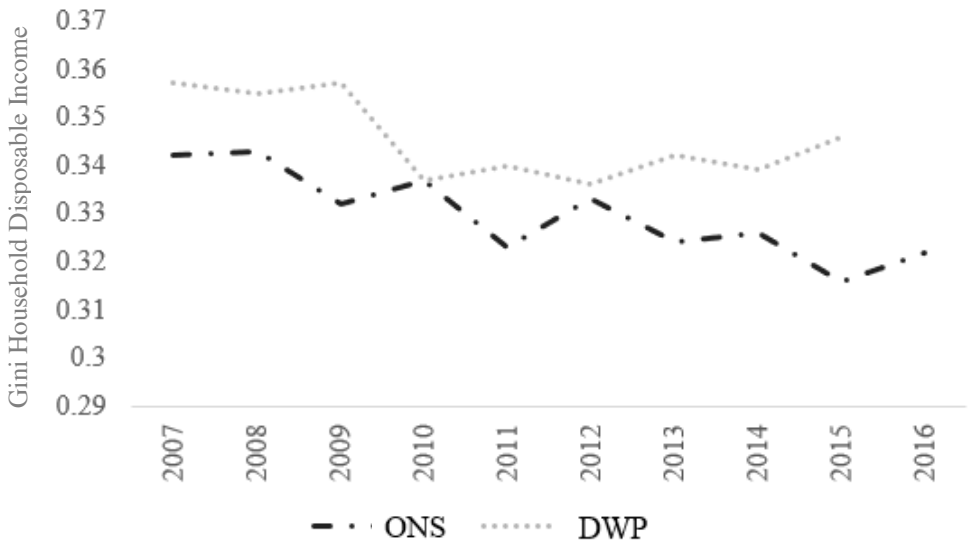
3. Current UK Inequality and Capital Income Narrative

This chapter familiarises the reader with the main inequality indicators used in the UK context and how capital incomes are at present featured in these debates. Section 3.1 describes which indicators are predominantly used in the UK context to inform policy debates and gives an overview of which data sources are used to construct these indicators. Section 3.2 provides a methodological discussion, in particular the problem of underestimation error in household surveys, how this impacts inequality indicators and how this can be corrected for using top income corrections. Section 3.3 draws upon the previous sections and highlights the implications for capital incomes allowing to precise the empirical contribution of the work that will be carried out in subsequent chapters.

3.1. Inequality Indicators

There are two official inequality series in the UK. Both the Department for Work and Pensions (DWP) and the Office of National Statistics (ONS) produce a Gini coefficient for equivalised household disposable income, Figure 3. In recent years, the inequality narrative presented by these indicators has started to diverge. Corlett (2017) describes that in 2015-16 the ONS and DWP estimated the Gini coefficient for household disposable income at 0.316 and 0.35 respectively. The main reason for this discrepancy is that the DWP applies a top income adjustment to their series. The top income adjustment corrects for estimation error in household surveys at the top of the distribution. Further details of this estimation error and top income adjustment methodology is explained in Section 3.2.

Figure 3: Main UK inequality indicators. The Gini coefficients for household disposable income produced by the ONS and the DWP



Note: The DWP estimate is produced After Housing Costs (AHC) and Before Housing Costs (BHC) to account for variations in housing costs which do reflect comparable variations in the quality of housing (DWP 2017). Housing costs include rent (gross of housing benefit), water rates, community and council water charges, mortgage interest payments, insurance premiums for owner occupiers and ground rent and service charges (DWP 2015a). In the BHC series income growth reflects an increase in living standards because increasing housing costs reflect increased quality of housing and better accommodation. In the AHC series income growth could overstate living standards especially for lower income households because an increase in housing benefits to compensate higher rents would overstate living standards (DWP 2017). The before housing cost series DWP series is most comparable to the ONS figures and is shown in the Figure.

The headline indicators produced by both the ONS and DWP are derived from various data sources, subject to data manipulation, which can create some confusion how the final indicators are produced. A practical implication of the top income adjustment is that it takes longer to release the DWP series which are needed to carry out the adjustment. The ONS series, without adjustment, is therefore picked up earlier in policy and political debates even though this series is known to not capture up surges in the top 1% share from 1980s onwards (Corlett 2017). He notes that the ONS figure is close to 1985 levels suggesting inequality is at its lowest point in 30 years, this discrepancy has allowed for cherry picking in UK political debates (Corlett 2017). At the time of writing the ONS is exploring ways to apply a top income correction, in collaboration with the DWP (Shine & Webber 2019).

Table 5 provides an overview of the data sources used to create the official UK inequality statistics. This in turn, helps to clarify how the main inequality indicators in the UK are produced. The academic literature has produced a wider variety of Gini estimates more details of these estimates can be found in Appendix I. Table 6 provides a brief description of the data sources used by DWP and ONS to produce the ETB and HBAI files.

Table 5: Description of the data sources used by the ONS and the to produce the official UK inequality statistics

Data source	Use
Effect of Taxes and Benefits on Household Income (ETB)	**Used to produce the official inequality statistics by the ONS**. The ETB is constructed using the Expenditure and Food Survey (2001-2007) and the Family Expenditure Survey (1977-2001) (Corlett 2017). The sample size for these surveys is relatively low at around 5.000 households, for this reason aggregate administrative data is used to improve the quality of the underlying data sources to construct the ETB (Corlett 2017).
Households Below Average Income (HBAI)	**Used produce the official inequality statistics by the DWP**. The series includes a top income correction. The HBAI is constructed using the Family Resources Survey (FRS) and is predominantly used for research on poverty and material deprivation (Tomlinson & Corlett 2017). Key income variables are in disposable equivalise household income, it is not always clear which imputations are made. The HBAI includes a top adjustment to correct for underestimation of the rich in surveys which has been carried out by the DWP since 1991 (Burkhauser et al. 2018). Tax administrative data (Survey of Personal Incomes), with more available information at the top, is used to compliment the household survey data.

Note: This Table restricts itself to underlying sources used to produce headline inequality indicators produced by the DWP and ONS.

Table 6: Brief description of the data sources used by DWP and ONS to produce the ETB and HBAI files

Data source	Use
Living Costs and Food Survey (LCFS) Expenditure and Food Survey (2001-2007) Family Expenditure Survey (1977-2001)	Household survey collected by the ONS. The household survey has experienced various (name) changes over the past decades. Source predominantly used for research on expenditure, indirect taxes and public services (Corlett 2017). The sample size for these surveys is relatively low at around 5.000 households (Corlett 2017).
Family Resources Survey (FRS)	Sample of over 19.000 UK households (DWP 2017). Survey extended in 2002-03 to include Northern Ireland. Most detailed source for different income sources than other UK household surveys (DWP 2017).
Survey of Personal Incomes (SPI)	Tax administrative data in the UK. Source traditionally used to calculate top income shares. This data source is constructed from three separate sources of data collected by Her Majesty's Revenue and Customs (HMRC), making it a stratified sample. The underlying data sources are mainly the National Insurance and Pay-As-You-Earn (PAYE) systems and Computerised Environment for Self-Assessment (CESA) (UK Data Archive 2012).

Note: This Table provides an overview of the data sources used by the DWP and ONS to create the HBAI and ETB databases. The HBAI and ETB are subsequently used to calculate the official inequality statistics used in the UK.

3.2. Methodological Debates

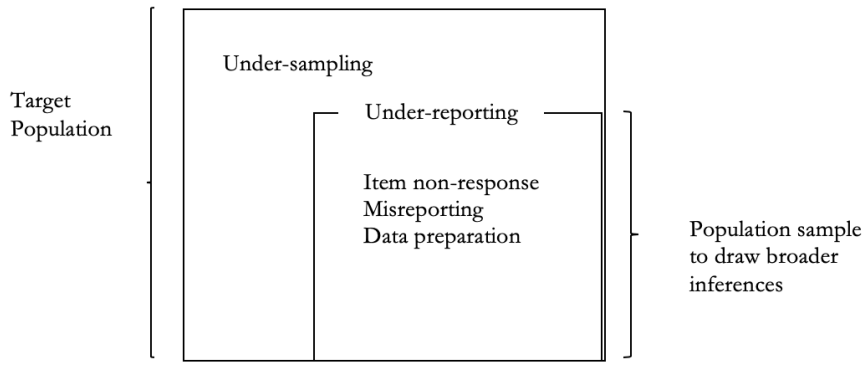
It is a stylised fact that household surveys do not adequately capture high income individuals at the top of the distribution. All household surveys used to produce the official statistics, described in the previous chapter, suffer from this underestimation error. The main implication of the underestimation of top incomes in household surveys is that it produces a downward effect on inequality indicators, as shown for the ONS series. This downward bias is of concern because policy makers and other societal actors use such indicators to inform the decision-making process. Section 3.1 has briefly touched upon top income corrections used to account for this underestimation error and how the inequality narrative changes after applying such corrections. This Section includes a more comprehensive discussion of this underestimation error and the methodology used in the top income corrections.

Section 3.2.1. explains why the underestimation of top incomes in household survey arises and the different underlying causes. Section 3.2.2. discusses the specific methodologies correcting for this underestimation error in the UK case. More recently the academic literature has started to produce more methodologies of this kind. Where applicable to the UK case methodological debates, insights from the academic literature will be included in the main text. A brief overview of other academic advances will be discussed in the Appendix and could be incorporated into the work in a future stage. This thesis uses fiscal sources as benchmark for total capital income. Section 3.2.3 points out at the outset that fiscal sources are known to not capture all capital income in the economy for various reasons. This section shows how capital income in the fiscal source compares to other capital income benchmarks such as the national accounts. The empirical estimates produced in this thesis (Chapter 4) are in essence a lower bound taking the fiscal sources as benchmark.

3.2.1. Underestimation of top incomes in household surveys

Household surveys are known to miss the richest in society. This problem of `missing rich' is the main cause of underestimation error at the top of the distribution in household surveys (Atkinson & Piketty 2007, 2010). All inequality indicators constructed using only household surveys are known to underestimate levels of inequality (Bourguignon 2018). The previous Section has shown that in the UK this underestimation affects both reported levels of inequality and their trends. Underestimation error arises through different channels. These channels are generally related to sampling and data collection. A general overview of these errors is presented in Figure 4.

Figure 4: Underestimation error in household surveys arises through under-sampling and under-reporting



Note: Figure reconstructed based on information and a combination of terminology taken from (Anand & Segal 2015; Blanchet et al. 2018; Bourguignon 2018; Corlett 2017; Lustig 2018)

Broadly speaking underestimation takes place through under-sampling and under-reporting (Anand & Segal 2015; Blanchet et al. 2018; Bourguignon 2018; Corlett 2017; Lustig 2018). The former relates to households which are not sampled. The latter relates to sampled households not responding or misreporting income levels (either willingly or unwillingly).

Surveys only provide information on a fraction of the target population, relying on a population sample to draw broader inferences. Among the households sampled and responding to the survey underestimation errors also arises through the data collection process. Participants may decide to not reply to all variables (item non-response) and responses might be misreported (either willingly or unwillingly). After the information has been gathered, data preparation such as anonymisation, rounding, truncating etc. often introduced additional underestimation error in the reported income estimates.

At the top of the distribution underestimation is driven by both under-sampling and under-reporting of income by rich households (Bourguignon 2018).[6] Top incomes sampled are often volatile because of the small amount of households/individuals sampled at the very top (Burkhauser et al. 2017b, 2018). Furthermore, there is evidence that in particular high-worth individuals are typically under sampled in surveys and that misreporting of income increases as one moves higher up the income distribution (Blanchet et al. 2018; Schröder et al. 2018).

3.2.2. Top Income Methodology

Top income adjustments have started to receive more attention in both the UK context and in the wider academic community. Top income adjustments are also referred to as top income corrections or harmonisation methods. These labels will be used interchangeably throughout the remainder of the thesis.

In order to streamline the methodological discussion, to be of relevance to the UK inequality narrative this thesis sets out to address, this Section will take the following

[6] The literature discussing top income adjustments is still in its infancy at the time of writing. As a consequence, terminology is often inflated. This thesis adopts the terminology used in Anand & Segal (2015) and Bourguignon (2018).

structure. First, a general description of the purpose of top income adjustments. Second, the adjustment parameters used to carry out the adjustments and introducing the notation that will be used through the remainder of the work. Third, a description of the top income methodology discussed in the UK context. Fourth, a description of how advances in the academic literature could be incorporated in the UK context in future work.

This Chapter has so far focussed on underestimation error more generally because at the time of writing all the proposed top income methodology has been applied to total income. Section 3.3 and 3.4 will bring out the implications for capital incomes in terms of underestimation and top income methodology in more detail. This will help to put into perspective the main empirical contribution of this thesis. to improve the capture of capital incomes in inequality indicators, an income sub-component (Chapter 4).

Purpose of top income adjustments

Top income adjustments are used to correct for the various forms of underestimation in household surveys, described in the previous section. The adjustments use information from tax administrative data to supplement the shortcomings of the household surveys at the top of the income distribution. It is a stylized fact that top income adjustments have an upward effect on inequality indicators (Anand & Segal 2015, 2017; Atkinson & Jenkins 2019; Bourguignon 2018; Burkhauser et al. 2018; Jenkins 2017). Therefore, the corrections have important implications because inequality indicators are used to inform policy and public debates.

Top adjustments come in different shapes and sizes and at present there is no consensus on which method is better to use. There is a trade-off between methods allowing for timely release of the inequality indicators used to inform policy more sophisticated methods developed within academia. The former is more relevant in the context of this

thesis. This Section will describe (1) the top income adjustments discussed in the UK context allowing for timely release of the indicators (2) followed by a brief description of methods recently proposed in the academic literature and a brief discussion of how they could be applied to the current context in future research.

Adjustment parameters

The most common parameters applied to the top income correction are the eligibility threshold, income replacements and weight calibrations. Some methods apply all three parameters other methods apply a combination of the parameters. The following notation will be used throughout the thesis to indicate the different modifications applied to the data, see Table 7.

Table 7: Notation used throughout the thesis to indicate parameters used for income corrections

Notation	Explanation
α	Eligibility threshold measured as top shares (e.g. 0.05 = top 5%)
φ	Income replacements
ω	Weight recalibration

The eligibility threshold (α) indicates the share of the population to which the top income adjustment is applied. Income replacements (φ) correct for under-reporting of income, or missing income, in surveys. In general terms, income levels in the household survey are replaced by higher income levels observed in the tax administrative data for households/individuals observed above α. Weight recalibrations are applied to correct for under-sampling of high-income individuals/households (ω), or missing people. This recalibration places more weight on high income individuals typically falling out of the household survey, scaling up their observations in the survey.

Top income adjustments discussed in the UK context

Various top income adjustments have been discussed in the UK context. The purpose of top income adjustments and the chosen values for the adjustment parameters vary in the different discussions. The DWP top income adjustment dates back to 1992, putting the UK in a pioneering position in cross-country comparative perspective. The DWP methodology has recently been challenged in two ways. First, direct alternatives to the DWP direct alternatives to the DWP methodology have been proposed by Burkhauser et al. (2016, 2017a,b, 2018). Second, the wider academic community has also started to think more carefully about top income corrections (Alvaredo 2011; Anand & Segal 2015; Atkinson & Jenkins 2019; Blanchet et al. 2018; Bourguignon 2018; Jenkins 2017; Lakner & Milanovic 2015; Lustig, forthcoming).

In order to streamline this methodological discussion, to be of relevance for the UK context, the following structure is adopted here. First, a discussion of the top income methodology used by the DWP to produce the official UK statistics. Second, a discussion of the top income methodology proposed by the academic community to improve the DWP methodology. Third, a replication of these methodologies with the data sources used in this thesis. Fourth, a discussion of the methodological insights produced in these debates and how they could be better incorporated into the current UK methodology in the future.

Department of Work and Pension (DWP) Top income methodology

As described in Section 3.1, the DWP uses the Household Below Average Income (HBAI) as data source for their calculations. The HBAI is derived from the Family Resources Survey (FRS) as explained in Table 5 and 6. At the time of writing, the DWP series is the only

official UK inequality series with top income adjustment. The UK tax administrative data (Survey of Personal Incomes) is used to carry out the top income adjustment. The correction reports higher overall inequality levels than non-adjusted household survey estimates.

The DWP method has originally been designed to correct for volatility, because of small numbers in the sampling design at the top of the distribution (DWP 2015a). At present there is no publicly available documentation explaining the details of this methodology. A brief description is given in the HBAI Quality and Methodology Information Reports, see for example (DWP 2015a, 2017). The academic community has made great efforts to make the exact methodology more transparent by requesting access to unpublished materials, talking directly with the DWP and the HMRC and trying to replicate the calculations using HBAI and SPI public-use data (Burkhauser et al. 2017b, 2018). The aim of the authors has been to provide the most detailed publicly available overview of the DWP methodology Nevertheless, even after these best efforts some parts of the methodology remain undocumented.

Part of the empirical contribution of this thesis is to examine how capital incomes feature in this methodology and how their capture could be improved (Chapter 4). For this reason, this section includes only a general description of the methodology which allows the reader to put into context the empirical results presented in Chapter 4. For a thorough description of the methodology the reader is referred to the work of (Burkhauser et al. 2017b, 2018; DWP 2015a).

This general description explains how the adjustment parameters (α, φ and ω) are used in the DWP methodology. First, the eligibility threshold (α) varies between pensioners and non-pensioners and geographic location. In total this creates four stratification groups: pensioners and non-pensioners in Great Britain and pensioners and

non-pensioners in Northern Ireland. The monetary threshold used to determine the eligibility threshold as a percentage of the population (α) have been reconstructed by Burkhauser et al. (2017b, 2018) and presented in their Table A1. To give an example, in 2012/13 the eligibility threshold for non-pensioners and pensioners in Great Britain was £236,694 and £73,631, respectively (Burkhauser et al. 2017b).

This implies that the top correction is not necessarily carried out on the highest incomes, but on the highest incomes carrying out separate adjustments for pensioners and non-pensioners. The correction is applied to individuals above the eligibility threshold α but the official statistics are produced at the household level. In other words, individuals within a household receive a top income adjustment instead of the entire household itself. Broadly speaking the eligibility threshold is applied to the top 0.5% (α=0.05) (Burkhauser et al. 2017b, 2018). In later chapters of this thesis, and for replicability in this Chapter, it is assumed the correction is applied to the top 0.5%.

The DWP methodology uses income replacements (φ), which implicitly corrects for under-reporting of income levels. This income replacement differs for the four different stratification groups. The income replacement consists of replacing the income levels for each of the individuals above α, observed in the household survey, with information form the tax administrative data. In the literature this is also referred to as income cell-mean replacements (Burkhauser et al. 2017b, 2018). In the tax administrative data one income mean, for each year, is calculated for individuals above α for each stratification group, for each year. The income mean derived from the tax administrative source is used to replace corresponding incomes of eligible individuals in the household survey. One implication of this method is that every individual above α receives the same income value, depending on

the stratification group. The average income for eligible individuals rises, but the income variation between them is reduced to the four values of the stratified groups.

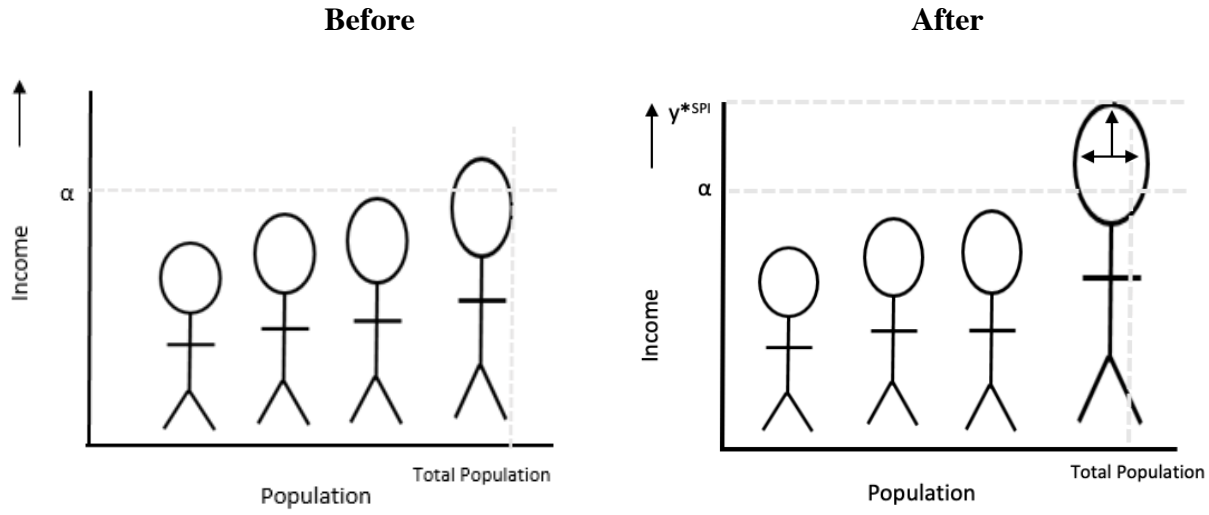
The DWP uses the Family Resources Survey to apply the income cell-mean replacements for individuals. These figures provide the basis for the corrected household level statistics reported in the HBAI. As mentioned in the previous Section, the conversion from the FRS to the HBAI is not fully transparent and at the time of writing not much documentation is publicly available to fully come to grips with the conversion of the variables after the cell-mean replacements have been carried out. In particular, it is not fully clear how the conversion from gross individual level variables to the disposable household income variables, the official measure of the inequality statistics takes place.

The Survey of Personal Incomes (SPI), the tax administrative file, is used to calculate the income means. One limitation of using the SPI is the time lag in the release of the tax files. The DWP and the HMRC have combined efforts to allow for timely release of the top adjusted inequality statistics. HMRC calculates the income cell-means, for the four stratification groups, based on projected values for the current year using the data sources used to construct the SPI. The HMRC delivers these income cell-means to the DWP so they can be used to produce their top adjusted series. There is little is known about how the HMRC carries out this projection in practice (Burkhauser et al. 2017b, 2018).

The DWP methodology also uses weight recalibrations (ω) implicitly correcting for under-coverage in the household survey. More individuals are observed above the eligibility thresholds in the tax data than in the survey data. The tax data is used produce an estimate of the number of individuals above α used as population control total for pensioners and non-pensioners. The survey weights, for individuals above α, are subsequently recalibrated. One take away point is that the DWP replaces income levels for a relatively small fraction

of the population (0.5%) but drastically alters the weights. The recalibration of the weighs largely drives the observed increases in inequality after applying the adjustment. A visualisation of this methodology is given in Figure 5.

Figure 5: Visualisation DWP top income adjustment before (left) and after (right)



Note: The DWP adjustment corrects the top 0.5% for both underreporting and under sampling. Income is indicated on the vertical axis and increases as one moves up the axis. The horizontal dotted line represents the eligibility threshold, indicated by α. The official DWP method uses an income threshold to determine α, the replication in the thesis uses the top 0.5% as population threshold, and α represents the income threshold at the population cut-off. The horizontal axis represents the population, where the vertical dotted line represents the total population. The DWP adjustment is only applied to those above the eligibility threshold, the individuals below the threshold remain unaffected by the adjustment. Each of the four figures can be seen individually but can also represent a group of individuals. For individuals with incomes above α, in the household survey, their income is replaced by the mean income for those above α observed in the fiscal source indicated with y^{*SPI}. This pushes up income levels of these individuals, which is indicated by the increase in height of the person above the threshold after the correction. The individuals above the threshold also receive a higher weight, to match the weighed population total for the eligible individuals as observed in the fiscal source. This is represented by the person eligible for the correction increasing in width. Because there is no adjustment further down the distribution to compensate the additional observations inserted at the top, the size of the eligible individual expands beyond the boundary of the total population.

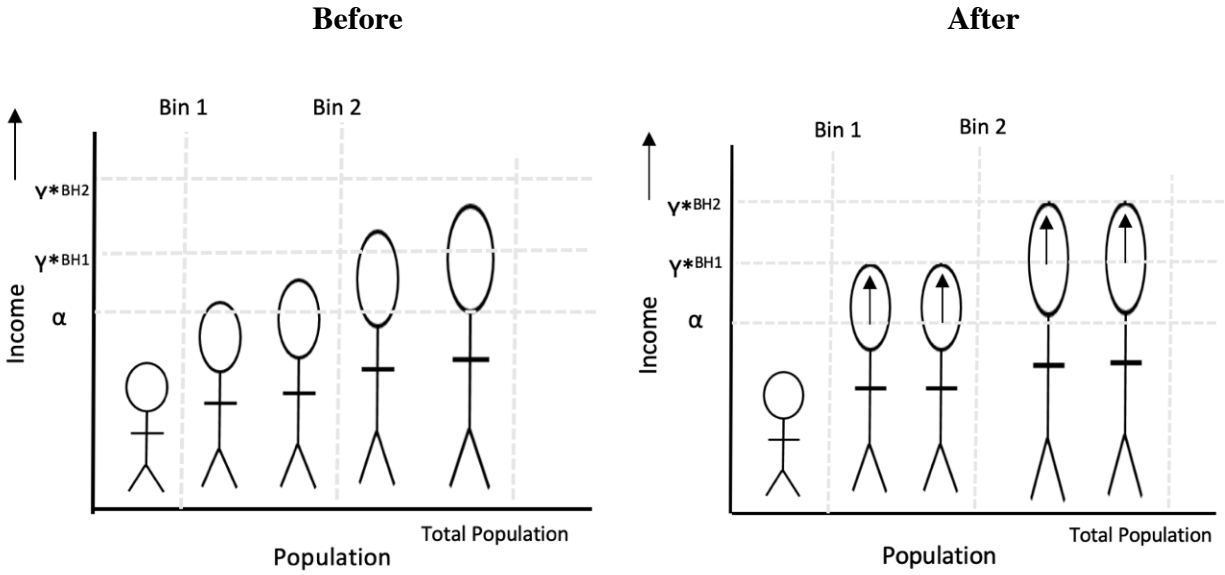
BH top income methodology (Burkhauser et al. 2016, 2017a)

Burkhauser et al. (2017b, 2018) argue that the DWP method makes unnecessary corrections, for example, they argue that the stratification method adopted has been a random decision based on expansion of coverage of the FRS to include Northern Ireland in 2002-03. Therefore, their response has been to challenge the DWP method and put forward an alternative to this method. In this thesis this method will be referred to as the BH methodology. Their method is replicable using the databases at our disposal with a few modifications which will be discussed (Burkhauser et al. 2016, 2017a).

At the time of writing, the BH methodology has been discussed with the DWP and the ONS. The DWP and the ONS have jointly developed a new top income methodology which incorporates parts of the BH methodology (Shine & Webber 2019). These new methods have been made publicly available two months before submission of this thesis, for this reason the new methodology does not feature more prominently in the current analysis. They improve the DWP method and address some of the critiques made by Burkhauser et al. (2017b, 2018). This further allows the ONS to make top income correction to their series produced using the ETB. This suggest that the topic of top income adjustments is highly relevant in the UK context. The additional corrections proposed in the subsequent chapter can be of use to further inform these debates, in particular how to better account for capital incomes in the UK inequality indicators.

A visual representation of this method is given in Figure 6. In this method, the eligibility threshold (α) is based on a monetary value but a population share. The monetary value is the income level observed at the cut-off point in the population. In the peer reviewed article, the authors have chosen the top 5% ($\alpha = 0.05$) (Burkhauser et al. 2017a). In the working paper the correction is applied to the top 10% ($\alpha = 0.10$).

Figure 6: Visualisation BH top income adjustment before (left) and after



Note: The BH adjustment corrects for underreporting of income at the top of the distribution. The method replaces incomes at the top of the distribution, as measured by surveys, by incomes at the top of the distribution, as measured in fiscal sources. Each of the four figures can be seen individually but can also represent a group of individuals. Income is indicated on the vertical axis and increases as one moves up the axis. The lower horizontal dotted line represents the eligibility threshold, indicated by α. In this Figure α should be interpreted as the income threshold at the population cut-off (e.g. 5% or 10%). The horizontal axis represents the population total where the final vertical dotted line represents the total population. For those eligible for the adjustment, this income correction depends on the location within the income distribution. The Figure shows the intuition of the adjustment for two bins. In the BH method each bin represents 1/1000 of the population ranked by their position in the income distribution. The income level of individuals within each bin are scaled up to the income mean of that bin from the fiscal source. In the example this is y^{*BH1} and y^{*BH2} for bin 1 and bin 2, respectively.

The remainder of the correction takes place through income replacements (φ). First, in both the HBAI and the SPI individuals are ranked by their pre-tax income (gross income). Second, in each data source individuals are placed in income groups. These income groups can be referred to as income cell means or bins. Each bin has the size of 1/1000 groups or bins (j) of the adult population (+15). In this step population control totals are used; the control totals are also used by WID researchers to calculate top income shares. This ensures the weighted population above those eligible for the top income correction (α) is the same in both income sources. Third, income averages of each bin, eligible for the correction, are calculated using the tax administrative data. Fourth, the income averages derived from the tax administrative data are used to replace corresponding values observed within each bin in the household survey. For example, with $\alpha = 0.05$ the correction will consist of replacing 50 bins (j) in the household survey with the income mean for that particular bin in the tax administrative data. The authors find similar results when calibrating the weights after having applied the income correction, based on this they decide to only use the cell replacement. The FRS weights are not recalibrated, the authors mention that the results do not change when they use the FRS-HBAI weights.

Academic literature

Over the past years academics have proposed other harmonisation methods to correct for survey underestimation at the top (Aitken & Weale 2017, 2018; Alvaredo 2011b; Anand & Segal 2015, 2017; Atkinson & Jenkins 2017; Blanchet et al. 2018; Bourguignon 2018; Lakner & Milanovic 2013; Lustig, forthcoming). The growing number of methods proposed in the academic literature, have so far not been used to challenge the DWP methodology directly. At the time of writing there is no consensus on the gold standard of harmonisation methods. Each method has its pros and cons and often relies on arbitrary choices of e.g. cut-off points.

From the outset it is not clear whether more complex methodologies proposed by the academic community will practically allow for timely release of top income corrected statistics. As mentioned, the top adjustment applied by the DWP relies on income projections which are produced by HMRC to construct their inequality series. It will be less labour intensive for HMRC to produce income projections for the purpose of carrying out income mean replacements instead of projecting income totals, even though such projections could improve the accuracy of the top correction. In the UK case, stochastic imputations replicating the distributional properties of the household survey has also been applied but this would also require more complex imputations/projections from HMRC (Aitken & Weale 2018). In other words, there is a trade-off between more sophisticated methods, developed within academia, and simpler methods allowing for timely release of the statistics to be of use to inform policy. The framing of the thesis suggests the latter approach is more appropriate for our purposes.

At present there are more techniques that correct for income (φ) than for weights (ω). A finding that has been receiving more attention in the academic literature is that if weight at the top are re-calibrated the population total increases, this would require an adjustment

further down the distribution (Anand & Segal 2015, 2017; Blanchet et al. 2018; Bourguignon 2018). These debates have been introduced fairly recently and apart from the original papers these techniques have not been applied widely. Because the current analysis is interested in a sub-income component the implications are even less clear cut. As discussed, the DWP method the majority of the correction takes place through the weights. The authors of the BH method find that the adjustment through weights and income are roughly similar and chose the income cell-replacement rather than the re-weighing technique. In both cases, it is not discussed further how these techniques affect population totals and total income totals. The techniques relying on re-calibration of weights will need further exploration both in the academic literature.

I argue that, given the advances in the literature at the time of writing, among the top income corrections discussed in the UK context the BH method is the best option available to propose an additional set of corrections to better account for capital incomes in the official inequality series for the United Kingdom.

3.2.3. Use of fiscal sources as benchmark

The top income methodology typically harmonises household surveys and tax administrative sources. In which the tax administrative source is used as a benchmark to measure total income. However, it is known that fiscal sources are underestimated when compared to other benchmarks such as the national accounts. As briefly mentioned in Chapter 2, there are several reasons to believe that fiscal sources have been measuring less capital income over time. This effect is particularly strong for capital incomes given the race to the bottom in capital income taxation. Chapter 4 discusses fiscal reforms together with the empirical measurement of capital incomes and shows that there is reason to believe that the fiscal sources, used as benchmark in the analysis, have been capturing less capital incomes.

The main research question of the thesis as identified in the introduction is: *Why are capital incomes not adequately picked up by headline inequality indicators used to inform social policy, how can to correct for this and what are the implications?* In the main empirical analysis of this thesis (Chapter 4) fiscal sources are used as benchmark to measure capital incomes. However, it is important to keep in mind that the use of fiscal sources suggests all the empirical findings in this thesis will represent a lower bound. There are more layers standing in between capital income measured in household surveys, fiscal sources and the total economy.

National Accounts

The national accounts indicators are typically used as a measure of total income in the economy. National accountants produce a range of indicators measuring aggregate levels of capital income in the economy. Traditionally capital shares are calculated taking the national accounts as starting point (Elsby et al. 2013; Gollin 2002; Karabarbounis & Neiman 2014; Piketty & Zucman 2014). The capital shares that we have looked at so far are the ones observed using micro statistics.

Table 8 compares the total amount of capital income observed using data sources produced in the different literature described in Chapter 2. This includes information from micro sources, national accounts and frameworks using both simultaneously. Column 1-3 shows capital share indicators produced in the household survey and fiscal literature. Column 1 and 2 show the capital share constructed using capital income observed in the FRS and SPI as a percentage of GDP.

Column 3 puts forward an in indicator which has not yet received much attention in the literature. Atkinson (2012) brings to the light that many items in the national accounts are imputed and should not be counted as income from a household perspective. Atkinson proposes a new headline indicator based on an income concept which he names *spendable income*. He constructs this benchmark using the national accounts household sector (S14) capital income variable, explained shortly, from which he subtracts imputed net equity funds, the value of government services and imputed rent from real gross disposable income. By taking the household sector accounts as benchmark his analysis excludes retained earnings etc. This is one clear example of when the capital income benchmark is higher, than the capital income benchmark calculated using the household survey and fiscal source.

Column 4 uses the household sector national accounts capital income variable (S14) to construct the capital share. This variable has been used in OECD analysis (Fesseau & Mattonetti 2013; Fesseau et al. 2013; Zwijnenburg 2017; Zwijnenburg et al. 2016). Column 5 is the national accounts total economy aggregate (S1) traditionally used in the capital share literature (Berg et al. 2018; Elsby et al. 2013; Giovannoni 2014a,b; Karabarbounis & Neiman 2014; Rodriguez & Jayadev 2013). Column 6 and 7 give the capital share measured in the S11 (non-financial corporations, ESA 2010), S12 (financial corporations) based on national accounts figures. These variables have more recently been included in inequality

analysis through the Distributional National Accounts (DINA) project (Alvaredo et al. 2017). From the early 2000s onwards, there has been strong growth in financial services (measured as % of the UK economy) until the crisis (Rhodes 2019). This explains the increases in S12 observed during the years leading up to the crisis, these surges have been large enough to impact the capital share measured for the total economy.

Table 8: Total capital income variables as measured in different sources used in the literature % GDP

	micro statistics			national accounts			
	FRS	**SPI**	**(Atkinson, 2012)**	**HH (S14)**	**S1**	**S11**	**S12**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
1995	1%	2%	4%	11%	30%	4%	15%
1996	1%	2%	4%	11%	31%	4%	15%
1997	1%	3%	5%	11%	33%	4%	16%
1998	1%	3%	5%	12%	34%	4%	17%
1999	1%	3%	4%	10%	30%	3%	16%
2000	1%	3%	5%	12%	36%	4%	19%
2001	1%	3%	4%	11%	34%	4%	19%
2002	1%	3%	4%	10%	31%	4%	16%
2003	1%	3%	4%	10%	31%	4%	16%
2004	1%	3%	4%	11%	35%	4%	19%
2005	1%	4%	5%	12%	40%	5%	22%
2006	1%	4%	5%	12%	47%	6%	28%
2007	1%	5%	6%	13%	54%	6%	34%
2008	1%		6%	14%	56%	6%	35%
2009	1%	5%	6%	11%	37%	5%	20%
2010	1%	4%	5%	11%	34%	5%	17%
2011	1%		5%	11%	35%	6%	18%
2012	1%	4%	5%	10%	33%	4%	17%
2013	1%	5%	6%	10%	32%	4%	15%
2014	1%	5%	6%	11%	32%	4%	15%
2015	1%	6%	6%	12%	31%	3%	15%
Average	**1%**	**4%**	**5%**	**11%**	**36%**	**4%**	**19%**

Source: Author's estimates from FRS, SPI and Blue Book. Calculated using GDP chained volume measures seasonally adjusted as published by the ONS. The capital income indicators are taken from the national accounts S1 (total economy), S11 (non-financial corporations, ESA 2010), S12 (financial corporations) and S14 (households, ESA 2010). For each of the institutional sectors the variable D.4 Property Income (resources) is used as capital income aggregate. From the early 2000s onwards, there has been strong growth in financial services (measured as % of the UK economy) until the crisis (Rhodes 2019). This explains the increases in S12 observed during the years leading up to the crisis, these surges have been large enough to impact S1.

To construct the capital share using the micro sources (column 1-2) the aggregate amount of capital is calculated in both the FRS and SPI and divided by GDP. For column (3) the national accounts total for property income (D4 resources), measured in the household sector, is used and the relevant capital income components are subtracted which is divided

by GDP to reach the figures presented in Table 8. For column 4-7 The capital income indicators are taken from the national accounts S1 (total economy), S11 (non-financial corporations, ESA 2010), S12 (financial corporations) and S14 (households, ESA 2010). For each of the institutional sectors the variable D.4 Property Income (resources) is used as capital income aggregate. From the early 2000s onwards, there has been strong growth in financial services (measured as % of the UK economy) until the crisis (Rhodes 2019). This explains the increases in S12 observed during the years leading up to the crisis, these surges have been large enough to impact the capital income indicator measured in S1.

Capital income as measured in the FRS captures 1% of GDP and is stable over time (column 1). This variable has been used to calculate existing UK factor decompositions (Belefield et al. 2017; Brewer & Wren-Lewis 2016). Over the period 1995-2015 the amount of capital income observed by fiscal sources has increased by 4 percentage points, from 2% to 6%, mainly driven by dividends (column 2). The capital income measured in Atkinson (2012) his spendable income, we observe an increase in the capital share of 2 percentage points, from 4% to 6%. Using this definition. For most recent years Columns 1-3 have converged. One of the reason for this convergence is the fact that national statisticians have brought the national accounts household sector estimates closer in line with the fiscal sources (Kent 2017).

In Chapter 2 we have seen that OECD researchers have been scaling up income totals as measured in surveys to equal income in the National Accounts Household Sector (S14) (Fesseau & Mattonetti 2013; Fesseau et al. 2013; Zwijnenburg 2017; Zwijnenburg et al. 2016). This variable has stayed relatively stable over time at 11% (column 4).[7]

[7] The OECD makes additional imputations e.g. imputing income flows for the underground economy but S14 is represented for simplicity.

Column 5 shows the capital share as traditionally employed in the macroeconomic literature (excluding self-employment income) (Elsby et al. 2013; Karabarbounis & Neiman 2014; Piketty & Zucman 2014).[8] This includes the major capital income components dividends, rent and interest observed within both the household and corporate sector. Alvaredo et al. (2017) and Glyn (2012) use the national accounts to calculate factor shares, they do not solely look at aggregate capital shares but also at capital shares within the different sectors reported by the national accounts. This includes non-financial (S11) and financial corporation (S12). These indicators are given in Column 7 and 8, respectively.

The gap between the SPI and the Atkinson (2012) household adjustment has closed over time. The ONS has recently made corrections to their statistics in which they draw more closely from fiscal sources (Kent 2017).[9] This can potentially explain some of the convergence observed over the period, from 2 percentage points to zero. It should be noted that the national accounts is constructed following the SNA (2008) accounting principles, in practice it is hard to fully come to grips with differences between micro statistics and national accounts totals.[10]

[8] It is unclear what is driving the surges in S12 over the period 2005-2008 there have been changes in the national accounting framework that could potentially explain this surge which is also picked up by S1.

[9] This change is related to the separation in the UK national accounts between the household sector and non-profit institutions serving households (NPISH). Improved calculations for interest in collaboration with estimates provided by the Bank of England applied for 1998 onwards. Dividend payments have been adjusted from 2011 onwards, resulting in a rise in dividend pay. In addition, the ONS uses share ownership data to reallocate information assets between the different sectors e.g. household and corporations. At the ESCoE workshop 'Imputation of data into household surveys' held in October 2017 this topic was briefly discussed and the separation between the household sector and NPISH sector appears to have given a more prominent role to SPI figures in particular dividends; however, to the best of my knowledge the exact procedure remains undocumented.

[10] OECD EG-DNA researchers have facilitated dialogue between micro and macro statisticians in order to come to grips with micro-macro gaps, but at present parties continue to speak different languages and there is no clear solution on how to close micro-macro gaps (Zwijnenburg et al. 2016). Because of differences in underlying frameworks, makes it hard to come to grips with all observed differences between both sources.

In sum, there are still layers that stand in between the mainstream inequality indicators, produced using the surveys and fiscal sources, and the total economy, where national accounts are used. To truly come to grips with differences between the column we would need more detailed discussion between DWP, HMRC and ONS. This thesis adopts the fiscal sources as benchmark to correct for capital incomes in the household survey. Table 8 shows the amount of capital income in fiscal sources is also underestimated compared to e.g. the national accounts. Even though it remains an open question to what extent indicators of income inequality (in the individual or household distribution) should account for all the capital income as observed in national accounts, it is expected that the empirical estimates put forward in Chapter 4 are capturing a lower bound.

3.3. Implications for capital incomes

The main implication for capital incomes in these methodological debates is that the decomposability of top income corrections, by income source, is at present not actively discussed and/or prioritised by neither by the DWP, ONS or in the academic circles. At present it is not possible to carry out factor decomposition using top adjusted series.[11] A limitation encountered is that is that a large proportion of the harmonisation methods put forward in academia use Pareto techniques (Alvaredo 2011b; Anand & Segal 2017; Jenkins 2017; Lakner & Milanovic 2013, 2015). These techniques do not allow for straightforward decomposition, which is required if one is interested in the effects of income sub-component on overall inequality. Appendix II gives some more background information on the decomposability of harmonisation methods put forward in the academic literature in recent years.

The scarce evidence on factor decomposition in the UK is largely based on the FRS. These studies find a low and stable contribution of capital incomes on inequality at the household level (Belefield et al. 2017; Brewer & Wren-Lewis 2016). This finding is not surprising given these studies take the 95th and 99th percentile as cut-off for their series. Moreover, the official statistics including housing costs raises the Gini coefficient, Corlett (2017) points out that more attention should be geared towards bringing out the property income story by including imputed rent in headline indicators.

At the time of writing the HBAI data source has been critiqued for not being transparent at the level of total income (Corlett 2017). There is little or no insight into how capital incomes have been treated from the raw data sources (FRS and SPI) to the top adjusted

[11] This information has been released to the author after personal correspondence with the ONS. For practical reasons it is not likely that the ONS will make a decomposable top income adjustment without strong arguments to do so. They argue in favour of an overall adjustment for simplicity, consistency with DWP and simplifying data requirement to HMRC. Furthermore, it is not likely that after choosing a method this methodology will be adjusted in the near future based on academic advances.

household disposable income measure. The HBAI documentation itself warns that the investment income variable should be treated with caution (DWP 2017). The replication brings some points into the light. The fiscal data has individual level observations which cannot be linked back to households. Given the already poor measurement of capital incomes it is best to apply the top income correction to individual gross income, an approach frequently taken by UK academics (Atkinson & Jenkins 2019; Burkhauser et al. 2017a). In addition, the DWP does not release individual level files for their net income variables, not allowing to compare the results directly to the official series or come to grips with allocation assumptions across households and how capital incomes perform in the net distribution (Burkhauser et al. 2016). The FRS files mention that they assume a 20% tax rate on investment income and their disposable measure rents are taking out because of double counting in the post-tax distribution, which is why separate imputations are made to account for housing costs. The thesis will delve deeper into these assumptions and their implications in later chapters.

In sum, because capital incomes are skewed towards the top of the distribution, the non-decomposability of official statistics and truncation is expected to produce a severe downward bias in the capital income narrative. Individual taxation does not give an accurate picture of capital incomes in the household distribution. The post-tax measures used by official measurements are most likely making tax assumptions that are too high, and capital-income sub-components such as property income do not systematically enter into the debate but are known to raise inequality, and efforts for additional imputations are needed.

Chapter 4 and 5 set out to make advances in changing the narrative. Chapter 4 will have a particular focus on addressing measurement issues with a particular focus on gross individual income where the data arguably faces less uncertainty, as measurement issues

surrounding capital incomes are already a large challenge by itself. Chapter 5 incorporates the insights produced in the thesis so far. It provides a more detailed discussion of specific challenges that could potentially be discussed with the producers of the official inequality statistics in the UK. Combined these chapters will make the case, with empirical evidence to underpin the conclusions, that the effect of capital incomes on overall inequality in the UK needs to be changed from a low (and stable) contribution to a moderate (and increasing) one. In addition, even though surges in capital income are not yet picked up by the traditional measure of living standards (household disposable income) this does not imply that living standards are not affected by capital incomes indirectly through other channels.

3.4. UK Capital Income Narrative

In the beginning of the 20th century capital incomes were very much concentrated at the top of the income distribution, and stable at 70% of total income for those assessed for the super tax (i.e. the very rich) (Atkinson 2007a). This figure is calculated using super-tax data payable on £5,000 a year, or £1,5 million a year in today's values. In line with the long-run top income literature, between 1954 and 1980 the share of income of the top 1% that was investment income declined (Alvaredo et al. 2018). A clear turning point is observed over the period 1965-1979 in which wage income became more important for the top 1% (Atkinson 2007a). Household survey results in the UK go back to the 1970s where they can be used to complement the picture. However, they find capital incomes start making a bigger contribution to overall inequality over this period (Atkinson, 2000; Jenkins, 2000). It appears that during this period the population observed in the household survey and tax administrative data experience two different realities. One explanation is that the rise in popular wealth (housing, private pensions etc.) is picked up by household surveys affecting

those further down the distribution, while at the very top there is a reversal of capitalists making room for wage earners at the top of the distribution.

Capital incomes made a contribution to inequality during 1980s up to the beginning of the 1990s (García-Peñalosa & Orgiazzi 2013; Green et al. 2008; Jenkins 1995, 2000). Despite a rise in the overall importance of employment income in total income, there are modest surges in the importance of capital incomes those within the top 1% of the total income distribution from 1979 onwards (Atkinson 2007a).

During the 1990s and 2000s studies there are only few studies, mainly cross-country comparative using household surveys, focussing on the contribution to capital incomes to inequality and report different units of measurement making it hard to draw conclusions about general trends. Fräßdorf et al. (2011) find that the absolute contribution of capital income to total incomelity (using the half squared coefficient of variation) stays relatively stable at 0.018 in the UK for the period for the period 1992-2004. The OECD (2011) reports a decline in the the relative contribution to the Gini coefficient in market income from 8% in 1987 to 5.8% and 5.2% in 1995 and 2005, respectively. Green et al. (2008) find that the absolute contribution of cpaital incomes to the Gini coefficeint of market income has fallen from 0.067 in 1969 to 0.021 in 2004. The IFS has carried out factor decomposition highlighting the role of capital incomes up to 2004 (Belefield et al. 2017). This IFS study restricts the sample to the bottom 95% and do not mention capital incomes in detail.

There is less information on the relationship between capital incomes and inequality after the mid-2000s. The question of what happened to capital incomes during the post-crisis period and its aftermath in the UK remains unanswered in the household income literature. The UK narrative appears consistent throughout the literature surveyed, drawing up on different household surveys such as the Family Resource Survey (FRS), British Household Panel Survey (BHSP), Luxembourg Income Survey (LIS), OECD and EU-SILC (European

Union Statistics on Income and Living Costs) figures. A schematic overview of the existing UK narrative can be found in Appendix III.

4. Reuniting capital income windows in the UK

4.1. Introduction

The UK capital income narrative has long been that of low (and stable) contribution to inequality (Belefield et al. 2017; Brewer & Wren-Lewis 2016; OECD 2011) while fiscal sources have observed increases in investment income (Atkinson 2007a). The objective of this chapter is to examine how well UK top income corrections account for capital income. This chapters propose new ways to correct for the capture of capital incomes in the headline inequality indicators (Gini), in the form of a UK case study.

This chapter sets out to construct a top income adjusted series with additional capital income correction taking the household survey as basis. First, this chapter investigates the extent to which existing UK top income methodologies pick up capital income as measured by fiscal sources. Second, the chapter proposes an extension to the UK methodology, with the specific aim to correct for underestimation of capital incomes in inequality indicators. Third, this produces an adjusted capital income series as an initial step towards re-writing the capital income narrative. The capital income adjusted series proposed by this chapter will used to rewrite the capital income narrative in Chapter 5.

Over the past years leading inequality scholars have been arguing for the substitution of household surveys for fiscal data to inform policy. The use of fiscal sources combined with national accounts aggregates would to a large extent help put capital incomes on the policy agenda. An influential approach to doing so is being developed by WID researchers under the label of Distributional National Accounts, as outlined in earlier chapters. From that perspective taking household surveys as basis for such a correction might appear outdated, but this thesis argues there is value of continuing to take them as starting point.

It is not clear when and if fiscal sources will be adopted over surveys by governments any time soon, and whether such a shift will be taking place uniformly across countries. The message this thesis tries to convey is that the meantime, there is a need for statistics that more accurately reflect the role of capital incomes on inequality for immediate policy purposes. A large body of important policy analysis is still based on household surveys carried out by governments and international organisation such as the OECD etc. Given the practical considerations above, the household survey is chosen as basis as to provide an immediate, or intermediate, solution rather than following the more visionary approaches proposed by WID researchers. A research agenda is laid out for future improvements for the UK pioneering case, which could also serve as example for other countries.

There are further benefits to the use of household surveys which have so far not yet been discussed. Household surveys reach further down the income distribution than tax administrative data. In addition, household surveys include co-variates which give information about other characteristics of the individual and/or households such as educational level etc. These types of socio-economic characteristics, key to answering many research questions in the social sciences, are typically not reported in tax administrative data.

This research is driven by broader underlying policy concerns. The first is of (economic) measurement: what is not picked up by the headline indicators, will structurally fall out of policy debates. Second, not all information generated within academia is reaching the places where it is expected to have a real-world impact. It would be useful if more systematic attempts were made to bring together existing knowledge and bring this to the attention of policy makers, alongside traditional efforts to produce new knowledge. A broader goal within the academic space, is to reflect on the importance of decomposability of top income corrections, in particular, its implications for the capital income and inequality narrative, and point out the implications if the measurement issue fails to receive enough

attention. The information derived from this approach can be of use to inform discussions on harmonisation of surveys and fiscal sources going forward. The information generated by the exercise contributes to both academic and policy discussions of various types such as producers of (headline) statistics, policy makers and academics.

4.2. Diverging Windows

4.2.1 Data

For the main analysis the Family Resources Survey (FRS) is used. The data source covers the period 1994-2015. The FRS has been used in recent academic research reconciling household surveys and fiscal sources in the UK (Atkinson & Jenkins 2019; Burkhauser et al. 2016, 2017b; Jenkins 2017). The FRS was collected under the name Family Expenditure Survey from 1962-1993. The population scope includes Great Britain before 2002 (excluding Northern Ireland from the sample). The FRS provides the basis for the Household Below Average Income (HBAI) database. The HBAI is traditionally used to calculate headline inequality statistics for the UK (DWP 2015a). The HBAI figures are derived from the FRS variables. In addition, it is difficult to distinguish income components using the HBAI (Brewer & Wren-Lewis 2016). This thesis uses the FRS as main database for the analysis to stay as close to the original source as possible.

The disadvantage is that the HBAI is specifically designed to draw conclusion for disposable equivalized household income, of interest to social policy makers. Because of comparability issues between the household survey and fiscal data this analysis adopts the definition of gross individual income to draw conclusions, using the least possible number of assumptions, in the UK context (Jenkins 2017).

On another note, Aitken & Weale (2018) use the Living Conditions and Food Survey (LCFS) to improve capital incomes estimates in the UK. The LCFS sample size is smaller than the FRS and given large number of zero values in capital income measurement, the FRS is the preferred source. In addition, many FRS variables are collected on a weekly basis. The weekly variables have been adjusted to yearly variables using the correction factor listed in the FRS documentation. This correction factor, given in the FRS documentation, differs for leap years and non-leap years been applied accordingly to reconstruct the total figures.

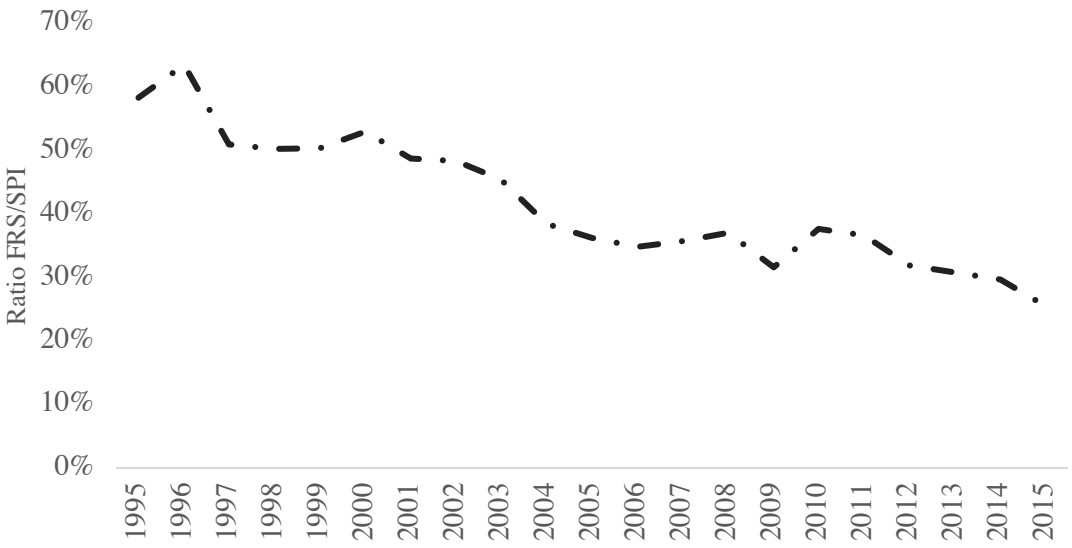
The Survey of Personal Income is a stratified sample taken from tax administrative data in the UK. It is the best available source to analyse capital incomes in the UK. The SPI public use tape is available for the years 1995-2015 through the UK Data Service. The unit of analysis is the individual; hence, it is not possible to draw conclusions at the household level. The SPI is used in all UK studies reconciling household surveys and fiscal data (Alvaredo et al. 2017; Atkinson 2007b; Atkinson & Jenkins 2017, 2019; Burkhauser et al. 2016, 2017a; Jenkins 2017). The SPI statistics suffer from a few biases worth nothing. The fiscal data is affected by income forestalling during the tax years 2010 and 2013 triggered by announced changes in top marginal tax rates (Atkinson & Ooms 2015; Jenkins 2017; Seely 2015). This leads to artificial fluctuations observed during these years. Public tape files for the years 2008 and 2011 have not been released by HMRC, at the time of writing. A small number of records in the public tape data at the very top of the distribution have been anonymized using a standard procedure documented in the SPI documentation.

4.2.2 Falling capture of capital incomes in surveys

Aggregate capital income

In the UK the capture of capital incomes in surveys, compared to fiscal sources, has declined by 33 percentage points over the past 20 years, from 58% in 1995 to 26% in 2015, see Figure 7. At present, only around 1/4 of the capital income indicated by the fiscal data is captured by the FRS. These trends and their implications are very worrisome and have not been discussed to any significant extent in academic or policy circles. The UK Dividend Monitor published by LINK Asset Services shows that dividend figures for 2018 are 1/5 higher than in 2015 and are projected to reach record heights in 2019, providing some indication that the gap can be expected to grow (LINKGroup 2018). Because capital incomes are heavily skewed towards the top of the income distribution, this decline and the extent to which it has been captured in the survey can be expected to have a significant impact on the inequality trend captured by headline indicators.

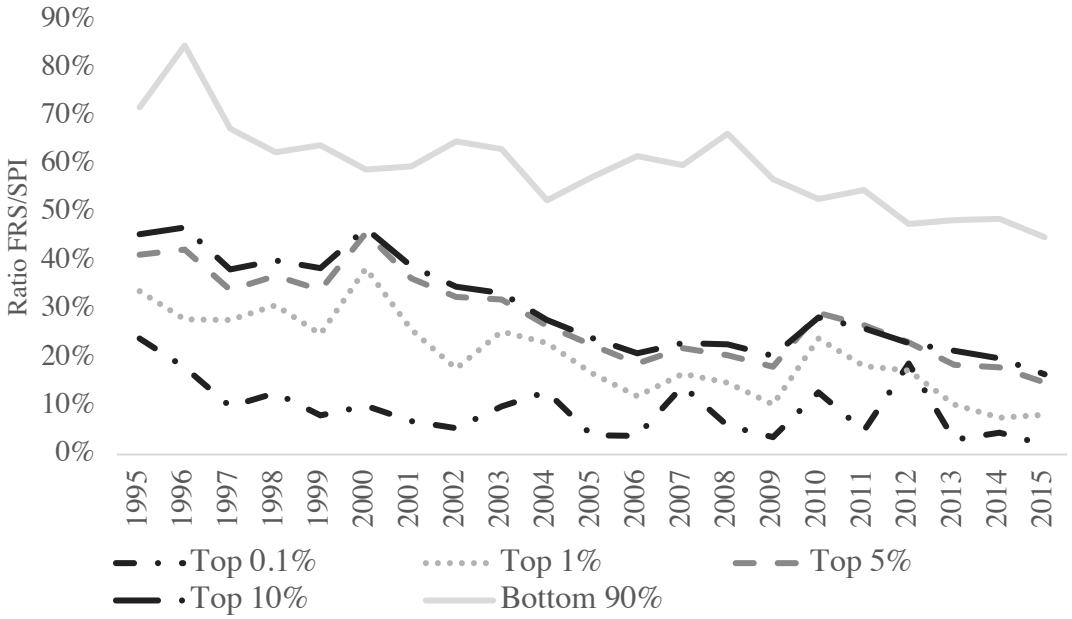
Figure 7: Increasing underestimation of capital incomes in the FRS. Ratio aggregate level of capital income observed in the FRS divided by the aggregate level of capital income observed in the SPI for the period 1995-2015



Note: Author's estimates from FRS and SPI data The SPI Public Tape micro files are not released for 2008 and 2011. The SPI benchmark for (1) 2008 is the average of 2007 and 2009 (2) 2011 is taken from HMRC tabulations.

Figure 8 shows that the underestimation takes place across the entire capital income distribution and that the underestimation grows as one moves up the capital income distribution. The Figure reports the ratio of the aggregate level of capital income observed in the household survey and fiscal source within different populations shares.

Figure 8: Declining capital income across the capital income distribution. Ratio aggregate level of capital income observed in the FRS divided by the aggregate level of capital income observed in the SPI for the period 1995-2015. By income group for gross individual income.



Note: Author's estimates from FRS and SPI data The SPI Public Tape micro files are not released for 2008 and 2011. The SPI benchmark for 2011 is taken from HMRC tabulations and the benchmark for 2008 is calculated as an average of the HMRC tabulated figures for 2007 and 2009. Populations shares are fixed in both databases, using the WID control totals, to improve comparability between both databases.

Table 9 adds to this picture that the same trend is observed for the main income components dividends, interest and rents. The capture at the very top, 0.1% share, fluctuates most over time which can be driven by volatile nature of capital incomes and outlier. Towards the top of the distribution less capital income is captured, the increased underestimation is largest for dividends and interest.

Table 9: Falling FRS/SPI ratio for income sub-components across the distribution. Ratio aggregate level of capital income observed in the FRS by the aggregate level of capital income observed in the SPI for the period 1995-2015. Per capital income component and position within the distribution for gross individual income.

	Dividends and Interest					Rents				
	Total	**Top 0.1%**	**Top 1%**	**Top 5%**	**Top 10%**	**Total**	**Top 0.1%**	**Top 1%**	**Top 5%**	**Top 10%**
1995						89%	65%	62%	80%	87%
1996	68%	24%	28%	42%	47%	88%	37%	81%	86%	90%
1997	52%	10%	25%	32%	37%	69%	50%	66%	69%	68%
1998	48%	10%	24%	32%	36%	62%	53%	89%	69%	66%
1999	49%	7%	22%	31%	36%	51%	28%	42%	48%	45%
2000	52%	8%	35%	42%	45%	62%	49%	71%	73%	63%
2001	47%	5%	21%	32%	35%	58%	16%	53%	60%	57%
2002	45%	5%	13%	26%	29%	62%	19%	45%	64%	61%
2003	42%	9%	21%	28%	29%	55%	27%	35%	42%	48%
2004	37%	14%	22%	25%	25%	59%	21%	43%	49%	54%
2005	36%	4%	16%	21%	23%	46%	12%	28%	37%	38%
2006	35%	4%	12%	18%	20%	48%	16%	20%	34%	39%
2007	36%	12%	16%	21%	22%	55%	34%	38%	50%	50%
2008	36%	3%	10%	17%	20%	53%	29%	39%	46%	46%
2009	32%	4%	11%	18%	20%	43%	10%	12%	29%	37%
2010	38%	15%	24%	30%	27%	46%	21%	36%	35%	41%
2011	36%	5%	20%	26%	25%	47%	8%	24%	37%	37%
2012	28%	10%	12%	18%	17%	49%	20%	23%	46%	53%
2013	27%	2%	7%	14%	17%	52%	14%	38%	45%	50%
2014	26%	4%	6%	14%	15%	50%	17%	23%	45%	49%
2015	22%	2%	8%	13%	14%	45%	16%	18%	35%	39%
Average	**39%**	**8%**	**18%**	**25%**	**27%**	**57%**	**27%**	**42%**	**51%**	**53%**

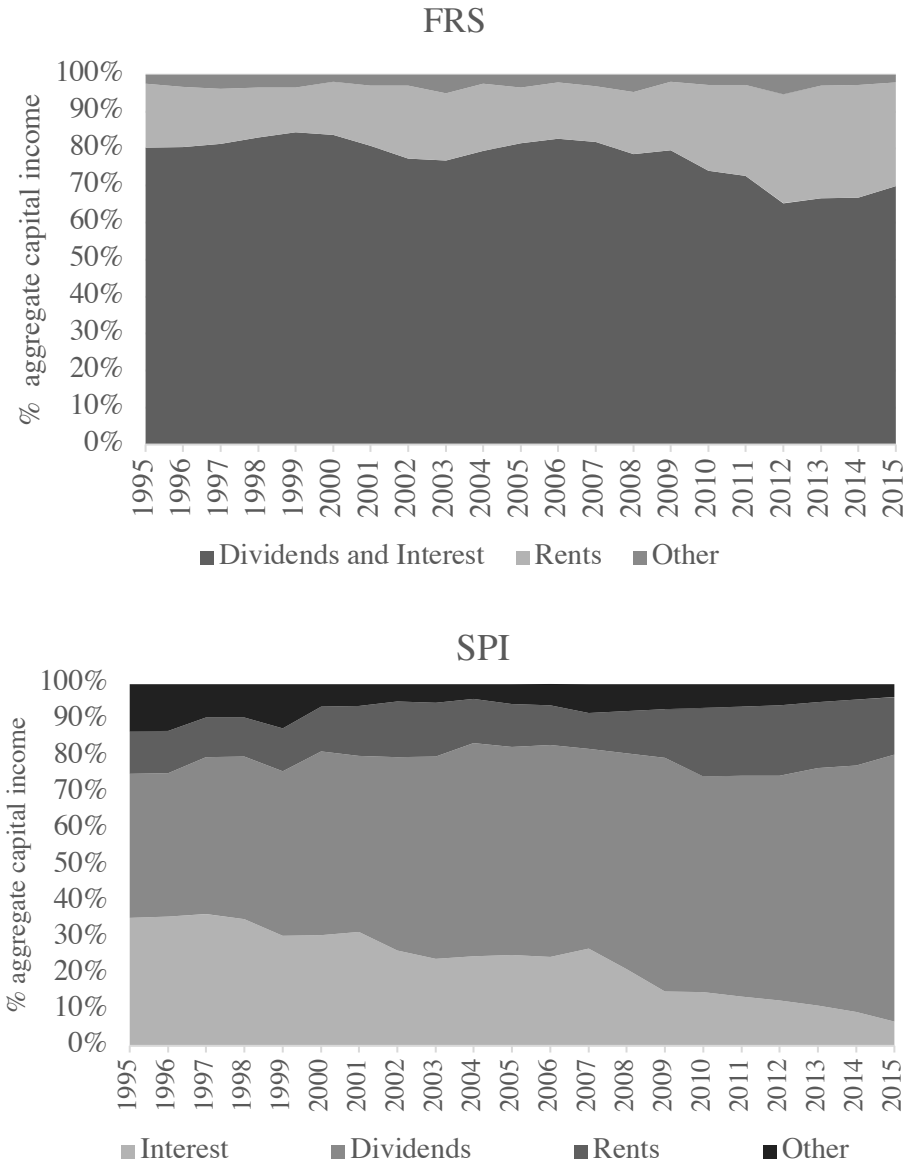
Source: Author's estimates from FRS and SPI data. The SPI benchmark for 2011 is taken from HMRC tabulations and the benchmark for 2008 is calculated as an average of the tabulated HMRC figures for 2007 and 2009.

Composition

Figure 9 gives a breakdown of aggregate capital income in the FRS and SPI.[12] A general observation is that in both the SPI and the FRS dividends and interest combined account for about 80% of all investment income. Unfortunately, the FRS does not allow for a separation of dividend versus interest income, the figures are therefore combined. SPI figures show that relative contribution of dividends to overall investment income has increased by 35 percentage points over the period, from 40% in 1995 to 75% in 2015. The SPI further reveals that income from interest has experienced a drop after the crisis, largely offset by an increase in dividend reporting. As a result of these post-crisis compositional shifts rents have gained in relative importance but the increase in dividends reported from 2010 onward has reversed this trend.

[12] The SPI public tape figures provide a breakdown per income source from 1999 onwards, HMRC tabulations have been used to construct a longer aggregate series for sub-components covering the period 1995-2015. Section 4.3 will delve deeper into underlying difference between both databases which make it hard to compare the sources directly.

Figure 9: Breakdown aggregate capital income into subcomponents (dividends & interest, rents and other) calculated using the FRS and SPI



Note: Author's estimates from FRS and SPI data.

Underestimation: under-reporting and under-sampling

Underestimation can be driven by both under-reporting and under-sampling of rich households (Bourguignon 2018).[13] In this thesis under-reporting is defined as reporting lower income levels and under-sampling refers to the missing rich in surveys. In the UK case it has frequently been argued that underestimation of top incomes is largely driven by under-reporting of incomes at the top (Burkhauser et al. 2016, 2017a, 2018).

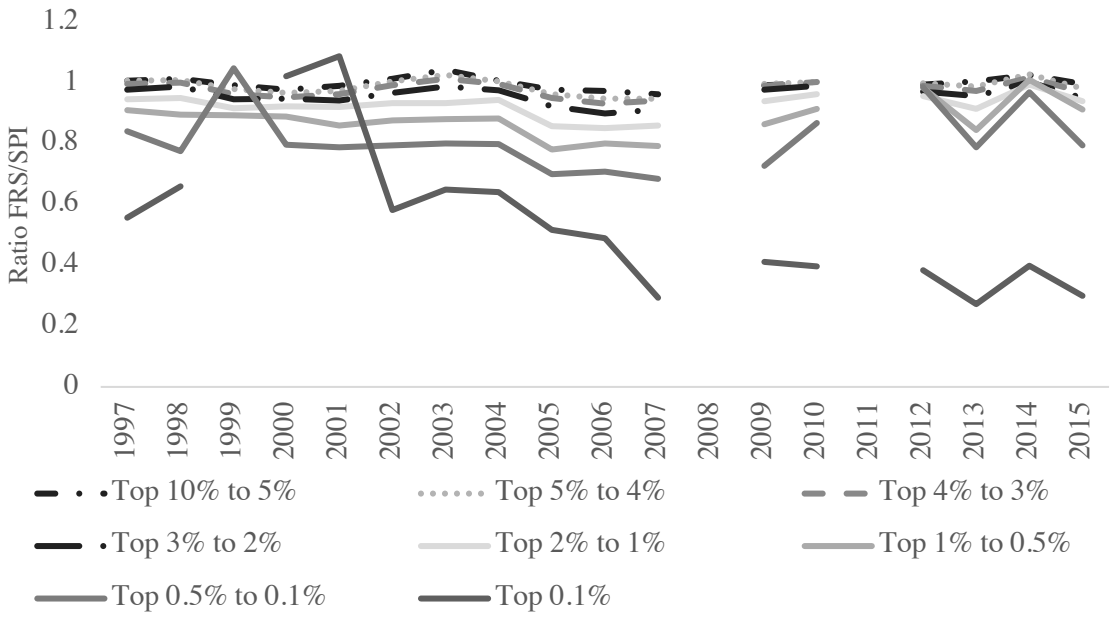
Figure 10 is constructed by classifying people into income groups (using a common base for the size of the UK adult population) assuming the population at the top is fixed in both databases, and plotting the ratio mean total income FRS/mean total income SPI for each income group. This Figure has first been produced by Burkhauser et al. (2016, 2017a, 2018) and has been replicated using the databases of choice in this thesis for individual gross income. This thesis produces an extension of the Figure produced by Burkhauser et al. (2016, 2017a, 2018). Figure 11 provides the first indication of how much capital income observed within the distribution of individual gross income.

Similar to the original paper, where the authors use the HBAI, the results show that the under reporting in the gross income distribution in the UK starts between P95 and P99 in the gross income distribution and increases from the 2000s onwards. Using the HBAI is not possible to calculate this Figure for capital incomes for the same time period. Using the FRS, for reasons explained previously, I extend on the work by Burkhauser et al. (2016, 2017a, 2018) by adding to this picture that under-reporting of capital incomes occurs across the entire gross income distribution. In addition, the very top of the household survey 0.1%

[13] In the UK context under coverage is defined as *the result of income under-reporting among the very richest rather than unit-non response* (Burkhauser et al. 2017a). Because this literature is still in its infancy at time of writing terminology is often inflated, this thesis has chosen to adopt the terminology used in Anand & Segal (2015) and Bourguignon (2018).

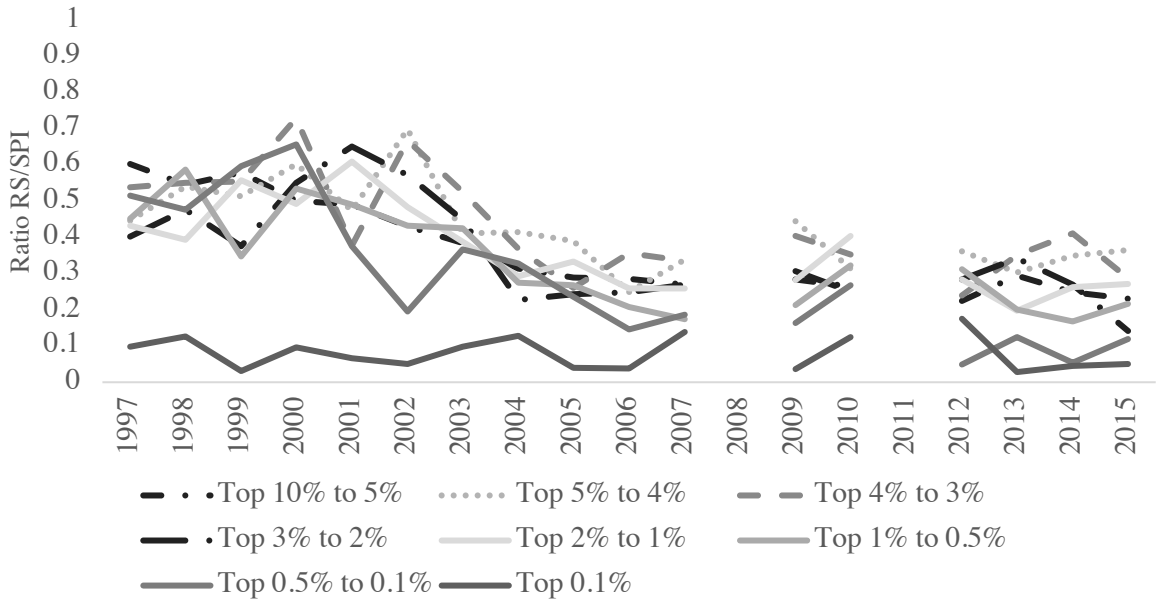
and 0.1%-0.5% appears to capture almost no capital income, provide a hint that under-sampling might be an overlooked issue for capital incomes, which has not yet received much attention in the UK case. Observed peaks could potentially be explained by the volatility in capital incomes and differences in timing in reporting of capital incomes.

Figure 10: Under-reporting total income within the individual gross income distribution (FRS/SPI). Ratio mean individual gross income (FRS) to mean individual gross income by income group.



Note: Author's calculation using the FRS and the SPI. Replication of graphs in Burkhauser et al. (2016, 2017a) using FRS rather than HBAI, gives similar results as in the original paper. WID control totals (UK adult population) are used to ensure the comparability of the population shares in both databases. The mean gross income for each of the population shares (as mentioned in the legend) are calculated in both the FRS and the SPI for each year individually. The ratio observed in the figure is the division between the FRS and SPI mean gross income for each population bracket.

Figure 11: Under-reporting capital incomes within the individual gross income distribution (FRS/SPI). Ratio mean individual capital income (FRS) to mean individual capital income by income group.



Source: Author's estimates from FRS and SPI data

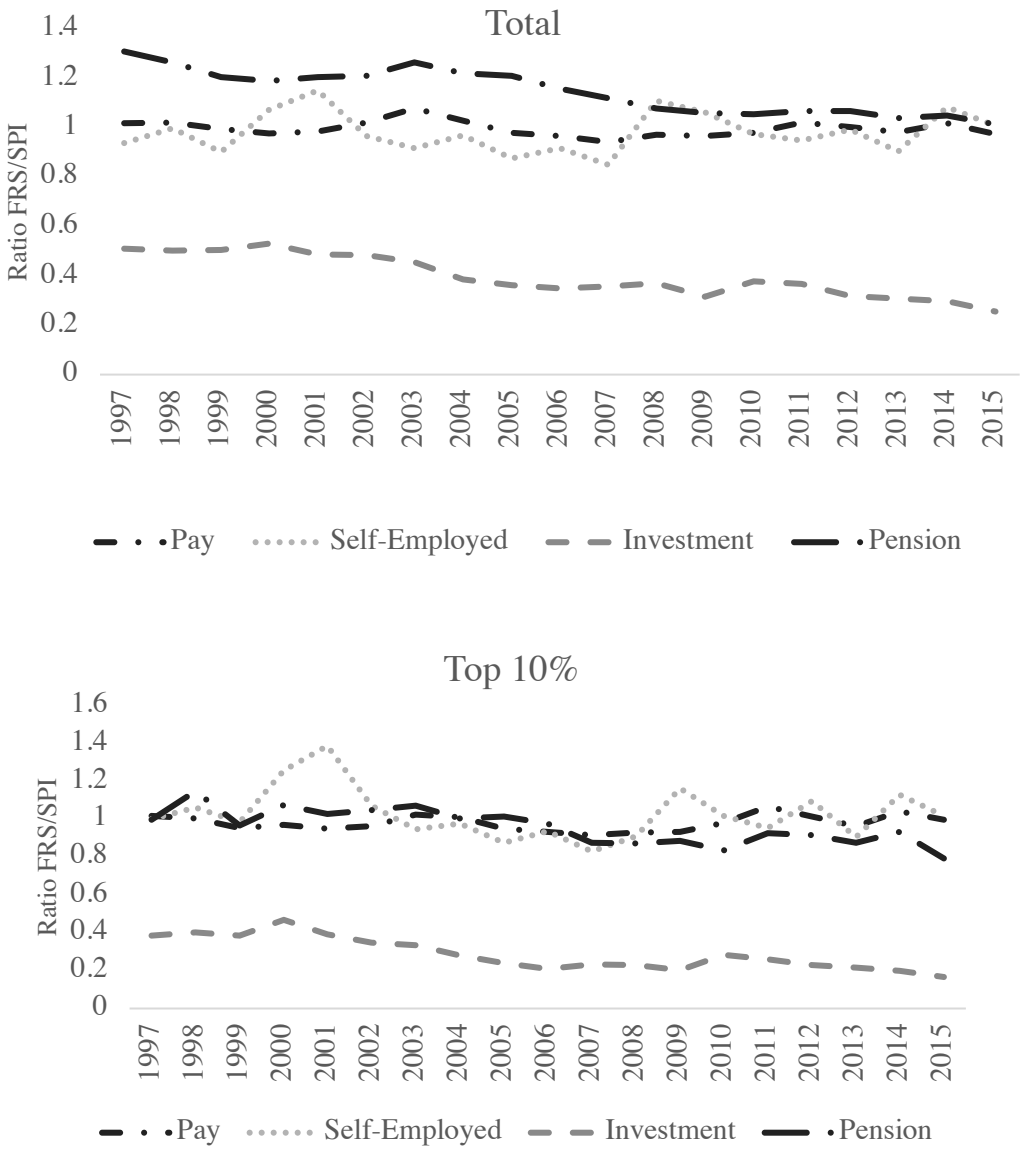
Note: Author's calculation using the FRS and the SPI. Replication of graphs in Burkhauser et al. (2016, 2017a) using FRS rather than HBAI. Different to the original graph this Figure does not look at gross income but looks at capital income within each population share of the gross income distribution. WID control totals (UK adult population) are used to ensure the comparability of the population shares in both databases. The mean capital income for each of the population shares within the gross income distribution (as mentioned in the legend) are calculated in both the FRS and the SPI for each year individually. The ratio observed in the figure is the division between the FRS and SPI mean gross income for each population bracket.

FRS Weights

It is important to note that the underestimation observed for capital incomes is not found for other income components which is shown in Figure 12. The figure presents the aggregate ratios (FRS/SPI) for pay, self-employment income, investment income and pensions. The figures for the top 10% and top 5% show a similar pattern. For some income sources in some years aggregate (weighted) income is higher in the survey than in the fiscal source. It might be the case that the FRS weighting process is not putting enough emphasis on income composition at the top which could contribute, in part, to the increasing underestimation.

As mentioned in Chapter 3, there is evidence that in particular high-worth individuals are typically underrepresented in surveys (Schröder et al. 2018). This point will be revisited throughout the thesis.

Figure 12: Under-reporting for different income sources. Ratio total of each income source observed in the FRS and the total of each income source observed in the SPI (top) and ratio for the top 10%(bottom)



Note: Author's calculation using the FRS and the SPI. Aggregate level of pay, self-employment, investment and pension income observed in the FRS divided by the equivalent aggregate in the SPI. For the total population and the top 10% within the gross income distribution.

Take away points

This thesis, so far, has drawn attention to the problem of increased underestimation of capital incomes observed in the UK. This issue has so far not been discussed in the UK inequality debates. Underestimation of capital incomes result in missing billions from the UK inequality statistics. New to this picture is that the amount of income falling out of the statistics has grown by 33 percentage points over the past 20 years, using the fiscal sources as benchmark. Adding to this picture the global race to the bottom in capital income taxation it is expected this fall is even larger as the tax base has eroded producing a downward bias in the fiscal source used as benchmark. The increased underestimation of total capital income opening up between the survey and fiscal sources will be referred to as the gap or missing capital income.

In addition, the findings so far have added to this general narrative that underestimation is a problem across both the capital income distribution and gross income distribution. Because of the concentration of capital incomes towards the top of the distribution this link is not surprising. The gap between the two sources becomes larger as one moves up the distribution, in other words the size of underestimation is positively correlated with both total income and position in the capital income distribution. And this trend is observed for all capital income sub-components.

The underreporting of total income has largely been attributed to under-reporting of income at the top in the UK debates (Burkhauser et al. 2017a). The analysis has added to this picture the fact that the underestimation of capital incomes takes place across the entire distribution and that at the very top (1%) almost no capital income is observed. The story at the top appears to be mainly a story of dividends, this suggests that policy debates might be

missing a large story around the growth of dividends among those at the top of the gross income distribution.

Overall, the observed discrepancies are worrisome and accounting for the missing capital income is expected to significantly affect the headline inequality statistics for three main reasons: (1) capital income is heavily skewed towards the top of the distribution imputing missing income to the rich is expected to raise inequality (2) underestimation increases with income so the imputation will therefore have a disproportionate effect on the top (3) the size of the discrepancy between both sources has increased over time across the entire distribution and for all capital income sub-components.

4.2.3 Drivers

Coming to grips with the drivers of a ratio implies that one need to look at both the numerator (FRS) and denominator (SPI). This section will start with some general observations and highlights the contribution of this section. The amounts observed in the fiscal data suggests the main driver of the gap is the surge in capital income observed in the SPI, in particular dividends. However, this does not fix the problem of increased under-capture of capital incomes in surveys, given the context of the thesis, it remains relevant to identify reasons that could help come to grips with the drastic fall in capital income reporting in surveys.

This section sets out to articulate concerns that arise in the areas of sampling, reporting and definitional differences which, taken together, pose barriers to straightforward comparisons across the distribution and per income component. This is embedded a way which can potentially help initiate and facilitate conversations with the statistical agencies directly in charge of data collection and preparation.[14] This has motivated the decisions to impose the least number of assumptions on the data.[15] This approach allows to stay as close as possible to the secondary source where and draw detailed information from its documentation.

[14] This is another reason for not using the HBAI statistics for this exploratory analysis. The research agenda put forward in this thesis provides a foundation to highlight the importance and start a dialogue with DWP to make relevant imputations for HBAI.

[15] This is a key difference between the approach taken by the Distributional National Accounts, which is more heavily reliant on assumptions. This thesis operates under the constraint that, at present, headline indicators are calculated using surveys. The DINA framework takes a longer-term approach in which they argue for the replacement of surveys towards more widespread use of tax administrative data.

Sampling differences

Table 10 gives an overview of the main sampling differences. The SPI and FRS are not directly comparable in terms of population scope, both sources are better at capturing different part of the population. The FRS captures private households and is the most representative source for the bulk of the population while SPI covers mainly taxpayers, is more representative for the taxpaying population and provides the best window to research high income individuals.

Table 10: Sampling differences between the FRS and the SPI

Household Survey (FRS)	Tax Administrative Data (SPI)
-Private households living in private dwellings, excludes those living in institutions, student dorms etc. -Before 2002/03 Great Britain, after inclusion Northern Ireland -Only households with asset holdings between £1,500 and £20,000 have been included in the FRS asset questions. Some households refused to answer the asset questions. This is expected to create a downward bias in capital incomes observed.	-Stratified sample: PAYE (all employees and occupational pension recipients), CESA (people with self-employed, rental or untaxed investment income. And those subject to a higher tax rate and complex tax affairs). -Claims (people without PAYE or CESA that have had too much tax deducted at source and claim replacement). -Mainly taxpayers, includes some information on non-taxpayers that is collected through the stratified sampling. -Excludes non-tax filers

Source: FRS (FRS 2017) and SPI documentation (HMRC 2017)

The FRS has extended its geographical reach in 2002/03 to include Northern Ireland but there is no clear evidence that this has influenced the FRS/SPI gap, there are no clear surges in total levels of capital income observed in the FRS around this period. The asset survey, from which the investment variable is constructed, is only carried out among household with assets between £1,500 and £20,000, which puts a both an upper and lower bound on interest and dividend observed. The SPI is based on a stratified sample, researchers have no access to the separate underlying databases. More granular data is collected by HMRC which would allow for a better breakdown and identification of specific groups with high capital incomes though e.g. self-assessment reporting, but this is not readily accessible for researchers. Non tax-filers are excluded, these are mainly individuals with total income below the personal allowance so there is a very low probability that these people earn significant amounts of capital income. The SPI includes mainly taxpayers but has some records for non-taxpayers. The current analysis is are interested in all capital income; therefore, it includes all available information on capital income irrespective of taxpayer status.

Reporting differences

Table 11: Reporting differences between the FRS and SPI

Household Survey (FRS)	**Tax Administrative Data (SPI)**
A. Recording of Income (timing)	
-Actual or expected receipts of the household during the reference period -Household statistics some components of income from financial assets are collected net of expenses (e.g. interest paid on borrowings for investment purposes)	-Income tax year starts in April. -Changes in (top) income taxation create artificial fluctuations in reported income. - Reporting sensitive to income-forestalling or income-delaying in response to changes in the tax rate
B. Unit of measurement	
Individuals and households (1994-2016) Households Family Expenditures Survey (1962 - 1993)	Tax unit individual (1990-present) Tax unit household (before 1990). SPI officially began in 1949-50.

Source: FRS (FRS 2017) and SPI documentation (HMRC 2017)

Table 11 gives an overview of the main reporting differences between the FRS and the SPI. Income reporting is on accrual or expected basis in the survey and on an accrual basis at the end of the tax year in the SPI. The tax administrative data is particularly sensitive to changes in taxation, leading to discontinuities or artificial fluctuations in capital income reporting. As discussed in Chapter 2, individual taxation puts a limit on the insights gain from tax minimising strategies within households at the top (Atkinson et al. 2018). The FRS allows to observe both individuals and household and in the SPI the tax unit is the individual from 1990 onwards, individual level analysis will allow to proceed with the least assumptions. For this reason, the approach taken by Jenkins (2017) is followed in which he harmonises the survey and fiscal data for gross individual income. In addition, this gives a proper benchmark to compare the analysis. It would be worth exploring further the use of the

Family Expenditure Survey (going back to 1962) and possible matching with the SPI during this period.

Fiscal reporting is sensitive to income-forestalling or income-delaying in response to changes in the tax rate. Over the period observed there has been a sequence of tax reforms affecting the levels reported in the SPI. First, a sequence of tax reforms, taking place in April 2000 and April 2002, have gradually lowered the corporate tax rate to 10% and 0%, respectively (Pope et al, 2016; IFS, 2002). This corporate tax reform (0% corporate tax rate) has impacted on the data collection of the Personal Income Tax though pass-through income mechanisms. The tax reform produced an incentive for self-employed to register as a company to reduce tax liabilities. Subsequently, they pay themselves a salary and dividends in a way that allows them to minimize their tax burden. The IFS (2002) has calculated that this construction would allow a person to pay themselves the annual personal allowance, during that period, of £4,615 and earn up to £10,000 in profits with no tax liability, reaching a tax-free ceiling of £14,615. This construction is particularly interesting for (small) companies with profits above £10,000 and/or potential gains of over £500 from incorporating (IFS, 2002). The rule for companies to have at least two directors was revoked by the 2006 Companies Act. The OBR estimates that after this reform single director firms drove all the growth in overall number of companies with over £500,000 in trading profits, making up 37% of total firms in 2014 (OBR 2016). In April 2004, the zero rate was abolished for distributed profits, in 2005 the zero rate was also abolished for retained profits. An increase in the number of reported dividends is expected from 2002 onwards.

Second, in March 2009 the Labour Government announced a rise in the top marginal rate from 40% to 50% to take place in April 2010. High income individuals above £500,000 brought forward their tax liability to 2009-10 from 2010-11, to legally avoid the top 50% tax rate on incomes above £150,000 (Atkinson, 2012). The change in the top rate is

estimated to have affected 1% of taxpayers (0.66% adult population) (Browne & Phillips 2017). The amount of income forestalled was 'considerable' (Seely 2015). This is expected this to create an upward/downward bias in the tax statistics of 2009/2010. Note that it is not possible to disentangle the negative bias of the financial crisis (2008-09) and the positive bias of the income forestalling.

Third, in March 2012 the Conservative Government announced a reduction in the top rate from 50% to 45% in April 2013. This created an incentive for high income individuals [+£500,000] to delay the receipt of income from 2012-13 to 2013-14 (Belefield et al. 2017). Around £16-18 billion has been brought forward, about 0.5% of total income of which £6 billion was dividends (35%) among incomes above £500,000 (Atkinson 2012b). Forth, in April 2016 the Dividend Tax Credit was replaced by a dividend allowance which allows the first £5,000 in dividend income to remain untaxed, this scheme raises the overall tax on dividends resulting in dividend payment being brought forward to 2015-16. It is estimated that £7,6-£10,7 billion of the income has been brought forward, 2/3 of this income was held by taxpayers in the income bracket + £150,000 (OBR 2017). In April 2018 the Dividend Allowance has been reduced further to £2,000. At the time of writing the 2018 SPI Public Tape file is not available to have a closer look at this tax reform.

Definitional differences

Table 12 provides an indication of definition differences per income component. The main investment income variable in the FRS does not include rents, royalties and income from partnerships. For the purpose of this chapter income components in total investment income have been included to create a more comprehensive definition of capital income.[16]

Dividends and interests are reported together in the FRS and are quite hard to disentangle. This puts some limitation on the capital income narrative that can be told for different income components. For example, capital income earned through tax exempt savings vehicles such as Individual Savings Accounts are grouped together in the FRS variable. The SPI makes estimates for investment income earned through ISA's and makes imputations which are added back to other investment income but warns of large margins of error. The structure of the existing micro data does not provide sufficient detail to be able to draw conclusions about the use of e.g. ISAs and distributional effects and separate roles of interest and dividend played within ISAs. It would be worth discussing this further with the data providers and drawing on tabulations released by HMRC on this topic (HMRC 2018a). The variable other investment income is not comparable between the two sources, they include a variety of different components, such as partnerships, royalties trusts etc. It is expected that these smaller components are mainly earned by high income individuals. A

[16] The results from the household inequality literature presented in Chapter 2 provide an indication that sub-components are not always specified. It is not clear to what extent other types of unearned income are imputed back to the main investment income variable. The factor decomposition for the UK drawing conclusions on capital income do not specify the investment income components (Brewer (OECD 2011)& Wren-Lewis 2016). It is worth exploring further whether these studies make this additional imputation for rents, which is not immediately evident surveying this literature.

lack of proper breakdown of these components puts a limit on the mechanisms and dynamics that researchers are able to identify among higher income individuals.

Table 12: Different definitions of capital income measured in the FRS and the SPI

Income Components	Household Survey (FRS)	Tax Administrative Data (SPI)
Dividends and Interest	Dividends and interest reported together Includes non-taxable interest and dividend received from tax efficient savings vehicles such as National Savings and Investments (NS&I) and Individual Savings Accounts (ISAs)	Dividends paid on shares (in UK companies and unit trust) Interest from UK banks, building societies and other deposit takers. Taxable when credited to account.
Property Income	Not included investment income variable but separately added: Rent from property, letting and lodging	Income from UK and overseas property (less expenses). Includes profits from renting, letting and/or lodging property.
Other Investment Income	Not included in investment income variable but separately added: FRS includes separate variables for income from silent partners (not working in the company), royalties (IP rights, land).	Not included variable used to calculate gross income. SPI Public Tape includes one aggregate variable for: interest on securities, interest from partnerships and trusts, settlements and estates Includes imputations savings and investment income without tax deducted at source. This includes a large fraction of interest from banks and building societies and few NS&Is.
Excluded	Both: Capital gains (realised and unrealised), capital incomes not reported because of tax avoidance/evasion, privately owned capital incomes held in the corporate sector such as retained earnings, lumpsum unearned income such as inheritance and lottery payments. SPI: Non-taxable income	

Source: FRS (FRS 2017) and SPI documentation (HMRC 2017)

There are income components excluded or not captured in both sources, the 'usual suspects' such as capital gains (realised and unrealised) and incomes not reported because of tax avoidance/evasion. This also includes suspects that are getting more attention such as capital incomes retained in the corporate sector for tax minimisation purposes. As discussed in previous chapters all these income sources are highly skewed towards the top of the distribution (Roine & Waldenström 2012).

Capital income reporting in household surveys is generally considered as poor, variables suffer from e.g. misreporting of incomes and item non-response (DWP 2017). In addition, high income households, with disproportionate amounts of capital income, are often not sampled in the survey or decide not to participate in the survey when sampled. Apart from that statistic providers make adjustments to the data such as top coding. The FRS addresses the issue of under sampling at the top via the weighting procedure, but it is not clear that income composition is also included. In addition, the FRS statisticians make imputations for misreporting of incomes. The underlying procedure is not fully clear, but some averages have been constructed using available information in the FRS documentation, see Table 13. For reasons related to privacy the SPI has created composite records for individuals with over £1,000,000. This puts some limitation on what can be observed at the very top of the distribution. These records belong to approximately the top 0.5% of the gross income distribution in the UK.

Table 13: Data Preparation differences between the FRS and SPI

Household Survey (FRS)	Tax Administrative Data (SPI)
Dividend and investment income on average 13.8% imputed values (1994-2008) Royalty variable on average 6.7% imputed values (1996-2008) Sleeping partner variable on average 9.9% imputed values (1996-2008)	Round all sources of income to nearest 10 Not able to make a clean decomposition total capital income for all years in the SPI Public Tape Create composite records for people with total incomes over £1.000.000 combined according to stratum and gender status

Source: FRS (FRS 2017) and SPI documentation (HMRC 2017)

In sum, differences in sampling, definitions and reporting make it hard to compare the two sources directly. There are reasons to believe that under-reporting and under-sampling are taking place at the same time but is remains hard to determine their relative magnitudes in a clean way because of these underlying differences. In order to draw conclusions about the one or the other the present approach is to give up one degree of freedom. For example, population control totals are used, assuming the population at the top is the same in both databases, allowing to draw conclusions on under-reporting. In practice it is evident that under-sampling is also taking place.

4.3. Capture of capital incomes in top income adjustments

If one is interested in the effect of capital incomes on inequality, both the official DWP and academically improved BH series suffer from two limitations. First, the top correction is applied to total income not allowing for factor decomposition using top adjusted series. Second, there is reason to believe that both methods do not account for all the capital income in the SPI. Section 4.1 has shown that underestimation of capital incomes affects the entire distribution not just those above the eligibility thresholds. These two limitations have not been discussed so far in this context, a gap that this section sets out to fill. As a start point this analysis explores the extent to which the top income corrections proposed by the DWP and BH pick up capital income as measured in fiscal sources.

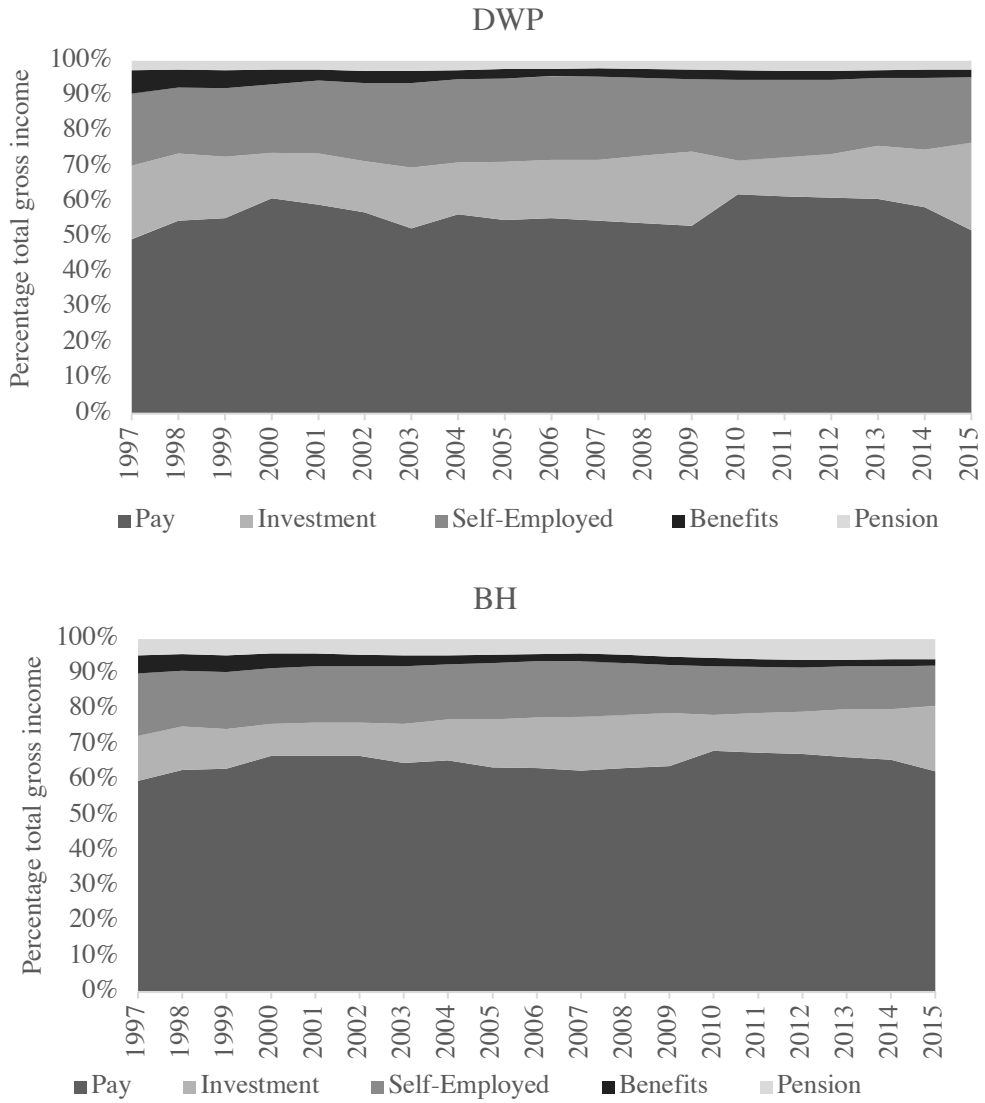
This is the first study within this literature to take an approach allowing for decomposition. In turn, this decomposability allows to put an initial magnitude on how much capital income is picked up by the inequality indicators and how much of this income is falling out of the statistics. As explained in Chapter 3, the DWP and BH method both rely on cell mean replacements (Burkhauser et al. 2016, 2017a; DWP 2015a,b, 2017; Jenkins 2017). To allow for decomposition analysis the cell replacement exercise is carried out on separate income variables. As starting point it is assumed assume that everybody above the eligibility threshold has the same income composition.[17] For the DWP method it is assumed that everybody above the eligibility threshold (the top 0.5%) has the same income composition and for the BH method it is assumed that every bin (1/1000) has the same income composition (applied to the top 5% and top 10%).

[17] The purpose of this exercise is to put a magnitude on the amount of capital income implicitly falling out of the inequality statistics using household surveys. The DWP method replaces the income each individual eligible for the top correction with the same value. This approach has been followed here for this initial analysis assuming constant income composition to carry out the decomposition analysis. In future research it would be worth exploring with increasing capital shares moving up the top 0.5% in line with findings presented earlier in this Chapter.

Under these assumptions, it is possible to create a visualisation showing the contribution of each income component to total income, among those eligible for the top income adjustment after applying the adjustment. In each case the sum of all adjusted sub-components of total income is equal to the original total income variable, which adds up to 100%. Figure 13 provides a breakdown of the composition of the top adjustment in the DWP and BH method. The relative shares do not change much over time. The majority of the top income correction applies to wage income, on average 57% and 65%, in the DWP and BH method respectively. Investment income corrects 17% and 13% in the DWP and BH method respectively. Nevertheless, because capital incomes are disproportionately held by the rich this is expected to have a noticeable impact on inequality.[18]

[18] Previously we have seen that total amount of wage income and self-employment income measured in the FRS is larger than the SPI which is most likely driven by the FRS weighing process and other underlying differences such as population scope. The correction does increase the amount of self-employment income, but this income component does not suffer the same underestimation error as we observe for capital incomes, the main focus of this analysis. It would be worth exploring further the FRS weighing process and starting a dialogue with statistical providers whether they take into consideration income composition.

Figure 13: Percentage contribution of each income source to total income among those eligible for the top income correction after applying the DWP and BH (α=0.05) methods



Note: Author's calculation using the FRS and the SPI. Decomposability reduces the time period to 1997-2015. The eligibility threshold for the DWP method is α=0.05, therefore the Figure shows the income composition of the top 0.5%. The eligibility threshold for the DWP method is α=0.05 therefore the Figure shows the income composition of the top 5% Results for the BH method using α=0.1 are similar.

To my knowledge, there has been no research quantifying the effect of missing capital income from the UK inequality statistics. The decomposition provides an initial indication of how much capital income is picked up by the statistics, when compared to SPI aggregate capital income. The results are presented in Table 14.

Table 14: Percentage capital income (measured using the FRS and after applying the DWP and BH method) divided by the SPI aggregate capital income as benchmark for the income total

	FRS	DWP	BH (5%)	BH (10%)
1997	51%	72%	82%	86%
1998	50%	67%	79%	83%
1999	50%	70%	79%	83%
2000	53%	67%	74%	79%
2001	49%	67%	76%	81%
2002	48%	68%	78%	84%
2003	45%	65%	77%	85%
2004	38%	55%	70%	80%
2005	36%	59%	74%	85%
2006	35%	60%	77%	87%
2007	36%	60%	76%	86%
2008				
2009	32%	60%	77%	87%
2010	38%	50%	69%	82%
2011				
2012	32%	46%	67%	81%
2013	31%	49%	70%	82%
2014	30%	48%	69%	82%
2015	26%	52%	71%	82%
Capital income measured (1997-2015)	40%	60%	74%	83%
Capital income unmeasured (1997-2015)	60%	40%	26%	17%

Note: Author's estimates from FRS and SPI data. Percentages are calculated use aggregate capital income as observed in fiscal sources as benchmark, adopting the decomposition methodologies and assuming of equal income composition, as described above. Capital income unmeasured gives an indication of the missing capital income using each of the top income methodologies.

As expected, both the DWP and BH methods increase the amount of capital income picked up in the series. Nevertheless, on average 40% and 26(17) % of the capital income remains missing after applying the DWP and BH 5(10) method, respectively. These averages mask the worrisome trend of increasing under-capture. The BH method outperforms the DWP based on adjusted capital income and the BH method is less sensitive to the falling capture but does not mitigate entirely for this trend, which is not surprising since the eligibility threshold reaches further down the distribution. Overall, this adds to previous findings that the BH method is the stronger method (Burkhauser et al. 2016, 2017b,a; Corlett 2017).

In Section 4.1 has shown that the increasing underestimation has been most pronounced for dividends. The FRS does not allow for a further breakdown between dividends and interest, but it is expected the top income correction to largely correct for dividend income. The prominent role of dividends at the very top is also found for France and the US (Piketty 2007; Piketty & Saez 2007a). With the findings for the UK this suggests a broadening of the stylized fact that capital incomes are skewed, to also include that most of the capital income story taking place at the top is running through dividends.

The assumptions of consistent income composition can be fleshed out in more detail in future research. Nevertheless, it is not expected that this assumption affects the conclusion that the BH method outperforms the DWP method in terms of capital income capture. Nor is it expected that altering this assumption would affect the main claim of this thesis that the narrative should change from little to moderate (and increasing) effect of capital incomes on inequality. The BH method will be used as top income correction to which the capital income adjustment methodology is applied, accounting for the remainder of the missing capital income.

4.4. Proposed capital income correction

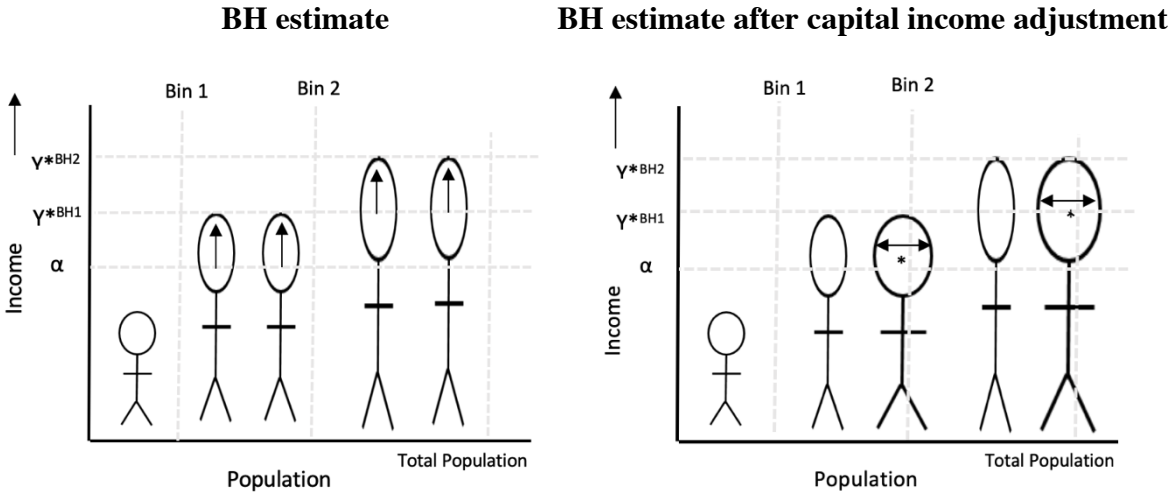
This section includes the main methodological contribution of this thesis. The methodological contribution is to propose an extension to existing UK top income methodology with the aim of allocating the missing capital income, as measured in fiscal sources. For reasons explained in Section 4.3, this capital income adjustment will be applied to the BH method. An existing top income methodology is chosen because the objective of this thesis is not to challenge the top income methodologies, rather the objective has been to understand how well existing top income methodologies correct for capital incomes and the effect on the inequality indicators.

The proposed extension is informed by three observations that have been made throughout the chapter. First, the very top of the household survey (0.1% and 0.1%-0.5%) appears to capture almost no capital income and the increasing underestimation is only taking place for capital incomes and not for other income components. This provides a strong indication that the individuals in the FRS will not be representative in terms of income composition and that the FRS weighing process is failing to adequately correct for this. Second, it has been observed that the most common parameters applied to the top income correction in the UK context include the eligibility threshold (α), and cell-mean replacements (φ) and/or recalibration of the weights (ω). As discussed in Section 3.2.2, the BH method uses income cell-mean, or bin, replacements implicitly correcting for under-reporting. It makes no alteration to the weights which could be interpreted as a correction for under-sampling. There is strong support that under-sampling is affecting capital income measurement in surveys. Third, underestimation of capital incomes is observed across the entire distribution of capital income and gross income. Even after the adjustment it is still expected that a fraction of capital incomes remains underestimated after the eligibility

threshold. In order to correct for 100% of the capital income as observed in the fiscal source, an additional adjustment that reaches further down the distribution will need to be made.

Figure 14 provides a visualisation of the capital income extension taking the BH top income methodology as starting point. The visualisation for the BH estimate has been given previously. The motivation for this approach will be provided shortly. But the key intuition is that the capital income correction places a higher weight on individuals with a relatively high capital share, correcting for under sampling of these groups, and scales up these individuals as represented in the left-hand graph.

Figure 14: Visualisation BH top income adjustment with capital income adjustment before (left) and after (right)



Note: The capital income adjustment corrects for capital income which remains missing after applying the BH top income methodology, which until now has only been applied to total income. The starting point (before) is the same as the BH estimate, visualised in Figure 6. The capital income adjustment classifies people within each bin into a high and low capital share individual. High capital share individuals within each bin are indicated with a *. The dotted horizontal line is at the height of the replaced bin mean in the BH method (y^{*BH1} and y^{*BH2}). The weight of the high-income individuals (*) is recalibrated using the appropriate recalibration factor for each bin. The recalibration of the weights accounts for the under sampling of individuals within relatively high individual capital shares at the top of the distribution. Put differently, the recalibration factor adjusts for the fact that there are more high-income individuals observed in the fiscal source than in the household survey. The effect of the recalibration on the Figure is that the individuals marked with a * expand in width. This width varies per bin and pushes the population total of the bin up plus the total weighted population expands beyond the boundary of the total population.

Identifying high capital share individuals

Taking the BH top adjusted estimates as starting point, using $\alpha = 0.05$ for explanatory purposes, leaves us with 50 corrected bins each representing 1/1000 (*j*) of the total population ranked according to their position in the gross income distribution. The income cell, or bin, replacement has assumed equal income composition allowing for decomposability, as discussed in Section 4.3. In other words, the income of each individual within each bin is scaled up to the income mean observed in the same bin in the fiscal source. There are no differences in income level within each bin but there are income level differences between each bin. It is assumed that the income composition within each bin is the same for every individual after the BH correction. Under these assumptions, which can be challenge in future research, the average capital share for each bin (*j*) is calculated using the BH estimated series.

Table 15 shows the average capital share for two bins *j*=50 (p95-p95.01) and *j*=1 (p99.9-p100) per year *t*. The figures can be interpreted in the following way: the top 0.1% (p99.9-p100) had a capital share (investment income/total gross income) of 29% in 1997. Those within bin 50 (p95-p95.01) had a capital share of 8% in 1997. The average capital share per bin *(j)* in period *(t)* is given the following notation $CSagg_{j,t}$.

Table 15 Average capital shares for bins J=50 (p95-p950.1) and J=1 (p99.9-p100) using BH corrected data

	***J*=50 (p95-p95.01)**	***J*=1 (p99.9-p100)**
1997	8%	29%
1998	7%	26%
1999	9%	23%
2000	6%	15%
2001	4%	17%
2002	6%	18%
2003	7%	20%
2004	9%	17%
2005	9%	17%
2006	10%	16%
2007	11%	16%
2008		
2009	9%	25%
2010	6%	9%
2011		
2012	9%	12%
2013	10%	16%
2014	9%	18%
2015	12%	30%

Note: Author's estimates from FRS and SPI data. Micro data for 2008 and 2011 is missing, therefore it is not possible to calculate values for these years. After applying the BH top income methodology, and applying the assumptions allowing for decomposability as discussed in Section 4.3, it is possible to calculate the average capital share for each bin (*J)*. Because the income cell-mean replacements create equal income composition for all individuals within a bin, the average capital share for each person is the same within each bin. To provide an example, the Table gives the average capital shares for two bins *J*=50 (p95-p950.1) and *J*=1 (p99.9-p100).

The average capital shares per bin ($CSagg_{j,t}$) among the bins eligible for the income correction in the BH method, are used to identify high and low capital share individuals. The next step is to determine for each individual, eligible for the top correction, whether their capital share is higher or lower than the average for their bin. Individuals eligible for the top correction are given the notation *(x)*. This identification of high and low capital share individuals is carried out the FRS and the SPI separately. Individuals (*x*) above the eligibility threshold in the FRS and the SPI are classified as either high or low capital share individuals in the following way:

$$High\ capital\ share\ individual: CSagg_{j,t} \geq CSind_{j,x,t}$$

$$Low\ capital\ share\ individual: CSagg_{j,t} < CSind_{j,x,t}$$

Classifying all the eligible individuals, in both the survey and fiscal source, allows to assign a (weighted) population total to the number of high and low capital share individuals observed in each bin in both the FRS and the SPI. Table 16 gives the percentage of high capital share individuals (high capital share individuals per bin/weighted population total per bin) for each bin and year in both sources. Subsequently, the ratio is calculated between both percentages (SPI/FRS) this ratio provides an indication of how much more high capital share individuals are observed in the SPI relative to the FRS. In other words, it provides an indication of how much the FRS under samples high capital share individuals relative to the SPI.

The results can be interpreted in the following way. On average, for bin 50 (p95-p95.01) there are five times as many high capital share individuals observed in the SPI, compared to the FRS. Of all the individuals observed in J=5 (p95-p95.01) in 1997, 9% have a high capital share in the FRS and 28% have a high capital share as measured in the SPI. For bin 1 (p99.9-p100) there are 14 times as many high capital share individuals observed

in the SPI. Of all the individuals observed in the top 0.1% in 1997, 10% have a high capital share in the FRS and 32% have a high capital share as measured in the SPI. As expected, we find that as we move up the gross income distribution fewer high capital share individuals are sampled in the FRS. The ratio fluctuates over time, which could be triggered by both sampling issues as well as volatility of capital incomes. Overall, we do find strong evidence that high capital share individuals are heavily under-represented in the survey at different points in the distribution. Note that high capital share individuals in J=1 (p99.9-p100) have a capital share of 34% on average. This implies that high capital share individuals, as defined in this thesis, still largely receive their income through earnings.

Table 16: Ratio of high capital share individuals, per bin and per year (SPI/FRS), examples shown for *J*=50 (p95-p95.01) and *J*=1 (p99.9-p100).

	J=50 (p95-p95.01)			*J*=1 (p99.9-p100)		
Year	FRS	SPI	Ratio	FRS	SPI	Ratio
1997	9%	28%	3	10%	32%	3
1998	4%	18%	5	6%	25%	4
1999	12%	19%	2	3%	29%	10
2000	5%	20%	4	2%	37%	19
2001	12%	14%	1	2%	43%	22
2002	5%	15%	3			
2003	5%	16%	3	5%	41%	8
2004				4%	35%	9
2005	2%	19%	10	1%	35%	35
2006	5%	22%	4	1%	47%	47
2007	4%	24%	6	8%	50%	6
2008						
2009	2%	17%	9	4%	43%	11
2010	4%	15%	4	8%	18%	2
2011						
2012	3%	19%	6	6%	21%	4
2013	12%	20%	2	3%	24%	8
2014	5%	18%	4	2%	24%	12
2015	1%	22%	22	2%	40%	20
Average	**5%**	**19%**	**5**	**4%**	**34%**	**14**

Note: Author's estimates from FRS and SPI data. No additional correction has been made if there are no high capital share individuals observed in an FRS bin, these values are left empty in the Table. The years 2008 and 2011 are empty because there is no SPI Public. Percentage of high capital share individuals (high capital share individuals per bin/weighted population total per bin) used to calculate the ratio.

The ratio calculated, and presented in Table 16, is used in the capital income correction to adjust for under-sampling of high capital share individuals in the survey. For example, in 1997 for *J*=50 (p95-p95.01) the weight of high capital share individuals identified in the FRS, within this bin, their weight is multiplied by the ratio 3. This adjustment raises the percentage high capital share individuals in the survey to match the percentage high capital share individuals in the SPI.

As a sensitivity check, the adjustment is also carried out through cell mean replacements rather than weight-calibration. The purpose of this check is to find out whether there is much difference whether analysis is carried out using income or weights. Instead of replacing individual capital income in the FRS by a cell mean observed for the corresponding bin of those individuals in the SPI, the income of high and low capital share individuals within each bin in the FRS is replaced by the corresponding mean capital income values of high and low capital share individuals observed in the SPI, Implicitly, this would correct for under-reported income rather than under-sampled income.

In addition, the underestimation of capital incomes affects the entire distribution, not only those above the eligibility threshold. Even after applying a combination of the BH cell-replacement and the re-calibration of the weights a fraction of capital income will remain unadjusted which will be allocated proportionately across the distribution for the purpose of this initial exercise. Table 17 provides a schematic overview of nine adjustments which are possible using different parameters. Table 18 shows how well each method corrects for the missing capital income.

Table 17: Nine proposed capital income adjustments to the BH top correction

Adj.	Proposed Extension	Top 5%	Top 10%	Re-calibration weights	Variation cell mean replacement
1	-Replace cell means top 5% FRS with cell means top 5% in the SPI for each income component -Differentiating between low and high capital share during the cell replacement -Use FRS weights	x			x
2	-Replace cell means top 5% FRS with cell means top 5% in the SPI for each income component -Allowing for a high and low cell mean during the cell replacement for the capital income variable -Use adjusted top 5% weights. Weights place more value on high capital share individuals.	x		$\alpha = 5$	x
3	-Replace cell means top 10% FRS with cell means top 10% in the SPI for each income component -Allowing for a high and low cell mean during the cell replacement for the capital income variable - Use FRS weights		x		x

Adj.	Proposed Extension	Top 5%	Top 10%	Re-calibration weights	Variation cell mean replacement
4	-Replace cell means top 10% FRS with cell means top 10% in the SPI for each income component - Allowing for a high and low cell mean during the cell replacement for the capital income variable -Use adjusted top 10% weights. Weights place more value on high capital share individuals		x	$\alpha = 0.10$	x
5	-Replace cell means top 5% FRS with cell means top 5% in the SPI. - Allowing for a high and low cell mean during the cell replacement for the capital income variable -Adjusted weights top 10%. Weights place more value on high capital share individuals.	x		$\alpha = 0.10$	x
6	-Replace cell means top 5% FRS with cell means top 5% in the SPI -Adjusted weights top 5% Weights place more value on high capital share individuals.	x		$\alpha = 0.5$	
7	-Replace cell means top 10% FRS with cell means top 10% in the SPI -Adjusted weights top 10% Weights place more value on high capital share individuals.		x	$\alpha = 0.10$	

Adj.	Proposed Extension	Top 5%	Top 10%	Re-calibration weights	Variation cell mean replacement
8	-Replace cell means top 10% FRS with cell means top 10% in the SPI -Adjusted weights top 10% Weights place more value on high capital share individuals. -Imputes remaining missing capital income proportionately across the distribution		x	$\alpha = 0.10$	
9	-Replace cell means top 10% FRS with cell means top 10% in the SPI -Adjusted weights top 10% Weights place more value on high capital share individuals. -Imputes remaining missing capital income proportionately across the top 10%		x	$\alpha = 0.10$	

Note: As explained in Table *7* α is used throughout the thesis to indicate the eligibility thresholds. In some methods this eligibility threshold is an income level in others this is a cut-off point in the population. In the Table above, $\alpha=0.05$ and $\alpha=0.10$ are used to denote a correction applied to individuals in the top 5% and top 10% ranked according to their position in gross individual income. The monetary cut off point is equal to the income held by the first individual at the cut-off point.

Table 18: Percentage measured capital incomes in the nine proposed adjustments (taking the capital income observed in the SPI as benchmark)

	FRS	BH (5%)	BH (10%)	adj1	adj2	adj3	adj4	adj5	adj6	adj7	adj8	adj9
1997	51%	72%	82%	60%	89%	60%	94%	92%	90%	95%	100%	100%
1998	50%	67%	79%	57%	84%	57%	89%	86%	85%	91%	100%	100%
1999	50%	70%	79%	56%	86%	57%	91%	89%	86%	91%	100%	100%
2000	53%	67%	74%	56%	79%	57%	85%	82%	80%	86%	100%	100%
2001	49%	67%	76%	52%	85%	53%	91%	88%	85%	91%	100%	100%
2002	48%	68%	78%	51%	73%	52%	79%	76%	82%	89%	100%	100%
2003	45%	65%	77%	51%	85%	51%	94%	91%	86%	96%	100%	100%
2004	38%	55%	70%	42%	76%	43%	87%	83%	78%	90%	100%	100%
2005	36%	59%	74%	43%	84%	44%	94%	89%	86%	98%	100%	100%
2006	35%	60%	77%	42%	88%	42%	98%	94%	91%	103%	100%	100%
2007	36%	60%	76%	43%	81%	44%	93%	88%	89%	101%	100%	100%
2008												
2009	32%	60%	77%	41%	80%	41%	90%	87%	88%	101%	100%	100%
2010	38%	50%	69%	40%	69%	41%	83%	77%	74%	91%	100%	100%
2011												
2012	32%	46%	67%	34%	58%	33%	65%	63%	72%	88%	100%	100%
2013	31%	49%	70%	34%	65%	34%	77%	76%	76%	92%	100%	100%
2014	30%	48%	69%	32%	64%	32%	72%	69%	76%	91%	100%	100%
2015	26%	52%	71%	30%	81%	30%	91%	88%	85%	98%	100%	100%
Average measured capital income	**40%**	**60%**	**74%**	**45%**	**78%**	**45%**	**87%**	**84%**	**83%**	**94%**	**100%**	**100%**
Average unmeasured capital income	**60%**	**40%**	**26%**	**55%**	**22%**	**55%**	**13%**	**16%**	**17%**	**6%**	**0%**	**0%**

Source: Author's estimates from FRS and SPI data. No SPI micro data available for 2008 and 2011. Average measured capital income is the average for the period 1997-2015, average unmeasured capital income amount of capital income which remains missing in the different adjustments.

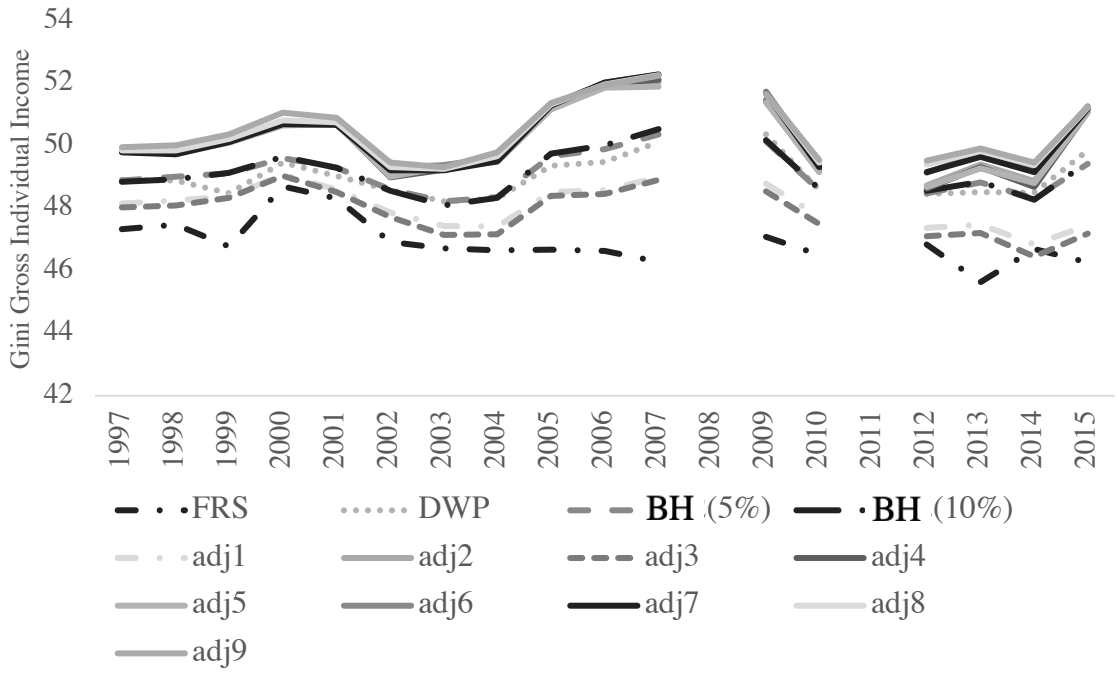
Table 18 shows that the adjustments using the FRS weights underperform based on the amount of capital income corrected for (adjustment 1 and 3). This suggests that the methods using the proposed re-calibration of weights outperform those using the FRS weights in this respect. Adjustment 7 outperforms the other adjustments in terms of adjusted capital income. For this reason, adjustment 7 has been chosen to allocate the remainder of the missing income (6%) under different assumptions. For this reason, adjustment 8 and 9 have been applied to this series.

There are several factors which might explain the remaining 6%. First, underestimation of capital incomes starts further down the distribution while the threshold α is set to correct for underestimation in total income. Second, the BH income cell-mean replacements give the same value to each individual within a bin eligible for the top income adjustment. As seen in Figure 5. This puts an artificial ceiling on the income observed within each bin, if an individual's income in the survey is above the income mean measured in the fiscal source, but it also gives people with zero capital income a mean value. Third, a fraction of the 6% could be attributed to population differences between the two databases which are not immediately reconcilable. Nevertheless, it remains a difficult task to identify the importance of differences in population scope in driving the remaining gap.

The additional adjustments are compared based on their performance of three criteria: (1) impact on overall inequality as measured by the Gini; (2) relative contribution to overall inequality; (3) ease of implementation based on the HRMC data requirements. And select the adjustment which is best fit to rewrite the UK capital income narrative. The headline inequality indicator used for policy purposes is the Gini coefficient, both in the UK and internationally (DWP 2015b; OECD 2011). For this reason, the decomposition to the Gini coefficient will be applied drawing upon the Gini decomposition put forward by Lerman & Yitzhaki (1985) and Van Kerm (2010). The objective of the next chapter is to re-write the capital income narrative using the selected adjustment. A more detailed discussion of the effect of capital incomes on overall inequality will be presented in that chapter.

All the proposed adjustments, apart from the adjustments using the FRS weights, have a similar effect on the overall Gini coefficient, see Figure 15. It does not appear to matter much for overall inequality whether the top 5% or top 10% is used for the capital income correction. The DWP and BH methods produce similar Gini values, despite large differences in choice of parameters. The corrections with a variation in cell-mean replacements do not appear to differ much from the adjustments re-calibrating the weights, similar to what is found in existing UK analysis previously described. The main driver of the results is the re-calibration of the weights. The adjustments raise the Gini coefficient by 3-3.5 Gini points compared to the FRS estimates and by 1-1.2 Gini points compared to the BH estimates.

Figure 15: Gini gross individual income for the FRS, reconstructed DWP and BH series and the proposed capital income adjustments



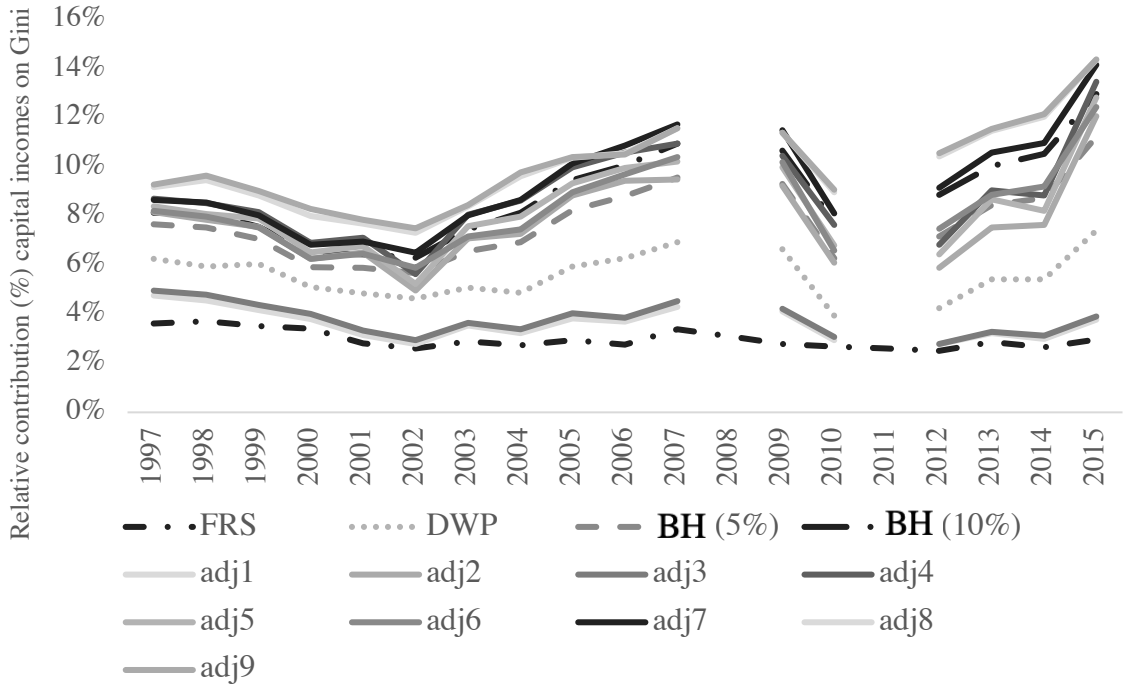
Source: Author's estimates from FRS and SPI data. No SPI micro data available for 2008 and 2011. The FRS series is calculated using the unadjusted survey (without top adjustment and additional capital income corrections). The DWP and BH series are constructed from the FRS and SPI for gross individual income and a top income correction has been applied as described in Chapter 3. The capital income adjustments (1-8) have been applied on top of the BH (5%) top income correction.

This is similar to the DWP method in which most of the correction is taking place through reweighting observations. Because the DWP only corrects for approximately the top 0.5% this problem is smaller in magnitude and the implications of this are currently not addressed in the literature.

All off the proposed adjustments increases the measurement of the relative contribution to the Gini, measured as a percentage of total Gini, compared to the non-adjusted survey data (FRS), as shown in Figure 16. The FRS estimates are close in magnitude to what is typically found for the UK in cross-country comparative analysis, in which capital incomes have a low and stable impact on overall inequality, as discussed in previous Chapters. The DWP and BH method raise the relative contribution by 3-6

percentage points. The BH (5% and 10%) methods have an average relative contribution of 8% and 9% respectively. The proposed extensions all have similar trends but different levels.

Figure 16: Relative contribution capital incomes to the Gini coefficient (percentage contribution to Gini gross individual income) for the FRS, reconstructed DWP and BH series and the proposed capital income adjustments



Source: Author's estimates from FRS and SPI data. The FRS series is calculated using the unadjusted survey (without top adjustment and additional capital income corrections). The DWP and BH series are constructed from the FRS and SPI for gross individual income and a top income correction has been applied as described in Chapter 3. The capital income adjustments (1-8) have been applied on top of the BH (5%) top income correction.

Another interesting observation is that adjustments 6 and 7 show a smaller post-crisis dip, the recalibration of the weights based on a ratio is possibly less sensitive than replacement based on cell means which are more sensitive to economic shocks, a point that deserve more attention in future work. Note that these averages mask fluctuations over time, which appear to be closely linked to changes in dividend reporting in the SPI triggered by tax reforms.

The original BH series with additional capital income adjustment using recalibrated weights performs similarly to the more labour-intensive calculations with a variation in cell mean replacements according to individual capital shares. This makes adjustments 6 and 7 easier to implement and more practical for widespread implementation. Theoretically, the re-calibration of the weights reflects the idea that a specific type of individual, with high capital income, is under-sampled in surveys.

In conclusion, adjustment 6 and 7, with $\alpha = 0.05$ and $\alpha = 0.1$, as outperforming the other corrections based on the three criteria described above and continue to use this series as basis for the results to be discussed further in the next chapter. The remaining 6% of missing capital income onto adjustment 7 can be allocated in two ways: allocating the income proportionally (adjustment 8) and allocating the income to the top 10% [upper bound] (adjustment 9). The upper bound estimates raise the relative contribution to the Gini further. In order to keep the allocation assumptions as natural as possible the proportional allocation as has been carried out in adjustment 8. Adjustment 8 will be taken as basis for the next chapter. An avenue for future research is to improve the preliminary imputations further down the distribution.

The choices above are not expected to affect the broader message the thesis tries to convey, rewriting the capital income narrative to be of better use for social policy. Rather this chapter lays out the groundwork for why and how researchers would want to go about (1) correcting for capital incomes in household surveys (2) allowing for decomposability of top income adjustments (3) addressing imputations further down the distribution.

4.3 Discussion: Pathways for Improvement

This chapter has examined, and corrected for, the capture of capital incomes in the headline inequality indicators (Gini) in the form of a UK case study. Accounting for the missing capital income, or billions of pounds falling out of the UK statistics has a noticeable effect on, both, the level and trend of inequality. Over the past 20 years, on average, there has been a 33-percentage point fall in the capture of capital incomes. In 2015 the survey capture was down to a low of 25%. These percentages area calculated using the fiscal sources as benchmark. As discussed in Chapter 2 and 3, taking the fiscal source as benchmark suggests these estimates are a lower bound.

The fall is driven mainly by a higher capture of dividends in fiscal sources. At the time of writing the SPI Public Tape Data allows researchers to examine the period up to 2015, but there is other evidence that the growth in dividends has increased since then and is projected to reach record heights in 2019 (LINKGroup 2018). Other sources such as property income might play a role further down the distribution but have not proven to be central to the current analysis with a particular focus on the top.

The exploratory results put forward in this chapter allows to make the general case that the effect of capital incomes on inequality is, at present, underestimated and the extent of this underestimation has been growing over time, mainly because the survey has failed to pick up observed surges in dividends. The main implication is that the UK narrative changes from capital income having little impact to having a moderate (and increasing) effect on inequality. I introduce the argument that that if there is no accurate picture of the effect of capital incomes on overall inequality policy responses will be inadequate and poorly designed. The proposed capital income corrected series will be used to rewrite the capital income narrative for the UK in the next chapter.

The BH top income methodology fails to measure, on average, 17-26% of total capital income as measured in fiscal sources. The proposed extension correcting for the underestimation of capital incomes, places more weights on individuals with a high capital share, bringing the unmeasured capital income down to 6%. This is not surprising given the finding that the underestimation of capital incomes starts further down the distribution, and not at the eligibility thresholds in top income methodology, suggesting capital income underestimation is not accounted for below this threshold.

The remainder of this missing capital income, after applying the additional capital income correction, is allocated using different assumptions. The most neutral assumption of for a proportionate allocation across the entire distribution. The capital income adjustments increase the Gini coefficient by approximately 3-3.5 Gini points compared to the FRS estimates and by 1-1.2 Gini points compared to the BH estimates. These magnitude are roughly in line with those found by Aitken & Weale (2018) who impute investment incomes and pensions onto inequality statistics using the UK Living Cost and Food Survey (LCFS) for the period 2005-2014. Their additional adjustments for pensions are of a much lower magnitude than for capital incomes.

After carrying out the adjustments, I observe that behavioural responses triggered by tax reforms (changes in corporate taxation and top marginal rates) have a substantial impact on the headline inequality indicators. The top income literature adopts a long-run perspective in which it is argued that discontinuities along the lines above do not affect underlying inequality trends (Alvaredo et al. 2013; Piketty & Saez 2007b). In the context of this thesis, interested in the short-run monitoring of capital incomes from a policy perspective, he implications of tax induced discontinuities and how to interpret and evaluate them when they are picked up by short-run inequality indicators are not yet clear.

UK researchers have concluded that under-reporting has been the largest driver of falling capture of household surveys (Burkhauser et al. 2017a; Corlett 2017). I add to this debate that under-coverage is a problem in particular for capital incomes. This is supported by the finding that the SPI captures 5-14 times more high-income earners who also have high capital incomes. The people who are not surveyed at the top of the distribution have characteristics which are positively correlated with holding capital income. In turn, these people are expected to drive the capital income story. For example, Chapter 2 has shown that top income groups observed in fiscal data have strong responses to the tax system affecting dividend reporting. The proposed adjustments are able to correct for such flows of income in inequality indicators, changing the overall narrative. However, with their characteristics missing in surveys it is not possible to use this source to draw conclusions about mechanisms and identify targeted policy responses towards this particular group, apart from higher taxation of dividends. Chapter 2 has described that that high-income individuals likely to be sensitive to such responses are expected to be severely underrepresented in survey sampling designs.

As the methodological literature develops, this estimate could be refined further, in particular the assumptions imposed to allow for decomposition. For the time being, the exploratory analysis helps to make the case that recalculating the headline statistics using capital adjusted series changes the narrative from little to moderate (and increasing) effect on inequality. To continue studying some of the phenomenon using surveys, a next step would be to explore a combination of existing methods, or hybrid methods. For example, a combination of cell-replacement means for the bottom 99% of the distribution along the lines of (Burkhauser et al. 2017a) but importing the very top, and their characteristics, from the fiscal sources which would be possible using methods proposed by (Anand & Segal 2015). Departing from the current objective to correct the UK headline statistics towards

correcting a more comprehensive capital income distribution used for academic purposes, stochastic imputation methods replicating distributional properties of the source data as used by for example (Aitken & Weale 2018) could be adopted.

Given the structure of the UK databases, in order to rely on the least number of assumptions, individual gross income has been chosen as the income definition to employ in the current analysis. Chapter 3 has described that the main inequality indicator captures living standards through household disposable income. The fiscal data is at the individual level and it is not possible link individuals back to households. Furthermore, it is not known how strongly people under-sampled in the survey are clustered together at the household level. Chapter 2 discussed the fact that at the top of the distribution women have more investment income than earned income over the period 1995-2010 (Atkinson et al. 2018). In 2007 women located at the top received ¼ of their income in the form of investments, for males this figure is 15% (Atkinson et al., 2015). This provides some indication that dividends might be reported among spouses making use of individual taxation, but it is hard to draw solid conclusions at the household level. At the time of writing the HBAI calculations have been critiqued for not being transparent enough (Burkhauser et al. 2018; Corlett 2017). The HBAI individual level variables goes back to 2004 providing little insight into how capital incomes have been treated in the transition from the individual to household level and from gross to disposable income. It is known that the unadjusted FRS data, the underlying source, assumes a constant 20% tax rate on dividends and interest combined. The FRS makes imputations for capital incomes [13,8% on average] which are not fully transparent, and their main investment variable does not include income from partnerships and royalties etc.

Another issue that arises is that rents are not the same concept when going from gross to net income, rents are not included in the same way as in equivalised disposable household income (FRS 2017). As seen in Chapter 3, imputed rents are not systematically included in the series and separate inequality series are produced which include housing costs. Housing costs do have a measurable upward effect on inequality of living standards (Corlett 2017). The analysis suggests that it is worth starting a discussion with the HBAI statistic providers about the falling capture of dividends in the FRS using the argumentation provided in this thesis.

5. Rewriting the UK inequality and capital income narrative

The objective of this chapter is to recalculate headline inequality statistics using the capital adjusted series to rewrite the UK capital income and inequality narrative. Drawing from previous chapters, complementary information produced by other areas of scholarship is used to strengthen and push forward the boundaries of the policy debate. Section 5.1 recalculates headline statistics using the top corrected capital adjusted series proposed in the previous chapter. The analysis provides empirical support that the UK inequality narrative should change from capital income having little (and stable) to moderate (and increasing) effect on inequality. Section 5.2 explores the use of complementary indicators which add substantial information to the capital income narrative but are not captured by headline indicators. Section 5.3 attempts to come to grips with characteristics of groups driving capital income dynamics. Section 5.4 brings in materials from other sources not yet discussed.

5.1. Traditional Inequality Indicators

This section draws conclusions about the capital income distribution and the role capital incomes play in the distribution for total income. The adjusted series are used to recalculate inequality indicators that are standard in the household survey literature. Where the results are directly comparable to estimates in the existing literature, a direct comparison will be made with the unadjusted FRS series. This will highlight how the household survey narrative is brought closer to the narrative told using other sources.

Distribution of capital income

Table 19 ranks the total population according to their position in the capital income distribution and calculates the share of total capital income received at different points of the population (column 1-4). In Column 5 $Yc_c>0$ indicates the percentage of the population with positive capital income.

Table 19: Percentage of total capital income distributed across the population (16+)

		1	2	3	4	5	6	7	8
Year	**Top 0.1**	**Top 1**	**Top 5**	**Top 10**	**Top 20**	***Yc*$_c$>0**	**Capital Share**	**Capital Share (FRS)**	**Capital Share (SPI)**
1997	21%	37%	63%	80%	95%	61%	6%	3%	8%
1998	20%	35%	61%	78%	95%	62%	7%	3%	8%
1999	20%	36%	61%	77%	94%	65%	6%	3%	8%
2000	16%	33%	60%	77%	95%	63%	6%	3%	7%
2001	19%	37%	64%	79%	95%	62%	5%	2%	7%
2002	14%	34%	62%	78%	95%	63%	5%	2%	6%
2003	19%	38%	64%	81%	96%	63%	5%	2%	7%
2004	14%	31%	59%	78%	96%	64%	6%	2%	8%
2005	15%	33%	62%	79%	96%	62%	7%	2%	8%
2006	15%	34%	63%	81%	97%	62%	7%	2%	8%
2007	15%	33%	62%	79%	96%	63%	8%	3%	9%
2008									
2009	27%	44%	69%	84%	98%	40%	7%	2%	9%
2010	8%	25%	59%	80%	98%	37%	6%	2%	8%
2011									
2012	10%	27%	61%	82%	98%	35%	6%	1%	8%
2013	15%	31%	62%	82%	98%	36%	7%	2%	8%
2014	15%	32%	64%	83%	98%	37%	7%	2%	9%
2015	24%	42%	70%	86%	99%	37%	8%	2%	10%
Av. (1997-2015)	17%	34%	63%	80%	96%	54%	6%	2%	8%
Av. (1997-2007)	17%	35%	62%	79%	95%	63%	6%	3%	8%
Av. (2009-2015)	17%	34%	64%	83%	98%	37%	7%	2%	9%

Source: Author's estimates from FRS and SPI data. Top shares within the distribution of capital incomes. $Yc_c>0$ indicates the percentage of the population with positive capital income. Column 1-6 are calculated with the BH top adjustment plus capital income correction. The unadjusted household survey capital share is calculated using the FRS. In both cases the denominator is total income of the series. Total taxable income used as denominator to calculate the SPI capital share.

The BH series plus capital income adjustment ensures that 100% of all capital income, as measured in fiscal sources, is now captured in the household survey. One important thing to note is that even after applying the capital income corrections the capital share fluctuates between 6% and 8%. In section 3.2.3 (

Table 8) it is shown that even using the SPI as benchmark, the fiscal source only repots 2%-6% of all capital income when compared to the national accounts aggregates. As explained in section 3.2.3 institutional capital such (e.g. pension funds and insurance), imputed rent and capital income held in the corporate sector stands in between what is observed in the official inequality statistics and the total economy.

The results are heavily affected by the series of tax reforms described in previous chapters. Figures for 2000-2002 are hard to interpret because of the sequence of tax reforms, leading to more incorporated business, and the dot-com crisis taking place simultaneously. In 2009 the negative effect of the financial crisis is offset by dividend income brought forward in response to increases in the top marginal tax rate in 2010. The change in the top marginal rate in 2013 has created an upward bias as incomes have been delayed to this year. In 2015 dividend payments have been brought forward, after the dividend tax reform in April 2016. The 2015 change has had an impact directly on dividend income, reaching record heights, as opposed to changes in top marginal rates which had only a partial effect on dividends. These points should be considered when interpreting the Tables presented in this Chapter.

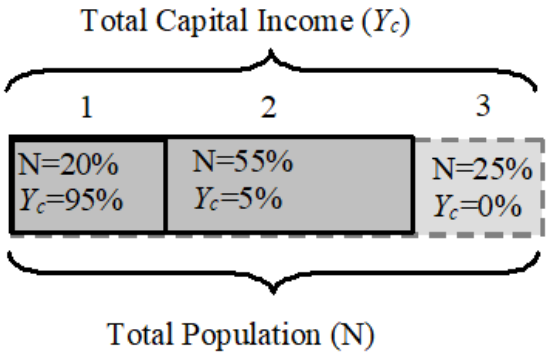
Almost all capital income is held by 20% of the total population. To put this in perspective, the dividend allowance of £2,000 introduced in April 2018 will apply to less than 20% of the population. Capital income is heavily skewed with 1/3 of all capital income going to the top 1% and 2/3 of all capital income going to the top 5% (of individuals ranked by capital income). Total capital income has become less unequal within the top 20%, except for the 2015 figures as the dividend tax reform has raised capital concentration in that year, with more capital income observed in the top 5% and top 10% over the entire period. The capital share has fluctuated between 5% and 8% over the past 20 years. Capital incomes are highly volatile, and any type of shock is felt most prominently by the top 1%. Because of

economic shocks (dot com bubble, financial crisis) and tax reforms (corporate taxation and changes top marginal rates) occur at similar moments in time the precise nature of the fluctuations of the very top are hard to pin down. In addition, because of mobility in and out of the top different groups of people are compared across time (Aaberge et al. 2013b). The capital share among this group is most volatile and a link is observed between fluctuations at the very top and the overall capital share. Post-crisis averages are higher among the entire top 20%, except for the top 1%. The increase in dividend reporting in 2015 has had an upward impact across the entire top 20. In 2015 99% of all the capital income goes to the top 20%. The dividend tax reform has led to a percentage point increase of reported dividends of 14%, 10% and 9% for the top 5%, 1% and 0.1% respectively. Compositional shifts appear to have taken place in which less capital income has gone to the very top but has become more equally distributed among the remaining 20% of capital income earners.

Capital incomes remain an abstract and complex concept, the concept will need to be made clearer to improve the commutation around this topic in public debates. In order to do so, capital income earners are placed into four broad categories. The first category includes well-off e.g. workers, capitalists and pensioners with household portfolio investments contributing to some of the 20% top capital income earners, and further up the top 20%, more complex and heterogeneous types of capital income earners are observed, e.g. with links to corporate sector income. This heterogeneous group, the top 20% of the capital income distribution, is driving most of the capital income and inequality dynamics. The second category includes individuals with small amounts of capital income, mainly in the form of interest from savings. This group has been hit by the crisis after interest rates fell to zero. Before the crisis they made up about 43% of the population with 5% of total capital income. Post-crisis they make up 17% of the population with 1% of total capital income. The first category includes individuals without any earnings from capital. Post crisis

around 2/3(63%) of the adult population report no capital income at all. Simplified categories are depicted in Figure 17.[19]

Figure 17: Three simplified groups within the capital income distribution



Note: This Figure simplifies the heterogeneity among individuals with capital income by classifying them into three broad categories. Yc_c>0 is the share of total capital income received by each group. *N* indicates the share of the population that can be classified in the three different groups. Group 1 represents 20% of the total population and together they receive the lion's share of capital income in total 95%. This group drives the capital income and inequality narrative and is very heterogeneous large part of their capital income is earned through e.g. dividends as they hold more complex financial products or companies. Group 2 represents 55% of the total population, together this group receives approximately 5% of total capital income (middle). This is mainly in the form of small interest payments on savings. Group 1 and 2 combined make up approximately 80% of the total population with either zero capital income or small interest receipts from savings. Group 3 is the share of the population without capital income representing approximately 25% of the total population (right).

[19] For illustrative purpose we round the average figures for the entire period to the nearest 5. Because of missing high capital share individuals in the survey and the inability to create a clean separation between groups, which is further discussed in Section 5.3, the last two groups described above are bundled within the top 20%.

Table 20: Gini coefficient distribution of capital incomes for three groups

	1	2	3	4
Year	**Gini (FRS)**	**Gini BH+cap**	**Gini BH+cap Group 1&2**	**Gini BH+cap Group 1**
	(1)	**(2)**	**(3)**	**(4)**
1997	0,92	0,90	0,83	0,56
1998	0,91	0,89	0,82	0,54
1999	0,91	0,89	0,83	0,54
2000	0,92	0,88	0,82	0,52
2001	0,92	0,89	0,83	0,56
2002	0,91	0,89	0,83	0,54
2003	0,92	0,90	0,85	0,57
2004	0,92	0,89	0,83	0,51
2005	0,91	0,90	0,84	0,54
2006	0,91	0,90	0,84	0,55
2007	0,91	0,90	0,84	0,54
2008	0,91			
2009	0,93	0,92	0,82	0,62
2010	0,94	0,90	0,75	0,50
2011	0,94			
2012	0,94	0,90	0,76	0,52
2013	0,94	0,91	0,77	0,54
2014	0,94	0,91	0,79	0,55
2015	0,95	0,93	0,82	0,63
Av. 1997-2015	0,92	0,90	0,82	0,55
Av. 1997-2007	0,91	0,89	0,83	0,54
Av. 2007-2015	0,94	0,91	0,79	0,56

Note: Author's estimates from FRS and SPI data, no SPI micro data available for 2008 and 2011 to carry out the analysis. Column 1 shows the Gini coefficient for capital income using the unadjusted FRS. Column 2-4 are calculated using the BH estimates plus capital income correction *(BH+cap)*. Column 2 shows the Gini for capital income for the three groups combined, this includes 25% of the population without capital income. Column 3 includes all individuals with positive capital income which is 75% of the total population *(groups 1 & 2)*, this includes many individuals with very small (sometimes negligible) amounts of capital income. Column 4 includes the individuals with belonging to the top 20% of the capital income distribution *(group 1)*.

Looking at summary inequality indicators, Table 20 shows first that the Gini coefficient for the distribution of capital incomes, as measured in the FRS, is 2 Gini point higher than what is observed in the capital adjusted series. The FRS figures are presented to give an indication of the changes to the survey after applying the BH estimate plus capital income correction. Reported inequality levels in the capital income distribution after the capital income correction is lower than reported in the FRS, which appears contradictory.

There are several differences between the series which causes this discrepancy which, in practice, makes it difficult to compare the results between the two series. The BH gives the same capital income value to each of the individuals within a bin eligible for the top income correction, even if the individual within a bin has zero capital income before the correction. This gives individuals a different ranking within the capital income distribution after the BH adjustment. All individuals eligible for the correction are artificially given a ranking towards the top of the capital income distribution. Because of the assumption of equal capital income shares per bin, there is no individual inequality within bins eligible for the correction only between bind eligible for the correction. This suggest there is less variation of capital income values observed among those eligible for the top correction which could potentially explain why the observed Gini for capital incomes is lower in the adjusted series. The proportional allocation of the remaining missing capital income has no effect on measured inequality. Changes in this allocation formula (e.g. disproportionate allocation towards the top) is expected to increase the Gini coefficient for capital incomes. The correction for under-coverage places more weight on high capital share individuals within each bin, however as discussed above, this group is expected to be more heterogeneous than the variation proposed in the capital income correction. This is another limitation that is expected to reduce variation, hence, the Gini coefficient within the capital income distribution post adjustment.

In sum, the Gini coefficient calculated using the capital adjusted series changes the capital income levels and ranking of people within the capital income distribution and is dependent on the assumptions made in the adjustment. For these reasons, it is hard to directly compare inequality levels between the FRS and the adjusted estimates for inequality. As mentioned, future research will have to look more carefully into the assumptions imposed on equal income composition within bins. Relaxing this assumption, allowing for variation of capital income within bins will introduce additional variation in capital incomes and is expected to have an upward effect on the Gini coefficient for capital incomes. This would be a more plausible scenario given the observation made for under-reporting and under-sampling in Chapter 4. When comparing trends, the FRS and the capital adjusted series is largely similar. The Gini coefficient for capital incomes has stayed relatively stable over the entire period (column 2), within an increase in capital income concentration after the crisis where there returns of capital of many fell (to zero).

Columns 3 & 4 are calculated using the capital adjusted series and just focus on the trends. A key point is that by looking at different parts of the distribution implicitly certain population groups without (or with negligible) capital income are excluded and has a downward pressure on the Gini coefficient as inequality at the bottom of the distribution is artificially reduced. Column 3 shows the Gini for 75% of the population with positive capital income (groups 1 and 2). Column 4 show the Gini for the top 20% capital income earners. The capital income distribution looking only at those with positive capital income (Column 3) has risen until 2007 but has fallen after the crisis. Among those in the top 20% of the capital income distribution there has been more fluctuation over time, the 2015 dividend tax reform has had the largest impact on this group (Column 4). This suggest that the income that has been brought forward is expected to have gone disproportionately to those with already high levels of capital income.

On average, Group 1 receives £5,459 annually, or £455 a month in capital income, but experiences large variations as one moves up the distribution, Table 21. The top 10% (p90), top 5% (p50) and top 1% (p99) hold 1.8, 2.6 and 7.1 times the average income of the entire group, respectively. The surge in capital income earned by the top 1% is striking in 2009, this is driven by income being brought forward to the 2009-10 tax year, and the effect of the financial crisis has been washed out for this group shown in Table 21. Separate calculations show that over the entire period the second group receives on average £127 annually or £11 monthly in capital income.

Table 21: Capital income levels held by the top 20% of the capital income distribution (Group 1)

	1	2	3	4	5	6	7	8
	p10	**p25**	**p50**	**p75**	**p90**	**p95**	**p99**	**mean**
1997	628	920	1503	2580	4559	7269	20654	2871
1998	785	1097	1865	2931	5082	8117	21378	3237
1999	797	1143	1916	2818	5391	8300	22375	3291
2000	879	1278	1934	3129	5663	8858	22741	3346
2001	757	1155	1666	2786	5255	9159	25850	3305
2002	676	1097	1772	2805	5545	9353	25710	3142
2003	630	1185	2045	3031	6030	9847	28980	3603
2004	815	1819	2913	4414	7529	11378	29971	4446
2005	860	1920	3087	5028	9689	14220	39526	5210
2006	888	2005	3191	5504	10270	16129	42100	5782
2007	1141	2645	3799	6403	12318	17821	48771	6855
2008								
2009	806	1837	3563	5522	10073	16530	60856	6886
2010	721	1947	3893	6177	12000	16128	29391	5570
2011								
2012	687	1889	5033	7515	14337	20671	41269	6984
2013	782	2413	5345	8617	15880	20352	53771	8245
2014	864	2303	5506	9187	17024	23487	60235	8925
2015	850	2550	5453	9547	19088	27632	85576	11109
Average (1997-2015)	798	1718	3205	5176	9749	14427	38774	5459
Average (1997-2007)	805	1479	2336	3766	7030	10950	29823	4099
Average (2009-2015)	796	2289	5334	8716	16582	23036	60213	8816

Source: Author's estimates from FRS and SPI data deflated using CPI 100=2015. No micro data available for 2008 and 2011 to construct the capital adjusted series. This table restricts itself to Group 1, the group driving the capital income and inequality dynamics, or the top 20% of the capital income distribution. The values give an indication of the amount of capital income held within the top 20% of the capital income distribution. Calculated using the BH estimates plus capital income correction *(BH+cap)*.

Table 22: P-ratios capital incomes held by the top 20% capital income earners (Group 1)

	1	2	3	4	5
Year	**mean/p50**	**p99/p50**	**P99/P95**	**p75/p25**	**p50/p25**
1997	1,91	13,74	2,84	2,81	1,63
1998	1,74	11,46	2,63	2,67	1,70
1999	1,72	11,68	2,70	2,47	1,68
2000	1,73	11,76	2,57	2,45	1,51
2001	1,98	15,51	2,82	2,41	1,44
2002	1,77	14,51	2,75	2,56	1,61
2003	1,76	14,17	2,94	2,56	1,73
2004	1,53	10,29	2,63	2,43	1,60
2005	1,69	12,80	2,78	2,62	1,61
2006	1,81	13,19	2,61	2,74	1,59
2007	1,80	12,84	2,74	2,42	1,44
2008					
2009	1,93	17,08	3,68	3,01	1,94
2010	1,43	7,55	1,82	3,17	2,00
2011					
2012	1,39	8,20	2,00	3,98	2,66
2013	1,54	10,06	2,64	3,57	2,21
2014	1,62	10,94	2,56	3,99	2,39
2015	2,04	15,69	3,10	3,74	2,14
Av. (97-15)	1,7	12,4	2,7	2,9	1,8
Av. (97-07)	1,8	12,9	2,7	2,6	1,6
Av. (09-15)	1,7	11,6	2,6	3,6	2,2

Source: Author's estimates from FRS and SPI data. No micro data available for 2008 and 2011 to construct the capital adjusted series. This table restricts itself to Group 1, the group driving the capital income and inequality dynamics, or the top 20% of the capital income distribution. The values are p-ratios calculated among the individuals belonging to Group 1. Calculated using the BH estimates plus capital income correction *(BH+cap)*.

Because of the volatile nature of capital incomes, the p-ratios fluctuate more over time than other measures discussed so far, Table 22. The mean/P50 ratio has stayed relatively constant. The findings suggest that the p75/p25 and p50/p25 ratios have widened, post-crisis ratios are structurally higher, suggesting those at the lower end of the capital income distribution have been falling behind to some extent, this has been amplified after the 2008 crisis. Ratios including the p99 are most volatile both because of the nature of their capital income and their sensitivity to tax reporting (2009, 2013 and 2015).

In sum, only a small fraction of the population (20%) earns the bulk of the capital income observed in the capital adjusted series. Labelled Group 1 in this analysis. For most of the population (labelled as Group 2) capital incomes take the form of small interest on savings. Among this group most have witnessed their interest fall to negligible amounts after the 2008 financial crisis. Returns on household portfolio investments held by those in well-paying jobs and older segments of the population, are found a further up the capital income distributions. Only a small fraction earns significant amounts of capital incomes generated through more complex channels, other than from savings and household portfolio investments. This group in particular is expected to drive the overall capital income and inequality dynamics, as will be further discussed in Section 5.3.

Capital incomes in the distribution of total income

Table 23 and Table 24 give an indication of how capital incomes and capital shares are held at different parts of the distribution of gross income. Table 23 shows that the amount of capital income earned at each part of the distribution increases as one moves up the gross income distribution. Again, the most volatile results are observed at the top 0.1% of the gross income distribution. The largest effects of the tax reforms are observed within the top 1%.

The amount of capital income and capital shares observed among the top 20%, minus the top 1%, are higher after the crisis, as presented in Table 24. The corrected series makes an adjustment for the top 10%, it is important to note that the growth in capital incomes at higher parts of the distribution is also picked up by the FRS and do not cease to exist after the top 10%. In line with previous findings, a post-crisis drop for the entire bottom 80% is observed in both Tables. Capital shares observed among the top 1% are closest to the 30% observed in the macroeconomic studies.

Table 23: Percentage of total capital income observed at different parts of the individual gross income distribution

	1	2	3	4	5	6	7	8
Year	Bottom 50	p5060	p6080	p8090	p9094	p9599	p99-p100	p99.9-p100
1997	11%	3%	10%	9%	11%	21%	35%	21%
1998	11%	4%	10%	9%	12%	20%	34%	20%
1999	12%	4%	10%	10%	13%	20%	33%	20%
2000	13%	4%	10%	11%	13%	19%	29%	16%
2001	12%	4%	10%	9%	12%	19%	35%	19%
2002	12%	4%	10%	10%	14%	21%	31%	14%
2003	10%	3%	9%	8%	15%	20%	35%	19%
2004	9%	3%	8%	11%	17%	24%	29%	14%
2005	8%	2%	7%	10%	15%	26%	32%	15%
2006	8%	2%	6%	10%	14%	26%	34%	15%
2007	8%	2%	7%	11%	13%	27%	32%	15%
2008								
2009	6%	2%	6%	8%	15%	21%	42%	27%
2010	8%	2%	7%	10%	22%	28%	23%	8%
2011								
2012	6%	2%	6%	11%	21%	29%	25%	10%
2013	6%	2%	6%	16%	16%	26%	29%	15%
2014	6%	2%	6%	14%	16%	27%	30%	15%
2015	5%	2%	5%	11%	12%	25%	40%	24%
Average (97-15)	9%	3%	8%	10%	15%	23%	32%	17%
Average (97-07)	10%	3%	9%	10%	14%	22%	33%	17%
Average (09-15)	6%	2%	6%	12%	17%	26%	32%	17%

Source: Author's estimates BH+capital adjusted series. No individual level fiscal data available for 2008 and 2011. Columns 1-7 add up to 100%. Because of the heavy concentration of capital incomes towards the top of the distribution Column 8 provides additional information for the top 0.01% (p99.9-p100).

Table 24: Capital shares observed in different parts of the individual gross income distribution

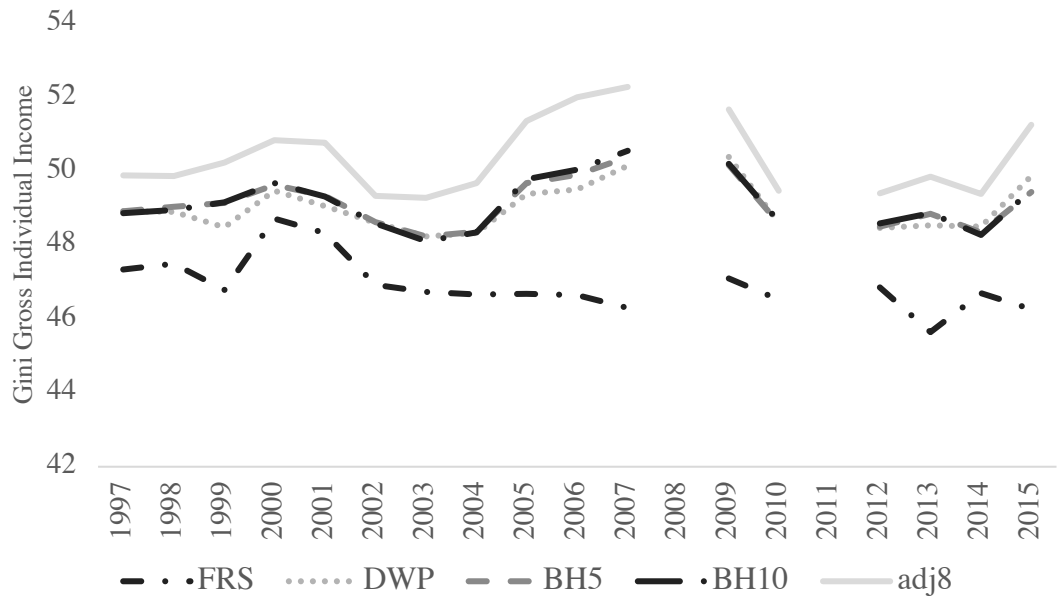
	1	2	3	4	5	6	7	8
Year	Bottom 50	p5060	p6080	p8090	p9094	p9599	p99-p100	p99.9-p100
1997	4%	3%	3%	4%	7%	9%	20%	30%
1998	4%	3%	3%	4%	8%	10%	19%	28%
1999	4%	3%	3%	4%	7%	9%	18%	25%
2000	4%	3%	3%	4%	7%	8%	14%	17%
2001	4%	3%	3%	3%	6%	8%	15%	19%
2002	4%	3%	2%	3%	7%	8%	15%	19%
2003	3%	2%	2%	3%	8%	8%	17%	21%
2004	3%	2%	2%	4%	10%	11%	15%	18%
2005	3%	2%	2%	4%	10%	12%	17%	17%
2006	3%	2%	2%	5%	9%	13%	16%	15%
2007	4%	2%	3%	6%	10%	14%	17%	16%
2008								
2009	3%	2%	2%	4%	11%	11%	20%	24%
2010	2%	2%	2%	4%	12%	12%	11%	10%
2011								
2012	2%	2%	2%	4%	13%	13%	14%	14%
2013	2%	2%	2%	7%	11%	14%	16%	17%
2014	2%	2%	2%	7%	11%	14%	17%	19%
2015	2%	2%	2%	7%	10%	15%	24%	31%
Average (97-15)	3%	2%	2%	5%	9%	11%	17%	20%
Average (97-07)	4%	3%	3%	4%	8%	10%	17%	20%
Average (09-15)	2%	2%	2%	6%	11%	13%	17%	19%

Source: Author's estimates BH+capital adjusted series. No individual level fiscal data available for 2008 and 2011. Average capital share according to the position in the gross income distribution bracket, calculated by aggregating capital income and total income within each part of the distribution.

Factor Decomposition

One of the main findings of this research is that the 'missing' capital income correction (adjustment 8) raises the overall Gini coefficient for individual gross income. Capital incomes are concentrated at the top of the distribution of total income, the capital income corrections therefore push up total inequality at the top.

Figure 18: Gini gross individual income as measured applying different top income corrections



Source: Author's estimates from FRS and SPI. The FRS series is calculated using the unadjusted survey (without top adjustment and additional capital income corrections). The DWP and BH (with top 5 [BH5] and top 10 [BH10] adjustment) series are constructed from the FRS and SPI for gross individual income and a top income correction has been applied as described in Chapter 3. The *adj8* series is the BH10 method plus the capital income correction, which has been selected to rewrite the capital income narrative as argued in Chapter 4.

Figure 18 shows that the trend is similar compared to the DWP and the BH, but the level is structurally higher. The FRS trend shows the traditional narrative of stable inequality. This literature will find a falling impact on inequality and draw the wrong conclusions about the role of capital incomes in inequality in the UK, carrying over into cross-country comparative analysis (where this may often be the case for other countries). The DWP and BH series pick up the widely discussed increases in wage inequality at the top of the distribution

(Corlett 2017). The adjusted series adds capital income to this picture, correcting for underestimation driven mainly by surges in dividends and under sampling of high capital share individuals, pushing up overall inequality by between 1-1.2 Gini points compared to the BH estimates, when eyeballing the figures.

In other words, the household survey is not only underestimating the story of wages, as put on the research agenda by leading top income researchers (Atkinson & Piketty 2007, 2010), but also the story of capital incomes. The story of capital incomes is also largely missed in the inequality indicators produced by the DWP and BH. In addition, even if there were no underestimation the lack of decomposability would not have allowed researchers to tell the capital income story using official statistics. Two gaps this thesis has set out to fill.

The results for the first factor decomposition using top adjusted and capital income corrected series will now be presented. For the purpose of this analysis the Gini coefficient and its decomposition is examined as discussed by (Lerman & Yitzhaki 1985; Milanovic 2017; Van Kerm 2009).[20] Equation 1 shows how the Gini coefficient can be decomposed into the contribution stemming from the different income sources , in the example below these are labour *(l)* and capital *(c)*.

$$(1) \quad G = S_l R_l G_l + S_c R_c G_c$$

where G_i is the distribution of each income source i (labour or capital), S_i is the factor share and R_i the correlation ratio between the source (i) and total income. R_i is the ratio of two correlation coefficients.

[20] Within the policy framework of the thesis, the Gini coefficient is most appropriate for the current analysis. In addition, recent advances in the literature linking capital shares and the income distribution, uses the Gini coefficient as reference (Milanovic 2017). The academic literature discussed in Chapter 2 looks at other decompositions such as the squared coefficient of variation or mean logarithmic deviations. An academic extension would be to use the series to contribute more specifically to that literature.

In recent years, R_i has been labelled the elasticity of transmission between the capital share and interpersonal inequality by (Milanovic 2017). A high coefficient ($R_i = 1$) indicates that individual rankings in the total distribution (fully) coincide with their ranking in the distribution of the source.

$$(2) \qquad R_i = \frac{\text{corr (Income source/Rank person (j) within total income)}}{\text{corr (Income source/Rank person (j) within distribution source } (i))}$$

The extent to which the capital share S_i 'transmits' onto inequality is determined by G_i and R_i. This thesis bring into this debate the effect of an increase in *Yc* on the overall Gini coefficient [relative marginal effect] derived by (Lerman & Yitzhaki 1985) as:

$$(3) \qquad \frac{dG/dec}{G} = \frac{S_c G_c R_c}{G} - S_c$$

In which *dec* is the elasticity of the capital share in response to an increase in the Gini of gross individual income. A one percentage point increase in the capital share raises the Gini by x%.

The corresponding values are presented in Table 25. The capital share has fluctuated between 5% and 8% over the period, with a peak in 2015. There is a high and increasing correlation ratio (R_c) (column 2). According to Milanovic (2017) an increase in R_c implies a higher transmission from the capital share onto inequality. Column 5 confirms this result and tells that a one percentage point change in the capital share contributes to increases in overall Gini by 3% on average, 4% after the crisis.

Table 25: Results factor decomposition using the capital adjusted series

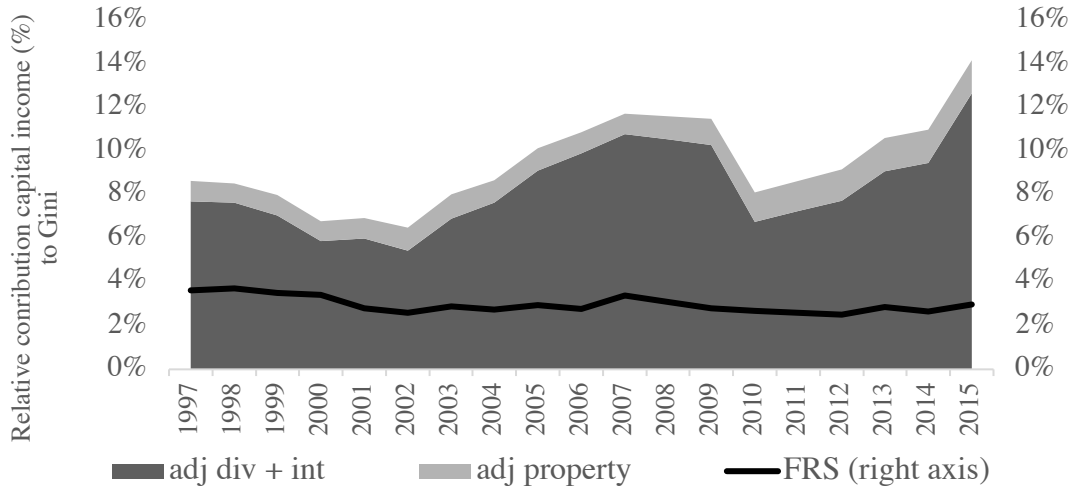
	1	2	3	4	5
Year	S_c	R_c	G_c	G	$\frac{dG/dec}{G}$
1997	6%	0,72	0,90	0,50	3%
1998	7%	0,71	0,89	0,50	3%
1999	6%	0,70	0,89	0,50	2%
2000	6%	0,68	0,88	0,51	2%
2001	5%	0,71	0,89	0,51	2%
2002	5%	0,70	0,89	0,49	2%
2003	5%	0,75	0,90	0,49	3%
2004	6%	0,75	0,89	0,50	3%
2005	7%	0,78	0,90	0,51	4%
2006	7%	0,79	0,90	0,52	4%
2007	8%	0,78	0,90	0,52	4%
2008					
2009	7%	0,83	0,92	0,52	4%
2010	6%	0,78	0,90	0,50	3%
2011					
2012	6%	0,81	0,90	0,50	4%
2013	7%	0,82	0,91	0,50	4%
2014	7%	0,83	0,91	0,50	5%
2015	8%	0,86	0,93	0,51	6%
Average (97-15)	6%	77%	0,90	0,51	3%
Average (97-07)	6%	73%	0,89	0,51	3%
Average (09-15)	7%	82%	0,91	0,50	4%

Source: Author's estimates from FRS and SPI data. The FRS series is calculated using the unadjusted survey (without top adjustment and additional capital income corrections). The DWP and BH series are constructed from the FRS and SPI for gross individual income and a top income correction has been applied as described in Chapter 3. The capital income adjusted series has been constructed using the BH10 estimates as starting point and applying the additional correction for capital incomes, as proposed in Chapter 4. In which *dec* is the elasticity of the capital share in response to an increase in the Gini of gross individual income. A one percentage point increase in the capital share raises the Gini by x%.

The relative contribution of capital incomes to the Gini coefficient is shown in Figure 19. This figure is the first representation of the relative contribution of capital incomes to the Gini coefficient for gross individual income in the UK, using top adjusted data. Factor decomposition is often carried out in the academic literature and can be of use for policy purposes. The fact that the top adjusted estimates presented in Figure 19 are missing from the policy debates is problematic because the adjusted series draws a completely different picture. The FRS shows a low and stable contribution to inequality while the adjusted series shows a moderate and increasing contribution. The contribution of dividends and interest and of property income and have added the FRS trend can be further distinguished.

Over, the entire period the relative contribution of capital incomes to overall inequality change from 3% (FRS) to 9% (capital adjusted series). The series imports artificial fluctuations triggered by the tax system, as discussed in Chapter 4. It not yet clear how to separate real effects from behavioural responses in tax reporting using the current method.

Figure 19: Relative contribution capital incomes as a (%) Gini individual gross income



Source: Author's estimates from FRS and SPI data. Figures for 2008 and 2011 are calculated as averages for 2007/09 and 2010/12, respectively. The Figure shows the relative contribution of capital incomes to the total Gini (%) using the FRS series. The stacked area shows the total contribution constructed using the adjusted series, broken down dividend and interest (*adj div+inv*) and property (*adj property*).

Overall, this thesis draws the broader conclusion that, accounting for the growing underestimation of capital incomes in surveys, the UK capital income narrative changes from a relatively low (and stable) contribution to a moderate (and increasing) contribution. Post-crisis there has been an increase in dividends which has been distributed more evenly among the top 20% capital income earners, the 2015 tax reform has introduced an artificial fluctuation mainly impacting those further up the distribution. The movement of capital income further down the distribution has gone to individuals who generally are located further up the gross income distribution, this has increased the transmission strength from capital incomes onto the individual income distribution. The adjusted series picks up part of the inequality story previously untold.

In sum, there is reason to believe that the current UK narrative is wrong in both national and cross-country comparative perspective downplaying policy discussions on these topics. The exact figures can be improved as the knowledge of top income corrections and decomposability improves. As explained in Chapter 4, the series suffers from limitations. Overall, one would expect the corrected series to represent a lower bound because using fiscal data as benchmark and not all capital income in the economy is captured using this source, this is further elaborated on later in this Chapter. It is expected that limitation in the series affecting the general trend, not artificial fluctuations, will be outweighed if one were to account for unmeasured capital income, such as tax-exempt flows (foreign dividends), capital income flows that fall out of the Personal Income Tax (capital gains), tax exempt investment income earned by those with non-domiciled status etc. These points will be elaborated on shortly.

5.2. Supplementary Indicators

So far, this analysis has focussed on the measurement of capital incomes in inequality statistics. The motivation for this section come from the top share literature in which the UK has reported an increase in capital income at the top of the distribution, while income from earnings remains the dominant income source at the top (Alvaredo et al. 2018; Atkinson 2007a). Over the past years novel inequality indicators have been proposed that are more tailored to study drivers of the link between capital incomes and other income distributions (Aaberge et al. 2013a; Atkinson 2007b; Atkinson & Lakner 2015, 2017; Ranaldi 2018, 2019).

This Section provides an overview of supplementary information with valuable insights for policies, related to the distribution of (1) total gross income and capital income and (2) earnings and capital income. These links, at present, largely fall outside of the mainstream debates. The main policy implication of such an link is that we would need to design policies that would help to mitigate the effects of the concentration of ownership of wealth (Aaberge et al. 2013a; Atkinson & Lakner 2015). The discussion of these indicators will allow to strengthen and push forward the boundaries of the policy debate beyond e.g. direct taxation of dividends in response to the findings, which is the main reason for including them in this Chapter. However, in order for these indicators to be of practical use in a policy context their presentation and interpretation would need to be simplified further.

The main thing to consider when studying the *correlation* between capital incomes and the gross income distribution (using the alignment coefficient, explained shortly) and the *joint distribution* of capital and earnings (using the copula function explained shortly) is that the underlying population is not directly comparable. This has implications for the direct comparability of both of the indicators, which have not yet been compared in the academic

literature, this thesis provides and initial attempts to point out some key differences. A more rigorous analysis for the UK for each indicator, in the form of separate papers and the precise differences between them would be a valuable addition to the academic literature and would improve the understanding of how the broader message these indicators try to capture be put to more practical use.

This Section sets out to bring out the story relevant to policy that can be constructed based on existing indicators and restricts itself to fiscal sources. Because of the under-sampling of high capital share individuals in the survey, the survey will not adequately pick up the dynamics which the supplementary indicators set out to capture. The SPI is the best source for the current analysis because of its relatively good capture of both top incomes and capital incomes. Note that the SPI is not representative of the entire population, for reasons explained in Chapter 4. For technical details explaining the underlying indicators the reader is referred to the original papers.

Table 26 gives the correlations between the gross income distribution and capital income and earnings + capital distribution (=total income) and capital incomes.

Table 26: Capital income correlated with the gross income distribution and correlated with the joint distribution of earnings + capital income

	Gross Income Distribution				Earnings + Capital Distribution			
Year	**Total**	**Top 1%**	**Top 5%**	**Top 10%**	**Total**	**Top 1%**	**Top 5%**	**Top 10%**
1997	0.85	0.95	0.9	0.89	0.54	0.66	0.63	0.62
1998	0.88	0.97	0.92	0.91	0.54	0.66	0.62	0.6
1999	0.86	0.87	0.81	0.8	0.59	0.69	0.66	0.65
2000	0.66	0.68	0.66	0.65	0.64	0.65	0.65	0.65
2001	0.72	0.74	0.71	0.71	0.43	0.39	0.42	0.42
2002	0.78	0.75	0.71	0.7	0.65	0.74	0.72	0.71
2003	0.78	0.88	0.82	0.81	0.56	0.61	0.6	0.59
2004	0.76	0.87	0.79	0.78	0.61	0.69	0.66	0.65
2005	0.76	0.86	0.78	0.77	0.58	0.61	0.6	0.6
2006	0.79	0.9	0.81	0.8	0.64	0.68	0.66	0.65
2007	0.78	0.86	0.78	0.78	0.6	0.61	0.6	0.6
2008								
2009	0.88	0.91	0.89	0.89	0.65	0.68	0.68	0.67
2010	0.49	0.52	0.48	0.48	0.27	0.26	0.24	0.24
2011								
2012	0.64	0.58	0.54	0.54	0.28	0.28	0.27	0.28
2013	0.72	0.65	0.64	0.63	0.44	0.44	0.44	0.44
2014	0.78	0.84	0.8	0.79	0.27	0.25	0.26	0.26
2015	0.87	0.8	0.79	0.78	0.23	0.2	0.22	0.22
Average (97-15)	0.76	0.80	0.75	0.75	0.50	0.54	0.53	0.52
Average (97-07)	0.78	0.85	0.79	0.78	0.58	0.64	0.62	0.61
Average (09-15)	0.73	0.72	0.69	0.69	0.36	0.35	0.35	0.35

Note: Own calculations using SPI. Gross income distribution includes earnings, capital income, self-employment income and pensions. To calculate correlations within the top shares WID population totals have been used. The joint distribution of earnings and capital has been constructed, dropping all tax units without income from earning or capital income. Correlations within top shares have been calculated based on an income threshold.

The correlation between capital income and gross income is generally higher than the correlation between capital income and capital income and earnings + capital income. The correlation has gone down over time for all distributions across the entire distribution. The years affected by tax reform, such as the change to the dividend taxation in 2015 which caused increases in divided reporting, drives short term upward fluctuations in the correlation. The observed fall in interest payments during the post 2008 crisis period can possibly explain the falling correlation in post crisis years, especially among those in the earnings + capital income distribution. The UK post-crisis story of dividends reaching record heights has been accompanied with lower correlation ratios. It should be noted that the fiscal source excludes information of individuals lower down the distribution, such as those falling below the personal allowance, which is expected to affect the correlation table, as it is not representative of the entire population.

On average, over the entire period, there are approximately 487.000 tax units in the gross income distribution per year. On average over the entire period, there are approximately 235.000 tax units in the earnings & capital income distribution (calculating total income as the sum of earnings and capital income). The latter distribution excludes all individual with zero income from either source, or represents, on average, only 48% of the individuals observed in the gross income distribution. These numbers are subject to fluctuations over time.

Alignment Coefficient

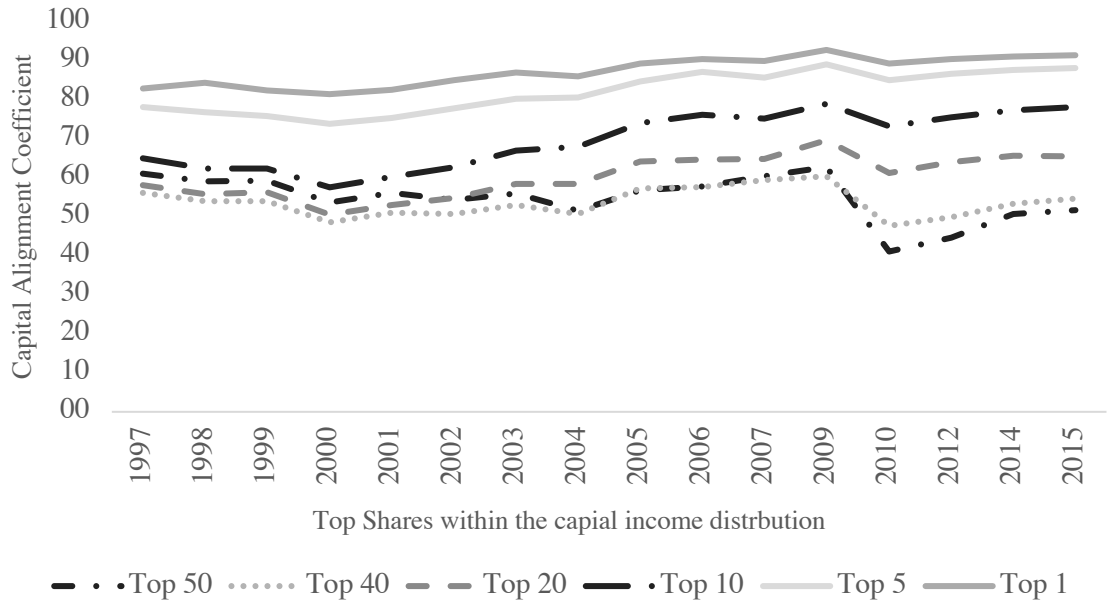
Atkinson (2007b) proposes the alignment coefficient which allows for the investigation of the link between capital incomes and the gross income distribution. To my knowledge, this coefficient is only discussed by Atkinson in the top shares methodological chapter (Atkinson 2007b) and in the World Bank paper published by Atkinson & Lakner (2017). The coefficient has not yet received widespread attention in academia (peer-reviewed articles) nor in policy circles.

The coefficient ranges from 0-1 and is calculated separately for different top shares within the capital income distribution. The alignment coefficient for capital income (share of total capital income observed within the top x% of the gross income distribution/the share of total capital income observed within the top x% of the capital income distribution) and is shown in Figure 20 based on the SPI.

The coefficient is interpreted in the following way. In 1997, 83% of total capital income observed within the top 1% of the capital income distribution goes to tax units who are also in the top 1% of the gross income distribution. The remaining 17% of capital income observed within the top 1% of the capital income distribution, is earned by the remaining 99% of tax units within the gross income distribution. The alignment coefficient between capital income and total income has become stronger all income brackets within the top 20% of the capital income distribution.

The indicator is informative about whether the aggregate level of capital income observed (at the top of the capital income distribution) is also observed at the top of the gross income distribution, showing some form of correlation. The indicator is not informative about *how* the aggregate level of capital income is spread out e.g. whether individuals at the top 1% of the capital income distribution are also at the top of the gross income distribution or wage distribution.

Figure 20: Alignment coefficient capital income



Source: Author's estimates from SPI data. The top shares are calculated using the WID population control totals (+15). The alignment coefficient for capital income is calculated as the share of total capital income observed within the top x% of the gross income distribution/the share of total capital income observed within the top x% of the capital income distribution. Figures for 2008 and 2011 are calculated as averages for 2007/09 and 2010/12, respectively. The x axis represents the top shares within the capital income distribution. The y axis represents the alignment coefficient, which could be seen as a ratio between the aggregate level of capital income observed within the top x% of the capital income distribution (capitalist) and the aggregate level of capital income observed within the top x% of gross income distribution. In 2015, 91% of all the capital income earned by the top 1% capitalist goes to the top 1% tax units (gross income distribution).

This alignment coefficient for capital income has shown the largest increase among the top 10% (13 p.p. increase) and the top 5% (10 p.p. increase). More of the capital income observed among those within the top 10% of the capital income distribution is also observed within the top 10% of the gross income distribution. The fall among the top 40% and top 50% is in line with the findings that post-crisis a large share of individuals further down the distribution (Group 2 as defined in Section 5.1) have observed drops in their capital income, mainly driven by interest rates falling to zero. This magnitude of the alignment coefficient is in line with previous findings and similar to the magnitudes found for the US (Atkinson & Lakner 2017).

Copula Framework

There has been a branch of research has been motivated by the observed shift away from traditional class societies with a strict division between capitalists and workers, towards a society in which people at the top of the distribution are earning income from multiple income sources (Aaberge et al. 2013a, 2018; Atkinson & Lakner 2015, 2017). As mentioned, the alignment coefficient does not link the position of the tax units in the capital income distribution back to their position in other distributions (such as the wage distribution). The copula framework allows to study the joint distribution of earnings and capital income (Aaberge et al. 2013a, 2018; Atkinson & Lakner 2015, 2017).

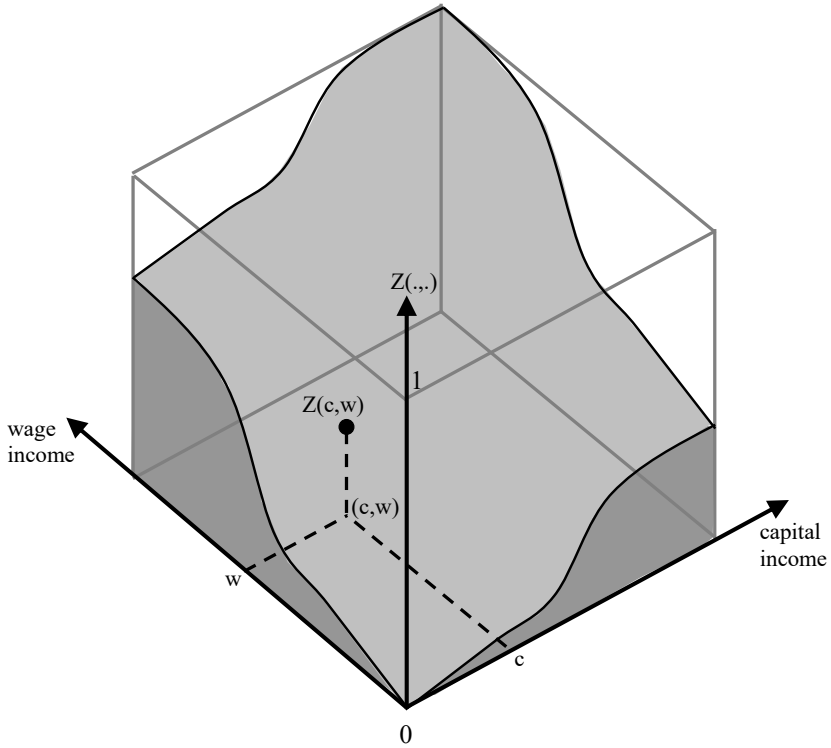
The academic literature on this topic is still very technical in nature. The papers have applied their theories in different ways using Norwegian and US data.[21] The original methodological paper introducing the copula function in inequality studies only exists in the form of a working paper (Atkinson & Lakner, 2015). Empirical results are presented in a World Bank Policy Research Discussion Paper with an application for the USA (Atkinson & Lakner, 2017) and in the Journal of Economic Inequality with an application to Norwegian data (Aaberge et al. 2018). Both papers use a different representation of the results, for the current purposes, the representation which is most common across the available papers at the time of writing has been chosen. These results have so far only been discussed with academia (only one peer-reviewed article) and have not yet been brought into policy debates.

Figure 21 is a visualisation of the joint distribution of earnings and capital income. On the left hand is the distribution of wage income starting at 0 increasing as one moves up the axis. On the right hand is the distribution of capital income starting at 0 increasing as

[21] In general, these studies allocate 30% of capital income to the self-employed, which is why their results are expected to differ slightly from the ones presented below.

one moves up the axis. *Z(c,w)* represents the number of people with a joint distribution of capital income and earnings at point c and w, points on the in the capital and wage distribution, respectively. To study the joint distribution of capital and earnings only the population with positive earnings from both capital earnings and labour earnings is considered. This is visualised by no observations at Z*(0,0)*. Each combination of *Z(c,w)* combined makes up a three dimensional plane representing the joint distribution at one point in time. The literature has not yet provided a satisfactory way to compare changes on the plane over time. Only curves at the same point on the plane can be compared over time. Given the many tax changes affecting the plane over time, this comparison is not straightforward in the UK case, and will be left out of the analysis for the current purpose.

Figure 21: Visualisation joint distribution of wage and capital income



Note: Own representation joint distribution wage and capital income distribution. On the right hand is the distribution of capital income starting at 0 increasing as one moves up the axis. *Z(c,w)* represents the number of people with a joint distribution of capital income and earnings at point c and w, points on the in the capital and wage distribution, respectively. To study the joint distribution of capital and earnings only the population with positive earnings from both capital earnings and labour earnings is considered. This is visualised by no observations at *Z(0,0)* in the Figure. Figure represents the distribution at one point in time *t*. The asymmetry is visualised by more observations located among the wage income distribution (left hand side) than observations located among the capital income distribution (right hand side).

The results of this analysis are represented in matrix form in the literature Table 27. In essence the matrix tries to represent parts of the three-dimensional plane. Only individuals with positive earnings from wage and capital are included in the results. With *Z(0,0)*=0 suggest the sample used to calculate the copula function, in exercise, has dropped all individuals with zero earnings from either wage income or capital income. Table 21 presents the result for 2015.[22] In 2015 the joint distribution of earnings and capital income includes 3988230 tax units. In 2015, 0.23 % of all tax units (or 91729 tax units) observed in the SPI, were in the top 1% of the wage distribution as well as in the top 10% of the capital income distribution. Of the top 1% in the capital income distribution 0.10% were also in the top 10% in the wage distribution (or 398823 tax units). The copula function allows to highlight the asymmetry that there are more tax units in the joint distribution of capital and wage income at who can be labelled as `workers' rather than `capitalists'.

Table 27: Joint distribution of capital income and wage income - matrix (2015)

	Capital Income					
Wage Income	**Top 50%**	**Top 40%**	**Top 20%**	**Top 10%**	**Top 5%**	**Top 1%**
Top 50%	22,87%	17,50%	8,36%	4,13%	1,77%	0,42%
Top 40%	18,42%	13,98%	6,50%	2,90%	0,81%	0,21%
Top 20%	10,25%	8,01%	4,22%	2,19%	0,45%	0,13%
Top 10%	5,55%	4,57%	2,72%	1,78%	0,30%	0,10%
Top 5%	2,55%	2,05%	0,98%	0,59%	0,24%	0,08%
Top1%	0,58%	0,54%	0,34%	0,23%	0,10%	0,04%

Source: Author's estimates from SPI data. Each cell represents the share of the total tax units observed within the SPI (without using WID control totals). Matrix representation is used to represent a 3-dimensional plane with capital and wage (horizontal axis) and number of tax units (vertical axis).

[22] This Table has different names in the literature such as the Survival Association Matrix (Atkinson & Lakner 2017) and the Survival Function (Aaberge et al. 2018). There is no straightforward comparison over time. The analysis has been restricted to include only people with positive earnings and/or capital income. As a consequence, groups such as the unemployed or pensioners without any income from capital fall out of the analysis.

Atkinson & Lakner (2017) and Aaberge et al. (2018) conclude that for the US and Norway the rising association between earnings and capital incomes has contributed to the increase in top shares. Both papers use slightly different (but no straightforward way) to compare the result over time. The plane visualised in Figure 21 will change every tax year and will be very sensitive to changes in the tax code. These issues will have to be explored in more detail, which would be the subject of an entire paper, before being able to draw solid conclusions about developments over time for the UK. As mentioned, its visualisation and interpretation, especially over time, remains too abstract to be of general uses for policy at the time of writing.[23]

In sum, this section provides preliminary evidence for the UK that individuals today do draw income from multiple sources with more high wage earners who are also high up the capital income distribution, than capitalist with a high wage income. This provides some indication that spill-over effects from the wage distribution onto the capital income distribution might be taking place, but this topic will need further investigation.

[23] At the time of writing an interesting indicator has been proposed by Ranaldi (2018, 2019) which looks at income composition inequality. In a class society with separate income sources are strongly held by two segments of the society (workers and capitalists) the index is high and could potentially allow for a more straightforward monitoring of dual income earners at the top from a policy perspective. This indicator has so far only been studied using net income observed in household surveys and the authors adopt a very broad definition of capital income including the self-employed and pensions (Iacono & Ranaldi 2018). Our results using fiscal sources are more volatile which affects the slope and trends of the coefficients and have been excluded from the main analysis for this reason. More research is needed to see if and how this indicator could be applied to pre-tax fiscal income.

Conclusion

The correlation between capital incomes and the gross distribution and capital incomes and the wage + capital income distribution has fallen over time. The correlation is sensitive to changes in the tax code and has dropped to record lows post-crisis. The alignment coefficient finds a stronger link between the aggregate level of capital income held at the top of the capital income distribution and the aggregate level of capital income held at the top of the gross income distribution. This suggests there is a form of correlation between aggregate levels of capital income held the top of the capital income distribution and the gross income distribution. However, this is not picked up in the correlation Tables. These contradictory findings might suggest that even though the correlation at the individual level has become weaker (for the population as a whole driven by small interest payments falling to zero after the crisis) the few individuals towards the top of the capital income distribution are increasingly found at the top of the gross income distribution (most likely the surges in dividend payments observed). Both indicators are capturing a different part of the story.

The copula function allows to study changes in the joint distribution of earnings and capital income, in particular it brings out the asymmetry that more capital income goes to the top of the wage distribution than wage income goes to the top of the capital income distribution in the UK. This asymmetry is not captured by the correlation and the alignment coefficient.

The difference between the alignment coefficient (as currently used in the literature) and the copula function is that the former gives information on a correlation between the aggregate levels of capital income observed along the gross income distribution and aggregate levels of capital income observed along the capital income distribution. The latter gives information on the joint distribution of earnings and capital income. The indicators are informative of different population groups and different income distributions (as currently

used in the literature). The alignment coefficient does not link the position of the people in the capital income distribution back to their position in the gross income distribution or wage distribution, is not informative on the income composition of those at the top of the capital income distribution, and how that income composition might be driving part of increase in the coefficient. Nevertheless, correlations and the alignment coefficient allow for comparisons over time which is more problematic using the more complex copula function.

The results for the copula function and the alignment coefficient are not directly comparable as they are capturing different population groups and a different joint distribution. With the indicators available at present is hard to satisfactory answer the question Has an increased joint distribution between earnings and capital income been a driving factor of the increased alignment between capital incomes and gross income? In other words, given the different nature of the coefficients, it is not clear to what extent an increasing alignment between capital incomes and total gross income, is driven by a strengthening of the joint distribution between capital income and earnings. This question will require more research effort in the future.

Overall, we find similar magnitudes as observed for the US for both the alignment coefficient and the copula function. With more wage earners at the top of the distribution, which has been the case in the both the USA and the UK (Alvaredo et al. 2013; Atkinson 2007a; Piketty & Saez 2007a). A lot of policy attention has been going how best to mitigate surges in wage inequality across countries (OECD 2011). Less mainstream attention has been paid to whether observed increases in top earnings have allowed high earners to disproportionately benefit from capital markets, and which policies could mitigate such spill over effects. It would be worth exploring further weather surges in UK dividend payments have increasingly gone to high wage earners.

5.3. Missing people driving capital income narrative – a first glance

In Chapter 4 we have seen that the core UK income survey is under-representative of high capital share individuals. The capital income narrative described above is expected to be driven by precisely the group of high capital share individuals missing from the survey, mainly those who also have high labour incomes. Without information on characteristics we will not be able to understand and study the dynamics properly going forward. We have found that the FRS does not capture the individuals at the top with relatively high capital shares and expect that the dynamics observed are largely driven by these individuals.

Previous research has shown that the individuals residing at the top of distribution are heterogeneous and include e.g. bankers, professionals, CEOs, business owners and rentiers in varying proportions (Piketty & Saez 2007a; Waldenström 2017). Individuals operating in these different environments have different levers to influence their tax exposure, making it is hard to pin down the exact nature of their investment and tax minimising strategies. The key is that the contribution of capital incomes to both overall inequality and surges in top shares do not have one single driver but is a complex combination of many drivers operating simultaneously. This section provides an overview of some of the mechanisms that have come to the light in the different areas of research that have been reviewed in Chapter 2. The characteristics and mechanisms described are not expected to be mutually exclusive.

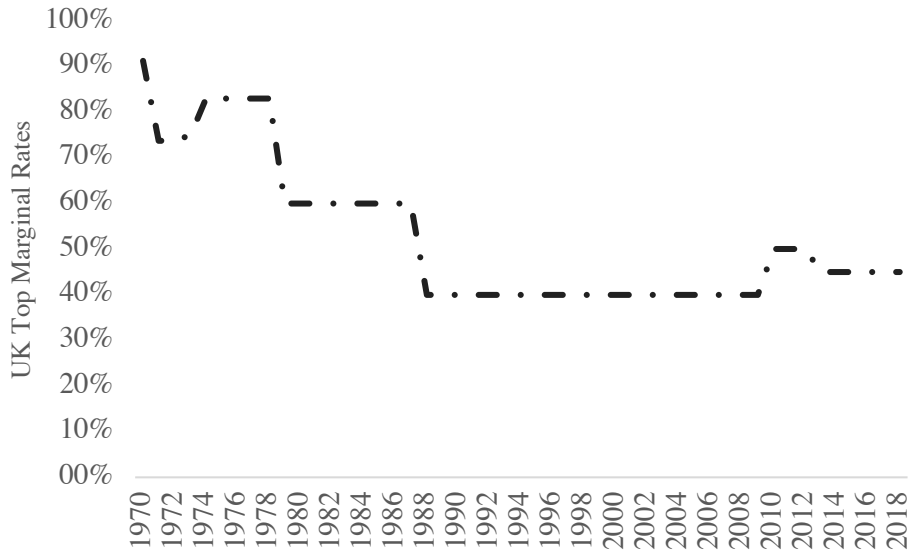
The SPI allows to further disentangle some characteristics of the group of high capital share individuals. To allow for better comparability with the previous chapter we restrict the analysis to the individuals that were eligible for the top income correction in the previous Chapters, individuals within the top 10% of the gross income distribution.

This provides some groundwork which can be extended in future research. It is important to place this against the background that wage income is the predominant source at the top of the distribution in the UK. Individuals with relatively high capital shares still receive an income which predominantly consists of wages. We identify the five large groups at the top of the distribution who are expected to drive a large part of the overall capital income dynamics.

Top earners

One channel through which top earners (e.g. executives) are able to receive capital incomes is performance pay through stock options (Hall & Murphy 2003). Another channel is the fall in top marginal rate which endues tax shifting from wage income to lower taxed capital income. Figure 22 shows the development of UK at a rate of 91% in 1970 falling to 40% in 1988. Over the past decades, top rates have remained between 40% and 50%. The literature has found this has enabled top earners to increase savings and accumulation of wealth, expected to raise capital incomes in future periods (Aaberge et al. 2018; Alvaredo et al. 2013; Atkinson & Lakner 2015).

Figure 22: Changes in UK top marginal rates (1970-2018)



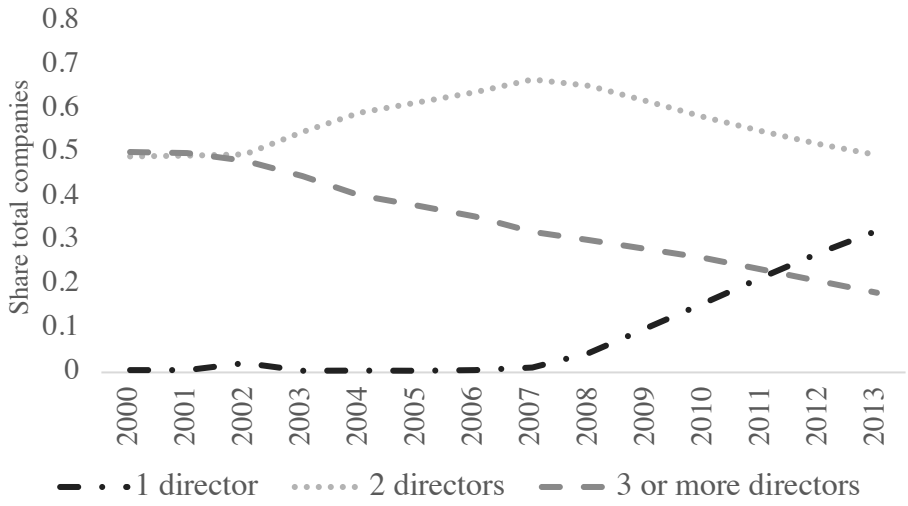
Source: Piketty et al. (2014), 2011 onwards own update

Furthermore, Atkinson (2007a) argues that the super-rich are operating at a global scale allowing them to arrange themselves in different ways not accessible to the general public. Specific top income groups in sectors such as banking and other high earning professionals can afford costly wealth management strategies allowing them to maximise wealth accumulation and benefit disproportionally from capital markets, as well as labour markets. In sum, there are various channels that enable top earners to also receive high income from capital.

Incorporated individuals

In previous chapters we have seen that, over the past 20 years, the UK tax system has provided incentives to incorporate. Figure 23 shows that after the corporate tax reform in 2000-2002 has led to an increase in companies with over two directors, subsequently we observe a surge in one director companies after 2006 Companies Act.

Figure 23: Company population by number of directors



Source: HMRC Figures taken from the OBR Economic and Fiscal Outlook

These shifts are expected to have strengthened links between the household and corporate sector of the economy. This has implications for in particular retained earnings, profits and dividend payments which are taxed at lower rates than labour income and the use of retiming strategies after changes in top marginal rates (Atkinson 2012b; Förster et al. 2014; Pope & Waters 2016; Smith 2018). Owner managers have more flexibility over when and how they receive income, and especially higher income owner-managers benefit from retained earnings (Smith 2018; Tomlinson & Corlett 2017). The IFS finds that for 2017-2018 the tax due on a job generating £40.000 differs between employees (£12.146 or 30%), self-employed (£8,713 or 22%) and owner-managers (£7.358 or 18%) (Smith 2018). In which owner-managers and self-employed effectively pay less taxes than workers within this income bracket.

Self-Employed

The UK has experienced growth in self-employment income, especially after the 2008 crisis this has been a large driver (45%) of overall employment growth. In particular there has been a growth in high earning self-employment (accounting, consultancy etc.) (Tomlinson & Corlett 2017). In addition, self-employed are also known to have higher savings because they have less social protection than wage earners which, in turn, is expected to influence their capital income flows (Fräßdorf et al. 2011). So far, we have not included the self-employed in the analysis because of the choice to not impose assumptions on the data if not necessary but including this source of income in the definition of capital income would raise the estimates in this thesis significantly. The literature largely ignores the fact that the self-employed further up the distribution have observable capital income flows which are clearly separable from their profits. This can be observed using the SPI Public Tape. In addition, an under investigated topic is the fact that payroll employees can theoretically be self-

employed/have a closely held business on the side to carry out e.g. consultancy. It is unclear to what extent the privileged self-employed discussed by Tomlinson & Corlett (2017) are predominantly in employment and use this type of construction to benefit from the lower tax rates on profits and dividends earned through this type of side projects.

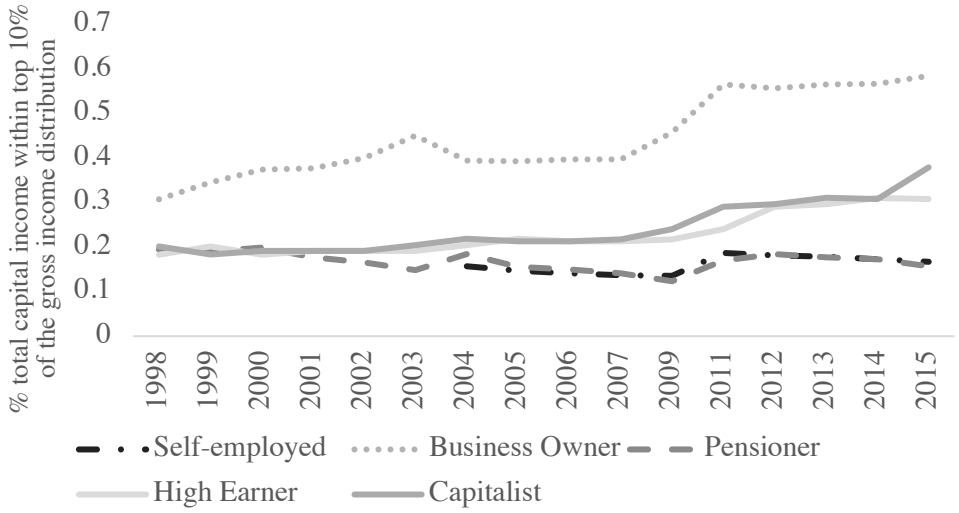
Capitalists & Pensioners

The narrative told in the top income literature is that wage earners (with some forms of capital income, but not their predominant income source) have moved into the top of the distribution. Both high earners and capitalists reside at the top, as discussed in Chapter 2. In addition, older population groups have been able to accumulate wealth over their lifetimes (Hills et al. 2013). For that reason, we also expect to find a group of pensioners with high capital earnings to drive part of the capital income and inequality dynamics.

As previously mentioned, to allow for better comparability with the previous chapter we restrict the analysis to the individuals that were eligible for the top income correction (top 10%) in the previous Chapters. This groups receives on average 80% of all capital income observed in the SPI. For this illustrative exercise we have used simplified classifications, which can be refined in future research. Both high wage earners and capitalists are defined as earning over 90% of their income from wage or capital, respectively. The group business owners include directors of closely held companies and directors not closely held company. Depending on the framework adopted business owners can also be counted as capitalists. The group of self-employed are those defined as such in the SPI. Pensioners are grouped according to their age.

Figure 24 shows gives an indication of which types of individuals, located within the top 10% of the gross income distribution, receive income from capital. The total share of capital within the top 10% of the gross income distribution is calculated. This is used as benchmark (100%) to construct the Figure. Business owners have witnessed roughly a 30-percentage point increase (31% to 59%) of capital income received within the top group. This is in line with the UK tax reforms affecting the decision to incorporate. High wage earners and capitalists receive about 20% of total capital income going to the top 10%. The post crisis increase suggests business owners, high wage earners and capitalists have all benefitted from the increase in dividend observed after this period. Pensioners and the self-employed earn about 10% of total capital income within the top 10%. They have benefitted less from surges in dividend after the crisis.

Figure 24: % total capital income earned by those within the top 10% of the gross income distribution, by group



Note: Author's estimates from SPI data. The total share of capital within the top 10% of the gross income distribution is calculated. This is used as benchmark (100%) to construct the Figure. The aggregate level of capital income, for each of the five groups within the top 10% of the gross income distribution, is calculated and divided by the benchmark. Groups are not mutually exclusive, individuals can belong to various groups, which is why the lines can exceed 100%.

In practice more detailed analysis is needed to interpret fluctuations observed in the graph its underlying dynamics and how this changes as we move up the distribution.[24] The underlying capital income dynamics for each group is expected to differ (heterogeneity) and the groups are not mutually exclusive. Making it hard to establish a clear link between the groups, and not everybody within the groups is expected to earn capital incomes. Capital incomes and their sensitivity to tax rates, the transformative nature, volatility and mobility in and out of the top makes it hard to create one broader narrative. Nevertheless, capital income dynamics of these groups, and how this differs moving up the distribution, should be explored further.

5.4. Other Sources

The main analysis in Chapter 4 has focussed on correcting for the gap in capital income measurement between the household survey and fiscal sources to start re-writing the capital income narrative. There are other sources that can be used to complement the narrative in future work such as capital incomes falling out the PIT and capital incomes as measured in the national accounts.

Capital gains

While capital gains are most often not included in standard measures of household income, they represent a very important facet of income from capital. Not only are these not captured in household surveys, in the UK case they are not included in the SPI either as they are not taxed under the Personal Income Tax on which that is based, being taxed under a different scheme instead. None the less, HMRC tax revenue statistics can provide some insight into

[24] The graph for the top 5% shows strong similarities business owners earn most capital income followed by high earners and capitalists. Among the top 1% during the post-crisis period more capita income (dividends) have gone two high earners and capitalist. The top 0.1% is harder to interpret because of mobility, more heterogeneity and stronger overlap between groups.

the magnitudes involved (HMRC, 2018b). (The information is reported on the Self-Assessment returns but not included in the SPI.) Capital gains tax is levied on realised gains or after the sale of an asset e.g. property or shares. In the 1980s capital gains tax rates were around 30%. In 2016 capital gains taxes were reduced from 18% and 28% to 10% and 20% respectively. The tax allowance on capital gains has been raised from £5,500 to £8,800 over the period 1992-2006 (Fräßdorf et al. 2011). This shows a significant fall in capital gains taxes over the past decades (HMRC, 2018c).

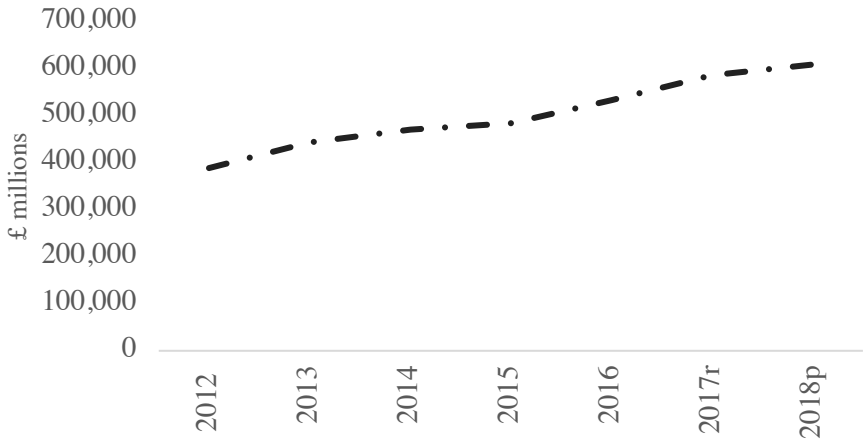
In 2016-17 capital gains reached a record height of £51,1 billion which is attributed to the performance of equity and property markets, individual gains increased by 1% but gains for trusts increased by 39% (HMRC, 2018b). Trusts have largely fallen out of the analysis so far, but this suggests that tax shifting mechanisms are giving them a larger role. A more detailed look into trusts and their use for individual tax minimising purposes would add substantially to the UK narrative given the figures reported by HMRC, combined with the stylised fact that capital gains are most heavily concentrated towards the top of the distribution.

The HMRC documented Capital Gains Tax Statistics gives some more information about the distribution of capital gains across the distribution of taxable income. Over 1/3 of total capital gains were made by 12% of taxpayers with a taxable income of £150,000 or above. Another 1/3 of capital gains are generated by 32% individuals with taxable income between £32,000 and £150,000 (HMRC, 2018b). We can further derive that 61% of capital gains tax is levied on gains with a total value of more than £1 million, most of the capital gains fell between gains between £10,000 and £25,000. These figures have remained largely stable over the past 5 years (HMRC, 2018a).

Individual Savings Accounts (ISA)

Another significant issue with the data in the UK case is tax exempt capital income, where individuals save via Individual Savings Accounts (ISAs).[25] The total market value of these funds for 2012-2018 based on HMRC calculations given in Figure 25, the rise in market value has been attributed to increases in stock and share values (HMRC 2018a). The majority of ISA holders fall within the income bracket of £10,000-£19,990, making it an important source further down the distribution.

Figure 25: Adult Individual Savings Accounts (market value of funds)



Source: (HMRC 2018a)

Offshore wealth

Alstadsæter, Johannesen, & Zucman (forthcoming) have calculated that offshore wealth held by UK citizens is about 16% of GDP, nearly double the world average of 9.8%. Their calculations show that approximately 25% of the top 0.1% wealth share is held offshore, this figure is almost 40% for the top 0.01% wealth share. Furthermore, other estimates reveal that about 6% ($140 billion) of Swiss offshore wealth is held by British holders (Zucman

[25] Chapter 4 has discussed that HMRC makes imputations to correct for tax exempt income earned through ISAs in the SPI, but imputation methods are non-transparent and are uncertain. The FRS has information on tax exempt income, but the quality of these variables is also uncertain.

2015). Zucman has further estimated that the revenue loss produced by tax havens is about €12,7 billion. Offshore wealth is very concentrated among the very top of the wealth distribution, there is no one-to-one link between the wealth and capital income distribution and their characteristics, but it is to be expected that a large fraction of capital incomes remains unreported and this fraction is potentially high in the UK in cross-country comparison (Alstadsæter et al. 2018). To this picture we add that foreign dividends have been exempt form UK corporation tax, individuals are able to remit offshore income without paying tax (Miller & Pope 2015).

Non domiciled residents

An additional relevant phenomenon in the UK is those with non-domiciled status; this group is not liable for tax on offshore income as long as that income is not brought back into the UK. From 2007 onwards there were over 100,000 individuals with this status with a drop to 91,000 in 2017 (HMRC 2018d).

Distribution of wealth

Alvaredo et al. (2018) find that surges in top shares are closely linked to increases in investment income at the top, however this might not be driven by the same people. In practice linking the wealth distribution and the capital income distribution to study these dynamics is hard. Surges in private wealth has been observed from the 1970s onwards in many advanced economies. From mid 1990 onwards these surges have been particularly large for the UK after privatisation of state enterprises and public housing, with private wealth as a percentage of national income increasing from 400% in 1995 to over 600% in 2015 (Alvaredo et al. 2018; Piketty & Zucman 2014). These dynamics operate at the background but because of the weak empirical links described above we will have to base the policy judgement on other types of information.

In sum, with capital gains at an all-time high, above average offshore wealth holdings and surges in private wealth we expect that capital income in the UK is severely underestimated even when both surveys and fiscal information is employed, and the gap is growing over time. The income earned on ISAs is expected to be of importance to those lower down the distribution but neither the FRS nor the SPI adequately capture these incomes. Special schemes such as the use of trusts and non-domiciled status apply only to a small group of the population. However, given the fact that capital income dynamics are driven by a relatively small fraction of the population suggests that coming to grips with how smaller schemes are connected will help to uncover a large part of the dynamics. At the same time these schemes are hard to connect because there are potentially invested interests to keep them disconnected. Nevertheless, these issues are important to keep in mind when interpreting the levels of capital income observed and their trends over time. In addition, the issues raised in this Chapter do not only affect the measurement of inequality but raises broader questions related to distributional issues such as the fairness of the tax system.

5.5. Conclusion

This chapter has re-examined the capital income narrative for the UK using the adjusted series. This has been linked back to insights produced by the wider literature. The main finding is that the contribution of capital incomes to inequality changes from low (and stable) to moderate and (increasing).

Headline Indicators

After correcting for the growing measurement gap between the FRS and the SPI it is found that the Gini coefficient is raised on average by 3-3.5 Gini points and the relative contribution of capital incomes changes from 2-3% to a peak of 7% in 2015. Capital income at the very top (1%) is very volatile and they have driven fluctuations in overall capital shares.[26] The increase in dividend pay-outs appears to have impacted on the next top 4% pushing up overall inequality levels. The top 10% has also experience increases on average but not as much as the previous group. Dividends have been projected to reach record heights in 2019, suggesting that this increase is still taking place, but the micro files are not available at time of writing (LINKGroup 2018).

About 20% of the population is estimated to receive almost all capital income. Because fiscal data is collected at the individual level it is in practice hard to know where capital income is allocated across the distribution of households and how this 20% group is allocated across the household distribution. Chapter 2 has provided some evidence that females within top deciles have disproportionate earnings from capital, suggesting the

[26] These conclusions are based on our adjusted series which are an improvement compared to the FRS figures, but still suffer several limitations. The SPI Public Tape is a stratified sampled and bunches records above £1 million in different ways to guarantee anonymity.

individual UK system provides tax incentives to reallocate income between spouses. Part of this increase is expected to be picked up at the household level, but this increase is not measurable using any existing UK window. In addition, there is evidence that households are surveyed at the top of the distribution are not representative in terms of income composition at the top when compared to the SPI. Overall, collapsing the adjusted series to the household level will not give an accurate picture of capital incomes in the household distribution.

The official inequality indicators are measured in terms of disposable income, assuming a tax rate of 20% on capital incomes. It is not evident that the effective tax rate on capital incomes is 20% and that this is the same across the distribution and per income source. In addition, the UK has abolished the tax on foreign dividends in 2009 and it is possible to accrue some dividends through ISAs which are tax exempt. The FRS and HBAI impose the 20% tax assumption on both interest and dividends on an already underestimated series. Before it is possible to draw conclusions on the distribution of disposable income tax assumptions would need to be made more in line with reality.

The UK post-crisis story is one of dividends reaching record heights fuelling overall inequality, the findings suggest that accounting for billions of dividend payments currently falling out of the inequality statistics, pushes up the overall Gini coefficient for gross income. After the crisis interest rates fell to zero and have affected a large fraction of the population with very modest levels of interest income. The correction makes an additional imputation for capital incomes further down the distribution, where interest and property income most likely are a more important capital income source. This structurally lowers the Gini for the distribution of capital incomes compared to FRS figures.

The UK case is distinctive in not witnessing the shift from labour to capital observed in terms increased capital shares, as measured in the national accounts, found in other

advanced economies. Comparing the measures with different indicators of total capital income in the wider literature, capital shares have remained relatively stable across different indicators. The exception is the SPI where a 4-percentage point increase is found in capital income as a percentage of GDP over the entire period, driven by the surges in dividend reporting. However, there are still many measurement layers standing in between the socio-economic indicators and capital shares in the total economy.

Supplementary Indicators

Supplementary indicators show that capital incomes have become more closely aligned with total income and wage income. With more wage earners observed at the top in the UK, it is expected that surges in top income shares have been magnified over time by top earners who have benefitted from labour markets, having been able to gain disproportionately from capital markets. In addition, there is evidence that decreases in top marginal rates have facilitated wealth accumulation, hence raising capital income receipts in future periods.

Researchers have become increasingly concerned with the joint distribution of earnings and capital which has policy implications for the distribution of ownership. Therefore, some of the policy proposals directed towards dampening the effect of the transmission of capital incomes onto inequality also runs through the distribution of ownership. Another policy implication is that monitor the joint distribution of capital incomes and wage income might be something worth monitoring for policy purposes, in the same way as we monitor overall inequality. These insights broaden the scope of policy implications of this research to include ownership of assets.

It is possible to broaden the scope of the capital income policy debate further to include broader concerns of social justice, in particular related to fairness of the tax system. Because capital incomes are generally taxed at lower rates than labour there are many incentives in

the tax system to transform personal income into lower taxed capital incomes. To give a few examples. First, tax differentials between earners, self-employed and those with closely held businesses in the UK (Smith 2018) and observe a larger fraction of the population incorporating for tax purposes. Second, above average offshore wealth holdings are expected to produce losses in tax revenue. Third, the race to the bottom in capital income taxation takes subtle forms, the exception of foreign dividends from UK corporation tax in 2009 is one such example (Miller & Pope 2015). Such tax exemptions also translate into lower tax revenues. Fourth, DINA researchers further highlighted that much of the missed capital income in fiscal sources takes the form of corporate taxation, in this framework corporate profits are viewed as an augmented definition of capital income, as defined in Chapter 2. Taking this perspective profit shifting practices, where multinational companies declare substantial fractions of their profits in countries that enable them to pay the lowest corporate tax rate, also relate capital incomes back to broader concerns of social justice.

6. Policy Implications

The main puzzle posed at the outset of this thesis is why marked increases in capital shares observed in many advanced economies appear to have little impact on standard indicators of income inequality. Chapter 2 has shown that part of this puzzle can be explained by the fact that all the data sources measuring capital incomes give only a partial view. There is a positive relationship between the amount of capital income observed in each window and its effect on overall inequality. This correlation is typically observed by regressing capital shares on inequality (Bengtsson & Waldenström 2018). For policy the value added of the approach taken in this thesis, leading to the same finding, is that it is able to address the policy related shortcomings of such regression techniques. In other words, apart from the empirical contribution, my approach also allows to identify and to connect policy implications that have opened up studying the intermediate layers, which are not picked up by existing techniques.[27] Given the fact that most of the research cited in this thesis has been produced in the past few years, suggests pulling together these responses is relevant and timely. As capital incomes and inequality continue to receive more academic and policy interest, information generated in the fiscal and augmented literature, as defined in Chapter 2, may not reach those involved with social policy in an efficient way, and vice versa. This is the gap that is addressed in this chapter.

From a traditional social policy perspective, capital income did not appear to have a large effect on household inequality statistics in the UK, and in cross-country comparative perspective. This thesis has shown shows that the UK narrative is constructed based on an

[27] The Distributional National Accounts (DINA) also provides a framework to link capital income in the total economy back to inequality in the personal distribution. As previously addressed, there are two main distinctions between the DINA approach and the approach adopted in this thesis. The thesis is framed around the practical observation that many governments are still using household surveys to calculate their headline inequality indicators. In the UK case there are no indications this will change in the near future. In addition, this thesis has taken the approach of limiting the number of distributional assumptions. This allows for the formulation of a more precise research and policy agenda for capital incomes in the UK, than the assumption heavy DINA.

underlying database which has experienced a 33-percentage point drop in the 'capture' of capital income compared to fiscal sources, reaching an all-time low of ¼ in 2015. In addition, the transformation from the original data source (FRS) into the official top corrected series (HBAI) suffers from major limitations for the question at hand. These include missing high capital share individuals at the top of the distribution, unrealistic tax assumptions applied to already underestimated series, and not being able to make an accurate transition from the individual (adult) to the household level. Furthermore, the 'official' top income correction is not decomposable, and none of the existing factor decompositions in the UK are able to draw solid conclusions about the role of capital incomes on inequality.

In the beginning of the thesis the argumentation has been introduced that without an accurate picture of the effect of capital incomes on overall inequality their impact will not be properly captured and understood, and policy responses will be inadequate and poorly designed. This thesis makes the general claim that after the corrections developed and implemented here, the UK capital income narrative changes from low (and stable) to moderate and (increasing). There are certainly remaining limitations in the estimates and large uncertainties of capital income measurement overall. Nevertheless, this claim now provides with the motivation bring to the forefront policies that have been discussed in different areas of research.

Policy implications discussed in this Chapter will take three forms (1) a discussion of what the empirical results presented in this thesis mean for policy makers (2) improve measurement of capital incomes in inequality analysis and (3) identify the policy responses that have been studied in each area of scholarship. There is great potential to expand the discussion of capital (income) redistribution in social policy debates in various directions, with the broader objective to streamline them further in the future.

6.1. Empirical Findings and Policy

The thesis has put forward a harmonisation methodology to empirically correct for the underestimation of capital incomes in official statistics. This methodology has an upward impact on the inequality indicators. In addition, the methodology allows to put a more precise estimate on the contribution of capital incomes to overall inequality. These findings have several direct implications for policy.

First, my research shows that at present billions of pounds fall out of the UK inequality indicators. This income is mainly held by elite groups who are able to take advantage of the transformative nature of capital incomes and the use of loopholes in the tax system, both legally and illegally. The implication is that the end users of inequality statistics (governments, politicians, journalists, academics etc.) are constructing their narratives around statistics underestimating both levels and trends of economic inequality. The main implication of the empirical findings of this thesis is to make the proposed capital income corrections to the official inequality statistics to bring the inequality narrative more in line with reality. Adjusting the statistics will allow for more informed policy discussion and responses.

One thing the inequality narrative, told by different societal actors, have in common is that they are structurally underestimating the income held at the very top. Top income researchers have put this underestimation on the map (Atkinson 2007b, Atkinson & Piketty 2007, 2010). Top income harmonisation methodology now allows to create top adjusted inequality statistics (Bourguignon 2018; Burkhauser et al. 2018; Jenkins 2017; Lustig 2018). However, the problem of underestimation of capital incomes is not adequately addressed in these new developments. Based on the empirical chapters in this thesis I argue that (1) adding an additional correction for the underestimation of capital incomes in the official

statistics and (2) introducing a new indicator measuring the contribution of capital incomes to inequality will allow to reformulate the inequality narrative to more accurately reflect the effect of capital incomes on inequality. At the time of writing I have been in contact with the Department for Work and Pensions, the Office for National Statistics and Oxfam to make an initial connection between my academic findings and the real world.

Second, it is not possible to adequately formulate policy responses towards phenomena that are not captured in the statistics. The implication of this is that at present capital income redistribution is not receiving the attention in political and public debates that it deserves. Precisely because of flawed statistics there is much potential to expand the discussion of capital (income) redistribution in policy debates.

This thesis has focussed mainly on aggregate levels of capital income and has found that in particular dividends have been playing a larger role in driving inequality than previously measured, data quality needs to be improved for a further breakdown. This finding suggests that one need to understand better the transformative nature of capital incomes, in particular (1) how elite groups use loopholes in the tax system (2) take into consideration this transformative nature of capital incomes in policy discussions.

The transformation of capital incomes is enabled by tax shifting between the personal and corporate tax base and different taxation of different types of capital incomes. Both academics and policy makers will have to come to grips with the complex interactions produced within the web of different forms of taxation. The most effective policy options will be located within this web. Recent examples discussed in UK context is tax all sources of income together (earnings and capital incomes) and equalising the tax rate on dividends and capital gains (Nanda & Parkes 2019). Equalising rates will reduce the tax incentives

inducing tax shifting and can potentially make the web less complex and contribute to fairness in the tax system.

Third, more research is needed to understand the behavioural patterns of elites closely linked to the tax system. Different groups might react differently to the equalisation of tax rates. Company owner managers are more likely to play around with tax rates differentials between the personal and corporate sector. Individuals, without a registered company, will be more affected by equalising the tax rate on dividends and capital gains. Because the equalisation of rates will affect groups differently more research needs to be carried out to come to grips with such heterogeneity to raise the effectiveness of the policy responses discussed above. Fourth, equalising and higher taxation rates on different types of capital incomes will produce the indirect effect of raising government budgets.

It is expected that as the link between capital incomes and inequality continues to receive more academic and policy interest, information generated in the fiscal and augmented literature, as discussed in Chapter 2, may not reach those involved with social policy in an efficient way, and vice versa. One issue to be highlighted at this point, in turning to implications for policy, is that different types of policy makers are informed by different areas of scholarship. A visualisation can be found in Figure 26.[28]

[28] The connections proposed in the diagram are generalisations and might not be as tight as proposed in this Figure, in practice there might be more fluidity between policy departments. The main argument is to think through these general links as first step towards and improving fluidity between debates.

Figure 26: Different areas of policy informed by different types of scholarship

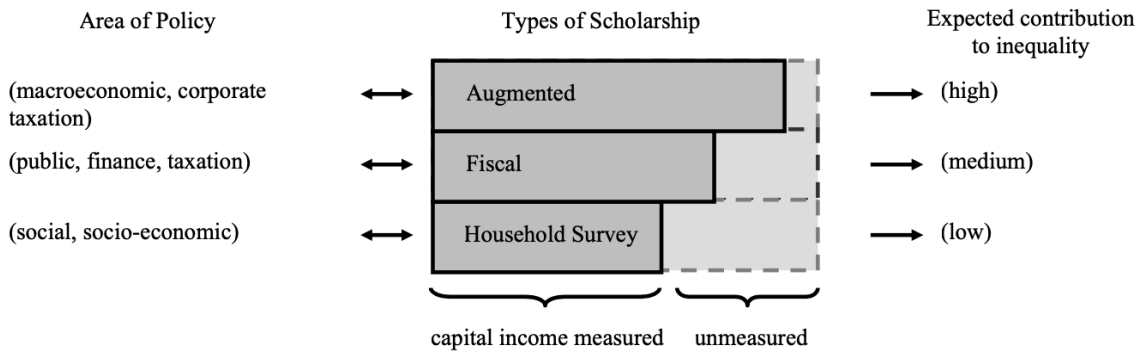


Figure 26 gives a general description of the use of inequality indicators produced within different types of scholarship to highlight the general point that different levels of capital incomes are observed by different end users. Inequality indicators produced by household surveys are mainly used to inform social/socio-economic policies related to personal income taxation and redistribution. Fiscal sources are used to inform policy decision related to public finance and taxation at the top of the distribution. Indicators taken from other sources, such as the national accounts or firm level data, are used to inform macroeconomic policies and corporate taxation policies.

6.2. Measurement Improvement

This section provides a list of recommendations related to the improvement of measurement of capital income and its contribution to income inequality:

- The ability to make a clearer separation between dividends and interest income in the FRS would allow researchers and policy makers to refine the UK capital income narrative per capital income component.
- At present the FRS does not include property income in their net variable. The FRS documentation describes that because of double counting moving from gross income

to net income (e.g. housing benefits) they construct a separate variable post tax, but this changes the interpretation of property income switching between the distributions (FRS 2017). This is why the HBAI series is calculated before and after housing costs. Including housing costs raises the HBAI 'official' Gini by 0.04 in 2015-16 and correcting for imputed rents is expected to raise the contribution further (Corlett 2017). The top income correction here is mainly driven by dividends, but there is evidence that correcting for property income will further add to the Gini. Looking at how housing adds to the narrative further down the distribution would be a very important extension of the research presented here.

- The producers of the FRS series could produce an augmented capital income variable in line with the capital income definition proposed in the Canberra Handbook (Canberra Group 2011). A reconstruction of the main capital income variable used to construct gross income in the FRS suggests that at present not all capital income sources are included in this definition, such as royalties and partnerships. Given the data limitations it is hard to say much substantive about investment income, not generated through dividends and/or interest.
- Another avenue for future research would be to start a dialogue with the producers of the FRS to come to grips with the calibration of weights and imputations. On average, 14% of the investment income variable is based on imputations, and these underlying imputations are not transparent. Making this information available to researchers would be of considerable use to extend the analysis.
- It is not clear how income composition is accounted for in the weighting process. It would be useful to discuss the implications of missing high capital share individuals at the top of the distribution. These groups are likely to drive the capital income narrative. Such groups have large incentives not to make this information available

or participate in the survey overall. For other purposes this might not be a top priority but in order to answer the research question posed in this thesis this is a severe limitation

- The SPI could add an indicator that allows the user to identify imputations made for non-taxable capital income, in particular interest from bank and building societies and NS&Is and ISAs. This income is now unidentifiably added to other investment income, biasing the picture of those further down the distribution.
- At present the HMRC has made a unique connection between the PIT and the corporate tax records of the company for researchers from the Institute for Fiscal Studies (Smith 2018). It would be interesting to explore whether these links can be of use to improve the inequality estimates including to account for corporate sector income. In addition, capital gains taxes are reported on self-assessment returns opening a dialogue with HMRC on whether it is possible to make customised linkages would be an important avenue for future research.
- Once the methodological debates on top income correction in the academic literature relating to total income are closer to consensus, that should provide a basis on which to extend those discussions to incorporate decomposability, to improve capital income capture and allow for top adjusted decomposable series in more countries. This would allow to recalculate inequality indicators in other countries and highlight the contribution of capital incomes.
- The findings raise the broader question of whether a similar divergence is taking place between surveys and fiscal sources in other countries, and how this affects both the national narrative and cross-country comparative conclusions. Only by pursuing more harmonisation efforts that focus particularly on capital income measurement (e.g. between country specific household surveys and fiscal sources or correcting

fiscal sources for discontinuities) it will be possible to improve both national narratives and the comparability of results across countries.

- Interpreting trends in wealth inequality in a cross-county comparative perspective has always been highly complex, so it is hardly surprising that the same applies to the flows of income from wealth. For example, in Nordic countries there is a strong welfare state and the importance of wealth accumulation under these circumstances is not the same in countries with less welfare provision. Such major differences in institutions, underpinning differences in wealth-holding, have to be kept in mind in comparing capital incomes and their contribution to income inequality across countries, but this is none the less a valuable direction for future research.

6.3. Streamline policies

After the surges in wage inequality observed from the 1980s onwards, much of the attention of policy-makers has been directed towards incomes from that source (OECD 2011). Because of apparently modest contribution of capital incomes to inequality, this topic has long been downplayed in social policy debates, with more emphasis on the post-tax and redistributive side of the system. In conclusion it is worth highlighting some recent developments in that regard, though, drawing on ideas now being debated at the time of writing. Given the rapid progress this literature is making in different directions, one can hope to be able to make more solid connections with policy implications as time progresses

To start with a cautionary note. Within a social policy framework an immediate response to this narrative could be higher taxation on dividends. However, taxation policy related to capital incomes can be expected to produce distortionary effects on the economy, e.g. economic growth. Ex ante it is not clear whether such distortions are the same for each

capital income sub-component and across the distribution. In addition, in recent years the UK has actively lowered taxation on dividends and corporate taxation (Miller & Pope, 2015) and has introduced special schemes for high worth individuals to reside in the UK (HMRC, 2018d) in order in order to stimulate the pre-distributive side of the economy. Capital income taxation is a delicate topic which rests heavily on trade-offs. In addition, policies might not be received the same way in an Anglo-Saxon model versus a Nordic model. Research will need to come to grips with capital income taxation from a pre-distributive and post-redistributive perspective and strike a balance between new proposals and feasibility of such proposals considering these trade-offs within the country specific context.

There are redistributive mechanisms, discussed throughout the thesis, that work in less direct ways than direct taxation of e.g. dividends. The alignment between wage and capital incomes is key, suggesting that there is need to pay more attention to the distribution of ownership of assets. There is evidence that decreases in top marginal rates shares have led to more wealth accumulation at the top of the distribution (Alvaredo et al. 2013). Piketty's (2014) influential framing in terms of 'r > g' suggests that this accumulation has become stronger over time, pointing towards an increased importance of inheritance. If it is indeed the case that specific groups that have benefitted from labour market changes have disproportionately benefitted through capital markets (e.g. CEO stock options) and wealth accumulation, as discussed in Chapter 5, there is need for wider distributive schemes affecting those further down the distribution to correct for such spill-over effects. Even though empirical links between investment income and wealth are hard to make using

household surveys and fiscal sources, policy proposals have been put forward that address the type of dynamics that is described above such as: [29]

- A wider distribution of asset ownership such as Employee Stock Options (Milanovic 2017)
- *Capital endowment (minimum inheritance) paid to all at adulthood* (Atkinson, 2015)
- *Receipts of inheritance and inter vivos gifts should be taxed under progressive lifetime capital receipts tax* (Atkinson, 2015)
- Allow for decomposability in top adjusted series to be able to monitor the relative contribution of capital incomes to overall inequality along the lines proposed in this thesis
- Monitor of dual income earners at the top from a policy perspective along lines proposed by (Ranaldi 2018, 2019)

Researchers operating within the domain of public finance and taxation highlight anomalies using information from fiscal sources. Some capital income related phenomena have received more attention in the UK context taking this approach:

- Owner managers have more flexibility over when and how they receive income, and especially higher income owner-managers benefit from retained earnings (Smith 2018; Tomlinson & Corlett 2017). The IFS calculates that for 2017-2018 the tax due on a job generating £40,000 differs between employees (£12,146 or 30%), self-employed (£8,713 or 22%) and owner-managers (£7,358 or 18%) (Smith 2018).

[29] For a detailed analysis of wealth distribution and polices in the UK the reader is referred to (Hills et al. 2013)

- After the 2000-2002 corporate tax reform we observe an increase in companies with 2 directors. After the 2006 Companies Act which abolished the role for companies to have at least two directors, we observe that growth in single director companies. An increasing fraction of the population arranging them in ways that strengthens their ties with corporate sector income, or capital incomes, in novel ways. Furthermore, it is observed that the importance of average retained profits increase with the income of such owner managers (Smith 2018).
- More capital income is going to businesses owners within the top 10% of the gross income distribution, indicates that the links between personal income and business income has strengthened in the UK and will need to be included in the inequality debates going forward
- The UK has witnessed a rise in self-employment income and a gap between precarious and privileged self-employed opening up (Tomlinson & Corlett 2017). One can expect the privileged self-employed (e.g. consultancy, IT etc) to arrange themselves in ways to pay lower tax rates than workers or the average self-employed through the types of features of the tax system described through the thesis.
- At the time of writing influential UK bodies such as the government and think tanks have been discussing new ways to design the tax system to reduce tax differentials between legal arrangements (e.g. self-employed or owner managers). One of the side objectives of the change from the Dividend Tax Credit to the Dividend Allowance of £5,000 (£2,000) in April 6th, 2016 (2018), has been to target those groups able to arrange themselves fiscally to pay themselves out in dividends. In other words, new forms of earning a livelihood are set up to take advantage of lower capital income taxation, in this setting dividend income can be seen as a new form of pay.

The question whether we should be interested in augmented forms of capital income is context dependent. With clear incentives in the tax system and a larger fraction of the (high income) population registering their livelihoods in the corporate sector it would be worth exploring augmenting the capital income definition in the UK context. In order to better account for capital incomes gained though corporate ownership, as there are clear signs this type of income appears to have gained importance among a fraction of the population already positioned high up the income distribution. In addition, with dominance of wage income at the top of the distribution and an increasing alignment between capital and wage income it would be worth exploring further to what extent such arrangements are carried out next to having (high) earnings. Unobserved income (e.g. offshore wealth flows, capital gains, retained earnings) are expected to increase with income. At present the SPI bundles smaller capital income components (tax exempt income, interest on securities, interest from partnerships and trusts) it is expected that much of the dynamics is taking place among a heterogeneous group of individuals that have the resources allowing them to engage in more complex financial constructions including these smaller components. Coming to grips with the uses of smaller components, not accessible by the general public, may be of more importance to the overall capital income dynamics than the size of individual schemes leads to believe. For future research, it would be important to embed the emerging debates, captured using fiscal sources, back into the capital income and inequality narrative proposed in this thesis and formulate more precise policy responses, and potential linkages with the wage distribution.

Other proposals have been put forward by researcher taking a more augmented approach, as defined in Chapter 2, focussing on corporate sector income (profits) or total economy variables. The policy implications raise through this literature are more broadly related to

social justice with the fairness of different sources of income, as put by Atkinson (2009b) rather than direct redistributive measures following the household survey literature.

- Macro-economic research has linked increases in the capital share (as measured in the total economy) to the substitution between labour and capital (Berg et al. 2018; Elsby et al. 2013). In this framework proposed by IMF researchers, labour is substituted by capital and this has led to policy proposals arguing for a higher tax on capital or taxation of robots, for example to help finance universal basic income as compensation for labour (Berg et al. 2018).
- The race in the bottom of capital income taxation is affecting government revenues and therefore has indirect distributional consequences. Apart from individuals minimising taxation through various routes, multinational companies are known to shift their profits to countries where they pay the least tax, lowering their overall tax rates further (Zucman 2014). This relates to the broader definition of capital incomes, profits, as seen in in the augmented and capital share literature. These are two major channels through which profits have been increasingly taxed at lower rates, with indirect implications for the taxation of labour and raising questions of fairness and sustainability of the tax system in the 21st century.
- Piketty (2014) has found the empirical consistency of $r>g$ to hold over long periods of time and proposes a global tax on capital.
- Zucman (2015) has proposed a global financial register which allows the authorities to identify the beneficial owner of all shares in the economy. This would allow to significantly improve the understanding of inequalities generated through capital markets and the corporate sector.

In this approach can be viewed as another indirect channel of taxation on profits, a form of capital income, and how this lower taxation reduces government revenue. This would translate into higher taxes on labour to maintain public spending or reduce public spending overall at the cost of public service provision.

In conclusion, this thesis discusses the changing nature of capital and capital income dynamics in the 21st century lie at the heart of many policy debates. Arguing that the effect of capital incomes on inequality is low not only overlooks the mis-measurement problems highlighted in this thesis, but also ignores other capital income and inequality dynamics that are affecting living standards through indirect channels. The use of capital incomes by individuals as a tool to reduce effective tax rates, affecting inequality between types of employment (e.g. worker and owner managers). The use of capital incomes by multinational corporations as a tool to lower corporate tax paid on profits affecting inequality between capital and labour. The use of capital incomes as a tool for top earners to get higher returns on their savings increases the gap between the top 1% and the rest. In the end, relevant policy proposals emerge out of a broader perspective on the link between capital incomes and inequality beyond what is captured by headline statistics. Researchers will need to continue to draw from and combine different areas of expertise and policy making to effectively tackle these broader challenges.

7. Conclusions

7.1. General conclusions

After observed surges in capital shares in advanced economies, researchers have begun to pay more attention to the effect of capital incomes on inequality. Because there is no one database that captures capital incomes correctly different views have started to emerge, depending on the observation window employed. This has led to different capital income narratives opening up in the academic literature. At present researchers are operating in silos, and a gap opens up for blueprint to create broader capital income narrative and relate all findings coming out. Those arguing that the effect of capital incomes on inequality is low are not only overlooking the many measurement problems examined in detail here, they are also ignoring other capital income and inequality dynamics that are affecting living standards through indirect channels. In the end the policy proposals emerge out of a broader takes on the link between capital incomes and inequality beyond what is captured by headline statistics. There is need to continue to draw from and combine different areas of expertise and policy making to effectively tackle the broader challenges.

There is a strong correlation between choice of database and the conclusion reached about the effect of capital incomes on inequality. The idea introduced in the blueprint is that depending on the framework a different effect of capital incomes on overall inequality is observed. In other words, at a first glance the effect of capital incomes on inequality appears ambiguous. The various databases available all have limitations and are not directly comparable but do allow to tell different parts of the story and are informative for different types of policy design. The blueprint advanced here represents a first attempt to combine all

the available evidence in a new way, allowing to insert critically important information back into the household survey literature used to inform social policy.[30]

UK case study good example of diverging windows. In the UK household surveys are still used to calculate headline inequality statistics which are in turn used to inform social policies. The first implication is that there are two headline statistics used in the UK, with and without top income correction produced by the DWP and ONS, telling a different story. The former is not decomposable by income source, and the latter is underestimating overall inequality and is not decomposable. This thesis has provided the first estimates allowing for factor decomposition of top adjusted series. In addition, this thesis shows that in the UK surveys have experienced a drop of 33 percentage points in capture over the past 20 years, using fiscal source as benchmark. Accounting for this gap in the decomposed series raises the Gini coefficient by 3 Gini points. Because capital incomes are skewed toward the top of the distribution, as expected, imputing for the missing income changes the narrative from little (and stable) to moderate (and increasing) effect on inequality. This brings the narrative closer to the one told by the fiscal literature. There are reasons to believe that this estimate is still a lower bound.

The DWP is a pioneer in applying a top income correction to official inequality statistics. In the UK, academics have proposed a method challenging the DWP method. At the time of writing the ONS is in contact with these researchers to apply a top income correction to the second official series (ETB series) using the BH method. Because of its

[30] The Distributional National Accounts also systematically combines windows but generally argues in favour for the use of fiscal sources (Alvaredo et al. 2017). This thesis has taken a different approach in which it is observed that household surveys are still used as basis to inform policy makers in the UK. There is no clear indication that this will change in the short run. For this reason, the thesis has adopted the approach to adjust the headline indicator (Gini) coefficient to help inform and rewrite the UK narrative through surveys.

relevancy in the UK policy debate we have imputed the missing capital income using the BH method. The academic community has also begun to pay more attention to harmonisation between surveys and fiscal sources Against this background we have followed broader harmonisation debates proposed by leading inequality scholars and where relevant commented on these discussions in the Appendix, given the UK context they have not been brought to the surface in this thesis. Private conversations with the ONS lead to believe that once they choose the method for their top income correction, they will most likely stick to this method even if new academic advances emerge. In addition, they will only adjust by income source if there are strong arguments to do so. The results of this thesis can potentially be of use to inform this debate.

It appears that under-coverage in the FRS is particularly strong for people with high individual capital shares, the people that are driving the capital income and inequality dynamics. These dynamics are partially captured through fiscal sources and unique linkages between Personal Income Tax records and corporate sector records. The SPI provides some background information on the type of people with high individual capital shares. In particular the trend of multiple income earners, with high earning from both wages and capital income, has received some interest by academics but has been featured less in policy debates. In addition, at the time of writing IFS researchers are using unique links created by HMRC between personal and corporate tax records of UK company owner managers to investigate tax optimising behaviour between the household and corporate sector (Smith 2018). The results of this research are not yet publicly available at the time of writing. We would want to come to grips with specific groups driving the capital income dynamics.

In conclusion, we observe that the changing nature of capital and capital income dynamics in the 21st century lies at the heart of many policy debates, but they have so far not been brought together. By arguing that the effect of capital incomes on inequality is low, we are not only overlooking the measurement problem, but we are ignoring other capital income and inequality dynamics that are affecting living standards through indirect channels.

7.2. Limitations

A very large part of the research cited in this thesis has only been released over the past few years. Much of the literature linking capital incomes and inequality has come out since the start of the thesis. This thesis, in particular Chapter 2, represents an initial navigation of a literature that is still very much in movement. This points towards the timeliness of the topic, however, it also means there is still much disagreement among scholars choosing for different approaches and very little efforts relating them to each other.

This thesis has reflected on different measures of total capital income, but so far has empirically contributed to correcting household surveys taking the fiscal sources as benchmark. At present the estimates presented are expected to be lower bounds; given a race to the bottom in capital income taxation and globalisation we expect that less capital income to be observed in the indicators running through different mechanisms we have described. There are more strides to be made augmenting capital income variables to include e.g. capital incomes reported in the corporate sector, extending the analysis to include pensions and self-employment income. In addition, we have taken the household survey as starting point of the analysis but there more information available in the fiscal sources that can be exploited to strengthen the analysis further.

Headline inequality indicators in the UK are constructed using household disposable equivalised income. We have argued that the data limitations surrounding capital incomes

have led to the choice to carry out the UK analysis for gross incomes. There are major limitations in studying the role of capital income in the household disposable equivalized income distribution. At present in the adjusted income series income composition is considered equal among all eligible for the top correction[31]; combined with the knowledge that high capital share individuals are missing from surveys, collapsing the constructed series to the household level will not give an accurate picture of capital incomes in the household distribution. In addition, the UK tax unit is the individual, not allowing one to draw any conclusions about where high capital share individuals are located in the household distribution. The HBAI files are non-transparent, not user friendly and the top income correction is not decomposable (Burkhauser et al. 2018; Corlett 2017). Given this background it is not clear how (accurate) capital incomes are treated in the household disposable equivalised income series. In addition, to make the transition from gross to net income the FRS, the underlying files for the HBAI, assumes a 20% tax rate on net investment incomes. It is not evident that the effective tax rate on capital incomes is 20% and that this is the same across the distribution and per income source. For example, we have highlighted that the recently introduced dividend allowance and the use of ISA's make it possible for individuals to earn more than £5,000 in dividends without paying dividend tax. Since dividends are identified as largest driver of the capital income and inequality dynamics at the top this assumption does not seem reasonable. More research into these limitations is needed to be able to construct a more accurate net investment income variable in household surveys.

The methodological literature harmonizing surveys and fiscal sources has also seen major developments since the start of the thesis. We have actively followed these methodological advances. Given that this thesis is embedded in the UK policy context, we

[31] Equal within cells but not across cells among those eligible for the top income correction.

have chosen to primarily develop methods used in the UK context. In addition, the methodological literature has an overall focus on total income and very little attention has been paid to income decomposition. There are still issues that remain unresolved in this context. To give some examples, the DWP and the proposed extension to the BH method re-calibrate weights which raises population totals, but the implications of this procedure are not clearly discussed in the literature. Another example is the assumption of equal income composition that allows for a preliminary decomposition of the top income correction. As socio-economic researchers advance their methods it would be useful to have discussions with statisticians on how to address specific biases - for example, that in the UK case we have only observed significant underestimation for capital incomes compared to the SPI benchmark, and not for other income sources such as wage and self-employment income. It would be useful to advance dialogue with household survey statisticians on their sampling and weighting process in particular related to income composition and the disproportionate under-coverage of high capital share individuals. Cell-mean replacements increase levels of capital income at the top but reduce income differences between people in the bins. The 'neutral' assumption about the remaining under-counted capital income distribution being spread across the distribution is in effect equalizing.

Many of policy proposals that have been put forward by economic inequality scholars are novel. It is important to add on a cautionary note that in the economy everything rests on trade-offs. It is too early to comment on implicit trade-offs, related to equity and efficiency, that underlie the proposals put forward in this work. Novel policy debates surrounding capital income taxation and redistribution need more time to develop, we do not yet know enough about the drivers and interaction effects between variables, and for the correct design of policies around this framework more research is needed. Taxation policy related to capital incomes is expected to produce distortionary effects on the economy. Ex

ante it is not clear whether such distortions are the same for each capital income subcomponent and across the distribution. We have combined the main policy discussions concerned with the link between capital income and inequality at the time of writing. Making further links is not yet possible given the current state of academic and policy debates.

7.3. Reflection future research

A broader question that opens up is whether the increasing underestimation of capital incomes in surveys is unique to the UK or that this is a part of a more general trend. This is worrisome in particular for cross-country comparative analysis. This thesis has provided evidence as to why the UK capital income narrative put forward by for example the OECD is not correct. In addition, the UK provides a good example of why it is necessary to think more carefully about decomposition of top income corrections to allows for top adjusted factor decomposition. With capital incomes highly concentrated, we can expect such corrections to change the narrative.

This thesis has made advances combining micro sources in the UK following methodologies adopted by influential UK bodies and academics. As the academic community develops better methodologies a more accurate academic series can be constructed drawing upon the materials collected for this thesis, perhaps more econometrically-sophisticated models taking more advantage of distributional properties of the original series along the lines proposed by (Aitken & Weale 2018).

We should further grapple with differences between capital incomes as measured in the national accounts and other sources, and to what extent it is possible to create unique linkages to corporate sector income using the help of e.g. HMRC. We also urgently need more information on the characteristics of high capital share individuals e.g. through fiscal sources, to understand accumulation dynamics and patterns of ownership of the top capital

income earners. Interactions between policies designed to advantage those at the top are of particular interest if the same people benefitting from labour market changes, in the form of increasing top salaries, are disproportionally benefitting from capital markets. We will need collective efforts including academics, statisticians, government, policy makers and even firms operating within the areas of economics and law to help broaden the view that we have, given the strong incentives to keep these flows hidden.

7.4. General public

Approximately 20% of the total population holds amounts of capital income that are defined as substantial in this thesis. This provides a strong indication that capital incomes will not be a relatable concept for most people. At the same time 30% of the total economy is made up of capital incomes. This capital income is directly earned and managed by a small fraction of society through assets held (e.g. shares) and managed (e.g. CEOs, company directors). Globalisation has made the study of capital incomes harder as it has facilitated cross-border capital income flows of both individuals and companies. There is much incentive to keep such flows hidden from tax authorities and new loopholes are found on continuous basis. Even though these income flows are not properly observed within households, or the effect of capital incomes on inequality is washed away in net/disposable income measures, there are many indirect channels through which capital incomes affect households.

Newspaper headlines such as eight men holding half the wealth of half the world, government bank bailouts, increase in bankers' bonuses, and rising CEO/worker pay reach households on a frequent basis. It is not satisfactory if prominent national and international institutions such as the IFS and the OECD continue to argue that the contribution of capital incomes have a limited impact on inequality if (1) there are indicators from other areas of research pointing in the opposite direction, and (2) there are clear links with rising wealth

accumulation that still remain seriously under-investigated and (3) indirect channels through which capital incomes affect living standards are ignored in these discussions. As researchers we will have to learn to communicate more effectively the channels through which capital incomes affect inequality, both directly and indirectly, through creating a narrative that makes capital incomes a less abstract concept for the general public. By bringing together the various windows in a structured way along the lines outlined in this thesis, and with further development in the statistics and methods available, we can construct an improved capital income narrative that is relatable and resonates with the general public.

8. Bibliography

Aaberge R, Atkinson AB, Königs S. 2018. From Classes to Copulas: Wages, Capital and Top Incomes. . (16):295–320

Aaberge R, Atkinson AB, Königs S, Lakner C. 2013a. From Classes to Copulas : Wages, Capital and Top Incomes. *working paper*. 1–16

Aaberge R, Atkinson AB, Modalsli J. 2013b. The Ins and Outs of Top Income Mobility. *IZA Discussion Paper No. 7729*

Acemoglu D, Autor D. 2011. Skills, tasks and technologies: Implications for employment and earnings. In *Handbook of Labor Economics*, Vol. 4, pp. 1043–1171

Adler M, Schmid KD. 2012. Factor Shares and Income Inequality - Empirical Evidence from Germany 2002-2008. *IAW Discussion Papers*. (82):

Aitken A, Weale M. 2017. Imputation of Pension Accruals and Investment Income in Survey Data. . 1–41

Aitken A, Weale M. 2018. Imputation of Pension Accruals and Investment Income in Survey Data. *ESCoE Discussion Paper*. 05:

Alstadsæter A, Jacob M. 2016. Dividend Taxes and Income Shifting. *Scandinavian Journal of Economics*. 118(4):693–717

Alstadsæter A, Jacob M, Kopczuk W, Telle K. 2016. Accounting for Business Income in Measuring Top Income Shares. Integrated accrual approach using individual and firm data from Norway. *Discussion Papers Statistics Norway Research Department*. (837):

Alstadsæter A, Johannesen N, Zucman G. Tax Evasion and Inequality. *American Economic Review*. Forthcomin:

Alstadsæter A, Johannesen N, Zucman G. 2018. Who owns the wealth in tax havens? Macro evidence and implications for global inequality. *Journal of Public Economics*.

162(January):89–100

Alvaredo F. 2010. Top Incomes and Earnings in Portugal, 1936-2005

Alvaredo F. 2011a. A note on the relationship between top income shares and the Gini coefficient. *Economics Letters*. 110(3):274–77

Alvaredo F. 2011b. A note on the relationship between top income shares and the Gini coefficient. *Economics Letters*. 110(3):274–77

Alvaredo F, Atkinson AB, Chancel L, Piketty T, Saez E, Zucman G. 2017. Distributional National Accounts (DINA) Guidelines: Concepts and Methods used in WID.world. *WID.world Working Paper*. (June):

Alvaredo F, Atkinson AB, Morelli S. 2018. Top Wealth Shares in the UK over more than a Century. *Journal of Public Economics*. 162(2018):26–47

Alvaredo F, Atkinson AB, Piketty T, Saez E. 2013. The Top 1 Percent in International and Historical Perspective. *Journal of Economic Perspectives*. 27(3):3–20

Alvaredo F, Pisano E. 2010. Top Incomes in Italy, 1974-2004. In *Top Incomes: A Global Perspective*

Anand S, Segal P. 2015. *The Global Distribution of Income*, Vol. 2. Elsevier B.V. 1st ed.

Anand S, Segal P. 2017. Who Are the Global Top 1%? *World Development*. 95:111–26

Atkinson A. 2012a. Putting people first and macro-economic policy. *Unpublished*. (October):1–23

Atkinson AB. 2007a. The Distribution of Top Incomes in the United Kingdom 1908-2000. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*

Atkinson AB. 2007b. Measuring Top Incomes: Methodological Issues. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*

Atkinson AB. 2009. Factor shares: The principal problem of political economy. *Oxford Review of Economic Policy*. 25(1):3–16

Atkinson AB. 2012b. UK Estimates of Top Income Shares 2009-2010: Revised Note on Methods. *WID.world Technical Note Series No 2012/5*

Atkinson AB, Bourguignon F. 2000. Introduction: Income Distribution and Economics. In *Handbook of Income Distribution*, Vol. 1, pp. 1–58

Atkinson AB, Casarico A, Voitchovsky S. 2015. Top incomes and the Glass Ceiling. . 1–29

Atkinson AB, Casarico A, Voitchovsky S. 2018. Top Incomes and the Gender Divide. *Journal of Economic Inequality*. 16:225–56

Atkinson AB, Jenkins SP. 2017. A different perspective on the evolution of UK income inequality

Atkinson AB, Jenkins SP. 2019. A Different Perspective on the Evolution of UK Income Inequality. *Social Policy Working Paper*. 01–19(LSE Department of Social Policy):

Atkinson AB, Lakner C. 2015. Wages, Capital and Top Incones: The Factor Income Composition of Top Incomes in the USA, 19602015. *Nuffield College Working Paper*. 138

Atkinson AB, Lakner C. 2017. Capital and Labor. The Factor Income Composition of Top Incomes in the United States, 1962-2006. *World Bank Group Policy Research Working Paper*. 8268:

Atkinson AB, Leigh A. 2005. The Distribution of Top Incomes in New Zealand. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*, pp. 333–64

Atkinson AB, Leigh A. 2007. The Distibution of Top Incomes in Australia. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and*

English-Speaking Countries, pp. 309–32

Atkinson AB, Leigh A. 2008. Top incomes in New Zealand 1921-2005: Understanding the Effects of Marginal Tax Rates, Migration Threat, and the Macroeconomy. *Review of Income and Wealth*. 54(2):149–65

Atkinson AB, Ooms TC. 2015. UK Estimates of Top Income Shares 2012-2013: Note on Methods

Atkinson AB, Piketty T. 2007. *Top Incomes over the 20th Century: A Contrast Between Continental European and English-Speaking Countries*

Atkinson AB, Piketty T. 2010. *Top Incomes: A Global Perspective*

Atkinson AB, Søgaard JE. 2013. The Long-Run History of Income Inequality in Denmark: Top Incomes from 1870 to 2010. *Economic Policy Research Institute (EPRU) Working Paper Series*. 1(2013):

Bartels C. 2017. Top incomes in Germany, 1871-2013. *WID.world Working Paper Series 2017/18*

Bartels C, Jenderny K. 2015. The Role of Capital Income for Top Income Shares in Germany. *WID.world Working Paper Series 2015/1*

Belefield C, Blundell R, Cribb J, Hood A, Joyce R. 2017. Two Decades of Income Inequlaity in Britain: the Role of Wages, Household Earnings and Redistribution. *IFS Working Paper*. W17(01):

Bengtsson E, Waldenström D. 2018. Capital Shares and Income inequality : Evidence from the Long Run. *The Journal of Economic History*. 78(3):

Berg A, Buffie EF, Zanna L-F. 2018. Should We Fear the Robot Revolution? (The Correct Answer is Yes). *IMF Working Paper*. (WP/18/116):

Blanchet T, Flores I, Morgan M. 2018. The Weight of the Rich: Improving Surveys with Tax Data. *WID.world Working Paper Series 2018/12*

Boschini A, Gunnarsson K, Roine J. 2017. Women in Top Incomes: Evidence from Sweden 1974 – 2013. *IZA Discussion Paper Series*. (10979):

Bourguignon F. 2018. Simple adjustments of household survey distributions for missing income and missing people Missing income and missing people in income / consumption surveys. . (May):

Brewer M, Wren-Lewis L. 2016. Accounting for Changes in Income Inequality: Decomposition Analyses for the UK, 1978-2008. *Oxford Bulletin of Economics and Statistics*. 78(3):289–322

Browne J, Phillips D. 2017. Updating and critiquing HMRC's analysis of the UK's 50 % top marginal rate of tax. *IFS Working Paper*. W17/12:

Burkhauser R, Hérault N, Jenkins S, Wilkins R. 2017a. Top incomes and inequality in the UK : reconciling estimates from household survey and tax return data. . (September):1–26

Burkhauser R V., Hahn MH, Wilkins R. 2015a. Measuring top incomes using tax record data: a cautionary tale from Australia. *The Journal of Economic Inequality*. 13(2):181–205

Burkhauser R V., Hahn MH, Wilkins R. 2015b. Measuring top incomes using tax record data: a cautionary tale from Australia. *The Journal of Economic Inequality*. 13(2):181–205

Burkhauser R V., Herault N, Jenkins SP, Wilkins R. 2016. (Top End) - What Has Been Happening to UK Income Inequality Since the Mid-1990s? Answers from Reconciled and Combined Household Survey and Tax Return Data. *Nber Working Paper Series*. (9718):58

Burkhauser R V., Hérault N, Jenkins SP, Wilkins R. 2018. Survey Under-Coverage of Top Incomes and Estimation of Inequality: What is the Role of the UK's SPI Adjustment?

Fiscal Studies. 39(2):213–40

Burkhauser R V, Hérault N, Jenkins SP, Wilkins R. 2017b. Survey Under-Coverage of Top Incomes and Estimation of Inequality: What is the Role of the UK's SPI Adjustment?

Canberra Group U. 2011. *Handbook on Household Income Statistics Second Edition 2011*

Cirillo V, Corsi M, D'Ippoliti C. 2017. European Households' Incomes Since the Crisis. *Investigacion Economica*. 76(301):57–85

Corlett A. 2017. Unequal results. . 44(December):

DWP. 2015a. Households Below Average Income (HBAI) Quality and Methodology Information Report – 2014/15. . (Department for Work & Pensions):

DWP. 2015b. *Households Below Average Income. An Analysis of the Income Distribution 1994/5 - 2013/14*

DWP. 2017. Households Below Average Income (HBAI) Quality and Methodology Information Report – 2016/17

Elsby MWL, Hobijn B, Şahin A. 2013. The Decline of the U.S. Labor Share. *Brookings Papers on Economic Activity*. 2:1–63

Fesseau M, Mattonetti ML. 2013. Distributional measures across household groups in a national accounts framework. . (53):

Fesseau M, Wolff F, Mattonetti ML. 2013. A cross-country comparison of household income , consumption and wealth between micro sources and national accounts aggregates. . (52):

Förster M, Llena-Nozal A, Nafilyan V. 2014. Trends in Top Incomes and their Taxation in OECD Countries. *OECD Social, Empoyment and Migration Working Papers*. 159(OECD Publishing):

Francese M, Mulas-Granados C. 2015. Functional Income Distribution and Its Role in

Explaining Inequality. *IMF Working Papers*. WP15/244:

Fräßdorf A, Grabka MM, Schwarze J. 2011. The Impact of Household Capital Income on Income Inequality - a Factor Decomposition Analysis for the UK, Germany and the USA. *Journal of Economic Inequality*. 9:35–56

FRS. 2017. National Centre for Social Research, Office for National Statistics, Social and Vital Statistics Division, Department for Work and Pensions. *Family Resources Survey, 2015-2016*

García-Peñalosa C, Orgiazzi E. 2013. Factor Components of Inequality: A Cross-Country Study. *<halshs-00802825v2>*

Giovannoni O. 2014a. What Do We Know About the Labor Share and the Profit Share? Part II: Empirical Studies

Giovannoni O. 2014b. What do we know about the labour share and the profit share? Part III: Measures and structural factors

Glyn A. 2012. Functional Distribution and Inequality. In *The Oxford Handbook of Economic Inequality*

Goldin C, Katz LF. 2008. *The Race Between Education and Technology*

Gollin D. 2002. Getting Income Shares Right. *Journal of Political Economy*. 110(2):458–74

Goos M, Manning A, Salomons A. 2009. Job polarization in Europe. *American Economic Review*. 99(2):58–63

Green R, García-Peñalosa C, Orgiazzi E. 2008. Factor Components of Inequality: Cross-Country Differences and Time Changes. *Luxembourg Income Study Working Paper Series*. 503:

Hall BJ, Murphy KJ. 2003. The Trouble with Stock Options. *Journal of Economic Perspectives*. 17(3):49–70

Hills J, Bastagli F, Cowell F, Glennerster H, Karagiannaki E, Mcknight A. 2013. *Wealth In the UK: Distribution, Accumulation and Policy*. Oxford University Press

HMRC. 2017. KAI Data. *Policy and Coordination*

HMRC. 2018a. Individual Savings Account (ISA) Statistics

HMRC. 2018b. Capital Gains Tax (CGT) Statistics

HMRC. 2018c. *Rates of Capital Gains Tax*. Table A.1. https://www.gov.uk/government/statistics/rates-of-capital-gains-tax-statistics

HMRC. 2018d. Statistics on Non-Domiciled Taxpayers in the UK 2007-08 to 2016-17

Iacono R, Ranaldi M. 2018. Sources of Inequality in Italy. *ECINEQ Working Paper Series*. 479:

Jacob M, Jacob M. 2013. Taxation, Dividends, and Share Repurchases: Taking Evidence Global. *Journal of Financial and Quantitative Analysis*. 48(4):1241–69

Jacob M, Michaely R, Alstadsæter A. Taxation and Dividend Policy: The Muting Effect of Diverse Ownership Structure. *Review of Financial Studies, Forthcoming*

Jäntti M. 2003. Inequality in Five Countries in the 1980s: The Role of Demographic Shifts, Markets and Government Policies. *Economica*. 64(255):415–40

Jäntti M, Riihelä M, Sullström R, Tuomala M. 2010. Trends in Top Income Shares in Finland. In *Top Incomes: A Global Perspective*, pp. 371–447

Jenkins SP. 1995. Accounting for Inequality Trends : Decomposition Analyses for the UK , 1971- 86. . 62(245):29–63

Jenkins SP. 2000. Trends in the UK Income Distribution. In *The Personal Distribution of Income in an International Perspective*, pp. 129–57

Jenkins SP. 2017. Pareto Models, Top Incomes and Recent Trends in UK Income Inequality. *Economica*. 84(334):261–89

Kaldor N. 1961. Capital Accumulation and Economic Growth. *The Theory of Capital*.

Palgrave M:177–222

Karabarbounis L, Neiman B. 2014. The global decline of the labor share. *Quarterly Journal of Economics*. 129(1):61–103

Kent K. 2017. National Accounts Articles: Detailed Assessment of Changes to Sector and Financial Accounts, 1997 to 2015. *Office for National Statistics*

Lakner C, Milanovic B. 2013. Global Income Distribution: From the Fall of the Berlin Wal to the Great Recession. . (6719):

Lakner C, Milanovic B. 2015. Global income distribution: from the fall of the Berlin Wall to the Great Recession. *World Bank Economic Review*. (August):1–50

Lerman RI, Yitzhaki S. 1985. Income Inequality Effects by Income Source: A New Approach and Applications to the United States. *The Review of Economics and Statistics*. 67(1):151–56

LINKGroup AS. 2018. UK Dividend Monitor

Lundberg J, Waldenström D. 2018. Wealth Inequality in Sweden: What can we Learn from Capitalized Income Tax Data? *Review of Income and Wealth*

Lustig N. 2018. The Missing Rich in Household Surveys: Causes and Correction Methods. *CEQ Working Paper 75*. (Commitment to Equity (CEQ) Institute, Tulane University):

Milanovic B. 2017. Increasing capital income share and its effect on personal inequality. In *After Piketty*, eds. H Bouchey, B DeLong, M Steinbaum. Harvard UP

Miller H, Pope T. 2015. Corporate Tax Changes under the UK Coalition Government (2010-15). *Fiscal Studies*. 36(3):327–47

Morelli S, Smeeding T, Thompson J. 2015. Post-1970 Trends in Within-Country Inequality and Poverty: Rich and Middle-Income Countries. In *Handbook of Income Distribution*, Vol. 2, pp. 593–696. Elsevier B.V. 1st ed.

Nanda S, Parkes H. 2019. Just Tax Reforming the Taxation of Income from Wealth and

Work. . (September):

Nolan B. 2007. Long-Term Trends in Top Income Shares in Ireland. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*, pp. 501–30

Nolan B, Salverda W, Checchi D, Marx I, McKnight A, et al. 2014. *Changing Inequalities & Societal Impacts in Rich Countries: Thirty Countries' Experiences*

OBR. 2016. *Economic and Fiscal Outlook*

OBR. 2017. Economic and Fiscal Outlook. *Office for Budget Responsibility*. (March):

OECD. 2008. Growing Unequal?: Income Distribution and Poverty in OECD countries. *OECD Publishing, Paris*

OECD. 2011. Divided We Stand: Why Inequality Keeps Rising. *OECD Publishing, Paris*

OECD. 2015. In It Together: Why Less Inequality Benefits All. *OECD Publishing, Paris*

Piketty T. 2003. Income Inequality in France, 1901–1998. *Journal of Political Economy*. 111(5):1004–42

Piketty T. 2007. Income, Wage and Wealth Inequality in France 1901-98. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*, pp. 43–81

Piketty T. 2014. *Capital in the 21st Century*

Piketty T, Saez E. 2007a. Income and Wage Inequality in the United States, 1913-2002. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*, pp. 141–225

Piketty T, Saez E. 2007b. Income and Wage Inequlaity in the United States, 1913-2002

Piketty T, Saez E, Stantcheva S. 2014. Optimal taxation of top labor incomes: A tale of three elasticities. *American Economic Journal: Economic Policy*. 6(1):230–71

Piketty T, Saez E, Zucman G. 2019. Simplified Distributional National Accounts.

WID.world Working Paper Series 2019/1

Piketty T, Zucman G. 2014. Capital is back: Wealth-income ratios in rich countries 1700-2010. *Quarterly Journal of Economics*. 129(3):

Pope T, Waters T. 2016. A Survey of the UK Tax System. *IFS Briefing Note BN09*

Ranaldi M. 2018. Income-Factor Polarization A Methodological Approach. *Working Paper*. 1–11

Ranaldi M. 2019. Income Composition Inequality. *Working Paper*

Rhodes C. 2019. Financial services: contribution to the UK economy. *Briefing Paper House of Commons Library*. (6193):

Rodriguez F, Jayadev A. 2013. The Declining Labor Share of Income. *Journal of Globalization and Development*. 3(2):1–18

Roine J, Waldenström D. 2010. Top Incomes in Sweden over the Twentieth Century. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*, pp. 299–370

Roine J, Waldenström D. 2012. On the role of capital gains in swedish income inequality. *Review of Income and Wealth*. 58(3):569–87

Ruiz N, Woloszko N. 2016. What do Household Surveys suggest about the Top 1 % Incomes and Inequality in OECD Countries ? *OECD Economics Department Working Papers*. No 1265:

Saez E. 2012. Striking it Richer: The Evolution of Top Incomes in the United States Updated with 2009 and 2010 estimates

Saez E. 2015a. Strikng it Richer: The Evolution of Top Incomes in the United States (Updated with 2014 preliminary estimates). *WID.world Technical Note Series No 2015/6*

Saez E. 2015b. Striking it Richer: The Evolution of Top Incomes in the United States

(Updated with 2014 preliminary estimates). . 6:

Saez E. 2017. Taxing the Rich More: Preliminary Evidence from the 2013 Tax Increase. *Tax Policy and the Economy*. 31:71–120

Salverda W, Atkinson AB. 2007. Top Incomes in the Netherlands over the Twentieth Century. In *Top Incomes over the Twentieth Century. A Contrast Between Continental European and English-Speaking Countries*, pp. 426–71

Salverda W, Nolan B, Checchi D, Marx I, Mcknight A, et al. 2014. *Changing Inequalities in Rich Countries: Analytical and Comparative Perspectives*

Schlenker E, Schmid KD. 2015. Capital Income Shares and Income Inequality in 16 EU Member Countries. *Empirica*. 42(2):241–68

Schröder C, Bartels C, Grabka MM, Kroh M, Siegers R. 2018. A Novel Sampling Strategy for Surveying High-Worth Individuals – An Application Using the Socio-Economic Panel

Seely BA. 2015. Income Tax: The Additional 50p Rate. *House of Commons Library, Briefing Paper*. (00249):

Shine M, Webber D. 2019. Using tax data to better capture top earners in household income inequality statistics. . (February):1–15

Short N. 2017. Mergers and Acquisitions and Top Income Shares

Smith K. 2018. How do Small Business Owners Respond to the Tax System ? *IFS Presentation*

SNA. 2008. System of National Accounts. *United Nations, New York*. 1–722

Stiglitz JE. 2015. New Theoretical Prespective on the Distribution of Income and Wealth Among Individuals: Part I. The Wealth Residual. *NBER Working Paper No. 21189*

Tomlinson D, Corlett A. 2017. A Tough Gig? The Naure of Self-Employment in the 21st Century Britain and Policy Implications. *Resolution Foundation*. (February):

UK Data Archive. 2012. Survey of Personal Incomes Public Use Tape Documentation 2009-10. . (7160):2009–10

Van Kerm P. 2009. sgini - Generalized Gini and Concentration Coefficients (with Factor Decomposition) in Stata. *CEPS/INSTEAD*. v1.1((revised February 2010) Differdange, Luxembourg):

Vassilev G, Walker C, Darke V. 2017. National Accounts Articles: Improving the Household, Private Non-Financial Corporations and Non-Profits Institutions Serving Households Sectors' Non-Financial Accounts. *Office for National Statistics Article*. 19 April:

Waldenström D. 2017. Inequality and the Super Rich. *Journal of Income Distribution*. (July):1–23

Zucman G. 2014. Taxing across Borders: Tracking Personal Wealth and Corporate Profits. *The Journal of Economic Perspectives*. 28(4):121–48

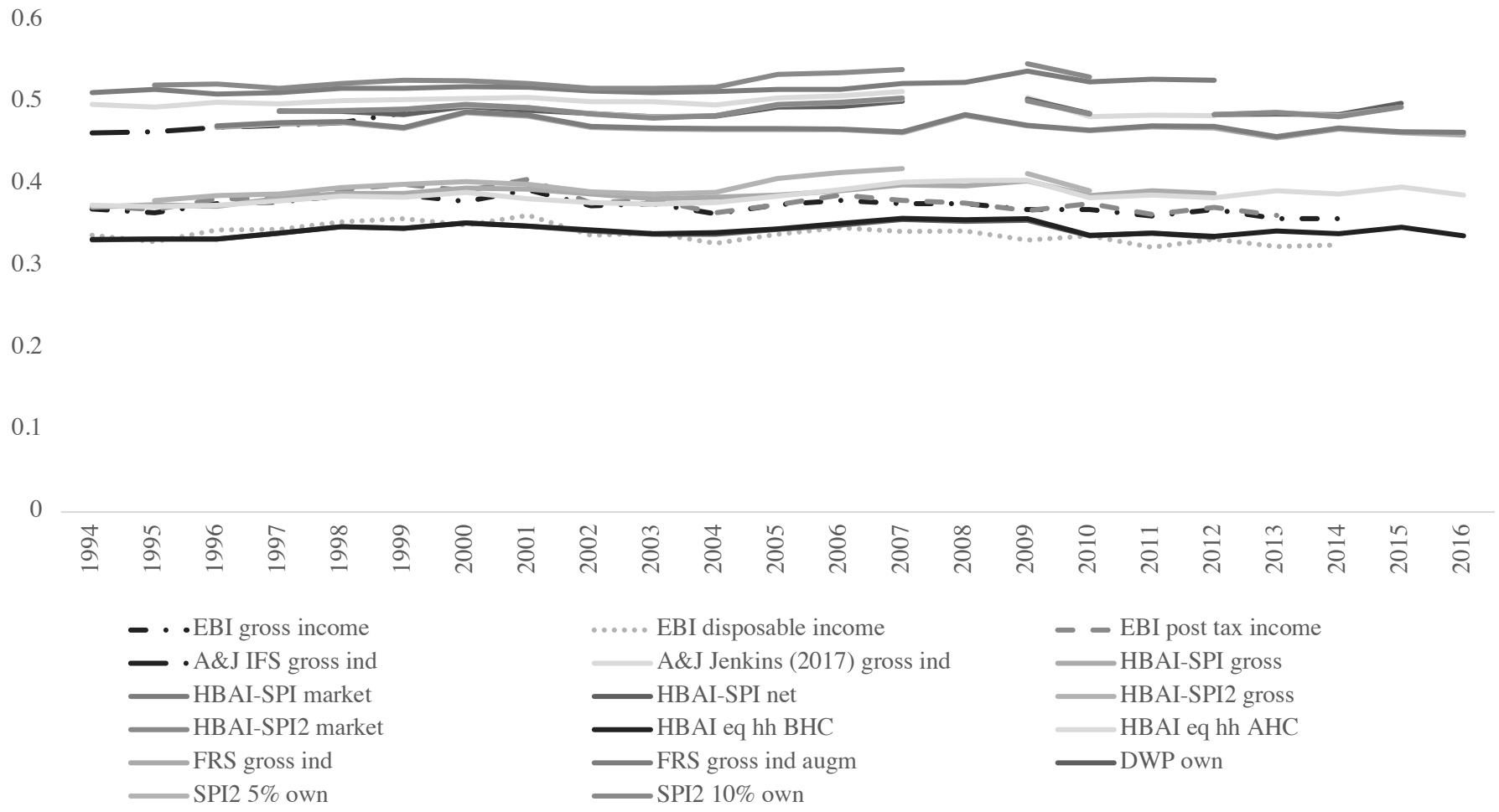
Zucman G. 2015. The Hidden Wealth of Nations. *The University of Chicago Press*

Zwijnenburg J. 2017. Unequal distributions? *OECD Statistics Directorate*. (August):1–37

Zwijnenburg J, Bournot S, Giovannelli F. 2016. OECD Expert Group on the Disparities in a National Accounts Framework - Results from the 2015 Exercise. . (2016):

9. Appendices

Appendix I: Gini coefficients in the UK



Legend	Source	Database	Income Definition	Period	Top Correction
EBI gross income	ONS-EBI	Living Cost and Food Survey	Household Equivalized Gross Income	1977-2014	No
EBI disposable income	ONS-EBI	Living Cost and Food Survey	Household Equivalized Disposable Income	1977-2014	No
EBI post tax income	ONS-EBI	Living Cost and Food Survey	Household Equivalized Post-Tax Income	1977-2013	No
A&J IFS gross ind	Atkinson & Jenkins (2019)	IFS	Individual Gross Income	1962-1999	Yes
A&J Jenkins (2017) gross ind	Atkinson & Jenkins (2019)	Jenkins (2017) using the FRS	Individual Gross Income	1994-2012	Yes
HBAI-SPI gross	Burkhauser et al (2016)	HBAI & SPI	Gross Income. Individual unit of analysis & household income equivalised using modified OECD scale	1994-2012	Yes
HBAI-SPI market	Burkhauser et al (2016)	HBAI & SPI	Market Income. Individual unit of analysis & household income equivalised using modified OECD scale	1994-2012	Yes
HBAI-SPI net	Burkhauser et al (2016)	HBAI & SPI	Net Income. Individual unit of analysis & household income equivalised using modified OECD scale	1994-2012	Yes
HBAI-BH gross	Burkhauser et al (2016)	HBAI & SPI	Individual unit of analysis & household income equivalised using modified OECD scale	1995-2010	Yes

Legend	Source	Database	Income Definition	Period	Top Correction
HBAI-BH market	Burkhauser et al (2016)	HBAI & SPI	Individual unit of analysis & household income equivalised using modified OECD scale	1995-2010	Yes
HBAI eq hh BHC	IFS	FES and FRS	Equivalised household disposable income [Before Housing Costs]	1962-2016	No
HBAI eq hh AHC	IFS	FES and FRS	Equivalised household disposable income [After Housing Costs]	1962-2016	No
FRS gross ind	FRS (own calculation)	FRS and SPI	Individual gross income	1997-2015	No
FRS gross ind augm	FRS (own calculation)	FRS and SPI	Individual gross income	1997-2015	No
DWP own	Replication DWP method	FRS and SPI	Individual gross income	1997-2015	Yes
BH 5% own	Replication BH method	FRS and SPI	Individual gross income	1997-2015	Yes
BH 10% own	Replication BH method	FRS and SPI	Individual gross income	1997-2015	Yes

Appendix II: Discussion methodological advances in the academic literature and their decomposability

At present there is a trade-off between accuracy and timely release of statistics for policy purposes (Corlett 2017). In line with the objectives of the thesis we have chosen to apply the methods adopted in the UK. Nevertheless, recent methodological advances in the academic literature could be used to inform and improve the DWP and BH series moving forward. We will first discuss some general implications we encountered when replicating the harmonisation methods described for the DWP and BH series, followed by implications related to decomposability. Some of the issues raised in the latter part strongly relate to findings presented in Chapter 4.

Implications DWP and BH series

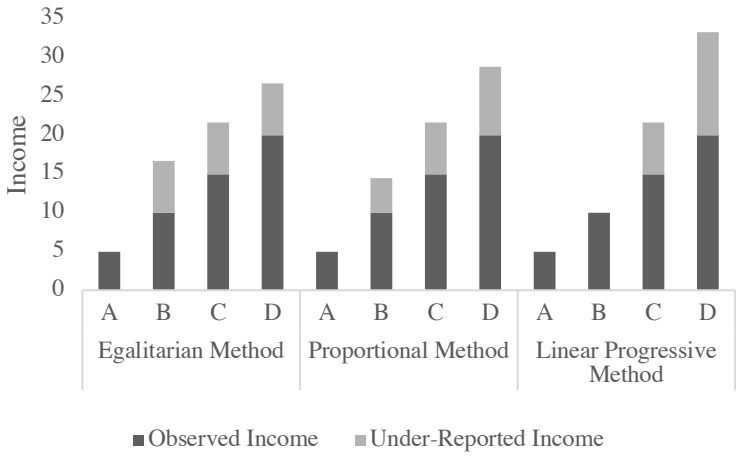
More are techniques have been developed that correct for income (φ) than for weights (ω). A finding, which has been receiving more attention in the academic literature, is that if weights at the top of the distribution are re-calibrated the population total increases, this would require an adjustment further down the distribution to counteract this increase and keep population totals constant (Blanchet et al. 2018; Bourguignon 2018). Apart from the original papers these techniques have not yet been applied widely, the implications will become clearer as the harmonisation debates progress. In the current analysis we are interested in an income sub-component (capital incomes) the implications become even less clear cut. For the UK we have seen that the DWP method used both income cell-mean replacement and re-calibration of weights, with the largest effect of the correction taking place through the weights. The authors of the BH method (Burkhauser et al. 2017a) find that

effect of the adjustment is roughly similar for weights (ω) and income (φ), they choose the income cell-replacement rather than the re-weighing technique. In both cases, how this affects population totals or aggregate income is not thoroughly discussed.

Decomposability

The majority of the methods that have been proposed that correct for income (φ) adopt Pareto techniques. The main implication that arises is that the eligibility threshold (α) is set for total income. Assuming equal income compositions among the groups eligible for the top correction we are able to decompose cell-mean replacements, this decomposition is less straightforward using Pareto techniques. The methodology that would allow for the most straightforward decomposition at the time of writing are the methods proposed by Anand & Segal (2015, 2017) and Bourguignon (2018).

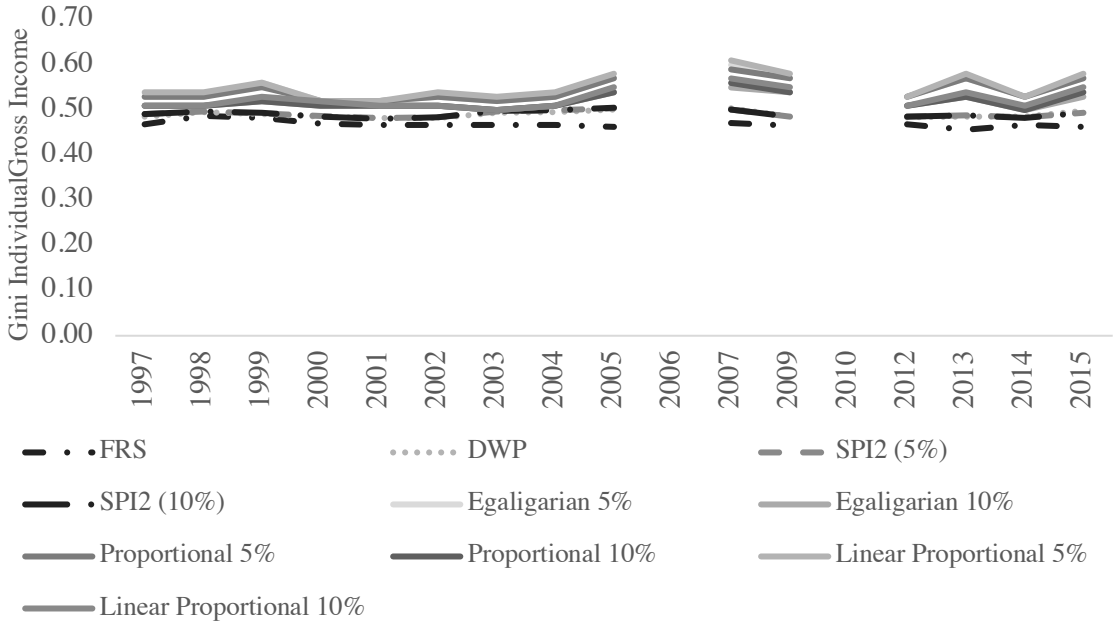
The main set of methods correcting for income (φ) which would allow for decomposability are proposed by Bourguignon (2018): egalitarian, proportional and linear progressive. The Bourguignon methods allocate the difference in total income (μ) observed between the household survey and benchmark source. Given the structure of our data we expect μ to be decomposable. A visualisation is given below:



Note: the individuals or group that would fall within (A) fall below the eligibility threshold.

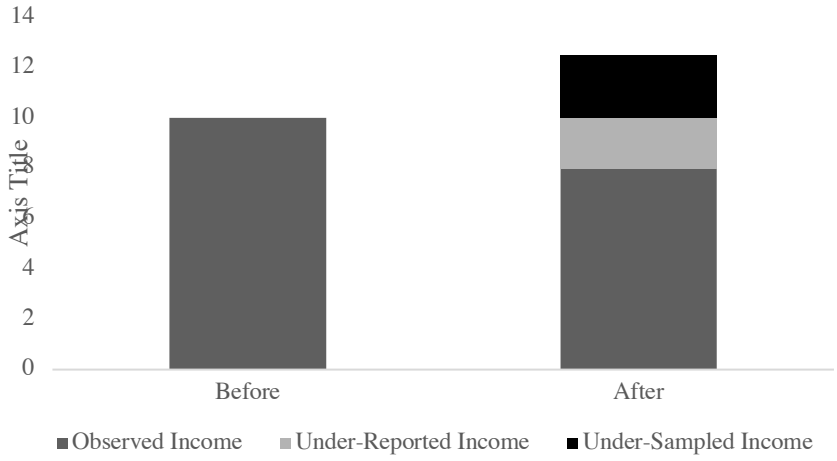
In each method a correction factor is calculated according to different distributional criteria. In the egalitarian method the income gap (μ) is allocated equally to all individuals above α. In the proportional method the income allocated increases with income, this form is most widely applied in the harmonisation literature (Bourguignon 2018). In the linear progressive method, the allocated income also increases with income, but this grows the further removed from α, with the first person eligible for the correction not receiving a correction. In Chapter 4, Figure 12, we find that in some cases income as measured in the survey than in the fiscal source. This issue does not arise in the original paper where national accounts total are used. In addition, we find that the linear progressive method is not decomposable in the current context.

We have recalculated the three series for total income to be able to compare them to the DWP and BH methods. One practical conclusion that we are able to draw is that the all BG methods result in higher inequality levels than the BH methods (income mean cell replacement, see below. If policy makers decide to adopt BG techniques rather than the DWP and BH methods this would have an upward effect on the Gini coefficient.

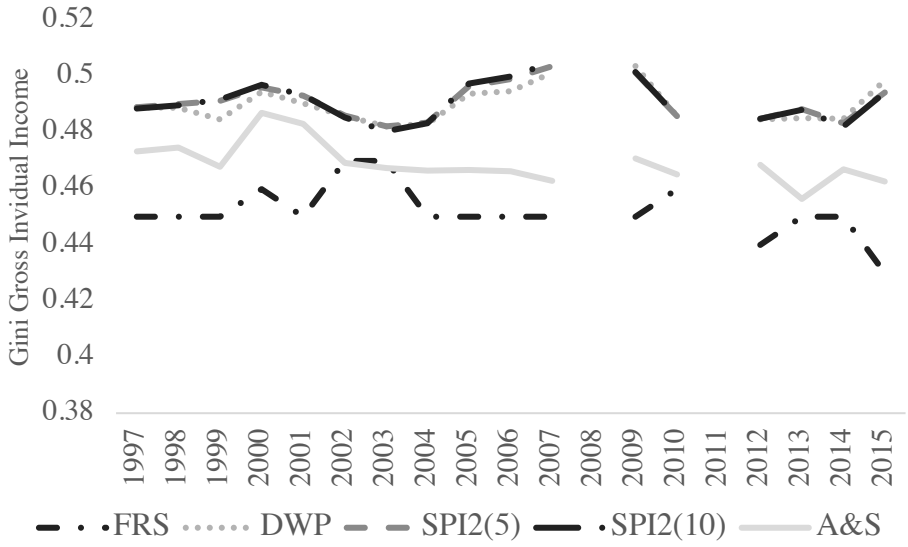


Source: Author's estimates from FRS and SPI data

The second method which is decomposable, given the structure of the UK data, is the method proposed by Anand & Segal (2015, 2017). The intuition behind this method is that it is an under-sampling adjustment (an extreme form) without assuming under-reporting. The method does assume that the top 1% is not sampled in the household survey overall. The weight calibration differs from the DWP and BH methods and the method presented in this thesis, where the weights of those eligible for the top income correction are scaled up. To maintain constant population totals constant the survey weights are re-calibrated to equal 99% of the total population, the top 1%, and their income, is subsequently appended from the tax data. A visualisation is given below, note that the purpose of the bars is to indicate that the correction takes place both through income and weights, and is not indicative of the relative size of the correction.



We show how the A&S method performs, correcting for the top 1%, compared to the DWP and BH adjustments. It should be noted that this correction has so far been applied in the study of global inequality, which suffers more data limitations that the micro data available for the present analysis. We find that the A&S method does not pick up the surges in top incomes that are picked up by the DWP and BH methods. This is not surprising given that in the DWP method most of the correction runs through the weighting process, and in the BH method the adjustment runs much further down the distribution.



Source: Author's estimates from FRS and SPI data

Nevertheless, this approach has interesting features for the current research that could be explored further, related in particular to findings in Chapter 4 and Section 5.3. It would be interesting to explore further the possibility of hybrid methods such as a combination of the BH adjustments and appending the top of the SPI, along the lines of Anand & Segal (2015, 2017). As this approach allows to import the characteristics of the people driving the capital income and inequality dynamics at the top. As we show in Chapter 4, these individual characteristics are missing from the household survey which is problematic.

Appendix III: Development capital incomes and inequality long-run perspective in the United Kingdom

Time Period	Reference	Trend
1900s-1960s	Alvaredo et al. (2018); Atkinson (2007a)	In 1911 and 1921, 72.3% and 71.3% of the super tax was in the form of investment income, respectively. Importance of capital income high and stable over time. From 1937 compositional shifts are observed but investment income remains highly concentrated. Contributing to 40% to the top 10%, but 70% to the very top. Between 1954-55 and 1979-80 the share of investment income held by the top 1% halved, as well as the top 1% in wealth. Recovery of top incomes since 1979. This is consistent with patterns observed across countries after the Second World War. From the mid-1960s income from employment has started to be the more dominant income source for the top 1% share in total gross income.
1970s	Atkinson (2007a); Jenkins (2000)	During the 1970s fiscal sources start to pick up the turning point in which earnings are becoming more important at the top of the distribution, but overall the top shares are declining over this period. Surveys report an increase in the role of capital incomes (mainly though pensions and investment and savings. It appears that in the 1970s the role of capital income became stronger among middle/higher incomes and lower among the very top. Capital incomes contributed to a 4-percentage rise in overall inequality, as measured by the Squared Coefficient of Variation, between 1973 and 1993 (from 7% to 11%), findings are based on IFS/HBAI and BHSP/HBAI data.
1980s	Atkinson (2007a); Jäntti (2003); Jenkins	Studies using household survey and fiscal data both observe an increased contribution of capital incomes to inequality indicators during the 1980s. Fiscal sources pick up surges in overall top

	(2000); Piketty & Zucman (2014a); Alvaredo et al. (2018)	shares, the overall importance of employment income rises in total income, but within the top 1% surges in investment income are also observed. Interest rate increases at the beginning of the 1980s and 1990s have contributed to importance capital incomes on inequality. Privatisation in the 1980s has led to the increase of wealth/national income ratios. Observed increases in wealth concentration from the 1980s onwards.
1990s	Alvaredo et al. (2018); Atkinson (2007a); Belefield et al. (2017); Brewer & Wren-Lewis (2016); OECD (2008); Piketty & Zucman (2014a)	Continued rise interest rates paired with increasing dividend and share prices, contribution capital incomes to inequality at 11% in 1993 (up from 7% in 1973). From mid 1990s onwards it has generally been concluded that capital income has reduced inequality in the UK. Unearned income has had very little impact on inequality among working households over the period 1997-2004. Fiscal evidence shows that in 1995/96 the share of top 1% in investment income is increasingly higher than the share of wealth. In 1990 the UK tax unit is changed from the household to the individual level affecting the conclusions we are able to draw at the household level. Continued surges in the wealth/national income ratio are observed.
2000-2007	Alvaredo et al. (2018); Belefield et al. (2017); Brewer & Wren-Lewis (2016); Miller & Pope (2015); OECD (2008); Pope & Waters (2016);	Evidence based on household surveys continues to find that capital incomes has reduced inequality in the UK, roughly until mid-2000s. Fiscal sources find a strong upward trend in investment income going towards the top of the distribution from the year 2009 onwards. During this period there has been a set of tax reforms making it easier for self-employed to incorporate and accrue pay in the form of dividends. In 2006 tax change allowed for the incorporation of single owner firms. Since 2009 foreign dividends are tax exempt form UK corporation tax, allowing individuals to remit offshore income to the UK without being taxed. Begin 2000s the

	Piketty & Zucman (2014a)	UK wealth/income ratio shows a decrease with a subsequent recovery mid-2000s. Large increases in the share of investment income to the top 1%.
2008-onwards	Aitken & Weale (2018); Alvaredo et al. (2018); thesis results	Researchers impute for underreporting of capital incomes in surveys and observe an increase in the Gini coefficient. Imputations for pensions raises overall inequality further but the effect is more pronounced for investment income. Interest rates have fallen to zero, affecting mainly those lower down the capital income distribution. On the contrary dividends have reported record heights post-crisis. Post-crisis we also observe increases in the wealth/income ratio.